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# TAXES AND THE FORM OF OWNERSHIP OF FOREIGN CORPORATE EQUITY

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## ABSTRACT

Investors can achieve international diversification in their portfolios not only through purchasing foreign equity directly but also through investing in domestic firms which then invest abroad. Yet these alternative approaches are taxed very differently. A number of countries have also imposed various forms of capital controls restricting direct purchases of foreign equity. This paper estimates the degree to which these tax and nontax factors have affected the relative use of these two alternative methods of international diversification, using data on investment in the U.S. by investors from each of ten other countries during the period 1980-1989.

While the composition of equity flows differs dramatically across countries, taxes do not appear to play an important role in the data in explaining this variation. Part of the explanation appears to be that tax distortions adjust endogenously to avoid large scale portfolio investments abroad. With the increasing integration of capital markets and the easing of capital controls in many countries, we have seen and expect to continue to see reductions in the tax distortions affecting the form of international capital flows.

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# Taxes and the Form of Ownership of Foreign Corporate Equity

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Investors in risky corporate capital face strong economic incentives to diversify their holdings not only across firms within their own country but also across firms in other countries.[1] The most commonly discussed method of such international diversification involves investing in multinational firms based in the home country which then invest throughout the world. The tax treatment of investment abroad by multinational firms is extremely complicated, and has appropriately been the subject of substantial research.[2]

Foreign direct investment is not the only means through which investors in one country can acquire ownership of equity in another country, however. The obvious alternative is for them simply to purchase shares in foreign equity in the securities market or to buy shares in a mutual fund which invests in foreign equity. These alternatives, known as portfolio investment, face a very different statutory tax treatment than foreign direct investment. In addition, while tax enforcement is always a problem with investments abroad, enforcement problems are likely to be far worse with portfolio investments than with foreign direct investments, to the point that portfolio investments abroad are often referred to as capital flight.

The objective of this paper is to estimate the degree to which differences in the tax treatment of portfolio investments vs. foreign direct investments have affected empirically the relative use of these alternative routes through which investors can purchase foreign equity. Our data set consists of aggregate information, much of it previously unpublished, on both portfolio and foreign direct investments in U.S. equity made by investors from each of ten other countries during the period 1980–1989.

The relative importance of portfolio equity investment vs. foreign direct investment will be affected by more than just tax factors. When corporations invest abroad, for example, they acquire both ownership and control over the foreign firms, whereas portfolio investors

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merely acquire ownership. This makes corporate investments more attractive to the extent to which there are synergy gains from joint operations of the domestic and foreign firms. In addition, some countries discourage portfolio investment abroad through use of capital controls. In the empirical work, we attempt to control for the effects of these nontax factors on the relative importance of portfolio vs. foreign direct investment.

The principle conclusions of the study are as follows. First, portfolio investment is quantitatively important. In spite of the presence in half of the countries in our sample of capital controls, which restrict portfolio investments abroad, portfolio investment in U.S. equity from our sample countries was still on average about two–thirds the size of foreign direct investment from these countries. Yet most studies of the taxation of international equity flows have confined their attention solely to foreign direct investment, thereby missing an important component of these equity flows.

Not surprisingly, portfolio investment plays a much more limited role among investors from countries with important capital controls. This is true even though these countries generally have much higher personal tax rates on dividends, in itself making portfolio investment much more attractive given the ease with which domestic personal taxes can be evaded on portfolio investments abroad. Apparently, these capital controls are effective enough that the countries can impose high taxes on dividends without inducing much capital flight, making such taxes much more attractive. It is not surprising, therefore, that the countries which eased capital controls during our sample period also tended at about the same time to lower their personal tax rates on dividend income. Given the substantial easing of capital controls in recent years and therefore the greater ease of capital flight, we would forecast both an increasing importance of portfolio investment in the future and further cuts in the personal income taxation of dividend income.

By focusing our study narrowly on the form of ownership of foreign equity, we avoided a number of complications that normally arise in any study of international portfolio holdings. For example, Adler–Dumas(1983) and French–Poterba(1991) both emphasize the puzzling lack of international diversification of equity portfolios. In our study, we take as given the total holdings of foreign equity, and focus solely on the form in which this foreign equity is owned. Implicitly, we assume that whatever factors explain the lack of

international diversification of equity portfolios do not also affect the relative attractiveness of the two alternative forms of ownership of foreign equity. In addition, many complicated factors can affect the degree to which international capital flows take the form of debt vs. equity. We take as given the degree to which equity is used, and focus solely on how this equity is purchased.

The organization of the paper is as follows: In section 1, we analyze how taxes distort the relative attractiveness of portfolio vs. direct investment. Nontax factors are summarized in section 2. In section 3, we describe the measurement of the various data series used in the empirical work, while the empirical results are described in section 4.

## 1. Tax distortions

In order to assess how taxes affect the relative attractiveness of portfolio equity investment vs. foreign direct investment, we compare the tax treatment of each type of capital flow.

*Tax treatment of portfolio investment*

We begin by analyzing the tax implications when an investor living in country $i$ buys directly a share of equity costing a dollar in firm $f$ in country $c$. Assume that this firm earns pretax economic income, per share, of $x_{cf}$. Based on the tax code in country $c$, it has taxable income per share of $x^c_{cf}$, and faces a statutory corporate income tax rate of $\tau^s_c$,[3] resulting in corporate tax payments of $\tau^s_c x^c_{cf}$.[4] The firm's income net of corporate taxes is therefore $x_{cf} - \tau^s_c x^c_{cf} = x_{cf}(1 - \rho_{cc}\tau^s_c)$. Here, $\rho_{cc} \equiv x^c_{cf}/x_{cf}$ measures the ratio between taxable income and economic income for firms in country $c$ based on the tax law in country $c$. For simplicity of notation, let $\tau_c \equiv \rho_{cc}\tau^s_c$.

Assume that the firm pays out the fraction $d$ of this net income as dividends each period. If the share owner lives in country $i$, then this dividend is subject to a withholding tax in country $c$ at rate $w_{ci}$.[5] Individuals therefore receive income net of foreign taxes of $x_{cf}(1 - \tau_c)(1 - dw_{ci})$.

In principle, share owners still owe personal income taxes on this income. However, it is extremely difficult for a government to enforce a tax on foreign-source income. In general, taxes on individual investors are primarily enforced either by requiring financial intermediaries to report directly to the government the income earned by domestic residents, or by

withholding at source. When individuals invest in foreign corporations through domestic financial intermediaries, these intermediaries can also be required to report the resulting income of each investor to the government, making enforcement straight–forward.[6] However, when residents invest abroad through foreign financial intermediaries, neither approach is feasible — these intermediaries cannot be required to withhold taxes for another government or report information to another government.[7] Since the home government has little ability to detect evasion in these circumstances, investors have little incentive to pay domestic taxes on such income. If they do evade domestic taxes, then their net income is simply $x_{cf}(1-\tau_c)(1-dw_{ci})$.

If individuals invest abroad through domestic financial intermediaries, however, then the government should be able to monitor their earnings, forcing the individual to pay domestic taxes on this income.[8] Under standard double–taxation conventions, they are taxed at home on their pre–withholding–tax dividends, $dx_{cf}(1-\tau_c)$, but receive a credit up to the amount of any domestic taxes owed for the withholding taxes paid abroad. If the typical personal tax rate in country $i$ on dividend income is $m_i$, then the net receipts of shareholders equal

$$x_{cf}(1-\tau_c)[1-d\max(m_i, w_{ci})]. \tag{1}$$

In addition, the investors receive capital gains, and may owe capital gains taxes if they sell shares. For simplicity, however, we ignore capital gains taxes. We will use expression (1) to describe the net receipts of portfolio investors even when investors evade personal taxes. When evasion is assumed, $m_i$ will simply be set equal to zero.

*Tax treatment of foreign direct investment*

If individuals invest abroad instead by investing further in a domestic firm which then uses these funds to buy a dollar of equity in the same firm $f$ in country c, the tax treatment would be much more complicated. To begin with, the tax treatment varies depending on the fraction of shares in the foreign firm purchased by the domestic corporation. The U.S., for example, requires that a domestic firm own at least ten percent of the shares in a foreign firm to qualify for a credit for taxes paid abroad, and own at least fifty percent to be able to pool earnings from this firm with those from other majority–owned firms

abroad. The tax treatment also varies depending on whether the foreign firm is organized as a subsidiary or a branch of the domestic firm. In the former case, domestic taxes are due only when profits are repatriated, while in the latter case, domestic taxes are owed each year on the entire profits.[9] For simplicity, we focus on the dominant case, that of a subsidiary in which at least fifty percent of the shares are owned by the foreign parent.

The pretax income per share, $x_{cf}$, of this subsidiary is as before subject to corporate income taxes at an effective rate $\tau_c$. Dividend payments remain subject to withholding taxes in country $c$. If the parent is based in country $i$,[10] then the withholding tax rate is denoted by $w^*_{ci}$. Commonly, $w^*_{ci} < w_{ci}$, in itself giving a tax advantage to foreign direct investment. If the dividend payout rate is $d$, then income net of taxes in country c equals $x_{cf}(1-\tau_c)(1-dw^*_{ci})$.

