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How Taxation Affects Foreign Direct Investment

(Country-specific Evidence)

Joosung Jun

Tax rules in the home country significantly affect capital flows from foreign direct investment; tax rules in the host country may not affect investment incentives as much as they are conventionally perceived to do. But in evaluating how taxes affect foreign direct investment, more attention should be paid to the specific taxes in both home and host countries.

Summary findings

Jun estimates empirically the degree to which the tax systems of both home and host countries affect foreign direct investment. He presents evidence that tax rules significantly affect capital flows from foreign direct investment (FDI).

Home country taxes in particular appear to significantly affect the behavior of FDI. By identifying the incentives associated with different tax parameters in the home and host countries, Jun identifies different channels through which taxes affect FDI.

The home-country *statutory* tax rate is claimed to measure the incentive effect of potential home-country surtaxes on new FDI; the home-country *effective* tax rate is shown to measure how taxes affect the substitution of investment in one country for investment in another.

The host country's effective tax rate should represent either the incentives for FDI in that country or simply the amount of foreign tax payments that are creditable against the home tax liability on the FDI.

The most robust of the statistical results — using data on investment in the United States by ten other countries between 1980 and 1989 — shows that the home-country statutory tax rate significantly hurts FDI when the country makes foreign-source income subject to home-country taxation. (The same variable has no significant effect on FDI from those countries that exempt foreign-source income from home-country taxation.)

Jun found that the coefficients of the home country's statutory and effective tax rates take the opposite sign in the estimated equations; this supports the presence of different channels through which home country tax systems influence FDI.

The weak performance of the host-country tax variable in the estimated equations suggests that the host-country tax does not affect decisions about where to invest FDI as much as is conventionally perceived. The host country tax largely represents creditable foreign taxes for many investors.

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Taxes potentially affect the international location of investment by influencing its relative net profitability in different locations. Since foreign direct investment (FDI) inevitably involves the question of overlapping tax jurisdictions, the tax treatment of foreign source income in the home country is always an important concern for multinational firms. Past debates about the tax effects on FDI have typically focused on the effective tax rate on foreign source income.

In general, the effective tax rate on foreign source income is influenced by the tax systems in both the firm's home and host countries. While home countries typically provide some kind of tax relief on their firms' foreign source income to avoid potential double taxation of that income, the nature and extent of such relief differs across countries and types of investment. Given a type of investment and the amount of foreign taxes paid on that investment, therefore, the home country's tax rules will determine the effective tax rate on the income from FDI.

Nonetheless, most previous studies of aggregate FDI have

ignored the role of home country taxation in explaining the effects of taxes on FDI.[1] The lack of country specific data has certainly been an excuse for the omission, but many authors have taken the further step of establishing a theoretical case in which "the home country's tax system does not affect FDI." The gist of their argument is that when the deferral of home taxes on foreign earnings is allowed, FDI financed through retained subsidiary earnings will not be affected by the home country tax rate since the home country's tax equally reduces the return and the opportunity cost of such investments. This is because the future home taxes on retained earnings are capitalized into the value of the firm once those taxes are thought to be an unavoidable tax liability. This tax capitalization hypothesis in the taxation of foreign source income was originally advocated by Hartman (1985) and since then has provided a major theoretical underpinning for many ensuing empirical studies; e.g. Hartman (1984), Boskin and Gale (1987), Newlon (1987), Young (1988) and Slemrod (1990).

The extent to which this hypothesis explains the actual

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[1] One notable exception is Slemrod (1990), which studied the effects on FDI in the United States of both U.S. and investor countries' tax systems. Yet the main focus of his analysis of aggregate FDI was on the impact of U.S. taxation, while the treatment of home country taxation in his disaggregate analysis was limited to estimated effects of a measure of the home country effective tax rate. Boskin and Gale (1987) and Jun (1990) studied the effects of U.S. tax incentives on U.S. direct investment abroad, but they had their share of problems by ignoring the host country tax system.

behavior of FDI is an empirical question.[2] Yet there exist several theoretical cases where the home country's tax system still matters for FDI. First, for marginal investments financed through parent transfers, the effective tax rate on the investment income can still be influenced by the home country tax system. Second, even for FDI financed through retained subsidiary earnings, the capitalization effects occur only when the home country taxes are perceived to be an "unavoidable" liability, which may be a very special case of the reality.[3] Third, the home country tax on certain types of investment cannot be deferred.

