

SENSIBLE TAX POLICIES IN OPEN ECONOMIES

James R. Hines, Jr.
University of Michigan and NBER

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Abstract: This paper evaluates the design and the desirability of business taxes in small open economies, in light of evidence of the impact of taxation on the activities of multinational firms. The high degree of international capital mobility implies that small countries benefit by reducing their tax rates below the rates of other countries with whom they compete, possibly to the point of eliminating any taxes on inbound investment. Countries likewise have incentives not to tax the foreign incomes of resident companies. Host countries that are tempted to use their tax systems to subsidize and thereby encourage local employment, net exports, research, or other activities of foreign investors may do so effectively, but greater targeted activity of this kind typically comes at significant cost to the local economy. Particular attention is paid to the experience of low rates of Irish taxation.

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1. INTRODUCTION

Economic openness contributes to the average performance of a country's economy, but brings with it exposure to the fluctuations of world economic conditions and an absence of self-sufficiency that political systems can find troubling. Economic openness constrains domestic economic policies by greatly increasing the costs of policies that are inefficient when a country faces global economic competition. This is particularly evident in the case of tax policy, which is the focus of this paper.

Small open economies that impose anything higher than negligible tax rates on the returns earned by foreign investors do so at their peril. The reason is that the cost of such taxation is borne by local residents in the form of lower real incomes. Taxation affects real returns and thereby distorts economic decisions, imposing efficiency costs that are likewise borne by local factors of production. While much of this effect is insidious, taking the form of wage rates or property values that are imperceptibly lower as a result of reduced productivity in the economy, the costs are nonetheless real and are the direct consequence of attempts to tax the return to investment by foreigners.

Facing such environments, countries have incentives not to attempt to tax the incomes earned by businesses within their borders. Since governments have to be financed, tax revenue must come from other sources, including personal income taxes, value added taxes, sales taxes, property taxes, excise taxes, and many others. Political systems have difficulty implementing such recommendations, since it is tempting to tax the return to business investments on fairness or distributional grounds, but the premise of such an effort is flawed, in that the cost of business taxation is in fact not paid by businesses, but instead by local factors of production. Hence a government facing the choice between using taxes on labour income or taxes on business returns, and with the sole desire of advancing the welfare of local labourers, pursues its objectives best by reducing taxes on businesses and replacing them with taxes on labour.

The argument that governments enhance the welfare of their citizens by reducing taxes on returns earned by foreign investors dates to Diamond and Mirrlees (1971), though it is generally underappreciated and widely mischaracterized. The premise of the argument is that business capital is highly mobile between countries in response to differences in after-tax rates of return. The thrust of research findings over the last fifteen years is strongly supportive of the validity of this premise, since there is considerable evidence of capital mobility triggered by tax rate differences.

An open economy that taxes foreign direct investment at moderate rates that are comparable to those of its neighbours should find lower tax rates to be attractive for at least two reasons. The first is sketched above: that reducing the taxation of foreign-owned businesses will increase the return to labour and other local factors by more than the tax revenue foregone, even if taxes must be imposed on labour and other factors in order to make up for the lost business tax revenue. The second reason to reduce taxes on foreigners is that, in doing so, countries reduce the incentives of multinational firms to reallocate taxable profits away from their own taxing jurisdiction; at sufficiently low tax rates, firms have incentives to shift taxable profits into their countries.

A similar logic applies to the taxation of foreign income earned by domestic firms. In a competitive world economy, attempts to tax foreign income reduce the efficiency of capital allocation and thereby reduce the productivity of the economy, depressing real wages and property values. Countries typically maximize their incomes simply by exempting foreign income from domestic taxation.

One interesting question is why more countries have not discovered the benefits of reducing taxes on foreign investors. Part of the answer is that several have, though these tend to be countries with small economies. Within the European Union, Ireland is an outlier both in its low tax rate and in the volume of foreign direct investment that it attracts. Doubtless there are many reasons why Ireland attracts the level of foreign investment that it does, but it is certain that included among these is the favourable tax climate that it offers.

The first part of section two of the paper reviews the taxation of international income, paying particular attention to the taxation of foreign income by the United States. There are three reasons for this emphasis: first, the United States is the world's largest capital exporter; second, the United States is a particularly important source of foreign investment in Ireland; and third, most of the available evidence of the impact of tax systems on foreign investment comes from analyzing data on American business operations around the world. Hence it is valuable to understand the mechanisms used by the United States to tax foreign incomes.

Section two follows by reviewing the available evidence of the impact of taxation on foreign direct investment and the behaviour of multinational firms. This evidence indicates the sizable impact of taxation on the level and location of foreign direct investment, the financing of investment and profit repatriation, the location of taxable income, and the operations of multinational firms. It does not follow from the consistent evidence of the impact of taxation that non-tax factors are unimportant to the level and character of the activities of multinational firms, but what does follow is that tax policy has the potential to make important differences.

Section three considers the implications of economic theory and the available evidence of the behaviour of multinational firms for sensible tax policies in open economies. Section four looks at the determinants of statutory corporate tax rates in a large sample of countries, noting that Ireland's low rate is unusually low even controlling for its income and population level, and particularly controlling for its European location. The level of American foreign direct investment in Ireland is particularly high, again controlling for income, population, and even for the low tax rates that Ireland offers. Section five is the conclusion.

2. TAX SYSTEMS AND THEIR IMPACT¹

The analysis of sensible taxation in open economies is usefully framed within an analysis of how existing rules influence firm behaviour. This section reviews the rules facing American firms and then considers the evidence on the effect of these rules on investment and tax avoidance activities. It concludes with a review of recent research that employs confidential affiliate-level data to identify tax effects using only within-firm variation.

2.1 International tax practice

The taxation of international transactions differs from the taxation of domestic economic activity primarily due to the complications that stem from the taxation of the same income by multiple governments. In the absence of double tax relief, the implications of multiple taxation are potentially quite severe, since national tax rates are high enough to eliminate, or at least greatly discourage, most international business activity if applied two or more times to the same income.

2.1.1 The foreign tax credit

Almost all countries tax income generated by economic activity that takes place within their borders. In addition, many countries – including the United States – tax the foreign incomes of their residents. In order to prevent double taxation of the foreign income of Americans, U.S. law permits taxpayers to claim foreign tax credits for income taxes (and related taxes) paid to foreign governments.² These foreign tax credits are used to offset U.S. tax liabilities that would otherwise be due on foreign-source income. The U.S. corporate tax rate is currently 35 percent, so an American corporation that earns \$100 in a foreign country with a 10 percent tax rate pays taxes of \$10 to the foreign government and \$25 to the U.S. government, since its U.S. corporate tax liability of \$35 (35 percent of \$100) is reduced to \$25 by the foreign tax credit of \$10.

2.1.2 Tax deferral

Americans are permitted to defer any U.S. tax liabilities on certain unrepatriated foreign profits until they receive such profits in the form of dividends.³ This deferral is available only on the active business profits of American-owned foreign affiliates that are separately incorporated as subsidiaries in foreign countries. The profits of unincorporated foreign businesses, such as those of American-owned branch banks in other countries, are taxed immediately by the United States.

To illustrate deferral, consider the case of a subsidiary of an American company that earns \$500 in a foreign country with a 20 percent tax rate. This subsidiary pays taxes of \$100 to the foreign country (20 percent of \$500), and might remit \$100 in dividends to its parent U.S. company, using the remaining \$300 (\$500 - \$100 of taxes - \$100 of dividends) to reinvest in its own, foreign, operations. The American parent firm must then pay U.S. taxes on the \$100 of dividends it receives (and is eligible to claim a foreign tax credit for the foreign income taxes its subsidiary paid on the \$100).⁴ But the American firm is not required to pay U.S. taxes on any part of the \$300 that the subsidiary earns abroad and does not remit to its parent company. If, however, the subsidiary were to pay a dividend of \$300 the following year, the firm would then be required to pay U.S. tax (after proper allowance for foreign tax credits) on that amount.

U.S. tax law contains provisions designed to prevent American firms from delaying the repatriation of lightly-taxed foreign earnings. These tax provisions apply to controlled foreign corporations, which are foreign corporations owned at least 50 percent by American individuals or corporations who hold stakes of at least 10 percent each. Under the Subpart F provisions of U.S. law, some foreign income of controlled foreign corporations is “deemed distributed,” and therefore immediately taxable by the United States, even if not repatriated as dividend payments to American parent firms.⁵

2.1.3 Excess foreign tax credits

Since the foreign tax credit is intended to alleviate international double taxation, and not to reduce U.S. tax liabilities on profits earned *within* the United States, the foreign tax credit is limited to U.S. tax liability on foreign-source income. For example, an American firm with \$200 of foreign income that faces a U.S. tax rate of 35 percent has a foreign tax credit limit of \$70 (35 percent of \$200). If the firm pays foreign income taxes of less than \$70, then the firm would be entitled to claim foreign tax credits for all of its foreign taxes paid. If, however, the firm pays \$90 of foreign taxes, then it would be permitted to claim no more than \$70 of foreign tax credits.