Corporate and personal taxes may be owed in country $i$ on the dividends received from this foreign subsidiary. In countries with a territorial tax system, such as the Netherlands, corporations do not owe tax on foreign-source income. Other countries, e.g. Canada and Germany, exempt from domestic corporate taxes any foreign-source income earned in countries with which they have signed tax treaties. In these cases, the only additional taxes owed are personal taxes on the dividend income. In order to equate the dividend payout rate in the cases of individual portfolio investment vs. corporate direct investment, we assume that all net-of-tax dividends received from abroad are then distributed to individual investors. If we denote by $m^*_i$ the personal tax rate on this income, then the final net income equals[11]

$$x_{cf}(1-\tau_c)[1-d(w^*_{ci}+(1-w^*_{ci})m^*_i)]. \qquad (2a)$$

Most countries, however, tax the pretax income needed to finance the dividends received by domestic corporations from foreign subsidiaries, but allow corporations a credit for any corporate and withholding taxes paid abroad. These credits can reduce or eliminate taxes due on the foreign-source income, but cannot reduce taxes due on any domestic-source income. Consider first the case of a multinational based in country $i$ which invests only in firm $f$ in country c. This multinational receives dividends per share from abroad equal to $dx_{cf}(1-\tau_c)(1-w^*_{ci})$. Under standard double-taxation conventions, it owes domestic

corporate taxes on the corporate income, before both corporate and withholding taxes, needed to finance these dividends, but receives a credit up to the domestic corporate taxes owed for all taxes paid abroad on this income. In particular, if the subsidiary's total income before any taxes, as defined under the tax law of country $i$, is denoted by $x^i_{cf}$, then the parent owes domestic taxes at statutory rate $\tau^s_i$ on the fraction of this income equal to the ratio of its dividend receipts to the subsidiary's income net of corporate taxes paid to country $c$, and receives a credit for the same fraction of the corporate taxes paid to country $c$, as well as for all withholding taxes paid. Net corporate taxes owed in country $i$ on the dividend income $dx_{cf}(1-\tau_c)(1-w^*_{ci})$ therefore equal

$$\frac{dx_{cf}(1-\tau_c)}{(x^i_{cf}-\tau_c x_{cf})}(\tau^s_i x^i_{cf}-\tau_c x_{cf})-w^*_{ci}dx_{cf}(1-\tau_c),$$

or zero, whichever is larger. If $\rho_{ci}$ is defined to equal $x^i_{cf}/x_{cf}$, and $\tau_{ci} \equiv \rho_{ci}\tau^s_i$, then the parent's dividend receipts net of domestic corporate taxes equal, after simple algebra, $dx_{cf}(1-\tau_c)\min[(1-w^*_{ci}),(\rho_{ci}-\tau_{ci})/(\rho_{ci}-\tau_c)]$, while the shareholders' income, including retained earnings but net of personal taxes, equals

$$x_{cf}(1-\tau_c)\left\{(1-d)+d\min\left[(1-w^*_{ci}),\left(\frac{\rho_{ci}-\tau_{ci}}{\rho_{ci}-\tau_c}\right)\right](1-m^*_i)\right\}. \qquad (2b)$$

The role of $\rho_{ci}$ in this expression deserves some discussion. If $\rho_{ci}=1$ and a corporate surtax is due on repatriated income, then this income is taxed on net at the same rate as domestic-source income — foreign taxes are fully rebated. If $\rho_{ci}<1$, however, then the effective tax rate on repatriated income is higher than that on domestic source income if $\tau_{ci}>\tau_c$, and conversely. The understatement of foreign-source income results in too large a fraction being taxed, for a given amount of dividend repatriations, but it also results in a credit for too large a fraction of foreign tax payments. The net effect depends on whether the foreign or the domestic effective tax rate is larger.

When a multinational invests in several foreign countries, it is normally allowed to pool the income repatriated from all of these countries, and credit against the domestic taxes due on this income any corporate and withholding taxes paid abroad on this income. In doing so, it can use excess credits from operations in one country to reduce any domestic taxes due on operations in another country. If, in total, its credits are sufficient to wipe

out its domestic tax liabilities on its foreign operations, world-wide, then no domestic corporate taxes result in particular from its operations in country $c$. In this case, its final net income is the same as in the "territorial" case, as shown in expression (2a). If, in contrast, its credits are insufficient to wipe out all domestic taxes due on foreign-source income, then it can receive a credit for all corporate and withholding taxes paid in country $c$, even if these taxes exceed the domestic taxes due on repatriations from country $c$. In this case, its final net income equals

$$x_{cf}(1-\tau_c)\left[(1-d)+d\left(\frac{\rho_{ci}-\tau_{ci}}{\rho_{ci}-\tau_c}\right)(1-m_i^*)\right]. \tag{2c}$$

Through careful allocation of its investments and timing of its repatriations, a corporations should normally be able to avoid domestic corporate taxation of its foreign operations.[12] Whenever it invests in a low-tax-rate country, where corporate and withholding taxes will be insufficient to offset domestic taxes, it can simultaneously invest in a high-tax-rate country. Repatriations should then occur simultaneously from each country, so that total tax payments abroad just equal total tax liabilities at home, pre credit. Not all firms may find this tax planning worth the effort. Planning sufficient to wipe out domestic corporate taxes becomes more difficult, if not impossible, when the domestic corporate tax rate is high. Therefore, in general, when pooling is allowed, some firms will earn net income described by expression (2a) and some will earn net income described by expression (2c). The percent facing expression (2c) should rise as $\tau_{ci}$ rises, where we denote the percent facing expression (2c) by $\theta$.[13] We therefore will use a weighted average of expressions (2a) and (2c) to measure the net income from corporate investments, with weights $(1-\theta)$ and $\theta$. To capture the relation between $\tau_{ci}$ and $\theta$, we let $\theta = \mathrm{a} + \mathrm{b}\tau_{ci}$. Theory suggests that $\mathrm{b} > 0$, and that $\theta = 0$ for relatively low $\tau$, implying that $\mathrm{a} = -\mathrm{b}\tau' < 0$ for some low $\tau'$.

Since 1986, the U.S. requires that repatriations from subsidiaries which are not majority owned must each be put in a "separate basket," preventing this pooling of credits. If this applied to all firms, then net income would be measured by (2b). However, pooling of credits is still allowed among firms that are each majority owned. Therefore, for the U.S. the new provisions should not change the incentives faced by most firms. We assume that "pooling" is the norm in the countries in our study which use a crediting system.

Two of the countries in our study use a hybrid system. In particular, France and Italy exempt a certain fraction, $e$, of repatriated foreign-source income from domestic corporate taxes.[14] On the remaining income, domestic taxes are due on the income received prior to withholding taxes paid abroad; the amounts paid in withholding taxes on the remaining income can then be claimed as a credit against domestic corporate taxes. Implicitly, foreign corporate tax payments are deductible from domestic taxable income. Net domestic corporate tax payments then equal $dx_{cf}(1-\tau_c)(1-e)(\tau_{ci}-w^*_{ci})$. After taking into account personal income taxes, a firm's net income is

$$x_{cf}(1-\tau_c)\{(1-d)+d[1-ew^*_{ci}-(1-e)\tau_{ci}](1-m^*_i)\}. \qquad (2d)$$

What factors affect the personal tax rate $m^*_i$? To begin with, $m^*_i$ should equal the value $m_i$ would take, ignoring evasion.[15] When dividend-imputation schemes are available to domestic investors in domestic corporations, however, $m^*_i$ but not $m_i$ will be reduced. Under these schemes, an investor in country $i$ receiving dividends of $\delta$ from a domestic corporation is imputed to have received dividends of $\delta/(1-s_i)$, for some tax parameter $s_i$, which are then taxable under the personal income tax. However, the investor gets a tax credit of $s_i\delta/(1-s_i)$. On net, therefore, the individual owes taxes of $(m_i-s_i)\delta/(1-s_i)$, so that $m^*_i=(m_i-s_i)/(1-s_i)$. Under a full imputation scheme, $s_i=\tau^s_i$. On net, $m^*_i$ is always less than or equal to $m_i$.

Countries do, however, try to restrict investors' ability to use the dividend-imputation scheme on dividends from domestic corporations financed by earnings from abroad. Typically, countries require that dividends eligible for the dividend-imputation scheme be less than the firm's after-tax profits from domestic operations. Unless a firm desires an abnormally high dividend payout rate, however, this restriction is unlikely to be binding. In the empirical work, we have assumed that these restrictions are not binding.

What about evasion of personal taxes? When individuals buy shares in domestic corporations, in principle the government can require that these corporations report to the government the dividends paid to all domestic residents, making the tax on dividends easily enforceable. Alternatively, the government can withhold taxes on dividends at source. Evasion cannot be ruled out, however. Some countries, for example, do not require firms

to file such reports. Even if they do require firms to file such reports, individuals can buy shares in domestic corporations through foreign financial intermediaries, making it difficult or impossible for the government to learn independently how much dividends these individuals receive.[16] To allow for the possibility of evasion, we will try replacing $m_i^*$ by $\min(m_i^*, 0)$ in some of the regressions described below. We try this alternatively for all countries and for just the countries in continental Europe, where evasion seems to be more prevalent.

So far, we have assumed that the dividend payout rate is the same for corporate and portfolio investments. In general, dividend payments result in extra taxes, so firms should avoid dividend payments unless the nontax gains from these payments outweigh their tax cost. These nontax factors could include cash needs of the shareholders as in Poterba-Summers(1985), the desire to limit agency costs as in Easterbrook(1984), or the signaling role of dividends as in Bhattacharya(1979). With portfolio investment, the dividend payout rate is chosen by the foreign firm based presumably on the nontax factors affecting its domestic shareholders. With corporate direct investment, in contrast, the parent can choose separately the dividend payout rate from the subsidiary to the parent and the dividend payout rate from the parent to the shareholders, in each case based on considerations affecting shareholders in country $i$. To the extent it gains from this extra flexibility, there is more of an advantage to corporate direct investment than is seen comparing equations (2a) and (2c) with equation (1). Hines-Hubbard(1989), for example, shows that subsidiaries appear to time their payouts to their parents so as to avoid surtaxes at repatriation, while Hines(1991) reports that parents have much higher payout rates to shareholders than do firms without foreign subsidiaries, perhaps because signaling is more important for firms with foreign operations. Firms therefore do seem to take advantage of the flexibility they have over dividend patterns.

Similarly, the above discussion assumes the same use of debt finance, regardless of the form of ownership. In general, firms in countries with high corporate tax rates should borrow relatively more, using bonds denominated in the currencies of countries with high inflation rates.[17] Multinationals may have extra flexibility, however. For example, a multinational may face less risk of default, since it can pool relatively independent risks from

its operations in two different countries, so be able to borrow more. In addition, if it can use its combined assets as collateral for loans, regardless of which firm does the borrowing, then it can concentrate its borrowing in the country where the deductions are more valuable. The gain from doing so would be greater the larger the difference in marginal tax rates applicable to interest deductions in the two countries. To the degree to which multinationals respond to these differences, there is more of an advantage to corporate direct investment in countries with extreme tax rates, both high and low, than is seen comparing equations (2a) and (2c) with equation (1).

We have also ignored any flexibility a multinational has to shift its taxable income towards countries with lower tax rates. They can do this not only through manipulation of the transfer prices used for goods and services traded between the subsidiary and the parent, but also through such devices as the location of ownership of corporate patents. The gain from shifting a given amount of taxable income to the low-tax country is proportional to the absolute value of the difference in the marginal tax rates affecting income accruing in each country.