There exists still another channel through which home country taxation can influence the firm's FDI decisions. To the extent that domestic investment and foreign investment are alternative methods of serving the same objective (e.g. producing the same good), the size of FDI can be affected by the substitutability between investment locations. The magnitude of FDI, therefore, may be affected not just by the effective tax rate on the FDI income but also by the effective tax rate on the income from the same type of investment in the home country.

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[2] For the investments from countries where foreign source income is exempt from domestic taxation, the effective tax rate depends only on the host country's tax system by definition.

[3] The capitalization will occur only if the home country tax rate is known and perceived to be permanent. Firms can also employ various income shifting schemes to minimize home country tax payments upon repatriation.

Note that this "substitution effect" channel is independent of the role of home and host country taxation in influencing the effective tax rate on the income from FDI. Surprisingly, most previous empirical studies have ignored this effect.

The objective of this paper is to estimate empirically the degree to which the tax systems of both the home and the host countries have affected FDI. The data set consists of FDI in the U.S. made by investors from each of ten other countries and related tax data during the period 1980-89. One key strategy of this study is to distinguish the particular roles of different tax parameters in identifying alternative channels for the tax effects on FDI.

FDI will be affected by more than just tax factors. Various other factors will influence the profitability of doing business abroad. R&D is an important source of comparative advantages with which a multinational may expand its activities across national boundaries. Exchange rates may influence the firm's FDI decision by affecting the competitiveness position of the host country. In the empirical work, I attempt to control for the effects of such nontax factors on FDI.

The principal findings of this study are as follows. Home country taxes appear to play an important role in explaining the behavior of FDI. The home country's statutory tax rate, which

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measures the extent to which home country taxation contributes to the total tax burden on the income from FDI, has a statistically significant effect on FDI across specifications and alternative measures of the variables. When estimated separately for countries that exempt foreign source income from domestic taxation, the coefficient of the same variable is insignificant as expected. The finding that the coefficients of the home country's statutory and effective tax rates are of the opposite sign in the estimated equations, supports the presence of alternative channels for the effects of the home country tax system on FDI. On the other hand, the performance of the host country tax variables in the estimated equations is mixed at best.

The organization of this paper is as follows: Section 1 derives the effective tax rate on the FDI income under various assumptions about institutions and behavior. Section 2 summarizes alternative channels through which home and host country taxation affect FDI. Section 3 describes the data used in the empirical work, while the empirical results are presented in section 4. A brief conclusion follows in section 5.

1. The Effective Tax Rate on Foreign Source Income

One major concern regarding international investment is the possibility that foreign source income may be taxed twice, once

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by the host country and again by the home country. In general,
the home country can adopt one specific approach or the other in
order to avoid such double taxation of foreign source income.
Under the 'territorial' system, the home country does not tax
foreign source income at all. France and the Netherlands have
adopted this approach. Under the more common 'residence' or
'worldwide' system, foreign source income is subject to home
country taxation, but a credit or deduction is allowed for taxes
paid to the host government. Further, the home country tax on
most types of active foreign business income can be deferred
until the income is repatriated to the parent.[4] Both foreign tax
credits and tax deferrals influence the effective tax rate on the
foreign source income and therefore the investment behavior of
multinationals.

1.1 The Foreign Tax Credit

The foreign tax credit is typically limited to the home
country tax liability on the foreign source income.
Multinationals whose potentially creditable foreign taxes exceed
the actual credit limit are said to be in an 'excess credit'

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[4] In some countries (e.g. the U.S.) the profits of a foreign
branch are taxed on an accrual basis. Deferral benefits are
usually not allowed for passive investment income such as dividends
or interest.

position.[5]   Thus, foreign tax credit limitations are likely to be binding when the firm invests in a high tax country. If the foreign taxes paid are less than the limitation on credits, the firm is said to be in a 'deficit credit' (or a 'full credit') position.