Taxpayers whose foreign tax payments exceed the foreign tax credit limit are said to have “excess foreign tax credits;” the excess foreign tax credits represent the portion of their foreign tax payments that exceed the U.S. tax liabilities generated by their foreign incomes. Taxpayers whose foreign tax payments are smaller than their foreign tax credit limits are said to have “deficit foreign tax credits.” American law permits taxpayers to use excess foreign tax credits in one year to reduce their U.S. tax obligations on foreign source income in either of the two previous years or in any of the following five years.

In practice, the calculation of the foreign tax credit limit entails certain additional complications, notable among which is that total worldwide foreign income is used to calculate the foreign tax credit limit. This method of calculating the foreign tax credit limit is known as “worldwide averaging.” A taxpayer has excess foreign tax credits if the sum of worldwide foreign income tax payments exceeds this limit.

2.2 Taxation and FDI

Tax policies are obviously capable of affecting the volume and location of FDI,⁶ since, all other considerations equal, higher tax rates reduce after-tax returns, thereby reducing incentives to commit investment funds. Of course, all other considerations are seldom equal. Countries differ not only in their tax policies, but also in their commercial and regulatory policies, the characteristics of their labour markets, the nature of competition in product markets, the cost and local availability of intermediate supplies, proximity to final markets, and a host of other attributes that influence the desirability of an investment location. Furthermore, the various tax and regulatory policies that are relevant to foreign investors may be correlated with non-tax features of economies that independently affect FDI levels. Consequently, it is necessary to interpret evidence of the effect of taxation with considerable caution.

The empirical literature on the effect of taxes on FDI considers almost exclusively U.S. data, either the distribution of U.S. direct investment abroad, or the FDI

patterns of foreigners who invest in the United States.⁷ The simple explanation for this focus is not only that the United States is the world's largest economy, but also that the United States collects and distributes much more, and higher-quality, data on FDI activities than does any other country.

The available evidence of the effect of taxation on FDI comes in two forms. The first is time-series estimation of the responsiveness of FDI to annual variation in after-tax rates of return. Implicit in this estimation is a q-style investment model in which contemporaneous average after-tax rates of return serve as proxies for returns to marginal FDI. Studies of this type consistently report a positive correlation between levels of FDI and after-tax rates of return at industry and country levels.⁸ The implied elasticity of FDI with respect to after-tax returns is generally close to unity, which translates into a tax elasticity of investment of roughly -0.6. The estimated elasticity is similar whether the investment in question is American direct investment abroad or FDI by foreigners in the United States.

The primary limitation of aggregate time-series studies is that they are identified by yearly variation in taxes or profitability that may be correlated with important omitted variables. As a result, it becomes very difficult to distinguish the effects of taxation from the effects of other variables that are correlated with tax rates. Two of the time-series studies exploit cross-sectional differences that offer the potential for greater explanatory power. Slemrod (1990) distinguishes FDI in the United States by the tax regime in the country of origin, comparing the behaviour of investors from with tax systems similar to that used by the United States to the behaviour of investors whose home countries exempt foreign profits from taxation. He finds no clear empirical pattern indicating that investors from countries that exempt U.S. profits from home-country taxation are more sensitive to U.S. tax changes than are investors from countries granting foreign tax credits. Swenson (1994) reports that industries in which the (U.S.) after-tax cost of capital rose the most after passage of the U.S. Tax Reform Act of 1986 were those in which foreign investors concentrated their FDI in the post-1986 period, which is consistent with the tax incentives of foreign investors from countries granting foreign tax credits.

Other studies of investment location are exclusively cross-sectional in nature, exploiting the very large differences in corporate tax rates around the world to identify the effects of taxes on FDI. Grubert and Mutti (1991) and Hines and Rice (1994) estimate the effect of national tax rates on the cross-sectional distribution of aggregate American-owned property, plant and equipment (PPE) in 1982. Grubert and Mutti analyze the distribution of PPE in manufacturing affiliates in 33 countries, reporting a -0.1 elasticity with respect to local tax rates. That is, controlling for other observable determinants of FDI, ten percent differences in local tax rates are associated with one percent differences in amounts of local PPE ownership in 1982. Hines and Rice consider the distribution of PPE in all affiliates in 73 countries, reporting a much larger -1 elasticity of PPE ownership with respect to tax rates. Altshuler, Grubert and Newlon (2001) compare the tax sensitivity of aggregate PPE

ownership in 58 countries in 1984 to that in 1992, reporting estimated tax elasticities that rise (in absolute value) from -1.5 in 1984 to -2.8 in 1992. Hines (2001) compares the distribution of Japanese and American FDI around the world, finding Japanese investment to be concentrated in countries with which Japan has “tax sparing” agreements that reduce home country taxation of foreign income. The estimated FDI impact of “tax sparing” is consistent with the tax elasticity of PPE reported by Hines and Rice.

One of the difficulties facing all cross-sectional studies of FDI location is the inevitable omission of many important determinants of FDI that may be correlated with tax rates and therefore bias the estimation of tax elasticities. This consideration makes it attractive to use empirical specifications that include locational fixed effects, but then the question becomes how it is possible simultaneously to identify the impact of tax differences on investment.

Hines (1996) incorporates state fixed effects in comparing the distributions of FDI within the United States of investors whose home governments grant foreign tax credits for federal and state income taxes with those whose home governments do not tax income earned in the United States. The inclusion of fixed effects implicitly controls for hard-to-measure state attributes (such as those that make Silicon Valley or midtown Manhattan “special”), as long as the effect of these attributes does not vary systematically between investors from countries with differing home-country tax regimes. Tax effects are identified by comparing, for example, the extent to which investments from Germany (which exempts from tax foreign-source income earned in the United States) tend to be located in lower-tax states than are investments from the United Kingdom (which provides foreign tax credits for state income taxes paid). The evidence indicates that one percent state tax rate differences in 1987 are associated with ten percent differences in amounts of manufacturing PPE owned by investors from countries with differing home-country taxation of foreign-source income, and three percent differences in numbers of affiliates owned. Taken as a structural relationship, the estimates imply a tax elasticity of investment equal to -0.6 . It is worth bearing in mind, however, that this estimate reflects the effect of taxation on the identity of ownership of capital as well as on the volume of investment.

2.3 Taxation and tax avoidance

One of the important issues in considering the impact of taxation on international investment patterns is the ability of multinational firms to adjust the reported location of their taxable profits. To the extent that FDI can facilitate the advantageous relocation of profits, then firms will have incentives to tailor their international investment strategies with such relocation in mind. Hence any complete analysis of the impact of taxation on the operations of multinational firms must necessarily consider the ability and evident willingness of multinational firms to undertake activities to avoid international tax obligations.

The financing of foreign affiliates presents straightforward opportunities for international tax avoidance. If an American parent company finances its investment in a foreign subsidiary with equity funds, then its foreign profits are taxable in the host country and no taxes are owed the U.S. government until the profits are repatriated to the United States. The alternative of financing the foreign subsidiary with debt from the parent company generates interest deductions for the subsidiary that reduce its taxable income, and generates taxable interest receipts for the parent company.

Simple tax considerations therefore often make it attractive to use debt to finance foreign affiliates in high-tax countries and to use equity to finance affiliates in low-tax countries.⁹ The evidence is broadly consistent with these incentives. Hines and Hubbard (1990) find that the average foreign tax rate paid by subsidiaries remitting nonzero interest to their American parent firms in 1984 exceeds the average foreign tax rate paid by subsidiaries with no interest payments, while the reverse pattern holds for dividend payments. Grubert (1998) estimates separate equations for dividend, interest, and royalty payments by 3467 foreign subsidiaries to their parent American companies (and other members of controlled groups) in 1990, finding that high corporate tax rates in countries in which American subsidiaries are located are correlated with higher interest payments and lower dividend payout rates.

Contractual arrangements between related parties located in countries with different tax rates offer numerous possibilities for sophisticated tax avoidance. It is widely suspected that firms adjust transfer prices used in within-firm transactions with the goal of reducing their total tax obligations. Multinational firms typically can benefit by reducing prices charged by affiliates in high-tax countries for items and services provided to affiliates in low-tax countries. OECD governments require firms to use transfer prices that would be paid by unrelated parties, but enforcement is difficult, particularly when pricing issues concern unique items such as patent rights. Given the looseness of the resulting legal restrictions, it is entirely possible for firms to adjust transfer prices in a tax-sensitive fashion without even violating any laws.

The evidence of tax-motivated transfer pricing comes in several forms. Grubert and Mutti (1991) and Hines and Rice (1994) analyze the aggregate reported profitabilities of U.S. affiliates in different foreign locations in 1982. Grubert and Mutti examine profit/equity and profit/sales ratios of U.S.-owned manufacturing affiliates in 29 countries, while Hines and Rice regress the profitability of all U.S.-owned affiliates in 59 countries against capital and labour inputs and local productivities. Grubert and Mutti report that high taxes reduce the reported after-tax profitability of local operations; Hines and Rice find considerably larger effects (one percent tax rate differences are associated with 2.3 percent differences in *before-tax* profitability) in their data. While it is possible that high tax rates are correlated with other locational attributes that depress the profitability of foreign investment,

competitive conditions typically imply that after-tax rates of return should be equal in the absence of tax-motivated income-shifting. The fact that before-tax profitability is negatively correlated with local tax rates is strongly suggestive of active tax avoidance.