To try to capture the gains available to a multinational through reallocation of interest deductions, and taxable income more generally, we include in the regression the absolute value of the difference in the statutory corporate tax rates in the two countries, $\text{abs}(\tau_c^s - \tau_i^s)$.[18] Harris et al(1991) do find that reported profits of U.S.-based multinationals vary as forecast with the corporate tax rates faced by their foreign subsidiaries, supporting this story.

*Comparison of net tax rates*

How do the net tax rates compare on portfolio investments vs. corporate direct investments? On portfolio investments, the investors' net income from an investment in firm $f$ in country $c$ equals $x_{cf}(1-\tau_c)[1-d\max(m_i, w_{ci})]$. On corporate direct investment by multinationals based in countries using the credit system, we have measured the net income from the same investment by a weighted average of expressions (2a) and (2c) (with weights $(1-\theta)$ and $\theta$) plus the gain from transfer pricing of $\gamma\text{abs}(\tau_c^s - \tau_i^s)$, where $\gamma$ measures the relative importance of this term.

After some simplification, the net tax advantage of portfolio investment can be expressed by

$$dx_{cf}(1-\tau_c)[w^*_{ci}+(1-w^*_{ci})m^*_i-\max(m_i,w_{ci})]$$

$$+\theta dx_{cf}(1-m^*_i)\left[A_{ci}(\tau_{ci}-\tau_c)-w^*_{ci}(1-\tau_c)\right]-\gamma\text{abs}(\tau^s_c-\tau^s_i), \qquad (3)$$

where $A_{ci} \equiv (1-\tau_c)/(\rho_{ci}-\tau_c)$. This expression consists of three terms. The first term describes the tax advantage if corporate investors owe no domestic corporate taxes when profits are repatriated. Corporate investors cannot claim a credit for withholding taxes against their personal tax liabilities, whereas portfolio investors can, giving an advantage to portfolio investments. Both withholding tax rates and personal tax rates tend to be lower, however, for corporate investments. The second term measures the extra tax burden corporate investors face if they are in a deficit–credit position, so pay at least some domestic corporate taxes on repatriated earnings. The third term measures the tax advantage corporate investors have through use of transfer pricing.

In sum, portfolio investors gain because they may be able to avoid domestic personal taxes on their foreign–source income, and by construction they face no domestic corporate taxes at repatriation. If they do pay personal taxes, they can claim a credit for withholding taxes. Corporate investors, in contrast, may well owe domestic corporate taxes at repatriation. On their foreign operations as a whole, these domestic taxes are always non-negative. However, by operating in a particular high–tax–rate country, they may reduce their domestic corporate taxes by using excess credits from operations in that country to reduce domestic taxes due on other foreign operations, so that the second term in equation (3) can sometimes be negative. Corporate investors also often face lower withholding tax rates on their repatriations, and can take advantage of transfer pricing. Even if their shareholders cannot evade personal income taxes, these personal tax obligations are reduced in countries which use a dividend imputation scheme. On net, the sign as well as the size of the net tax distortion will vary by country and over time.

For multinationals based in territorial countries, no corporate surtaxes are due at repatriation, so that the second term in equation (3) would be zero. For France and Italy, however, which use a hybrid system, this second term would equal the corporate taxes due at repatriation, so would equal $dx_{cf}(1-\tau_c)(1-e)(1-m^*_i)(\tau_{ci}-w^*_{ci})$.

## 2. Nontax factors

Many nontax factors also affect the relative importance of portfolio vs. corporate investments abroad. One key difference between the two is that corporate investments abroad allow joint control and operation of production in the two countries, whereas portfolio investments just affect ownership of the firm's income. Consider, for example, the situation of a firm based in country $i$ that owns a distinct product or technology that can profitably be manufactured in country $c$. This could occur because factor prices in country $c$ are more favorable, e.g. wage rates are lower and the firm's production is relatively labor intensive; it could occur because transportation costs make it cheaper to produce the good nearer the foreign customers, e.g. shipping the syrup for Coca Cola is cheaper than shipping the bottled soda; it could occur because trade barriers prevent sales of the product to foreign customers unless the good is produced locally; or it could result from the greater ease of adjusting the product to accommodate local tastes if production occurs on site, or if the distribution outlets are owned by the manufacturer.[19] These advantages may be sufficient to induce corporate investment in country $c$ even if it is taxed less favorably than portfolio investment in country $c$. The greater the tax disadvantage of corporate investments, the more important these nontax advantages must be to justify the investments.

All of these pressures are based on the premise that firms in country $i$ have some distinct products or technologies. The more this is the case, therefore, the greater these nontax pressures, everything else equal. We proxy the degree to which firms in a country own distinct products or technologies by a measure of the R&D effort in that country.[20]

When the nontax advantages of investing in country $c$ are large, what options does a firm have to reduce or eliminate any tax disadvantages of this investment? One option would be to license use of the technology to firms in country $c$, thereby allowing the technology to be used there while limiting the extent to which tax-disadvantaged investment must occur in country $c$. While transferring the technology to a subsidiary may allow better control over use of the technology, better control over access to information about the technology, and better transfer of information about the detailed characteristics of the technology, taxes may outweigh these advantages of common ownership.

When the gains from joint operation arise from other sources, other types of contractual links may arise which allow the firm to avoid tax-disadvantaged capital flows. For example, if the gain from joint operation is simply common control over pricing, then cartels might be set up instead to coordinate pricing. Similarly, distribution outlets can be arranged through contractual links, as with chain stores, rather than through direct ownership.

If common ownership is essential for nontax reasons, then another option is to have the user of the technology in country $c$ buy the owner of the technology in country $i$. Tax considerations would normally favor one direction of capital flow over the other. Ignoring withholding taxes and personal taxes, for example, the tax loss from corporate direct investment results from the corporate surtax that may be due when profits are repatriated to the parent corporation. When the multinational is operating in a "high-tax" and a "low-tax" country, then this surtax would be due if profits are repatriated from the "low-tax" to the "high-tax" country, but not conversely. Therefore, in this case joint ownership should occur through the firm in the "low-tax" country raising funds world-wide to finance the purchase of the firm in the "high-tax" country. If direct investment from country $i$ to country $c$ is tax disadvantaged, direct investment from country $c$ to country $i$ is likely not to be.

In certain cases, however, gains from joint operation may well require paying the extra taxes that result from a firm in a "high-tax" country taking over a firm in a "low-tax" country. For example, when operations of the potential multinational in one country are much larger than in the other countries, then it is much easier for this firm to acquire the other firms. If so, how large a capital flow is needed to acquire the gains from joint operation, and are further gains possible through larger capital flows? The surtax paid, everything else equal, will be proportional to the size of the capital flow, providing an incentive to minimize the amount of direct investment. This can be done by purchasing a smaller share of the equity in the subsidiary or by using relatively more debt in financing investments there. It might also be done by setting up a joint venture, in which most of the financing comes from the foreign partner. The share of the profits going to the firm in country $i$ can be adjusted as needed to reflect the value of the technology it contributes to the joint venture. In each case, corporate direct investment from country $i$ to country $c$ is reduced or eliminated while still maintaining the economic advantages of joint operation.

A variety of other nontax factors could also prove to be important. One obvious one is the use of capital controls in a number of the countries in our sample. These controls can take a variety of forms. France, for example, had regulations from 1981 – 1986 which allowed the purchase of foreign assets only from other French residents, in principle preventing any increase in portfolio investment abroad. Italy in contrast required that residents deposit funds equal to fifty percent of the amount invested abroad in an interest-free account. We saw no way to capture directly the effects of such diverse regulations on equity flows.

In order to test for the possible importance of capital controls, we simply included a dummy variable, denoted by $C_{it}$, which is set equal to one if in that country in that year significant restrictions exist on portfolio investment abroad. We experimented with alternative definitions of "significant." Countries with capital controls would be expected to have less portfolio investment abroad. We also tested to see whether controls make portfolio investment less responsive to changes in tax incentives.

## 3. Data on relative tax rates and the composition of capital flows

In order to test the sensitivity of the composition of international capital flows to these tax incentives, we have collected data on the relative tax treatment of portfolio vs. direct investment in the U.S. coming from each of ten other countries, and the composition of capital flows to the U.S. from each of these countries during the period 1980–89. These ten countries are Australia, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, and the U.K.[21]

*Relative tax rates*

In total, we need data for $m_i$, $m_i^*$, $w_{ci}$, $w_{ci}^*$, $\tau_c$, $\tau_{ci}$, $\tau_i^s$, $A_{ci}$, R&D intensity, and the dummy variable $C_{it}$ measuring the presence of capital controls, yearly from 1980 to 1989.

$m_i$: To begin with, we set $m_i$ equal to the top marginal tax rate prevailing in country $i$ in each year. Where appropriate, we took into account both Federal and local tax schedules. Given the concentration of wealth holdings among investors in the top tax brackets and given the greater tendency among those in the highest tax brackets to invest in equity,

this assumption seemed reasonable.[22] Data on these rates were taken from various issues of Coopers and Lybrand's *International Tax Summaries*.[23] The resulting tax rates for the period 1980–9 are reported in Table A1. In most of the regressions, however, we set $m_i$ equal to zero, on the presumption that individuals can easily evade domestic taxes on portfolio investments abroad.

$m_i^*$: To calculate $m_i^*$, we used our estimate of the top marginal tax rate along with information about the characteristics of any dividend imputation scheme available in country $i$ in that year. This information was again taken from Coopers and Lybrand's *International Tax Summaries*.[24] The resulting tax rates are reported in Table A2.

$w_i$ and $w_i^*$: Here, we simply used statutory rates for dividend payments from country c to country $i$ in that year, as reported by Coopers and Lybrand. These withholding tax rates are reported in Table A3. These figures ignore the possibility of firms routing dividend payments through a third country.[25]

$\tau_i^s$ and $\tau_c^s$: In each case, we used the statutory rate that applied to the largest firms in that year. Data again came from Coopers and Lybrand. When state or provincial governments in that country also taxed corporate profits, we used a combined tax rate.[26] This approach does not take into account the possibility that firms may have tax losses, so face a zero marginal tax rate, or be subject to supplementary taxes, e.g. an alternative minimum tax. When the statutory tax rate changed during the calendar year, we used a weighted average tax rate. The resulting tax rates are reported in Table A4. A few of the countries in the sample use a split-rate system, taxing income that is retained at a different rate than income that is paid out as dividends. For these countries, both rates are reported in Table A4.