Creditable foreign taxes include both foreign corporate income taxes and foreign withholding taxes on dividend and interest payments. If the host country effective corporate tax rate and the withholding tax rate on dividends are denoted by $t*$ and w respectively, then the creditable foreign taxes equal ($t*$ + $(1-t*)w$) times the repatriated portion of the foreign source income. Due to various investment incentives, the effective tax rate on local investment ($t*$) will generally be lower than the statutory tax rate (denoted by $u*$) in the host country unless the adverse effects of inflation are very large.

Since home country investment incentives are typically not extended to capital invested abroad[6], the home tax liabilities on the foreign source income can be approximately determined by the home country statutory corporate rate, denoted by u, multiplied

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[5]   In some countries, these excess credits may be carried backward or forward (two and five years respectively in the U.S.). In Korea, excess credits cannot be carried back or forward to other years. In lieu of claiming foreign tax credits (at the limitation amount), taxpayers may elect to treat all foreign taxes paid as a tax-deductible item.

[6]   In other words, the home country defines taxable foreign-source income based on some approximation to economic income.

by the income. If withholding taxes are ignored, the foreign tax credit position will then be approximately determined by the relative magnitude of the home country statutory tax rate vs. the host country effective tax rate.[7]

This intuitive result has received surprisingly little attention in the past literature. Many previous debates about the credit position have focused on the comparison of a set of "comparable" tax rates--namely either comparing the statutory tax rates of different countries (u and u*) or comparing the effective tax rates (t and t*).[8] The failure to distinguish the particular roles of different tax rates will be especially problematic in performing an empirical investigation of FDI. As stressed in this study, each of these four tax parameters may assume a distinctive role in identifying alternative channels for the tax effects on aggregate FDI.

1.2 Tax Deferrals

In addition to providing foreign tax credits, residence system countries typically allow their firms to defer the home country tax on certain types of foreign source income until the

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[7] I will ignore withholding taxes in the following discussion for simplicity.

[8] 't' denotes the home country effective tax rate.

income is repatriated.[9] Tax deferral can be an important source of tax benefits since it may lower the effective tax rate on foreign investment under certain circumstances.[10]

A central issue in determining the benefits from home tax deferrals is the method of financing marginal foreign investment. Related to this is the subsidiary's credit status. A foreign subsidiary can either draw transfers from its parent or retain its earnings to finance investment at the margin.[11]

Suppose that a subsidiary draws parent transfers to finance its marginal investment. If the subsidiary is in a full credit position (i.e. $u > t*$)[12], the firm can lower the effective tax rate on foreign earnings to the extent that it can defer home tax payments (which are higher than foreign taxes on the same

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[9] In general, active business incomes belong to this category. Income from passive investment (dividends and interest, for example) are typically taxed on the accrual basis. Most countries do not allow the tax deferral for foreign branch income.

[10] Unlike the foreign tax credit, which is designed to avoid double taxation of foreign source income, tax deferrals have been a source of controversy in some investor countries since they give multinationals a tax incentive to keep placing their earnings in foreign countries. A recent U.S. tax bill (H.R. 5270: The Foreign Income Tax Rationalization and Simplification Act of 1992) includes a provision which repeals tax deferral.

[11] Subsidiaries which have access to well-developed capital markets can also rely on local borrowing as the marginal source of funds.

[12] Note again that this condition is a simplification of the more complicated reality.

income). It can be shown that the effective tax rate on the foreign source income is a weighted average of u and t* with weights being the dividend payout ratio (denoted by d), $(1-d)t* + du$.[13]

If this subsidiary becomes mature enough to cover its investment expenditures by retaining its earnings, the deferral benefits will increase to the point where the effective tax rate on foreign investment is t*. To the extent that the home country taxes on the retained earnings are an unavoidable liability in the sense that those taxes have to be paid at some point in the future, those home taxes will be capitalized into the value of the subsidiary. Retained subsidiary earnings are a cheaper source of funds than parent transfers, since the opportunity cost of investing out of retained earnings becomes lower than that for transfers by the present value of the future home taxes on the retained amount. As far as taxes are concerned, therefore, subsidiaries in a full credit position should exhaust retained earnings as the source of investment firancing before drawing transfers from their parents. The effective tax rate on foreign investment financed through retained earnings thus becomes t*. Note that in this case the home tax rate (u) will not affect the effective tax rate on foreign source income.[14]

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[13] See Jun (1989) for a proof.