Harris, Moreck, Slemrod and Yeung (1993) report that the U.S. tax liabilities of American firms with tax haven affiliates are significantly lower than those of otherwise-similar American firms over the 1984-1988 period, which may be indirect evidence of aggressive transfer-pricing by firms with tax haven affiliates. Collins, Kemsley and Lang (1998) analyze a pooled sample of U.S. multinationals over 1984-1992, finding a similar pattern of greater reported foreign profitability (normalized by foreign sales) among firms facing foreign tax rates below the U.S. rate. And Klassen, Lang and Wolfson (1993) find that American multinationals report returns on equity in the United States that rose by 10 percent relative to reported equity returns in their foreign operations following the U.S. tax rate reduction in 1986.

Patterns of reported profitability are consistent with other indicators of aggressive tax-avoidance behavior, such as the use of royalties to remit profits from abroad and to generate tax deductions in host countries. Hines (1995) finds that royalty payments from foreign affiliates of American companies in 1989 exhibit a -0.4 elasticity with respect to the tax cost of paying royalties, and Grubert (1998) also reports significant effects of tax rates on royalty payments by American affiliates in 1990. Clausing (2001) finds that reported trade patterns between American parent companies and their foreign affiliates, and those between foreign affiliates located in different countries, are consistent with transfer-pricing incentives. Controlling for various affiliate characteristics, including their trade balances with unaffiliated foreigners, Clausing finds that ten percent higher local tax rates are associated with 4.4 percent higher parent company trade surpluses with their local affiliates, which is suggestive of pricing practices that move taxable profits out of high-tax jurisdictions. Swenson (2001) finds a similar pattern in the reported prices of goods imported into the United States, in which high unit tariff rates appear to be associated with unusually low prices.

Hines and Hubbard (1990) analyze a cross-section of U.S. multinationals using tax return data from 1984 in an effort to determine the sensitivity of multinational dividends to tax costs. In their sample, Hines and Hubbard note that large aggregate payouts are the result of selective and infrequent dividend payments by affiliates. Using this cross-section of data, they conclude that a one percent decrease in the repatriation tax is associated with a four percent increase in dividend payout rates.¹⁰ The evidence provided in Hines and Hubbard suggests that tax considerations are very important determinants of the timing of dividend repatriations.

The cross-section used by Hines and Hubbard makes it impossible to distinguish the effects of transitory and permanent changes in repatriation taxes. Altshuler, Newlon

and Randolph (1995) attempt to identify permanent and transitory tax costs by creating an unbalanced panel of subsidiaries using tax returns from 1980, 1982, 1984 and 1986. Permanent repatriation tax costs for subsidiaries are constructed from a first-stage regression that uses as explanatory variables statutory withholding tax rates and average tax rates of other subsidiaries in the same country. Altshuler, Newlon and Randolph find, as predicted by Hartman (1985), that transitory tax costs influence dividend payments while permanent tax costs do not. The effort to disentangle the permanent and temporary tax costs of dividends is limited, however, by the very small number of annual observations for each firm.

Grubert (1998) and Grubert and Mutti (2001) report that dividends are sensitive to tax costs in their analyses of cross-sections of tax returns for 1990 and 1992, respectively. Hines (1994, 1995) and Grubert (1998) offer evidence that the use of alternatives to dividends, such as interest and royalty payments, likewise respond to the tax costs associated with repatriation. Grubert (1998) presents somewhat anomalous results suggesting that levels of retained earnings are insensitive to tax costs. This evidence is consistent with the sensitivity of dividends to repatriation taxes under Grubert's interpretation that repatriation taxes do not affect net investment by subsidiaries, since firms can substitute alternatives to dividends in order to repatriate income to parents.¹¹

The form of a business organization can affect its tax obligation, thereby creating incentives for tax avoidance through the endogenous selection of organizational forms. The U.S. Tax Reform Act of 1986 introduced an important distinction between the tax treatment of income received from majority-owned foreign affiliates of American companies and income received from foreign joint ventures owned 50 percent or less by Americans. After 1986, Americans were required to calculate separate foreign-tax-credit limits for dividends received from each minority-owned joint venture. This change greatly reduces the attractiveness of joint ventures, particularly those in low-tax foreign countries. Desai and Hines (1999) and Desai, Foley and Hines (2004a) report that American participation in international joint ventures fell sharply after 1986, in spite of rising joint venture activity by non-American multinational firms. The drop in American joint venture activity is most pronounced in low-tax countries, which is consistent with changing tax incentives, and for which there is no obvious non-tax explanation. Moreover, joint ventures in low-tax countries use more debt and pay greater royalties to their American parents after 1986, reflecting their incentives to economize on dividend payments.

The location and intensity of R&D activity also appears to reflect tax avoidance incentives. Hines (1993) compares changes in the growth rate of R&D spending from 1984-1989 by firms with and without excess foreign tax credits in a sample of 116 multinational companies. The U.S. R&D expense allocation rules are similar to those for interest: multinational firms with excess foreign tax credits faced higher tax costs of performing R&D in the United States after 1986, while firms without excess foreign tax credits were unaffected. What distinguish firms in these two

groups are their average foreign tax rates, which are more or less randomly distributed (in the sense of being uncorrelated with R&D spending in the years before 1986). R&D spending levels of firms in the first group grew more slowly than those of firms in the second group, the implied elasticity of demand for R&D lying between -0.8 and -1.8 in alternative specifications of the R&D demand equation.

International differences in royalty withholding taxes offer evidence of the substitutability of R&D in different locations. Higher royalty taxes raise the cost of imported technology, which in turn stimulates local R&D if imported technology and local R&D are substitutes, and discourages local R&D if they are complements. Hines (1995) finds that American-owned foreign affiliates are more R&D-intensive if located in countries that impose high withholding taxes on royalty payments, and similarly, that foreign firms investing in the United States are more R&D-intensive if they are subject to higher royalty withholding tax rates. These results suggest that imported technology and locally produced technology are substitutes, and that multinational firms respond to tax rate differences by undertaking such substitution. Hines and Jaffe (2001), however, find that American multinational firms for which the tax cost of performing R&D in the United States became most expensive after 1986 exhibited the slowest subsequent growth in foreign patenting, which suggests a complementary relationship between domestic and foreign research.

International tax avoidance is evidently a successful activity. The reported profitability of multinational firms is inversely related to local tax rates, a relationship that is at least partly the consequence of tax-motivated use of debt financing, the pricing of intra-firm transfers, royalty payments, and other methods. It is important not to lose sight of the fact that, in spite of the demonstrated ability of multinational firms to arrange their affairs to avoid taxes, these large corporations nevertheless pay enormous sums in taxes each year. Tax avoidance appears to be limited by available opportunities and the enforcement activities of governments.

2.4 The Effect of Taxation on the Distribution of Activities within Firms

The evidence on behavioural responses to international tax rules reviewed above employs time-series variation or cross-country variation in tax rates. Unfortunately, these analyses typically employ aggregated data that may obscure unobserved variation across industries and multinational firms. A recent wave of research employs confidential affiliate-level data on the behaviour of American companies between 1982-1997 providing for the use of various fixed effects in estimating the impact of tax differences.¹² Tax effects then reflect the distribution of investment and activity between affiliates of the same company or between affiliates within the same industry that happen to be located in countries with differing tax rates. The advantage of using such a method is that doing so implicitly controls for any attributes, including differences in financial health that are common to affiliates of the same parent.

Analysis employing affiliate-level data further illuminates how firms restructure operations in response to tax incentives with respect to investment and tax avoidance. Desai, Foley and Hines (2001, 2002) consider the responsiveness of dividend repatriations to tax rate differences, finding that a variety of non-tax factors are operative in repatriation decisions, but that one percent lower repatriation tax rates are associated with one percent higher dividends – implying that repatriation taxes reduce aggregate dividend payouts by 12.8 percent. In addition to changed repatriation policies, financial decision-making within a multinational more generally appears to respond to tax differences. The evidence provided in Desai, Foley and Hines (2004c) indicates that 10 percent higher local tax rates are associated with 2.8 percent higher debt/asset ratios of American-owned affiliates, and that borrowing from related parties is particularly sensitive to tax rates. In addition to changed financial policies, transfer pricing effects are also evident when employing only within-firm variation. Specifically, Desai, Foley and Hines (2003) show that 10 percent higher tax rates are associated with 0.68 percent lower profit rates, translating to an elasticity of reported profits with respect to the tax rate of 0.33.

The effects of taxation on investment levels are also present when focusing exclusively on within parent differences. The estimates provided in Desai, Foley and Hines (2004b) that also control for the effects of non-income taxes, imply that one percent lower direct tax rates increase affiliate assets by 0.40 percent which translates into an estimated elasticity of asset allocation with respect to income taxes of 0.125. This same study further elaborates on the effect of direct taxes on investment by providing estimates of an implied elasticity of capital/labour substitution of 0.45. It is useful to consider how these estimates relate to the estimates from studies employing aggregated data. For example, the estimated elasticity of asset allocation with respect to income taxes of 0.125 is considerably smaller than the 0.6 elasticity that is commonly estimated in the literature using aggregate data. The estimated tax elasticities coming from within-firm studies can be thought of as reflecting substitution within a firm exclusively. These within-firm studies complement the evidence reviewed above suggests that tax incentives significantly influence both the distribution of activity at an aggregate level and within firms.