$\tau_c$, $\tau_{ci}$, and $A_{ci}$: By definition, $\tau_c = (\tau_c^s x_{cf}^c)/x_{cf}$, and $\tau_{ci} = (\tau_i^s x_{cf}^i)/x_{cf}$. In each case, the numerator equals actual tax payments, while the denominator equals economic income, so that the ratio measures an effective corporate tax rate. For $\tau_c$, this is the effective corporate tax rate on foreign holdings in the U.S. Most firms operating in the U.S. will have at least some foreign owners, though the fraction will vary by firm. We simply assumed that the effective tax rate on foreign holdings is the same as that on firms as a whole operating in the U.S., regardless of ownership, so measured $\tau_c$ by the

ratio of actual corporate tax payments to a measure of economic income.[27] Specifically, we measured $\tau_c$ by the ratio of direct taxes on income to operating surplus less net interest paid for the U.S. nonfinancial corporate sector, as reported in the "Accounts for Non-Financial Corporate and Quasi-Corporate Enterprises" in the OECD's *National Accounts 1976-88*.

In measuring $\tau_{ci}$, the appropriate definition is less clear, since existing data sources do not report directly the average tax rate on foreign-source income. As a result, we explored several alternative approaches. The first and simplest approach is to set $\tau_{ci}$ equal to $\tau_{ci}^s$, the statutory tax rate. This definition would be appropriate if each country defined taxable foreign-source income based on some approximation to economic income, e.g. did not extend various subsidies such as investment credits or accelerated depreciation to capital invested abroad. This in fact approximates the U.S. law.

Our second approach assumes implicitly that each country measures U.S.-source taxable income based on the U.S. tax rules, implying that firms do not in practice recalculate their taxable income when profits are repatriated. In this case, $\tau_{ci} = \tau_i^s(x_{cf}^c/x_{cf}) = \tau_i^s(\tau_c/\tau_c^s)$. Given this approach, $\tau_{ci} - \tau_c = \rho_{cc}(\tau_i^s - \tau_c^s)$ so that differences in effective tax rates are measured by differences in statutory tax rates, up to a multiplicative factor.

Our third approach assumes that foreign-source income is measured based on the domestic tax law in each of these countries, without modification due to its foreign source. As a first pass, the average tax rate on foreign-source income should then equal that on domestic-source income.[28]

Yet a fourth approach to measuring $\tau_{ci}$ would be to infer the effective tax rate based on the user cost of capital in each year, constructed using detailed information about corporate tax provisions. This is the approach used, for example, in Slemrod(1990). As argued in Bradford-Fullerton(1981), this measure of the effective tax rate can be very sensitive to assumptions made about such things as the required rate of return. More importantly, if reported earnings are not coming primarily from the return to marginal capital, as argued in Gordon-Slemrod(1988), then an effective tax rate measure based on the user cost of capital will be very misleading. Instead, the statutory rate should become more important. This provides an alternative justification for our second approach to measuring $\tau_{ci}$, which results in a comparison of statutory tax rates.

One complication for each of these definitions is the existence in some countries of a split-rate corporate tax system in which the tax rate on retained earnings is different than the tax rate on earnings paid out as dividends. As seen in expression (3), the only place that $\tau_{ci}$ enters relates to the tax treatment of dividend payments. Therefore, for the first two definitions of $\tau_{ci}$, we used the statutory rate applied to earnings paid out as dividends in countries with a split-rate corporate tax system. Things are a little more complicated under the third definition. Here, $\tau_{ci}$ refers to the average corporate tax rate for earnings paid out as dividends. We observe only the average tax rate on earnings, whether retained or paid out, which we now denote by $\tau_{ci}^{a}$. We estimate $\tau_{ci}$ by assuming that the average tax rate on retentions has the same relation to the statutory tax rate on retentions as the average tax rate on payouts has to that statutory tax rate.

Only the third definition for $\tau_{ci}$ required new data. We measured the average corporate tax rate in country $i$ using the same procedure and data source used in measuring $\tau_c$. There were missing data in these publications, however, for Canada, Switzerland, and the U.K. For Canada, we found comparable data in the *Corporate Financial Statistics* issued by Statistics Canada, which we used to calculate the Canadian rates. For Switzerland and the U.K., however, we were not able to find even roughly comparable data, so used instead the statutory corporate tax rate. The resulting measures of the average corporate tax rate are reported in Table A5. These figures are surprisingly volatile, often changing substantially from one year to the next. In four cases, all during the early 1980's, the resulting tax rate exceeds 100%. The cause of this volatility is unclear. It could be caused, for example, by the importance of no-loss-offset during the recession in the early 1980's. Alternatively, if investment credits on new investment or rapidly accelerated depreciation allowances are used to offset heavy future tax payments, then observed tax rates will be unusually high during periods of low investment, as in the early 1980's, and conversely. It seems unlikely that firms would respond much to these year-to-year fluctuations in incentives, even if the incentives were measured correctly — behavior should respond to a weighted average of expectations of future as well as current tax incentives. Given these problems, this measure seems much weaker than either of the first two measures. These first two definitions in practice are very similar. In the empirical work, we focus on the second measure, but report selected results using the other two measures for $\tau_{ci}$.

We also need to measure $A_{ci} = (1 - \tau_c)/(\rho_{ci} - \tau_c)$. Here, we make use of the relation $\rho_{ci} = \tau_{ci}/\tau_i^g$, and substitute the appropriate measure of each of the tax variables.

R&D intensity: We measured R&D intensity in year $t$ by the average value in country $i$ of R&D/GDP during years $t-3$ to $t-1$, and denote this average ratio by $R_{it}$.[29]

$C_{it}$: This variable was set equal to one for country $i$ in those years in which there were substantial capital controls. Some important controls existed in Australia (1980–84), France (1981–6), Italy (1980–7), Japan (1980–6), and Sweden (1980–88). Our loosest definition of capital controls sets $C_{it} = 1$ during each of these years. The nature of these controls differed substantially by country and over time, however. For example, Italy during the period of controls required that residents deposit funds equal to fifty percent of the amount invested abroad in an interest-free account, thereby sharply discouraging open ownership of foreign equity. These controls were gradually phased out during 1983–7. In contrast, during 1981–6 France prevented investors from *purchasing* equity from abroad, but existing holdings of foreign equity could continue without penalty and be traded within France. As a result, the French provisions should not in themselves have lowered portfolio holdings abroad, but would have prevented individuals from responding to any increase in incentives encouraging further portfolio investment abroad. During 1980–6, the main restrictions in Japan involved tight limits on the amount of foreign securities that financial intermediaries could purchase. Since Japanese investors own directly relatively little equity, these controls may well have affected aggregate portfolio investment in foreign equity, even though they did not restrict direct purchases of foreign equity. Our strictest definition of capital controls assumed that the Japanese provisions did not affect equity flows, that the French regulations had no effect, and that Italy had effectively ended its capital controls during 1987. The third and main definition we focused on was an intermediate case in which we weakened this latter definition by assuming that the Japanese controls were binding through 1986.

What do these numbers imply for the differential tax treatment of portfolio vs. direct investment from each of these ten countries into the U.S.? As seen in equation (3), the net tax advantage to portfolio investment consists of three terms, the first measuring the tax differences assuming no corporate surtax when profits are repatriated, the second

measuring the corporate surtax assuming that firms are in a deficit–credit position, and the third measuring the potential gain from shifting taxable income between the two countries. Given the estimates of the various tax parameters reported in Tables A1-A5, we calculated each of these terms. The resulting values for the first tax term are reported in Tables 1 and 1a, making alternative assumptions about evasion, those for the second tax term are reported in Table 2, while those for the last term are reported in Table 3.

The figures in Table 1 report the value of $(1-\tau_c)[w^*_{ci}+(1-w^*_{ci})m^*_i-\max(m_i,w_{ci})]$, assuming no evasion of personal income taxes. These figures suggest substantial variation across countries in the personal tax treatment of portfolio vs. direct investment. Most of this variation is due to the effects of dividend imputation schemes. France, Germany, Italy, and the U.K. all have important imputation schemes, and Australia adopted such a system in 1987, as can be seen comparing the values of $m_i$ vs. $m^*_i$ in Tables A1 and A2. The result, as seen in Table 1, is a substantial personal tax advantage to direct over portfolio investment in these countries. Canada and Japan have less important imputation schemes, yielding only a slight tax advantage to direct investment. Personal taxes made little difference in the other countries. If personal taxes on portfolio investments are evaded, then the results change dramatically, as seen in Table 1a where this expression is reevaluated under the assumption that $m_i = 0$. Now there is a dramatic personal tax advantage to portfolio investment.

Table 2 reports the size of the corporate surtax, assuming that firms are in a deficit–credit position. For countries which exempt foreign source income, the corporate surtax is zero. For Italy and France, which use a hybrid system, the corporate surtax term equals instead $(1-\tau_c)(1-m^*_i)(1-e)(\tau_{ci}-w^*_{ci})$. For countries using a crediting system, the term equals $(1-m^*_i)\,[A_{ci}(\tau_{ci}-\tau_c)-w^*_{ci}(1-\tau_c)]$. In the figures in Table 2, $\tau_{ci}$ is set equal to $\tau^*_i(\tau_c/\tau^*_c)$.[30] These tax terms are generally smaller than those reported in Table 1, and dramatically smaller than those in Table 1a, suggesting that differences in the personal tax treatment of portfolio vs. direct investment are much more important.

The term measuring the potential gain from transfer pricing is reported in Table 3. For countries with a split-rate corporate tax system, we use the tax rate applied to retained earnings.

*Data on the composition of capital flows*

The initial source of data for direct vs. portfolio investment by residents of country $i$ in U.S. equity came from the Survey of Current Business, using data compiled by the Bureau of Economic Analysis. These accounts, however, report data on direct investment in equity only from Canada, Japan, the Netherlands, and the U.K. Similarly, the published tables include data on portfolio investment in equity only for investors from Canada and Japan. Smith W. Allnut III of the Bureau of Economic Analysis kindly provided us with internal estimates of direct investment in U.S. equity for the other six countries in our sample, while Harlan King also of the Bureau of Economic Analysis provided us with estimates of portfolio equity investment in the U.S. for the remaining eight countries.