[14] This hypothesis is analogous to the standard capitalization argument developed in the context of the effects of dividend taxation on the cost of capital for the domestic corporation. For

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Note, however, that a subsidiary can lower the effective tax rate on its investment only when it faces higher tax payments in the home country (i.e. a full-credit position, u > t*). If the firm is in an excess credit position (u < t*), the effective tax rate on foreign source income will become t* regardless of the timing of income repatriation. Also, as noted earlier, not every type of foreign source income is eligible for the deferral benefits.[15] If a firm is in a full credit position and no deferral is allowed, then the effective tax rate is equal to the home country tax rate (u).

Table 1 breaks down the effective tax rate on foreign source income by the financing method and the credit position. If a foreign subsidiary is either in an excess credit position or from a territorial system country, the tax consequence is trivial. When a firm is from a residence system country and in a full credit position, the effective tax rate can be significantly influenced by the financing method and the deferral practice.[16]

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a more rigorous treatment of this subject, see again Jun (1989).

[15] See footnote 9.

[16] Multinational firms typically attempt to avoid an excess credit position. One possibility is that the firm changes the debt-equity mix of parent transfers in order to generate more interest expenses in the subsidiary.

2. Alternative Channels for the Tax Effects on FDI

The analytical result summarized in Table 1 suggests that investment incentives available in the home country (measured by t) and the host country statutory tax rate (u*) should not significantly affect the effective tax rate on the income from FDI. The relative importance of the two relevant tax variables, t* and u, in determining the tax burden on FDI income hinges on a variety of behavioral as well as institutional factors.

Yet this result does not reflect the possibility that t and u* can influence FDI through other channels. Indeed, the effects of the tax systems of the home and host countries on FDI cannot be adequately summarized by the effective tax rate on FDI income alone. One important distinction between a purely domestic firm and a multinational firm is that the latter typically has alternative locations for investment. This choice of locations may be affected by the relative net profitability in the firm's home and host countries. The importance of local investment incentives can be represented by the effective tax rates on domestic investment in each location (t and t*). If the effective tax rate on foreign source income and the pretax rates of return in the two locations are denoted by t^{fsi}, r and r* respectively, then the multinational firm will compare $r(1-t)$ and $r*(1-t^{fsi})$ to determine the investment location. As indicated in Table 1, t^{fsi} is a weighted average of u and t* with weights lying

between zero and unity. To the extent that the substitution

between locations is sensitive to the relative net rates of

return, FDI can be affected by the home country effective tax

rate (t), which deviates from the home country statutory rate (u)

due to the presence of investment incentives and the

distortionary effects of inflation.

In summary, the two home country tax variables (u and t)

effectively represent the two channels -- the effective tax rate

on FDI and the location-substitution effect, respectively --

through which home country taxation affects FDI. Note, however,

that these two variables have opposite implications for the

incentives to undertake FDI. The home country statutory rate (u)

is expected to measure a disincentive effect on doing business

abroad,[17] while the home country effective tax rate (t) will

measure an FDI incentive caused by taxation of domestic

investment in the home country. This result illustrates that a

naive analogy between the tax effects on domestic and foreign

investment can be quite misleading. While a reduction in the

statutory rate (u) and an increase in investment subsidies (lower

t for a given value of u) would both boost incentives for

domestic investment, the same tax changes would generate

offsetting incentives for FDI. This analytical implication is

specifically tested by including both variables in an estimated

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[17]   If the investor is from a territorial system country, u
does not measure this effect as shown in Table 1.

equation in section 4.