3. SENSIBLE TAX POLICIES ¹³

It is helpful to consider the formal analysis of taxation of the return to investment in a small open economy, since doing so clarifies aspects of the analysis that might otherwise be open to misinterpretation. This section starts by considering the taxation of domestic profits, and follows by considering the taxation of foreign income.

3.1 Taxation of capital income in an open economy.

In a small open economy, a tax on the return to domestic capital has no effect on the rate of return available to domestic savers,¹⁴ since the domestic interest rate is determined by the world capital market. Domestic investment falls in response to higher tax rates. For firms to continue to break even, in spite of the added tax, either output prices must rise or other costs must fall by enough to offset the tax. When output prices are fixed by competition with imports, the tax simply causes the market-clearing wage rate to fall. As a result, the burden of the tax is borne entirely by labour or other fixed domestic factors. While a labour income tax would also reduce the net wage rate, it would not in contrast distort the marginal return to capital invested at home vs. abroad. Following Diamond and Mirrlees (1971), a labour income tax dominates a corporate income tax, even from the perspective of labor.¹⁵ As a result, one immediate and strong conclusion about tax policy in an open economy setting is that a “source-based tax” on capital income should not be used since it is dominated by a labor-income tax.

It is useful to illustrate this finding in a simple setting in which the government has access to various tax instruments, at least including a source-based tax on capital, a payroll tax, and consumption taxes on any nontraded goods. The country is small relative to both the international capital market and the international goods markets, so takes as given the interest rate, r^* , on the world capital market, and the vector of prices, p^* , for traded goods.

Resident i receives indirect utility equal to $v_i(p^* + s, p_n + s_n, r^*, w(1-t)) + V_i(G)$, where p_n represents the vector of prices for nontraded goods, s and s^* respectively represent the sales tax rate on tradables and nontradables, r^* represents the rate of return to savings available on the world capital market, w equals the domestic wage rate, t is the tax rate on labour income, and G is a vector of government expenditures.

Each dollar of capital employed by domestic firms faces a tax at rate τ . Domestic firms have constant returns to scale, and operate in a competitive environment, so must just break even in equilibrium. Therefore, the unit costs for firms in each industry must equal the output price in that industry. Using c and c_n to denote the costs of producing traded and nontraded goods, respectively, equilibrium requires that, for traded goods,¹⁶ $c(r^* + \tau, w) \geq p^*$, while for nontraded goods $c_n(r^* + \tau, w) = p_n$. Since the country is assumed to be a price taker in both the traded goods market and the capital market, it follows immediately that firms in the traded sector continue to break even when τ increases only if the wage rate falls by enough to offset the added costs due to the tax. This implies that

$$(1) \quad \frac{dw}{d\tau} = -\frac{K}{L}$$

in which K/L is the equilibrium capital/labour ratio in these firms.¹⁷ Hence, the effect of taxation on domestic factor prices is determined by competition in traded goods industries.

For firms selling nontradables, the market-clearing price of their output must adjust to ensure that these firms continue to break even. The break-even condition is given by $p_n q_n = K_n (r^* + \tau) + L_n w$, in which q_n is the quantity of nontraded output, and K_n and L_n are quantities of capital and labour used in its production. Differentiating this condition, and imposing (1), implies that

$$(2) \quad \frac{dp_n}{d\tau} = \frac{L_n}{q_n} \left(\frac{K_n}{L_n} - \frac{K}{L} \right).$$

Prices rise in sectors of the economy that are more capital intensive than the traded goods sector, and fall in sectors that are more labour intensive.

Consider the government's choice of τ . By increasing τ , individuals are affected only indirectly, through the resulting drop in the market-clearing wage rate and through changes in the market-clearing prices of nontradables.¹⁸ The same changes in effective prices faced by individuals could equally well have been achieved by changing appropriately the payroll tax rate t , and the sales tax rates s_n . From an individual's perspective, an increase in τ is equivalent to changes in the payroll tax rate, t , and the sales tax rates s_n , that generate the same changes in after-tax wages and prices.

Since these alternative policies are equivalent from the perspective of individual utility, holding G fixed, it is possible to compare their relative merits by observing what happens to government revenue as τ rises, while the payroll tax rate t , and the sales tax rates s_n are adjusted as needed to keep all consumer prices unaffected. Given the overall resource constraint for the economy, the value of domestic output, measured at world prices, plus net income from capital exports/imports must continue to equal the value of domestic consumption and saving plus government expenditures. Therefore,¹⁹

$$(3) \quad p_g G = p^* [f(S + K_m, L_a) - (C + S)] - r^* K_m,$$

in which p_g measures the production cost of each type of government expenditure, $f(\cdot)$ is the economy's aggregate production function, S measures the net savings of

domestic individuals, C is their consumption, K_m measures capital imports/exports, and L_a is aggregate labour supply.

If τ increases, but its effect on consumer prices is offset through suitable readjustments in the payroll tax and in sales tax rates, then S , C , and L will all remain unaffected. Welfare is maximized if the tax rates are chosen so that the resulting value of K_m maximizes the value of resources available for government expenditures. Given the aggregate resource constraint, this implies that $p^* f_K = r^*$. Firms would choose this allocation, however, only if $\tau = 0$. Under optimal policies, therefore, there should be no source-based tax on capital. Any capital tax prevents the country from taking full advantage of the gains from trade.

Another immediate implication of the findings of Diamond and Mirrlees concerning productive efficiency under an optimal tax system is that a small open economy should not impose differential taxes on firms based on their location or the product they produce. This not only rules out tariffs but also differential corporate tax rates by industry and activity. As shown by Razin and Sadka (1991), this equilibrium set of tax policies implies that marginal changes in tax policy in other small countries will have no effects on domestic welfare. Behavioral changes in some other small economy can induce marginal changes in trade patterns or capital flows. Such changes in behaviour have no direct effect on individual utility by the envelope condition. They therefore affect domestic welfare only to the degree to which they affect government revenue. Under the optimal tax system, however, marginal changes in trade patterns or capital imports also have no effect on tax revenue. Therefore, there are no fiscal spillovers under the optimal tax system, and the Nash equilibrium tax structure among a set of small open economies cannot be improved on through cooperation among countries.

3.2 Taxation of foreign income²⁰

This section reviews the older argument that large and small countries do well to subject the foreign income of their resident firms to taxation at domestic rates. It then sketches the more modern line of thinking that, in fact, countries benefit by exempting foreign profits from domestic taxation.

Capital export neutrality (CEN) is the doctrine that the return to capital should be taxed at the same total rate regardless of the location in which it is earned. If a home country tax system satisfies CEN, then a firm seeking to maximize after-tax returns has an incentive to locate investments in a way that maximizes pre-tax returns. This allocation of investment corresponds to global economic efficiency under certain circumstances. The CEN concept is frequently invoked as a normative justification for the design of tax systems similar to that used by the United States, since the taxation of worldwide income with provision of unlimited foreign tax credits satisfies CEN. This is not exactly the system that the United States uses, since taxpayers are permitted to defer home country taxation of certain unrepatriated

foreign income, and foreign tax credits are subject to various limits. Nonetheless, CEN is often used as a normative benchmark against which to evaluate contemplated changes to the U.S. system of taxing foreign income,²¹ since tax systems that satisfy CEN are thought to enhance world welfare.

The standard analysis further implies that governments acting on their own, without regard to world welfare, should tax the foreign incomes of their resident companies while permitting only a deduction for foreign taxes paid. Such taxation satisfies what is known as national neutrality (NN), discouraging foreign investment by imposing a form of double taxation, but doing so in the interest of the home country that disregards the value of tax revenue collected by foreign governments. From the standpoint of the home country, foreign taxes are simply costs of doing business abroad, and therefore warrant the same treatment as other costs. The home country's desired allocation of capital is one in which its firms equate marginal after-tax foreign returns with marginal pretax domestic returns, a condition that is satisfied by full taxation of foreign income after deduction of foreign taxes. This line of thinking suggests that the American policy of taxing foreign income while granting foreign tax credits fails to advance American interests because it treats foreign income too generously. In this view there is a tension between tax policies that advance national welfare (NN) by taxing after-tax foreign income, and those that advance global welfare (CEN) by taxing foreign income while permitting taxpayers to claim foreign tax credits. The practice of much of the world, including Germany, France, Canada, and the Netherlands, that effectively exempts foreign income from taxation, is, by this reasoning, difficult to understand, since it is inconsistent with either national or global interests.

The third of the older efficiency principles is capital import neutrality (CIN), the doctrine that the return to capital should be taxed at the same total rate regardless of the residence of the investor. Pure source-based taxation at rates that differ between locations can be consistent with CIN, since different investors are taxed (at the corporate level) at identical rates on the same income. In order for such a system to satisfy CIN, however, it is also necessary that individual income tax rates be harmonized, since CIN requires that the combined tax burden on saving and investment in each location not differ between investors. While CEN is commonly thought to characterize tax systems that promote efficient production,²² CIN is thought to characterize tax systems that promote efficient saving. Another difference is that CIN is a feature of all tax systems analyzed jointly, whereas individual country policies can embody CEN or NN. As a practical matter, since many national policies influence the return to savers, CIN is often dismissed as a policy objective compared to CEN and NN.