Inevitably, these data do not measure precisely what we want. To begin with, if a corporation investing in a foreign firm does not own at least 10% of the shares in this firm, then the investment is reported as portfolio investment. Similarly, if an individual investor purchases more than 10% of a foreign firm, then this purchase is reported as a direct investment. In addition, the book figures for direct investment become misleading due to inflation in the U.S, for the same reasons that book capital figures can be misleading for domestic firms. Fortunately, the direct investment in the U.S. tends to be quite recent, and the inflation rate in the U.S. during the 1980's has been relatively low. Another complication is that the balance sheet figures are based on infrequent benchmark surveys, with updates based on reported flows derived from a more limited sample. If investors transfer funds to the U.S. through a third country, perhaps to avoid domestic or withholding taxes, then the reported flow figures but not the benchmark figures will attribute the capital flow to this third country.[31] For both reasons, between benchmark surveys the reported values can accumulate errors, as argued by Slemrod(1990). We were not in a position to correct for any of these possible measurement errors, so simply assume that they are uncorrelated with the measures of the tax variables. If so, then the measurement errors lead to a larger standard error of the regression but do not bias the coefficients.

The resulting figures for the fraction of equity flows from each country to the U.S. that take the form of direct investment are reported in Table 4. As seen in the Table, these figures vary substantially across countries. On average, for example, 90.9% of the equity

flows from Sweden to the U.S. take the form of direct investment, whereas the comparable figure for Switzerland is only 23.3%. This strikingly low figure for Switzerland suggests that portfolio investors from third countries, who route their investments through Swiss financial intermediaries so as to avoid domestic taxation, may form an important if not dominant component of the capital flows from Switzerland. While in principle, the U.S. data reports the ultimate beneficial owner, Swiss banking regulations prevent the nationality of the ultimate owner from being revealed. Another country whose data might be suspect is the Netherlands. Due to the low withholding taxes on interest payments from the U.S. to the Netherlands and the territorial treatment of firms by the Netherlands, multinationals often found it attractive to funnel investments through the Netherlands. The high fraction of direct investment from the Netherlands, in spite of their lack of any capital controls, at least suggests that some of it was owned by investors in other countries, in spite of the U.S. attempt to trace the ultimate beneficial owner. Given our concerns with the data from these two countries, we test below the sensitivity of our results to the exclusion of these two countries.

One immediate observation from Table 4 is that there is little systematic trend over the sample period or even substantial movement in the composition of equity flows, in spite of substantial changes in tax rates in these countries during the sample period. This tells us immediately that any tax effects, if found, must be subtle.

## 4. Estimation

### *Statistical specification*

The basic model for countries using a credit system assumes that the fraction of equity flows from country $i$ to country $c$ that takes the form of direct investment rather than portfolio investment is a function of the three tax terms in equation (3), where $\theta = a + b\tau_{ci}$. Substituting for $\theta$ gives four tax variables, denoted by $T_p$, $T_c^a$, $T_c^b$, and $T_c^s$, where:

$$T_p = (1 - \tau_c)[w_{ci}^* + (1 - w_{ci}^*)m_i^* - \max(m_i, w_{ci})],$$

$$T_c^a = (1 - m_i^*)[A_{ci}(\tau_{ci} - \tau_c) - w_{ci}^*(1 - \tau_c)],$$

$$T_c^b = \tau_{ci} T_c^a, \quad \text{and}$$

$$T_c^s = \text{abs}(\tau_c^s - \tau_i^s).$$

For countries exempting foreign-source income, $T_c^a = T_c^b = 0$. For Italy and France, we defined a fifth tax term, $T_c^c = (1-\tau_c)(1-m_i^*)(1-e)(\tau_{ci} - w_{ci}^*)$; its coefficient is allowed to differ from those of the other tax terms.

These five variables, plus $R_{it}$ and $C_{it}$, will be used to forecast the value of the ratio of direct investment to direct plus portfolio investment. Denote this ratio by $D_{it}$. This ratio is by definition between zero and one. A linear regression with this ratio as the dependent variable would therefore suffer from the same problems that linear probability models do. We therefore decided to use a logit specification. Given that we observe the population outcome for the choice between the two forms of equity flows, we can estimate a logit model using OLS, with the dependent variable being $\log(D_{it}/(1-D_{it}))$.[32] We started out with the regression specification

$$\log\left(\frac{D_{it}}{1-D_{it}}\right) = \beta_0 + \beta_1 T_p + \beta_2 T_c^a + \beta_3 T_c^b + \beta_4 T_c^c + \beta_5 T_c^s + \beta_6 R_{it} + \beta_7 C_{it} + \epsilon_{it}, \quad (4)$$

where $\epsilon_{it}$ captures the effects of factors omitted from the specification on the composition of equity flows. Based on the above discussion, the coefficients of $T_c^a$, $T_c^s$, $R_{it}$, and $C_{it}$ should be positive, while those of $T_p$, $T_c^b$, and $T_c^c$ should be negative.

*Regression results*

In our initial specification, we started with the following measures of the above variables: First, in defining $T_p$, we assumed personal tax evasion on portfolio investments but not direct investments.[33] Second, we set $\tau_{ci}$ equal to $\tau_i^s(\tau_c/\tau_c^s)$, which assumes that home governments rely on the U.S. definition of corporate taxable income when taxing repatriated earnings. Finally, we used our intermediate definition for $C_{it}$.

Using these variable definitions, we first estimated equation (4) using OLS. The resulting coefficient estimates are reported in column 1 of Table 5, with t-statistics reported in parenthesis.[34] The results are rather mixed. The coefficients of R&D and capital controls are both of the expected sign and statistically significant. The other statistically significant variable is $T_p$, but its coefficient is of the wrong sign. One hypothesis concerning

the coefficient of $T_p$ is that countries which are less threatened by capital flight are more inclined to impose high personal tax rates, implying a reverse causation. We return to this hypothesis below. Of the remaining coefficients, those of $T_c^a$ and $T_c^b$ have the expected signs while those of $T_c^c$ and $T_c^s$ do not. All these coefficients are very small and statistically insignificant, however.

To test for delayed responses to changes in incentives, we tried instead using lagged values of each of the independent variables. Since we did not collect tax data for 1979, the regression had to be run with data from 1981–9. The resulting coefficients on these lagged terms appear in column 2 of Table 5. The fit is slightly better statistically. The coefficients of $T_c^c$ and $T_c^s$ now have the expected signs, though remain small and insignificant. Otherwise, any differences from the original specification are minor. We therefore chose to focus on use of contemporaneous data, in order to avoid the loss of degrees of freedom.

Both of these regressions were estimated using OLS. Yet OLS is appropriate only if the error terms in the regression are homoskedastic and independent across observations. Given the panel nature of the sample, however, the error terms for a given country may be correlated over time, due for example to omitted random or fixed effects. Ignoring these correlations at least results in a bias in the estimates of the standard errors of the coefficients. If omitted country effects are correlated with the included independent variables, then the initial coefficient estimates are themselves biased.

To test for the importance of these possible problems, we reestimated the initial equation using both a fixed-effects estimator and a random-effects estimator. The resulting coefficient estimates assuming fixed effects are reported in column 3 of Table 5, while those assuming random effects appear in column 5.[35] As is apparent from the jump in the adjusted $R^2$, these country effects are highly significant as a group.[36] If the country effects are uncorrelated with the other included variables, then a random effects estimator would be appropriate. To test for this lack of correlation, we used the procedure described in Hausman(1978), which compares statistically the coefficient estimates from the fixed-effects and the random-effects regressions. The resulting Hausman-test statistic is 32.9, which has a P-value of only 0.00003 under the appropriate $\chi^2$ distribution, so strongly rejects the random-effects model. We therefore focus on the results from the fixed-effects procedure.

The coefficient estimates that result from the fixed-effects procedure differ substantially from those resulting from OLS, as is seen comparing column 1 with column 3. Comparing the fixed-effects coefficients with the forecasts from the theory, the results are again mixed. The coefficient of $T_p$ is now of the expected sign, but statistically insignificant. The coefficients of $T_c^a$ and $T_c^b$ have both changed sign, both contrary to theoretical forecasts. Given their relative sizes, however, the net effect of the corporate surtax $(\beta_2 + \beta_3 \tau_{ci})$ is still negative, as expected, as long as $\tau_{ci} < .57$, which is satisfied for all the countries in our sample. All that is surprising is that the effect is more negative for countries with a smaller value of $\tau_{ci}$. The coefficient of $T_c^c$, describing the corporate tax surcharge in Italy and France, has also changed to the expected sign, and is statistically significant. While the coefficients of the R&D and the capital-controls variables still have the expected signs, they are no longer significant.[37] The main inconsistency with the theory is the coefficient of $T_c^s$, which is not only of the wrong sign but highly significant. The economic effect implied by the coefficient is small, however. Given the logit specification for the dependent variable, $|\partial D_{it}/\partial \tau_i^s| = D_{it}(1 - D_{it})\beta_5 \leq .25\beta_5$, implying tiny effects of $\tau_i^s$ on $D_{it}$, given the various parameter values. Given the multiple ways in which tax rates enter the regression, and the small sample size, it is difficult to interpret each coefficient too strongly.

The estimates for the country dummies in the fixed-effects regression are reported in Table 6. Of the six countries with positive coefficients, four had capital controls during at least some part of the sample period, and the data from one of the others (the Netherlands) is likely to overestimate the size of $D_{it}$. These coefficients rather than the capital-control dummy would capture the effects of capital controls if these effects did not disappear quickly with the official end of capital controls. Learning lags could explain this slow response, suggesting stronger effects of capital controls than are captured by the capital-controls dummy. The only significant negative coefficient is that for Switzerland, where we also view the data to be suspicious.

The differences between the fixed effects results and the OLS results reflect the relative lack of time-series variation in the data but the substantial variation in average levels of $D_{it}$ across countries. In order to highlight these conflicting aspects of the data, we also report results from a between-effects regression in column 4 of Table 5, in which country

averages of each variable over the ten year period are used. The only coefficient whose sign is contrary to the theory is again $T_p$. Given the small number of countries in the sample, it is not surprising that t-statistics for the coefficient estimates are so low. Since it may be difficult to capture the *timing* of tax effects adequately in the fixed-effects regressions, these results do provide an important independent view of the nature of these tax effects.