This new approach of assigning a distinctive role to each tax parameter in explaining the behavior of FDI sharply deviates from the conventional treatment of home and host country taxation in the literature. As properly stressed in Slemrod (1990, p. 82), the empirical research has been extremely one-tracked. For example, most of the studies[18] on FDI in the United States have practically repeated the same specification adopted in Hartman (1984), in which the role of home country taxation was either theoretically ruled out or empirically untractable.[19] Even in the exceptional cases,[20] the home country's effective tax rate was the only variable representing the role of home country taxation, although the effective tax rate alone cannot adequately capture alternative channels for the effects of home country taxation on FDI.

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[18] See the citation about the literature in section 1.

[19] These studies typically estimated the response of inward FDI to tax incentives available in the United States, separately for investment financed through retained subsidiary earnings and parent transfers. This practice of decomposing FDI into two financing-types was motivated by the implication of the tax capitalization argument that home country taxation does not influence the effective tax rate on the income from FDI financed by retained earnings. As summarized in Slemrod (1990), the results of these studies, often inconsistent with each other, have failed to support the hypothesis. Strangely, the hypothesis was often adopted as an "explanation" for the lack of significant effects of a home country tax variable in some studies which include such a variable.

[20] See footnote 1.

The host country statutory tax rate (u*), which assumes no role in explaining the real investment behavior of a multinational, may still affect FDI capital flows through yet another channel. In addition to affecting the real investment decisions of multinationals, taxes may influence the firms' financial behavior. Multinationals have an incentive to shift their taxable income towards countries with lower tax rates. They can do this not only through manipulation of the transfer prices, but also through such devices as the location of ownership of corporate patents. Multinationals may also want to generate tax deductible expenses in the country where the deductions are most valuable. The gain from shifting a given amount of taxable income or deductible expenses is proportional to the absolute value of the difference in the marginal tax rates on the income accruing in each country. In the empirical work, I measure this transfer pricing effect by the absolute difference in the statutory corporate tax rates of the related countries $(abs(u-u*))$.

Many nontax factors also affect FDI. Since FDI suggests the acquisition of both ownership and control over the foreign firms, there may exist synergy gains from joint operations of the domestic and foreign firms. A firm which owns some distinct products and technologies may want to expand its operations internationally to exploit such advantages. I proxy the degree to which firms in one country own distinct products or

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technologies by a measure of R&D effort in that country. Exchange rates may influence the firm's FDI decision by affecting the competitive position of the host country. The relative size of the home country or the business cycle condition in the home country may also influence FDI.

3. Data

In order to test the sensitivity of FDI flows to tax incentives, we have collected data on the relevant tax and nontax variables in the U.S. and ten other industrial countries for the period 1980-1989. The data set also includes FDI flows into the U.S. from each of these other countries. The ten investor countries are Australia, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, and the U.K.

Specifically, the investor (home) country characteristics are represented by u, t, R&D intensity (R&D) and the relative size of GDP (RGDP), for each of the ten investor countries. The host country (U.S.) variables include u*, t*, the real exchange rate (REXC) and the capacity utilization rate (UCAP).

u and u*: In each case, we used the statutory rate that applied to the largest firms for each country in each year. Data of these rates came from Coopers and Lybrand's International Tax

Summaries. When state or provincial governments in that country also taxed corporate profits, we used a combined tax rate. This approach does not take into account the possibility that firms may have tax losses, and 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.

t: We measured the effective tax rate on domestic investment in the host country by the ratio of direct taxes on income to operating surplus less net interest paid for the nonfinancial corporate sector, as reported in the "Accounts for Non-Financial Corporate and Quasi-Corporate Enterprises" in the OECD's National Accounts 1976-89. An alternative measure for this variable is the effective tax rate based on the user cost of capital, constructed using information about corporate tax provisions. Slemrod (1990) adopted this measure in his disaggregate analysis. 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. In order to find a consistent tax measure which is less sensitive to country-specific factors, we used the OECD average tax rate as the base case measure.

t*: By definition, this is the effective corporate tax rate on foreign holdings in the U.S. Most firms operating in the U.S.