It is important to clarify the five main assumptions built into the standard normative framework that delivers CEN and NN as global and national welfare criteria. The first assumption is that the goal of home-country governments (in the case of NN) is to maximize the sum of tax revenue and the after-tax worldwide profits of home-

country firms, which is equivalent to maximizing national income. The second assumption is that tax policies of other countries are unaffected by changes in home-country tax policies. The third assumption is that tax rate differences are unrelated to the differences in the benefits that host countries receive from incoming foreign investment. The fourth assumption is that home countries receive no special benefits from the headquarters activities of resident multinational firms. And the fifth assumption is that the activities of foreign firms is unaffected by the repercussions of changes in the home-country taxation of foreign income. The first assumption makes sense if domestic residents are residual claimants (as shareholders, employees, or in other capacities) on the returns earned by home-country firms, and the residence of home-country firms is unaffected by the taxation of foreign income. The first assumption also ignores the second-best nature of taxation, in which governments must distort economies in order to raise revenue, so additional government revenue is typically worth more than income accruing to residents. The second assumption corresponds to countries not acting strategically in setting taxes, while the third assumption requires that tax rates are unrelated to the social value of additional investment. The fourth assumption rules out productivity spillovers from multinationals to other local firms. The first four assumptions have been criticized in the literature, and their implications explored,²³ though defenders of CEN and NN maintain that they are robust to changes in these assumptions.²⁴

The fifth assumption underlying the CEN and NN framework, that foreign firms do not respond to changes induced by home-country taxation, has received almost no attention but may be the most critical of all.²⁵ Investment by domestic firms at home and abroad may very well influence investment by foreign firms, a scenario that is inconsistent with the logic underlying CEN and NN. If greater investment abroad by home-country firms triggers greater investment by foreign firms in the home country, then it no longer follows that the home country maximizes its welfare by taxing foreign income while permitting only a deduction for foreign taxes paid. From the standpoint of global welfare, if home and foreign firms compete for the ownership of capital around the world, and the productivity of an investment depends on its ownership, then it is no longer the case that the taxation of foreign income together with the provision of foreign tax credits necessarily contributes to productive efficiency.

The more modern approach to evaluating the desirability of taxing foreign income considers the extent to which tax systems satisfy capital ownership neutrality (CON), the property that they do not distort ownership patterns. It is easiest to understand the welfare properties of CON by considering the extreme case in which the total stock of physical capital in each country is unaffected by international tax rules. In this setting, the function of foreign direct investment is simply to reassign asset ownership among domestic and foreign investors. If the productivity of capital depends on the identities of its owners (and there is considerable reason to think that it does), then the efficient allocation of capital is one that maximizes output given the stocks of capital in each country. It follows that tax systems promote efficiency

if they encourage the most productive ownership of assets within the set of feasible investors.

Consider the case in which all countries exempt foreign income from taxation. Then the tax treatment of foreign investment income is the same for all investors, and competition between potential buyers allocates assets to their most productive owners. Note that what matters for asset ownership is comparative advantage rather than absolute advantage: if French firms are always the most productive owners of capital, but they do not have the resources necessary to own everything, then efficiency requires that French firms own the capital for which their rate of return difference with the rest of the world is the greatest. The United States would reduce world welfare by taxing foreign income while permitting taxpayers to claim foreign tax credits, since such a system encourages American firms to purchase assets in high-tax countries and foreign firms to purchase assets in low-tax countries. These tax incentives distort the allocation of ownership away from one that is strictly associated with underlying productivity differences.

CON is satisfied if all countries exempt foreign income from taxation, but the exemption of foreign income from taxation is not necessary for CON to be satisfied in this particular case. If all countries tax foreign income (possibly at different rates), while permitting taxpayers to claim foreign tax credits, then ownership would be determined by productivity differences and not tax differences, thereby meeting the requirements for CON. In this case the total tax burden on foreign and domestic investment varies between taxpayers with different home countries, but every investor has an incentive to allocate investments in a way that maximizes pretax returns. More generally, CON requires that income be taxed at rates that, if they differ among investors, do so in fixed proportions. Thus, CON would be satisfied if investors from certain European countries face home and foreign tax rates that are uniformly 1.2 times the tax rates faced by all other investors.

In order for the allocation of capital ownership to be efficient it must be the case that it is impossible to increase output by trading capital ownership among investors. This efficiency condition requires not necessarily that capital be equally productive in the hands of each investor, but that the potential gain of reallocating ownership to a higher-productivity owner be exactly equal to the cost of such a reallocation by offsetting ownership changes elsewhere. Since taxpayers allocate their investments to maximize after-tax returns, the marginal dollar spent on new investments by any given investor must yield the same (expected, risk-adjusted) after-tax return everywhere. It follows that, if net (host country plus home country) tax rates differ between investments located in different countries, marginal investments in high-tax locations must generate higher pre-tax returns than do marginal investments in low-tax locations. Selling an asset in a low-tax location and purchasing an investment in a high-tax location increases output by the firm engaging in the transaction, but (generally) reduces output by the firm on the other side of this transaction. If both parties face the same tax rates, or face taxes that differ in fixed proportions from

each other, then CON is satisfied, ownership reallocation would have no effect on total productivity, and the outcome is therefore efficient. If some countries tax foreign income while others do not, then it is impossible to restore CON without bringing them all into alignment. Individual countries have the potential to improve global welfare by moving their taxation of foreign income into conformity with an average global norm, though the general theory of the second best applies (see, e.g., Dixit 1985), and a movement toward conformity is not always guaranteed to improve global welfare.

The welfare implications of CON are less decisive in settings in which the location of plant, equipment, and other productive factors is mobile between countries in response to tax rate differences. Tax systems then determine the location of production as well as patterns of ownership and control, so the net effect of taxation on global welfare depends on the sum of these effects. Hence pure source-based taxation at rates that differ between countries may encourage excessive investment in low-tax countries,²⁶ even though it would satisfy CON. If one country were then to tax foreign income while providing foreign tax credits, it would have the effect of reducing the welfare cost of real capital misallocation, but do so at the cost of distorting the ownership and operation of industry. Whether the cost of having too many factories in the Bahamas is larger or smaller than the cost of discouraging value-enhancing corporate acquisitions is ultimately an empirical question, though the importance of ownership to FDI suggests that its welfare impact may also be substantial.

The same circumstances that make CON desirable from the standpoint of world welfare also imply that countries acting on their own, without regard to world welfare, have incentives to exempt foreign income from taxation no matter what other countries do. The reason is that additional outbound foreign investment does not reduce domestic tax revenue, since any reduction in home-country investment by domestic firms is offset by greater investment by foreign firms. With unchanging domestic tax revenue, home-country welfare increases in the after-tax profitability of domestic companies, which is maximized if foreign profits are exempt from taxation. Tax systems that exempt foreign income from taxation can therefore be said to satisfy “national ownership neutrality” (NON). Hence it is possible to understand why so many countries exempt foreign income from taxation, and it follows that, if every country did so, capital ownership would be allocated efficiently and global output thereby maximized.

National welfare is maximized by exempting foreign income from taxation in cases in which additional foreign investment does not reduce domestic tax revenue raised from domestic economic activity.²⁷ This condition is satisfied if, to the extent that marginal foreign investment reduces domestic investment by domestic firms, it triggers an equally productive amount of new inbound investment from foreign firms. In more general cases, the welfare-maximizing tax treatment of foreign investment depends on the extent to which foreign investment substitutes for

domestic investment lost due to new outbound FDI, and the relative productivities of foreign-owned and domestic-owned capital in the home country. If foreign investment and domestic investment are equally productive in the home country, but inbound foreign investment replaces only 75 percent of domestic investment lost due to outbound FDI, then the analysis implies that the optimal home-country policy is to tax 34 percent of the after-tax foreign income earned by home-country firms.²⁸

The analysis of NON takes as its basis the setting used in the standard NN analysis of home country tax policies, one in which home-country welfare is a function of the after-tax profitability of home-country firms. With worldwide ownership of firms, it is possible that home countries no longer attach any special value to the profits of their resident companies. If so, then home-country welfare becomes a function of tax revenue and after-tax incomes of domestic residents. As is well-known from the results of Diamond and Mirrlees (1971), competition between jurisdictions then produces an outcome in which countries find it in their interest to exempt all capital income from taxation.²⁹ If followed by all countries, such an outcome satisfies all of CON, NON, CEN, NN, and CIN.

*3.3 Taxation and tax base-shifting.*³⁰

There are some revealing inconsistencies between the simple theory of capital allocation and data on the behaviour of multinational firms. If investments in equilibrium all yield the same rate of return r , net of source-based taxes, then the pre-tax rate of return in a country should be higher when the local corporate tax rate is higher. Yet the evidence indicates that reported pretax rates of returns of subsidiaries appear to be a decreasing function of the local corporate tax rate, with particularly high rates of return reported in tax havens. This is clearly the result of purposeful activity on the part of multinational firms that can reallocate taxable income from subsidiaries in countries with high corporate tax rates to those in countries with very low corporate tax rates. There are several possible methods of reallocating income, including judicious choices of prices, interest rates and royalty rates used for transactions between related parties, substitution between debt and equity finance, and careful consideration of where to locate investments that might become unusually profitable.