Given our suspicions about the quality of the data from Switzerland and the Netherlands, we tried dropping these two countries from the sample. The last column in Table 5 reports OLS results using the eight remaining countries. The main change is that the coefficients of $T_c^a$ and $T_c^b$ are now dramatically larger and still of the correct sign. The coefficients of R&D and capital controls are also much larger. $T_p$ still has the wrong sign, however.

In Table 7, we explore a variety of alternative definitions of the variables. Column 1 repeats the fixed-effects results from Table 5. In column 2, we try the stricter definition of the capital controls variable; little changes, except that the coefficient of $C_{it}$ is now negative but insignificant. (Results with the looser definition of $C_{it}$ are very close to those in column 1.) We also tried alternative assumptions about personal tax evasion; again, little changes. The results assuming no evasion are reported in column 3. In columns 4 and 5, we measure $\tau_{ci}$ using the two alternative definitions explored above. The coefficients of the corporate surtax terms do turn out to be very sensitive to the choice of this definition, though the other coefficients do not change much. When $\tau_{ci} = \tau_i^s$, all three of these coefficients are of the expected sign; when the average corporate tax rate is used, $T_c^a$ and $T_c^b$ have the expected signs, but $T_c^c$ flips to having the wrong sign.[38] More work is needed to assess how foreign-source corporate income is measured in practice in these countries before the behavioral effects of this corporate surtax can be judged with any confidence.

One complication in interpreting any of the above results is that government policy variables could well be endogenous, given the importance of tax evasion in many of these countries. To begin with, capital controls make it much easier to impose high personal tax rates, since evasion of these taxes through investing abroad would be discouraged by the capital controls. This merely suggests a correlation between the independent variables,[39] which does not create statistical bias. In addition, however, countries where for institutional or geographic reasons investors can more easily shift funds abroad should find it

more costly to impose high personal tax rates. In itself, this suggests a reverse effect of the dependent variable on $m_i^*$, biasing the coefficient estimates generally, but primarily creating a positive bias in the coefficient of $T_p$. The very high positive correlation in the data between $T_p$ and the dependent variable certainly suggests such a reverse causation. Countries facing more pressure from capital flight, everything else equal, should also be more likely to adopt capital controls, in order to lessen these pressures. This suggests that the residual will also be negatively correlated with $C_{it}$. We therefore experimented with two–stage–least–squares estimation methods, treating $C_{it}$ and $m_i^*$ as endogenous. In particular, we collected data on the top marginal tax rate on wages[40] in each of these countries, and the ratio of tax revenue to GDP, to use as instruments. The higher the tax rates are on labor income, and the higher the amount of revenue the government desires, everything else equal, the more likely the country is to raise revenue from taxes on financial income, and the more likely it is to impose capital controls to facilitate this taxation of financial income. While no aggregate variable will be entirely exogenous, any effects of the dependent variable on these series should be trivial, making them reasonable instruments. The variables $T_p$, $T_c^a$, $T_c^b$, and $C_{it}$ were all treated as endogenous. Rather than using the two instruments directly, we included six variables constructed using them,[41] along with the remaining variables from the original regression, in each of the four auxiliary regressions. The results, without fixed effects, are reported in column 6 of Table 7. These results ought to be compared with the OLS results in column 1 of Table 5. As expected, the coefficient of $T_p$ dropped substantially and now has the expected sign, while the coefficient of $C_{it}$ became dramatically larger. Reverse causation does appear to be an important factor. The coefficients of the remaining tax variables all change sign, still leaving two with the sign forecast by the theory. They all remain statistically insignificant, however.

Another possible complication is that capital controls may hinder any new portfolio flows, but may not force investors to liquidate unreported investments they have already made abroad. Even though the U.S. government knows about the nationality of these portfolio investors, this does not imply that the home government is in a position to prosecute specific cases of tax evasion or evasion of controls. To test for this, we allowed capital controls to reduce the sensitivity of the dependent variable to tax distortions, as well

as to change the mean value of the dependent variable. In particular, we multiplied each of the tax factors in equation (4) by $(1 - \alpha C_{it})$, then estimated $\alpha$ using a grid search.[42] Our expectation was that $0 \ll \alpha < 1$. The resulting estimate of $\alpha$, starting from the original OLS specification, was $-1.55$. Surprisingly, behavior seemed *more* sensitive to tax rates in countries with capital controls, though tax effects are still small.

## 5. Conclusions

Existing tax structures in our sample countries have important effects on the relative attractiveness to individuals of buying foreign equity directly vs. having a domestic firm they own buy these shares instead, particularly given the ease with which individuals appear able to evade domestic taxes on portfolio investments abroad. To what degree do these distortions change behavior? The composition of equity flows does differ dramatically among these countries, and at least part of the explanation appears to be tax differences. Behavior did not seem to change much during the 1980's, however, in spite of the many large changes in tax rates that occurred during this period. Part of the explanation appears to be the importance of capital controls in many of the sample countries. Another problem making inference more difficult is that tax policy itself seemed to be endogenous — countries where investors could more easily invest abroad were more likely to have lower tax distortions and to impose capital controls. In principle, the increasing international integration of financial markets and the steady reduction of capital controls should lead to increasing responsiveness of the composition of international capital flows to tax distortions. As a result, countries will be under increasing pressure to reduce these tax distortions, and past behavior suggests that they will in fact respond to this pressure.

## NOTES

1. See Adler–Dumas(1983) or French–Poterba(1991) for evidence on the substantial diversification achieved through purchase of foreign equity.

2. Many of the other papers in this volume, for example, as well as those in Razin and Slemrod1990) analyze the tax treatment of foreign direct investment.

3. For simplicity, we ignore variations in effective tax rates by firm. See Swenson(1990) for a comparison across U.S. industries of effective tax rates vs. the amount of foreign direct investment in the industry.

4. If the marginal tax rate varies with income, we adjust the measure of income here so as to produce the correct estimate of corporate tax payments.

5. In practice, this rate need not necessarily equal the statutory rate applying to capital flows between country c and country $i$. Investing using a financial intermediary in a third country may result in a lower withholding tax rate. We ignore these complications in the empirical work.

6. Not all countries do require this reporting by financial intermediaries. Without it, even taxes on earnings from domestic financial assets are difficult to enforce, except through withholding at source.

7. Some countries have information sharing agreements with each other. These agreements, however, do not involve automatic transfers of information, but only transfers of information about specific accounts which the home government learned about independently. But acquiring this independent information is a large part of the problem.

8. The convenience of using a domestic financial intermediary may outweigh the extra tax burden. In principle, the net return given evasion should be reduced to reflect the inconvenience of using foreign financial intermediaries.

9. Withholding taxes are also normally owed on the entire net–of–foreign–tax profits of a branch, but only on the dividends paid by a subsidiary.

10. For simplicity, we assume that the parent is located in the same country as the investor. In principle, the investor could own shares of a parent based in a third country, or the investment could be made through a subsidiary located in a third country, introducing further complications.

11. Note that credits for withholding taxes paid abroad are not passed through the domestic corporation to individual shareholders.

12. For supporting evidence, see Hines–Hubbard(1989).

13. Many other factors can affect the likelihood that a corporate surtax is due at repatriation. For one, economic and technological factors may cause multinationals based in one country to invest in a quite different set of host countries than do multinationals based in another country. In addition, some countries offer "tax sparing," which reduces the corporate surtax due on repatriations from selected countries. Funneling repatriations through these selected countries then reduces the corporate surtax due on investments in country $c$. We have not attempted to control for these other factors.

14. France exempts 95% of these repatriated earnings, while Italy exempts 60%.

15. In principle, the two forms of investments may attract different clienteles. For example, if there are economies to scale in learning about foreign investment opportunities, only wealthy individuals will invest abroad directly. However, equity holdings are sufficiently concentrated in most countries that this is unlikely to make much difference. In addition, financial intermediaries such as insurance companies and pension plans may face restrictions concerning the amount of foreign securities they can invest in. Japan, for example, has had such restrictions, though they were eased somewhat in 1986. In principle, the composition of equity purchased outside of these intermediaries can be adjusted to offset the effects of such restrictions, but the offset is complete only if enough equity would be purchased outside of these plans.

16. In this case, however, the investor must pay the withholding taxes due on repatriations to the country of the foreign financial intermediary. Presumably, investors would seek out intermediaries in countries facing low withholding tax rates.

17. See Gordon(1986) for further discussion.

18. The overall marginal tax rate on income accruing in each country may be more complicated due to the surtaxes when profits are repatriated.

19. For an extended discussion of nontax factors, see Dunning(1985).

20. Since we only examine the pattern of foreign investments made in one country, the U.S., we cannot readily test the effects of variation in the characteristics of the host country, e.g. the severity of trade barriers.

21. Data were also available for Bermuda and the Netherlands Antilles, but we decided not to include these data since the above theory was not designed to address the consequences of investing from country $i$ to country $c$ through some third country $j$.

22. This ignores, however, purchases of equity by financial intermediaries, e.g. pension plans, which are subject to very different tax treatment. When we test for evasion of personal taxes on all purchases of equity by setting $m_i = m_i^* = 0$, this also provides a test for the possibility that equity purchases mainly occur through pension plans.

23. Data from Australia and the U.K. were adjusted in certain years to take account of the difference between their fiscal year and the calendar year.

24. When tax changes occurred in midyear, we used a weighted average tax rate for that year.

25. This omission creates a problem only to the degree to which the opportunities differ by country or over time. But the size of the withholding tax to be avoided differs very little across countries or over time, as seen in Table A3, while access to tax havens should be very similar. Therefore, our results should be robust to this omission.

26. Where possible, we attempted to duplicate the procedure for calculating the combined rate used in Pechman(1988). For Switzerland, the combined rate is the maximum rate payable by a corporation operating out of Zurich.

27. Grubert, Goodspeed, and Swenson (1991), however, found that the average tax rate paid by foreign subsidiaries in the U.S. was much less than that paid by other firms. We assume that this is due to financial arbitrage engaged in by these firms, measured in our theory by $\gamma \text{abs}(\tau_i^* - \tau_c^c)$, rather than due to differences in the tax treatment of foreign-owned firms.

28. The two average tax rates can still differ for various reasons. For example, given the lack of indexation for inflation in the definition of taxable income in any of these countries, the effective tax rate on foreign-source income should differ from that on domestic-source income due to any differences in the inflation rates in the two countries, for the reasons discussed in Feldstein(1980a,b).