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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, and so measured
t* as the ratio of actual corporate tax payments to a measure of
economic income in the base case.[21] Since this variable
represents the key parameter for the host country tax effects on
FDI, we also tried a couple of other measures of the U.S.
effective tax rate in an effort to mitigate the concern about the
measurement issue. We used the OECD average tax rate as the base
case. The second measure used is an updated series of the
effective tax rate reported in Feldstein and Jun (1987). This is
the series that many past empirical studies have used in their
empirical estimation. The other alternative is the effective tax
rate based on the user cost of capital, the same time series as
used in Slemrod (1990), and which was originally reported in
Auerbach and Hines (1990).

R&D intensity: We measured the home country's R&D intensity
in year t by the average value in a country of R&D/GDP during
years t-3 to t-1.

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[21] 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. I assume that this is due
to financial arbitrage engaged in by these firms, measured in this
study by abs(u-u*), rather than due to differences in the tax
treatment of foreign-owned firms.

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RGDP: This relative GDP variable is the ratio of each investing country's real GDP to U.S. real GDP. The real GDP data is taken from an updated version of the series reported in Summers and Heston (1988).

REXC: For each country, it is the product of the nominal exchange rate (foreign currency/U.S.$) and the ratio of GDP deflators (U.S. GDP deflator/foreign GDP deflator).

UCAP: This variable measures the U.S. capacity utilization rate reported by the Federal Reserve Board.

Lastly, data for FDI from each of the ten investor countries into the United States are needed. This country-specific data is taken from various issues of the Survey of Current Business, published by the U.S. Commerce Department. This FDI time series was constructed by extrapolating the benchmark survey data, which has been collected occasionally (1959, 1974 and 1980). Since we used 1980-89 as the sample period, the FDI data used in this paper does not suffer from the problems associated with the changing definitions and the differing sample coverage from one survey to the subsequent ones.[22]

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[22] This balance of payments FDI data does not necessarily represent real capital expenditures by foreign affiliates. In fact, this measure, which consists of retained subsidiary or branch earnings and parent transfers, can be accurately thought of as a measure of financial transactions between affiliated parties. For a more detailed discussion of direct investment data, see Jun (1990).

4. Estimation

This section presents the estimated equations relating FDI in the United States to the tax and nontax variables described in section 3. The ratio of FDI in the United States to U.S. GDP is used as the dependent variable in the estimated equations.[23] We first pooled the data from all sample countries and estimated various specifications. Then we divided the whole sample into two tax system groups (residence and territorial) and tested the same specifications for each group.[24] This disaggregate analysis will shed further light on the role of home country taxation in explaining FDI. The predicted sign of the estimated coefficients are summarized in Table 2. The effects of u on FDI are expected to be significant for the residence system countries but insignificant for the territorial system group. For the residence system countries, the estimated coefficients of the two home country tax rates (t and u) are expected to have the opposite sign.

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[23] In the estimated equations, the FDI-GDP ratios are multiplied by 1000.

[24] Among the ten sample countries, four countries -- Canada, France, the Netherlands, and Germany -- belong to the territorial system group. The Netherlands and France are territorial system countries, while Canada and Germany exempt U.S. source income from domestic corporate taxes by a tax treaty. Italy uses a hybrid system, exempting a certain fraction of repatriated foreign source income from domestic corporate taxes. I tried three alternative combinations: (1) Italy in the residence system group; (2) Italy in the territorial system group; and (3) Italy omitted from both groups. Since the results were qualitatively similar, I report the results for the first case only.

The regression results for all sample countries are presented in Table 3. In the OLS regression (column 1), the coefficient of u is of the expected sign and is statistically significant. The effective tax rates of the home and host countries (t and t*) are both of the expected sign but are not statistically significant. The coefficient of abs(u-u*) is of the wrong sign and statistically insignificant. Nontax variables all have correctly signed and statistically significant coefficients.