The following framework is useful in understanding the evidence and implications of tax-motivated profit shifting, since much of this work relies on the premise that the stringency of government enforcement of international tax rules is a function of the extent to which reported profits differ from those actually earned in each jurisdiction. Consider the case in which a multinational firm earns true profits $\rho_i > 0$ in location i , but arranges transfer prices in order to report an additional profit of ψ_i in the same location (in which ψ_i might be negative). The firm incurs

compliance costs equal to $\gamma \frac{\psi_i^2}{\rho_i}$, with $\gamma > 0$. Consequently, reported profits in jurisdiction i equal:

$$(4) \quad \pi_i = \rho_i + \psi_i - \gamma \frac{\psi_i^2}{\rho_i}.$$

The firm chooses ψ_i to maximize worldwide profits:

$$(5) \quad \sum_{i=1}^n (1 - \tau_i) \pi_i = \sum_{i=1}^n (1 - \tau_i) \left[\rho_i + \psi_i - \gamma \frac{\psi_i^2}{\rho_i} \right],$$

subject to the constraint that

$$(6) \quad \sum_{i=1}^n \psi_i = 0.$$

The first order conditions for ψ_i imply:

$$(7) \quad \psi_i = \rho_i \left[\frac{1 - \tau_i - \mu}{2\gamma(1 - \tau_i)} \right],$$

where μ is the Lagrange multiplier corresponding to the constraint (6).³¹ Equation (7) implies that $\psi_i > 0$ in low-tax countries, where $\tau_i < 1 - \mu$, and conversely.

If firms invest facing an opportunity cost of funds of r , then the true marginal product of capital (denoted f_K) will satisfy:

$$(8) \quad f_K = r / [(1 - \tau_i)(1 + \gamma \psi_i^2 / \rho_i^2)].$$

Without the opportunity to reallocate taxable profits, firms would instead have allocated capital to that point that $f_K = r / (1 - \tau_i)$. This is also the investment condition that would be faced by local firms, who cannot make use of foreign operations to reduce taxes. A multinational firm's avoidance opportunities therefore give it a competitive advantage over local firms to the extent that $\psi_i \neq 0$. Equation (8) implies that the size of this competitive advantage is larger in countries with very low tax rates, such as tax havens.³²

The ability of foreign investors to reallocate taxable income not only increases the attractiveness of investing in low-tax locations, but also increases the attractiveness of investing in activities that facilitate tax-motivated reallocation of taxable income. In the simple model sketched above, all investment carries with it the same ability to shield the cost of income reallocation. The reality of income reallocation is certainly more nuanced. In particular, activities such as R&D that arguably contribute to rent creation may offer some of the highest returns to multinationals eager to argue that rents should be attributed to their operations in low-tax locations. As a result, lower tax rates encourage R&D in spite of the fact that the value of deductibility of R&D expenses is itself less valuable in low-tax locations than it would be in high-tax locations.

4. THE IRISH EXPERIENCE

The modern history of Ireland suggests a simple account of the impact of tax policies. In recent decades the Republic of Ireland has offered foreign investors an extremely favourable tax climate, Ireland has received a large volume of inbound foreign direct investment, and the Irish economy has grown rapidly. The confluence of these three developments prompts some observers to conjecture that there exists a causal association between them, that the low Irish tax rates on foreign investors are at least partly responsible for the rapid growth of the Irish economy. Certainly the evidence surveyed in section two of the paper is consistent with such an inference, since there is considerable reason to expect that the low Irish tax rates will attract more foreign direct investment than would go to Ireland in the absence of the favourable tax climate.

This is not to say that low tax rates are solely responsible for the large volume of foreign direct investment in Ireland. Levels of foreign investment are determined by many considerations, certainly including taxes, but also including factor costs, transportation costs, government regulations, access to markets, political stability, and many others. Approximately forty countries offer near-blanket tax exemptions for foreign investors, yet few of these have experienced the influx of foreign direct investment of the magnitude of Ireland.

It is instructive to consider the evidence of tax rate setting in a broad spectrum of countries. Table 1 presents estimated coefficients from regressions in which the dependent variable is a country's statutory tax rate at yearend 1999. Statutory tax rates do not incorporate differences in tax base definitions, tax credits, tax holidays, and other features of a country's tax system that make it appealing to foreign investors.³³ Nevertheless it is useful to consider the determinants of tax rates, since they represent the primary source of differences between countries in effective corporate tax rates,³⁴ and commonly influence income shifting and other important behavior.

The evidence presented in Table 1 indicates that countries with smaller economies impose lower tax rates. The regression reported in column 4 estimates the tax rate as a function of the log of a country's population, the log of the country's per capita GDP, and a dummy variable that takes the value one if the country is a member of the European Union, and zero otherwise. The 0.017 coefficient on log population indicates that larger countries impose higher tax rates; doubling a country's population is associated with a statutory corporate tax rate that is 1.7 percent higher. (The mean tax rate in the sample is 31 percent.) The -0.015 coefficient on the log of GDP indicates that, other considerations equal, doubling the income of a country reduces its statutory tax rate by 1.5 percentage points. The estimated coefficient on the European dummy variable is 0.042, indicating that European tax rates are 4.2 percentage points higher than what one would predict simply on the basis of the size of a country's population and income.

Table 1: Determinants of National Tax Rates in 2000

	-1	-2	-3	-4	-5	-6
	taxrate		taxrate	taxrate	taxrate	taxrate
lpop	0.011	0.01	0.01	0.017	0.017	0.017
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
lgdp	-0.008	-0.096	0.465	-0.015	-0.029	0.207
	(0.005)	(0.082)	(0.889)	(0.007)	(0.098)	(0.905)
lgdp2		0.005	-0.062		0.001	-0.028
		(0.005)	(0.107)		(0.006)	(0.109)
lgdp3			0.003			0.001
			(0.004)			(0.004)
Europe				0.042	0.04	0.039
				(0.019)	(0.024)	(0.023)
Constant	0.357	0.725	-0.817	0.429	0.483	-0.165
	(0.067)	(0.348)	(2.443)	(0.074)	(0.407)	(2.481)
Observations	106	106	106	106	106	106
R-squared	0.03	0.04	0.04	0.06	0.06	0.06

Source: Author's calculations. Note: The table reports estimated coefficients from regressions in which the dependent variable is a country's statutory corporate tax rate in 2000. **Lpop** is the log of population; **lgdp** is the log of GDP; and **Europe** is a dummy variable taking the value one if a country is a member of the European Union. Robust standard errors are in parentheses.

Ireland was in the midst of changing its corporate tax regime in 1999 in response to European pressures. Its statutory tax rate was 24 percent, though it was scheduled to fall ultimately to 12.5 percent; the relevant tax rate for foreign investors had been 10 percent, though it was also scheduled to converge to the 12.5 percent tax rate applicable to domestic firms. The data used in the regression reported in Table 1 indicates the Irish tax rate to be 24 percent, which is a misleading statement of the relevant tax regime from the standpoint of investors, since they could reasonably

count on the ultimate tax rate to be considerably lower. Nonetheless, the Irish residual in the tax rate equation is -0.09 , meaning that Ireland's measured 24 percent tax rate was well below the 33 percent rate predicted on the basis of its population, income, and European Union membership.³⁵ Thus, in case there was ever any doubt, Ireland offered a very favourable corporate tax climate in 1999, even as measured in statutory terms.

The thrust of the evidence reviewed in section two of the paper is that the favourable Irish tax climate could be expected to spur extensive foreign direct investment in Ireland. Tables 2 and 3 present regressions intended to explore one version of this hypothesis. The tables report estimated coefficients from regressions in which the dependent variable is foreign direct investment from the United States, as measured by aggregate assets, and the independent variables are log population, log per capita GDP and its powers, the statutory corporate tax rate, and a European dummy variable (Table 3 only).

Table 2: Determinants of U.S. Foreign Direct Investment

	-1	-2	-3	-4	-5	-6
	lassets	lassets	lassets	lassets	lassets	lassets
lpop	0.9216 (0.114)	0.9318 (0.110)	0.9314 (0.114)	0.9453 (0.114)	0.9474 (0.110)	0.9586 (0.110)
lgdp	1.9886 (0.180)	30.4366 (28.522)	1.9651 (0.181)	1.9694 (0.179)	34.9924 (28.481)	34.414 (28.318)
lgdp2		-3.8009 (3.407)			-4.3764 (3.405)	-4.2861 (3.386)
lgdp3		0.1647 (0.134)			0.1883 (0.134)	0.184 (0.134)
taxrate			-2.8441 (2.855)	18.5423 (13.230)	-4.1742 (2.776)	13.6591 (12.843)
taxrate2				-34.8614 (21.067)		-28.9822 (20.384)
Constant	-18.0673 (2.105)	-86.9024 (78.820)	-17.0478 (2.341)	-20.3436 (3.056)	-97.4141 (78.572)	-99.0632 (78.124)
Observations	93	93	93	93	93	93
R-squared	0.63	0.67	0.64	0.65	0.67	0.68

Source: Author's calculations. Note: The table reports estimated coefficients from regressions in which the dependent variable is the log of aggregate assets of U.S.-owned affiliates at yearend 1999. **Lpop** is the log of population; **lgdp** is the log of per capita GDP; and **taxrate** is top statutory tax rate on corporate income. Robust standard errors are in parentheses.