29. Assuming a one to three year lag between R&D expenditures and available technology is representative of the results found in empirical productivity studies, e.g. Griliches(1980).

30. The figures under the two alternative measures of $\tau_{ci}$ are qualitatively very similar.

31. The benchmark survey asks the ultimate beneficial owner of payments made to foreign investors.

32. See, e.g. Kmenta(1986), for a demonstration of this.

33. One striking and anomalous implication of this assumption is that the correlation of the resulting values of $T_p$ with the dependent variable is .78, which is the highest pairwise correlation with the dependent variable found in the study. Note that the sign of this correlation is the opposite of that forecast by the theory, a finding returned to below.

34. As noted below, these t-statistics are biased at least due to the fact that the residuals are not independent across observations, due to country effects.

35. As shown in Fuller–Battese(1973), the random–effects estimator involves replacing the initial dependent variable, $Y_{it}$, and independent variables $X_{it}$ with $Y_{it} - \lambda Y_i$ and $X_{it} - \lambda X_i$ respectively. Here, $Y_i$ and $X_i$ are the mean values for country $i$ over the full time period, and $\lambda = 1 - \sqrt{\sigma^2/(\sigma^2 + T\sigma_r^2)}$, where $\sigma_r^2$ is the estimated variance of the random effects, $\sigma^2$ is the variance of the idiosyncratic component of the residual, and $T$ is the number of years. As the estimate of $\lambda$ approaches one, the random–effects estimator approaches the fixed–effects estimator. In this specification, the estimate of $\lambda$ was 0.83, explaining the similarity of the coefficient estimates in the two cases.

36. The value of the F-test for omitting the country dummies in the fixed effects procedure is 3.2, compared with a 5% significance level of about 1.35.

37. Our definition of R&D is likely to measure poorly the *timing* of effects of R&D, so that weaker estimated effects in the fixed effects model should not be surprising.

38. Since foreign direct investment and average tax rates can both be affected by cyclical factors, these coefficients must be judged with some caution.

39. The correlation between $T_p$ and $C_{it}$ in our sample is 0.56, very much supporting this story.

40. Given the equivalence in present–value of value–added taxes and wage taxes, this variable captures the combined effects of both.

41. In particular, the six instruments were: tax revenue/GDP, (tax revenue/GDP)$^2$, $T_p$ with $m_i^*$ replaced by the top marginal tax rate on labor, this variable squared, and both $T_c^a$ and $T_c^b$ with $m_i^*$ replaced by the top marginal tax rate on labor.

42. In doing this, we used our loosest definition of $C_{it}$, since the controls in France should reduce the responsiveness of $D_{it}$ to taxes even if they do not discourage ownership of foreign equity per se.

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Table 1. Personal Tax Advantage to Portfolio Investment: No Evasion

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | -0.014 | -0.016 | -0.017 | -0.018 | -0.020 | -0.020 | -0.019 | -0.021 | -0.021 | -0.030 |
| Canada | -0.028 | -0.024 | -0.033 | -0.035 | -0.036 | -0.060 | -0.052 | -0.026 | -0.014 | -0.013 |
| France | -0.097 | -0.107 | -0.100 | -0.104 | -0.107 | -0.110 | -0.126 | -0.126 | -0.126 | -0.125 |
| Germany | -0.082 | -0.090 | -0.097 | -0.101 | -0.103 | -0.106 | -0.102 | -0.099 | -0.099 | -0.098 |
| Netherlands | 0.008 | 0.009 | 0.009 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 |
| U.K. | -0.081 | -0.089 | -0.096 | -0.010 | -0.102 | -0.105 | -0.097 | -0.086 | -0.104 | -0.109 |
| Italy | -0.043 | -0.047 | -0.050 | -0.066 | -0.122 | -0.136 | -0.130 | -0.127 | -0.127 | -0.165 |
| Sweden | 0.004 | 0.004 | 0.004 | 0.006 | 0.006 | 0.008 | 0.007 | 0.008 | 0.009 | 0.010 |
| Switzerland | 0.022 | 0.024 | 0.026 | 0.028 | 0.029 | 0.030 | 0.029 | 0.030 | 0.029 | 0.029 |
| Australia | 0.034 | 0.038 | 0.040 | 0.042 | 0.043 | 0.044 | 0.044 | -0.092 | -0.187 | -0.138 |

Table 1A. Personal Tax Advantage to Portfolio Investment: Evasion

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 0.357 | 0.392 | 0.419 | 0.437 | 0.433 | 0.445 | 0.427 | 0.401 | 0.400 | 0.312 |
| Canada | 0.245 | 0.277 | 0.204 | 0.212 | 0.218 | 0.200 | 0.234 | 0.233 | 0.201 | 0.206 |
| France | 0.160 | 0.176 | 0.236 | 0.246 | 0.252 | 0.259 | 0.178 | 0.164 | 0.164 | 0.162 |
| Germany | 0.152 | 0.167 | 0.179 | 0.186 | 0.191 | 0.196 | 0.188 | 0.184 | 0.184 | 0.182 |
| Netherlands | 0.334 | 0.367 | 0.392 | 0.409 | 0.419 | 0.431 | 0.413 | 0.404 | 0.403 | 0.399 |
| U.K. | 0.176 | 0.193 | 0.206 | 0.215 | 0.221 | 0.227 | 0.222 | 0.225 | 0.103 | 0.061 |
| Italy | 0.284 | 0.311 | 0.333 | 0.284 | 0.237 | 0.211 | 0.202 | 0.197 | 0.197 | 0.074 |
| Sweden | 0.410 | 0.450 | 0.487 | 0.482 | 0.488 | 0.480 | 0.461 | 0.430 | 0.416 | 0.399 |
| Switzerland | 0.067 | 0.072 | 0.077 | 0.061 | 0.065 | 0.056 | 0.054 | 0.023 | 0.039 | 0.034 |
| Australia | 0.292 | 0.320 | 0.342 | 0.357 | 0.366 | 0.376 | 0.352 | 0.170 | 0.048 | 0.091 |

Table 2. Corporate Surtax at Repatriation

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | -0.035 | -0.038 | -0.041 | -0.042 | -0.042 | -0.042 | -0.040 | -0.021 | -0.002 | 0.011 |
| Canada | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| France | 0.006 | 0.006 | 0.005 | 0.004 | 0.004 | 0.004 | 0.004 | 0.006 | 0.006 | 0.006 |
| Germany | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Netherlands | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| U.K. | -0.010 | -0.011 | -0.011 | -0.024 | -0.060 | -0.104 | -0.140 | -0.088 | -0.059 | -0.063 |
| Italy | 0.022 | 0.020 | 0.022 | 0.025 | 0.032 | 0.033 | 0.036 | 0.044 | 0.052 | 0.070 |
| Sweden | 0.005 | 0.006 | 0.007 | 0.010 | -0.005 | -0.006 | -0.005 | 0.012 | 0.028 | 0.030 |
| Switzerland | -0.140 | -0.158 | -0.169 | -0.224 | -0.243 | -0.255 | -0.247 | -0.165 | -0.101 | -0.100 |
| Australia | -0.058 | -0.063 | -0.068 | -0.071 | -0.072 | -0.074 | -0.074 | -0.051 | -0.043 | -0.086 |

Table 3. Difference in Statutory Corporate Tax Rates

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 0.054 | 0.054 | 0.054 | 0.054 | 0.065 | 0.068 | 0.068 | 0.118 | 0.174 | 0.158 |
| Canada | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.020 | 0.070 | 0.090 | 0.050 |
| France | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.060 | 0.000 | 0.030 | 0.000 |
| Germany | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.110 | 0.170 | 0.170 |
| Netherlands | 0.030 | 0.030 | 0.030 | 0.030 | 0.080 | 0.080 | 0.090 | 0.030 | 0.013 | 0.040 |
| U.K. | 0.010 | 0.010 | 0.010 | 0.005 | 0.047 | 0.097 | 0.147 | 0.100 | 0.040 | 0.040 |
| Italy | 0.147 | 0.147 | 0.097 | 0.097 | 0.047 | 0.047 | 0.047 | 0.013 | 0.073 | 0.073 |
| Sweden | 0.058 | 0.058 | 0.064 | 0.064 | 0.007 | 0.007 | 0.007 | 0.067 | 0.127 | 0.127 |
| Switzerland | 0.131 | 0.135 | 0.135 | 0.171 | 0.183 | 0.183 | 0.185 | 0.125 | 0.076 | 0.076 |
| Australia | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.025 | 0.050 | 0.000 |

Table 4. Direct Investment Relative to Total Equity Position
(percent)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 85.0 | 88.2 | 87.8 | 85.5 | 88.9 | 87.0 | 76.0 | 62.3 | 67.7 | 64.9 |
| Canada | 45.0 | 43.9 | 40.5 | 35.6 | 43.6 | 41.3 | 39.1 | 43.5 | 42.4 | 40.4 |
| France | 33.1 | 41.0 | 38.7 | 36.2 | 40.5 | 38.8 | 40.1 | 44.7 | 47.7 | 51.3 |
| Germany | 73.5 | 78.4 | 75.1 | 68.6 | 74.0 | 69.2 | 69.1 | 72.2 | 72.5 | 72.7 |
| Netherlands | 81.1 | 86.1 | 83.9 | 83.3 | 84.9 | 83.7 | 80.3 | 81.5 | 79.1 | 77.6 |
| U.K. | 46.9 | 51.3 | 52.6 | 48.1 | 48.9 | 45.0 | 43.0 | 50.8 | 55.7 | 52.3 |
| Italy | 39.4 | 78.2 | 80.5 | 77.4 | 75.3 | 62.3 | 57.3 | 64.9 | 60.8 | 56.9 |
| Sweden | 91.4 | 92.4 | 87.1 | 88.1 | 94.8 | 90.9 | 94.4 | 95.3 | 92.0 | 82.5 |
| Switzerland | 18.0 | 19.8 | 21.5 | 20.6 | 24.2 | 22.0 | 20.2 | 24.9 | 29.1 | 32.3 |
| Australia | 45.0 | 71.6 | 59.9 | 57.8 | 75.7 | 74.5 | 72.1 | 78.7 | 73.5 | 70.9 |