Studies generally indicate a lag between changes in the determinants of investment and subsequent changes in investment. We lagged the explanatory variables one year to test for delayed responses to changes in incentives. Since We did not collect tax data for 1979, the regression had to be run with data from 1981-1989. The resulting coefficients from this lagged regression appear in column 2 of Table 3. The t-values for t and t* are larger and the statistical fit is slightly better. Since differences from the original specification are minor, We chose to focus on the contemporaneous specification 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 the

very least, results in biased estimates of the coefficient

standard errors. 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 coefficient

estimates resulting from the fixed effects specification are

reported in column 3 of Table 3. As is apparent from the jump in

the adjusted R^2, these country effects are highly significant as

a group.[25] If the country effects are uncorrelated with the

other included variables, then a random effects estimator would

be appropriate.

Most coefficient estimates that result from the fixed-

effects procedure do not differ significantly from those

resulting from OLS. The coefficient of u is again of the

expected sign and statistically significant. The coefficients of

R&D, RGDP, REXC and UCAP are all of the expected sign as in OLS,

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[25]   The value of the F statistic for omitting the country
dummies in the fixed effects procedure is 5.3, compared with a 5%
significance level of about 1.35.

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but they are no longer significant. The coefficients of t and t*
have both changed sign but are still statistically insignificant.
The most significant change from the OLS specification is the
coefficient of abs(u-u*), which is now of the expected sign and
statistically significant. As reported in column 5 of Table 3,
the random effects results are very similar to those for the
fixed effects estimator.

In order to capture the cross-sectional variation in the
data, We also report results from a between effects regression in
column 4 of Table 3, in which the averages of home country
variables over the ten year period are used. The estimated
equation naturally includes only the investor country variables.
Given the small number of countries in the sample, it is not
surprising that t-statistics for the coefficient estimates are
low. Again, the estimated coefficient of u has the expected
sign.

In order to focus on the role of home country taxation
in explaining FDI, We estimated the same specifications
separately for each of the two tax system groups. One key
differing aspect of these two systems is the effect of u on FDI.
Since the home country tax system does not affect the effective
tax rate on foreign source income, the effect of u on FDI is
expected to be negligible in an estimated equation using

territorial country data.   The results are reported in Table 4.[26]

The results for residence system countries (columns 1 and 2) are very similar to the results for all sample countries.   In the fixed effects model, the coefficients of every tax variable are now of the expected sign.   The results for territorial system countries are reported in the last two columns of Table 4.   Most importantly, the coefficient of u is insignificant.   The coefficients of t and t* are statistically significant but of the wrong sign.   These results, combined with the corresponding results for the residence system group, strongly support the theoretical implication that it is the home country statutory tax rate that determines the extent to which home country taxation contributes to the tax burden on the FDI income.

In the estimated equations presented so far, the performance of the host country effective tax rate (t*) is mixed at best. expected results.   Especially puzzling is the result for the territorial system countries since t* is expected to play a relatively more important role for this group.   In order to test for the sensitivity of the results to the measurement of the effective tax rate, We estimated the same specifications using the two additional measures of t* discussed in section 3.   As reported in Table 5, the results are pretty robust to the choice

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[26]   I report only the OLS and the fixed effects results.

of the effective tax rate measure.[27]

In summary, the most robust result across all specifications and alternative measures of variables is that the home country's statutory tax rate has a highly significant negative coefficient in the estimated equations for the residence system group. This result is supplemented by the finding that the coefficient of the same variable is insignificant in the regression for the territorial system group. Another interesting finding is that the coefficients of t and u, the home country tax variables, are of the opposite sign in the estimated equations. This result may vindicate the theoretical case made in this study that each tax rate assumes a distinctive role in identifying alternative channels for the effects of home country taxation on FDI. The weak performance of the host country tax measures in the estimation contrasts with some previous findings.[28]

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[27] I report the OLS results. The results are also robust with respect to the choice of the tax measure in the fixed effects specification.

[28] For example, the results in Slemrod (1990) generally supported a negative effect of U.S. effective tax rates on aggregate FDI. Unlike the panel estimation performed in this paper, his study used a time series data set, 1956-84. The results of other studies were not as strong as those of Slemrod.

5.   Conclusions

The evidence presented in this paper confirms that home country taxation has had a significant effect on FDI.   This result sharply contrasts with the conclusions of past studies which have not supported any systematic effect of the home country's tax system on FDI either empirically or on theoretical grounds.   By suggesting various alternative channels for the tax effects, this paper disputes the popular theoretical claim that the home country's tax system does not matter for FDI financed through retained subsidiary earnings.