It is instructive to consider the regression reported in column 3 of Table 3. The estimated 0.4675 coefficient on the Europe dummy indicates that, after controlling for country size and wealth, European countries receive 47 percent greater investment from the United States as do other countries.³⁶ The -4.3937 tax rate coefficient indicates that ten percent higher statutory corporate tax rates are associated with 44 percent less foreign investment from the United States, controlling for income, population, and European location.³⁷ The residual for the

Table 3: U.S Foreign Direct Investment with Europe Effect

	-1	-2	-3	-4	-5	-6
	lassets	lassets	lassets	lassets	lassets	Lassets
lpop	0.8918 (0.113)	0.9222 (0.113)	0.9012 (0.113)	0.9156 (0.104)	0.9349 (0.112)	0.9466 (0.112)
lgdp	1.7788 (0.210)	27.7796 (29.201)	1.7186 (0.213)	1.7358 (0.212)	31.5211 (29.059)	31.1589 (28.900)
Europe	1.1573 (0.620)	0.3347 (0.712)	1.3108 (0.627)	1.2402 (0.507)	0.4675 (0.712)	0.4393 (0.708)
lgdp2		-3.4509 (3.503)			-3.9178 (3.478)	-3.8562 (3.468)
lgdp3		0.1494 (0.139)			0.1682 (0.138)	0.1652 (0.137)
taxrate			-3.9072 (2.849)	15.6636 (14.788)	-4.3937 (2.805)	13.2306 (12.466)
taxrate2				-31.8086 (26.583)		-28.621 (20.466)
Constant	-16.1125 (2.325)	-80.1298 (80.130)	-14.4527 (2.611)	-17.5997 (3.063)	-88.5078 (79.987)	-90.6727 (79.562)
Observations	93	93	93	93	93	93
R-squared	0.65	0.67	0.65	0.66	0.68	0.68

Source: Author's calculations. Note: The table reports estimated coefficients from regressions in which the dependent variable is the log of aggregate assets of U.S.-owned affiliates at yearend 1999. **lpop** is the log of population; **lgdp** is the log of per capita GDP; and **taxrate** is the top statutory tax rate on corporate income. **Europe** is a dummy variable taking the value one if a country is a member of the European Union, and zero otherwise. Robust standard errors are in parentheses.

Ireland observation in this equation is 0.526, indicating that the level of U.S. investment in Ireland is 53 percent higher than would be predicted on the basis of the observed variables. This suggests that foreign investment in Ireland is indeed very high in a way that cannot be explained by tax factors and other aggregate

economic factors, except that the tax rate used in the regression is certainly too high. If one were to replace the 24 percent Irish tax rate with a more appropriate 12.5 percent rate, then the Irish residual would fall by 0.505, making it only 0.02, and suggesting that U.S. investment in Ireland is only two percent greater than that predicted by this very simple model. Hence there is reason to believe that the Irish foreign direct investment experience is not anomalous.

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The preceding analysis takes host country GDP to be independent of the level of inbound foreign investment. This is a large literature that examines the impact of foreign investment on economic performance, a task made complicated by the obvious potential for a two-way relationship between these variables. While it is difficult to draw from this literature decisive evidence of a positive relationship between foreign investment and host country GDP, there is widespread belief that greater foreign investment stimulates other economic activity.

These issues have been considered at length in the context of Ireland.⁴⁰ While it is clear there are many features of the Irish economy that could account for its rapid growth and attractiveness to foreign investors, it is also clear that Ireland's low rates of taxation contributed importantly to the level and character of inbound investment activity. One of the important issues for Ireland going forward is how European integration and European policies will affect Ireland's ability to continue to offer special attractions to foreign investors. As the Irish economy develops it is natural for policy to become concerned with subtler issues than merely attracting foreign investment, and some attention has been paid recently to issues such as the possibility that the low rates of Irish taxation might discourage R&D-intensive investment in Ireland.⁴¹

5. CONCLUSION

Open economies have opportunities to benefit from world economic conditions, but to do so it is necessary to adopt appropriate government policies. The pressures on countries with open economies to lower their taxation of business income arise from several channels, but all urge roughly the same policy response. The Irish economy has benefited from the decisions on the part of Irish governments to make Ireland an attractive location for foreign investment. Tax policies represent a very important part of this broader policy mix. One of the questions for the world economy in the coming decades is how many other countries will follow the example of Ireland and others in tailoring their policies to improve their attractiveness to foreign investors. A second, and closely related, question is whether countries will consent to restrict their own ability to pursue such policies by agreeing, explicitly or implicitly, to harmonize their policies at levels that are inconsistent with national advantage.

Endnotes

1. This section draws on Hines (1997, 1999a) and Desai, Foley and Hines (2003).
2. The United States is not alone in taxing the worldwide income of its residents while permitting them to claim foreign tax credits. Other countries with such systems include Greece, Ireland, Italy, Japan, Norway, and the United Kingdom. Under U.S. law, taxpayers may claim foreign tax credits for taxes paid by foreign firms of which they own at least 10 percent, and only those taxes that qualify as income taxes are creditable.
3. Deferral of home-country taxation of the unrepatriated profits of foreign subsidiaries is a common feature of systems that tax foreign incomes. Other countries that permit this kind of deferral include Canada, Denmark, France, Germany, Ireland, Japan, Norway, Pakistan, and the United Kingdom.
4. In this example, the parent firm is eligible to claim a foreign tax credit of \$25, representing the product of foreign taxes paid by its subsidiary and the subsidiary's ratio of dividends to after-tax profits [$\$100 \times (\$100/\$400) = \25].
5. Subpart F income consists of income from passive investments (such as interest and dividends received from investments in securities), foreign base company income (that arises from using a foreign affiliate as a conduit for certain types of international transactions), income that is invested in United States property, money used offshore to insure risks in the United States, and money used to pay bribes to foreign government officials.

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- American firms with foreign subsidiaries that earn profits through most types of active business operations, and that subsequently reinvest those profits in active lines of business, are not subject to the Subpart F rules, and are therefore able to defer U.S. tax liability on their foreign profits until they choose to remit dividends at a later date.
6. FDI consists of changes in the ownership claims of controlling foreign investors. For example, an American parent firm that establishes a wholly-owned foreign affiliate with \$100 million of equity and \$50 million of loans from the parent company thereby creates \$150 million of FDI. In order for foreign investment to count as FDI, the American investor must own at least 10 percent of the foreign affiliate. FDI is the sum of parent fund transfers and American owners' shares of their foreign affiliates' reinvested earnings, minus any repatriations to American owners. Prior to 1974, the United States reported FDI only for investments in which American owners held at least 25 percent ownership shares. Reported FDI typically represents book values.
 7. Devereux and Freeman (1995) and Hines (2001) are recent exceptions.
 8. See, for example, Hartman (1984), Boskin and Gale (1987), Young (1988), Slemrod (1990), and Swenson (1994).
 9. Hines (1994) identifies exceptions to this rule that stem from the benefits of limiting equity finance in affiliates located in countries with very low tax rates in anticipation of reinvesting all of their after-tax profits over long periods.
 10. Dividend payout rates are calculated as dividends over assets. In the Hines and Hubbard sample, only 16 percent of subsidiaries with parents filing returns report paying dividends. Altshuler and Newlon (1993) find similar patterns in a related sample with a slightly reduced elasticity of dividends to tax costs.
 11. See also the evidence reported by Altshuler and Grubert (2003), who examine methods used by foreign subsidiaries to defer repatriation taxes.
 12. For a description of these data, see the appendix to Desai, Foley and Hines (2002).
 13. This section draws on Gordon and Hines (2002).
 14. This follows from the standard assumptions that capital is costlessly mobile internationally and there is no uncertainty.
 15. Dixit (1985) provides a detailed and elegant development of this argument.
 16. This equation is satisfied with an equality whenever the good is produced domestically.
 17. Note that this implies specialization in one particular industry, since this condition cannot simultaneously be satisfied for different industries selling tradables that have different capital/labour ratios. In equilibrium, a higher tax rate will cause the country to specialize in a less capital-intensive industry.
 18. Note that individual returns to saving are unaffected by τ , since this is a

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- tax on investment in the domestic economy, while returns to saving are fixed by the world capital market.
19. The discussion is simplified here by ignoring government purchases of non-tradables. Tax changes do affect the prices of non-tradables, but they imply equal changes in both government revenue and expenditures, so that these price changes have no net effect on the government budget.
 20. This section draws on Desai and Hines (2003).
 21. See, for example, the analysis in U.S. Congress, Joint Committee on Taxation (1991, pp. 232-264), and U.S. Treasury (2000).
 22. Horst (1980) identifies circumstances in which the optimal taxation of foreign income corresponds to CEN; see also Dutton (1982) and Horst (1982). These models draw on the insights of Richman (1963). Roussslang (2000) offers a recent statement of the significance of CEN.
 23. See, for example, Hamada (1966), Hufbauer (1992), Keen and Pekkiola (1997), Hines (1999a), and others surveyed by Gordon and Hines (2002).
 24. See, for example, Roussslang (2000).
 25. Exceptions include work by Levinsohn and Slemrod (1993) and Devereux and Hubbard (2003), who consider the possibility that home-country taxation influences the strategic interaction of domestic and foreign oligopolists in world markets.
 26. As Hines (1999b) and others note, the welfare cost of excessive investment in low-tax countries takes country tax rates to be unrelated to the social value of FDI. Tax rate differences between countries may instead be correlated with the net benefits governments perceive foreign direct investment to bring. Countries for whom the economic activity associated with foreign direct investment is most valuable, due to local economic conditions, tax policies, or other government policies, are the most likely to offer foreign investors attractive tax climates. Conversely, countries that perceive important costs to be associated with foreign direct investment are generally unwilling to try to attract foreign investment with low tax rates. To the extent that local tax rates reflect the local costs and benefits of FDI, it no longer follows that investment in low-tax countries is excessive from the standpoint of global welfare.
 27. This result is similar to those obtained by Slemrod, Hansen, and Procter (1997) in a related context. The desirability of exempting foreign income from taxation presumes strict adherence to international transfer pricing rules. One possible justification for the taxation of foreign income with provision of foreign tax credits is that such a system removes the incentive to reallocate taxable income to low-tax foreign jurisdictions, thereby protecting the domestic tax base (see, for example, McIntyre, 1993). The evidence, surveyed by Hines (1999a), indicates that the location of taxable income is sensitive to tax rate differences, though whether home-country taxation of foreign income is effective in protecting the domestic tax base (and whether it requires protection) is an open question.