Table 5. Test of Statistical Specification

| | (1) OLS | (2) Lag | (3) Fixed effects | (4) Between effects | (5) Random effects | (6) Excluding Switz. & Neth. |
|---|---|---|---|---|---|---|
| Constant | -0.579 | -0.472 | | -0.706 | 0.176 | -0.609 |
| | (-3.98) | (-3.20) | | (-1.02) | (0.81) | (-3.75) |
| $T_p$ | 1.971 | 1.911 | -0.281 | 2.302 | 0.162 | 1.013 |
| | (5.77) | (5.49) | (-0.81) | (1.37) | (0.47) | (2.04) |
| $T_c^a$ | 2.436 | 2.534 | -1.580 | 14.983 | -1.317 | 5.782 |
| | (1.21) | (1.28) | (-1.25) | (0.88) | (-0.98) | (1.15) |
| $T_c^b$ | -2.520 | -0.895 | 2.792 | -46.354 | 7.280 | -20.700 |
| | (-0.29) | (-0.10) | (0.41) | (-0.65) | (1.06) | (-1.09) |
| $T_c^c$ | 1.709 | -2.656 | -7.588 | -4.960 | -3.685 | 1.515 |
| | (0.54) | (-0.71) | (-1.99) | (-0.27) | (-1.04) | (0.46) |
| $T_c^d$ | -0.084 | 0.855 | -1.677 | 5.766 | -1.473 | 0.528 |
| | (-0.12) | (1.15) | (-3.39) | (1.01) | (-2.90) | (0.71) |
| R | 15.486 | 9.059 | 7.439 | 5.364 | 5.866 | 23.808 |
| | (2.93) | (1.70) | (0.86) | (0.18) | (0.75) | (4.03) |
| C | 0.256 | 0.273 | 0.099 | 0.153 | 0.145 | 0.429 |
| | (3.05) | (3.23) | (1.31) | (0.31) | (1.89) | (3.81) |
| Adjusted R-squared | 0.67 | 0.70 | 0.90 | 0.63 | 0.13 | 0.58 |

Notes: 1. t-statistics are in parentheses.

2. The regression using lagged independent variables is based on 90 observations, 1981-1989 by 10 countries; all others based on 100 observations, 1980-1989 by 10 countries.

Table 6. Country Effects

| | | |
|---|---|---|
| Japan | 0.612 | (2.24) |
| Canada | -0.142 | (-0.99) |
| France | -0.187 | (-0.95) |
| Germany | 0.421 | (1.84) |
| Netherlands | 0.704 | (3.08) |
| U.K. | -0.096 | (-0.40) |
| Italy | 0.611 | (2.84) |
| Sweden | 0.990 | (3.67) |
| Switzerland | -0.634 | (-2.05) |
| Australia | 0.308 | (1.73) |

Note: t-statistics are in parentheses.

Table 7. Test of Alternative Definitions of Variables

| | (1) Fixed effects (Table 5) | (2) Capital controls (Strict) | (3) No evasion | (4) $\tau_{ci}$ (Avg. corp. rate) | (5) $\tau_{ci}$ (Stat. corp. rate) | (6) 2SLS (w/o fixed effects) |
|---|---|---|---|---|---|---|
| $T_p$ | -0.281 | -0.012 | -0.750 | -0.284 | -0.309 | -0.206 |
| | (-0.81) | (-0.03) | (-1.26) | (-0.88) | (-0.84) | (-0.14) |
| $T_c^a$ | -1.580 | -1.281 | -1.548 | 3.352 | 7.783 | -5.209 |
| | (-1.25) | (-1.00) | (-1.24) | (1.95) | (1.16) | (-0.77) |
| $T_c^b$ | 2.792 | 0.195 | 3.934 | -7.241 | -15.397 | 47.142 |
| | (0.41) | (0.03) | (0.58) | (-2.49) | (-1.05) | (1.40) |
| $T_c^c$ | -7.588 | -10.417 | -7.325 | 7.827 | -6.956 | -12.019 |
| | (-1.99) | (-2.66) | (-1.98) | (4.22) | (-1.85) | (-1.38) |
| $T_c^s$ | -1.677 | -1.861 | -1.529 | -1.049 | -1.557 | 0.233 |
| | (-3.39) | (-3.93) | (-2.98) | (-2.70) | (-3.06) | (0.20) |
| R | 7.439 | 4.347 | 6.094 | 1.434 | 4.652 | 12.760 |
| | (0.86) | (0.50) | (0.70) | (0.20) | (0.56) | (1.70) |
| C | 0.099 | -0.073 | 0.119 | 0.178 | 0.113 | 0.857 |
| | (1.31) | (-0.88) | (1.53) | (2.72) | (1.48) | (2.13) |
| Adjusted R-squared | 0.90 | 0.90 | 0.90 | 0.92 | 0.90 | 0.40 |

Note: t-statistics are in parentheses.

Table A1. Top Individual Income Tax Rates
(percent)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 80 | 80 | 80 | 80 | 78 | 78 | 78 | 76 | 76 | 65 |
| Canada | 63 | 63 | 50 | 50 | 50 | 50 | 55 | 52 | 46 | 47 |
| France | 60 | 60 | 65 | 65 | 65 | 65 | 58 | 57 | 57 | 57 |
| Germany | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 56 |
| Netherlands | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 |
| U.K. | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 45 | 40 |
| Italy | 72 | 72 | 72 | 65 | 65 | 62 | 62 | 62 | 62 | 50 |
| Sweden | 86 | 86 | 87 | 83 | 82 | 79 | 79 | 76 | 74 | 72 |
| Switzerland | 23 | 23 | 23 | 20 | 20 | 19 | 19 | 14 | 16 | 16 |
| Australia | 60 | 60 | 60 | 60 | 60 | 60 | 59 | 53 | 49 | 49 |

Source: Authors' calculations based on Coopers & Librand, various issues

Notes:

1. Combined federal and local rates are reported where applicable.

2. When the tax rate changed during the calendar year, a weighted average tax rate is used.

Table A2. Top Individual Income Tax Rates, Net of Divided Tax Credit
(percent)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 75 | 75 | 75 | 75 | 73 | 73 | 73 | 70 | 70 | 56 |
| Canada | 50 | 52 | 36 | 36 | 36 | 36 | 42 | 43 | 38 | 39 |
| France | 40 | 40 | 48 | 48 | 48 | 48 | 37 | 36 | 36 | 36 |
| Germany | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| Netherlands | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 |
| U.K. | 43 | 43 | 43 | 43 | 43 | 43 | 44 | 45 | 26 | 20 |
| Italy | 63 | 63 | 63 | 53 | 45 | 41 | 41 | 41 | 41 | 22 |
| Sweden | 86 | 87 | 87 | 83 | 82 | 79 | 79 | 76 | 74 | 72 |
| Switzerland | 23 | 23 | 23 | 20 | 20 | 19 | 19 | 14 | 16 | 16 |
| Australia | 60 | 60 | 60 | 60 | 60 | 60 | 59 | 29 | 8 | 16 |

Source: Authors' calculation based on Coopers & Librand and Table A1.

Table A3. Withholding Tax Rates on Dividends: Corporate recipient/individual recipient
(percent)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 10/15 | 10/15 | 10/15 | 10/15 | 10/15 | 10/15 | 10/15 | 10/15 | 10/15 | 10/15 |
| Canada | 15 | 15 | 15 | 15 | 15 | 10/15 | 10/15 | 10/15 | 10/15 | 10/15 |
| France | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 |
| Germany | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Netherlands | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 |
| U.K. | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 |
| Italy | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 |
| Sweden | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 |
| Switzerland | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 | 5/15 |
| Australia | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

Source: Coopers & Librand, various issues

Table A4. Statutory Corporate Tax Rates (percent)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 56/44 | 56/44 | 56/44 | 56/44 | 58/46 | 58/46 | 58/46 | 57/45 | 56/44 | 55/47 |
| Canada | 51 | 51 | 51 | 51 | 51 | 52 | 53 | 52 | 48 | 44 |
| France | 50 | 50 | 50 | 50 | 50 | 50 | 45 | 45 | 42 | 39/42 |
| Germany | 56/36 | 56/36 | 56/36 | 56/36 | 56/36 | 56/36 | 56/36 | 56/36 | 56/36 | 56/36 |
| Netherlands | 48 | 48 | 48 | 48 | 43 | 43 | 42 | 42 | 40 | 35 |
| U.K. | 52 | 52 | 52 | 51 | 46 | 41 | 36 | 35 | 35 | 35 |
| Italy | 36 | 36 | 41 | 41 | 46 | 46 | 46 | 46 | 46 | 46 |
| Sweden | 57 | 57 | 57 | 57 | 52 | 52 | 52 | 52 | 52 | 52 |
| Switzerland | 38 | 38 | 38 | 34 | 33 | 33 | 33 | 33 | 31 | 31 |
| Australia | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 48 | 44 | 39 |
| U.S. | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 45 | 39 | 39 |

Source: Authors' calculations based on Coopers & Lybrand, various issues

Notes:

1. Combined federal and local rates are reported where applicable.
2. When the tax rate changed during the calendar year, a weighted average rate is reported.
3. In a split rate system, the first rate applies to retained earnings and the second to dividends.

Table A5. Average Corporate Income Tax Rates, Based on O.E.C.D., National Accounts (percent)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 49 | 51 | 50 | 48 | 46 | 46 | 42 | 44 | 45 | 53 |
| Canada | territorial | | | | | | | | | |
| France | 8 | 14 | 18 | 17 | 14 | 13 | 7 | 7 | 5 | 5 |
| Germany | territorial | | | | | | | | | |
| Netherlands | territorial | | | | | | | | | |
| U.K. | unavailable | | | | | | | | | |
| Italy | 23 | 71 | 117 | 41 | 40 | 31 | 27 | 35 | 32 | 32 |
| Sweden | 88 | 125 | 52 | 51 | 33 | 30 | 30 | 45 | 42 | 67 |
| Switzerland | unavailable | | | | | | | | | |
| Australia | 60 | 77 | 128 | 106 | 47 | 44 | 49 | 51 | 45 | 39 |
| U.S. | 43 | 37 | 33 | 30 | 28 | 26 | 29 | 31 | 31 | 32 |

Source: Authors' calculations based on OECD National Accounts, 1977-1989.

Note: See the text for an explanation of the tax rates larger than 100%.