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28. Specifically, if home-country firms have fixed capital stocks, so additional FDI comes at the expense of domestic investment, then the optimal repatriation tax rate, given by τ_r , can be shown to equal:

$$\tau_r = \frac{(1 - \tau^*)\tau(1 - \gamma)}{(1 - \tau\gamma)},$$
 in which τ is the domestic tax rate and τ^* is the

- foreign tax rate. γ is the product of the additional foreign investment triggered by a dollar of outbound FDI by home country firms and the ratio of the marginal products of foreign and domestic investors in the home country. This 34 percent calculation uses the U.S. statutory rate of 35% $[(1 - 0.75)/(1 - 0.35 * 0.75)]$.
29. The forces driving this type of competitive process are evident in the behaviour of firms that relocate their corporate homes between jurisdictions in response to tax system differences, as documented by Desai and Hines (2002).
30. This section draws on Hines and Rice (1994) and Gordon and Hines (2002).
31. The value of μ adjusts to ensure that (6) holds with equality.
32. In countries with high tax rates, multinationals have advantages over local firms, because they are able to reallocate taxable profits to reduce the impact of the high local taxes. Their advantage over local firms in tax havens stems from the desirability of tax haven operations as recipients of taxable income reallocated from elsewhere.
33. For this reason, many foreign direct investment studies including Hines and Rice (1994) and Desai and Hines (1999) use tax rates defined as the ratio of foreign income tax payments to foreign pre-tax income.
34. See, for example, the European evidence offered by the European Commission (2001).
35. Predicted Irish residuals in the equations reported in columns 4-6 vary between 9.0 percent and 9.2 percent; those for the equations reported in columns 1-3 (without the European Union dummy variable) vary between 6.4 percent and 7.4 percent.
36. This coefficient on the European dummy variable is not statistically significant, though removing the higher powers of log per capita GDP produces a larger and statistically significant Europe effect, as in the regression reported in column 3.
37. The tax rate coefficient has a t-statistic of only -1.57, making it statistically insignificant, though this reflects in part the heterogeneity of the countries included in the sample, the imprecision of the tax rate measure, the measurement of the dependent variable, and the absence of other, more detailed control variables on the right side of the equation. By including population and income as independent variables in the foreign investment equation, the estimation implicitly removes any effects of tax rate

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40. See, for example, Honohan and Walsh (2002) and Barry (2004).
41. See, for example, Circa Group (1998) and Barry (2005). In evaluating the impact of low corporate tax rates on R&D it is important to understand the appropriate counterfactual. Most countries effectively exempt R&D activities from taxation by permitting immediate expensing for tax purposes; in addition, several offer modest tax credits for qualifying R&D expenditures. There is extensive evidence of the efficacy of such tax subsidies in stimulating additional R&D activity (see Hall and van Reenen, 2000). In the absence of explicit subsidies, and if all countries simply permit R&D expenses to be deducted, then all subject R&D investment to the same, namely zero, effective taxation. Countries with lower statutory tax rates will attract greater levels of other forms of investment, making their R&D/sales or R&D/physical capital ratios look low, but it does not follow that they discourage R&D; what is really happening is that they are encouraging the use of other capital inputs at greater rates than they do R&D. As sketched in section 2, it is likely that low tax rates indirectly encourage local R&D activities as a method of permitting taxable income to be reported as accruing in low-tax environments.

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DISCUSSION

Frank Barry: Much of the argument in Jim Hines' paper is based on the extreme case where capital is perfectly mobile internationally and labour is immobile. Under these conditions the Diamond-Mirlees result arises: that workers are better off if taxes are imposed on labour than on capital.

The result would be the opposite of course if labour were internationally mobile and capital were fixed. It may be worthwhile to think about this in a sector-specific-capital model, as devised by Caves specifically with multinational corporations in mind. Think of capital in the non-traded sector as a function of population (since retail banks and shops, for example, need to locate close to their markets), and let manufacturing-sector capital be perfectly mobile. This will mean that non-traded capital will be about as mobile as labour, while traded-sector capital will be more mobile. Thus it is hard to disagree even in this case that overall capital is more mobile than labour for Ireland.

Many in Ireland who might balk at the Diamond-Mirlees result might have in mind the windfall gain granted to capital in non-traded services by the recent intersectoral harmonisation of the corporation tax rate at 12.5 percent. In this they are rejecting the plausibility of the assumptions that underlie the Diamond-Mirlees result. If they, and I, are correct that capital mobility is not the same across sectors then it is difficult to avoid the conclusion that it is inefficient for the European Commission to require that the same corporation tax rate be levied across sectors. Indeed it is a commonplace in the theory of public finance that higher rates should be levied on less mobile factors, and thus that the traditional Irish policy of levying a higher corporation tax rate on non-tradeable services was appropriate.

Even if capital is perfectly mobile internationally in the long run, mobility is not instantaneous and thus the tax burden is shifted onto labour only over time. If discount rates are very high it seems to me that the argument that it is more efficient to levy taxes on labour than on capital may not go through so smoothly.⁴¹

The notion of "location-specific capital" (such as the FDI attracted in by North Sea oil for example) cropped up tangentially in the paper. This is an important plank in one of the arguments against EU-wide corporation tax harmonisation. The logic of the argument in favour of harmonisation is based on the notion of a race to the bottom; if one country captures a lot of FDI through levying low tax rates, others will follow and the tax-competition game will lead to a huge transfer of rents from

the competing governments to the multinational companies over which they are competing.

Some claim that this race to the bottom has been taking place, as rates across the EU have come down over time. Others such as Baldwin and Krugman (2004) claim to the contrary that there has been a race to the top, as rates—which they define as corporation tax take as a share of GDP—have risen, and have risen faster in the EU periphery than in the EU core. They propose that this arises as the various EU countries develop their own set of FDI attractors—any idiosyncratic characteristics that prove attractive to FDI. Their argument is based on the notion that countries are not symmetric as assumed in the models that underlie the ‘race to the bottom’ argument.⁴¹

Countries are clearly not symmetric. For example, the Hines paper shows that smaller economies, other things being equal, prefer lower corporation tax rates. Why? Their tax bases are more elastic because they have fewer activities specific to their territories. I have redone Hines’ estimation to show that peripherality—defined as distance from purchasing power—has even stronger effects than country size. The more peripheral the EU country, the lower its effective corporation tax tends to be. Why? Because centrality (and, presumably, good infrastructure) are attractors for core countries and they can then use these attractors to tax some of the rents accruing to the multinational corporations that locate there.⁴¹

In the Baldwin-Krugman analysis both core and periphery countries may lose if forced to move to some average harmonised rate—the periphery countries because they will become less competitive, and the core countries because they are forced to move to below their optimal rates.

Hines dislikes harmonisation for another reason, arguing that the competitive aspects of the tax competition game force out tax inefficiencies. If these competition effects are relatively small however (which Hines clearly does not believe), there will be gains from co-operation for the overall EU if location-specific rents for the EU are higher than for EU countries acting individually. The presence of such EU-specific rents is indeed suggested by the positive dummy for EU membership in Hines’ regressions. Even in this case, though, the gainers from harmonisation should be able to compensate the losers—of which Ireland would be the leading one according to Gropp and Kostial (2000).

Finally, let me point out the very interesting material in footnote 39, where Hines points out that low corporation taxes do not necessarily act as a disincentive to R&D, as one frequently hears said in discussions of the Irish economy, e.g. O’Sullivan (2000). R&D intensity is measured relative to output or employment. Hines argues that if corporation taxes are indeed neutral towards R&D but expand the denominator by raising foreign-sector output and employment then they will

reduce measured R&D-intensity but not the actual level of R&D undertaken. I think there needs to be more discussion and research into this in Ireland. Desai, Foley and Hines (2002) show that in 1997 the only countries with similarly low effective corporation taxes as Ireland are Bermuda, China, Singapore, Hong Kong and Switzerland, so it would be interesting to compare sectoral R&D undertaken in these countries with the levels reported for Ireland. In any case, though, offering tax credits for R&D expenditures— towards which a first step was taken in the Finance Act of 2004—is likely to be advantageous.

I thank Jim Hines for his learned and stimulating paper to the Society, and am delighted to propose the vote of thanks.

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