The main approach taken in this study is to distinguish the particular roles of different tax parameters in identifying alternative channels for the tax effects on FDI.   Specifically, We argue that the home country statutory tax rate measures the effect of home country taxation on the income from FDI originating in a residence system country, while the home country effective tax rate measures a possible tax effect on the substitution between domestic and foreign investment.   On the other hand, the host country's effective tax rate should represent the investment incentives of undertaking FDI or the amount of creditable foreign tax payments, depending on the investor's home country policy toward foreign source income, the type of investment, and the firm's credit status.

In order to shed light on the relative importance of home and host country taxation in explaining FDI, We have estimated various specifications which relate FDI into the United States from ten other countries during the period 1980-1989 to relevant tax and nontax variables. The most striking finding is that the home country statutory tax rate has had a significantly negative effect on FDI from the residence system countries in the sample. This result is robust to the choice of specification and tax measures, and is supplemented by the finding that the same variable has had no significant effects on FDI from the territorial system countries. The finding that the coefficients of the home country's statutory and effective tax rates are of the opposite sign in the estimated equations supports the presence of alternative channels for the effects of the home country tax system on FDI. The weak performance of the host country tax variables in the estimated equations, coupled with the mixed results in the previous literature, may suggest that the host country tax does not affect investment incentives as much as conventionally perceived but largely represents the amount of creditable foreign taxes for many investors. The findings of this study also suggest a need to pay more balanced attention to the role of both the home and host country's tax systems in evaluating the tax effects on FDI.

REFERENCES

Alworth, J, The Financial Decisions of Multinationals, Oxford, Blackwell, 1988.

Auerbach, A. and J. Hines, "Investment Incentives and Frequent Tax Reform," American Economic Review, 78, 1988.

Boskin, M. and W. Gale, "New Results on the Effects of Tax policy on the International Location of Investment," in M. Feldstein ed. The Effects of Taxation on Capital Accumulation, University of Chicago Press, pp.210-219, 1987.

Bradford, D. and D. Fullerton, "Pitfalls in the Construction and Use of Effective Tax Rates," in C. Hulten ed. Depreciation, Inflation, and the Taxation of Income from Capital, Washington, Urban Institute Press, 1981.

Caves, R., Multinational Enterprise and Economic Analysis, Cambridge University Press, 1982.

Feldstein, M. and J. Jun, "The Effects of Tax Rules on Nonresidential Fixed Investment: Some Preliminary Evidence from the 1980s," in M. Feldstein ed. The Effects of Taxation on Capital Accumulation, University of Chicago Press, 101-156, 1987.

Gordon, R., "Taxation of Investment and Savings in a World Economy," American Economic review, 76, pp. 1086-1102, 1986.

Grubert, H., T. Goodspeed, and D. Swenson, "Explaining the Low Taxable Income of Foreign-Controlled Companies in the United States," in A. Giovannini, G. Hubbard, and J. Slemrod, International Aspects of Taxation, University of Chicago, forthcoming, 1992.

Hartman, D., "Tax Policy and Foreign Direct Investment in the United States," National Tax Journal, 37, No. 4, pp. 475-487, 1984.

Hartman, D., "Tax Policy and Foreign Direct Investment," Journal of Public Economics, 26, pp. 107-121, 1985.

Jun, J., "Taxation and International Direct Investment" NBER Working Paper No. 3048, 1989.

Jun, J. "U.S. Tax Policy and Direct Investment Abroad," in A. Razin and J. Slemrod eds., Taxation in the Global Economy, University of Chicago Press, 1990.

Newlon, T.S., "Tax Policy and the Multinational Firm's Financial Policy and Investment Decisions," Ph.D. Thesis, Princeton University, 1987.

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Slemrod, J. "Tax Effects on Foreign Direct Investment in the U.S.: Evidence from a Cross-Country Comparison," in A. Razin and J. Slemrod eds., Taxation in the Global Economy, University of Chicago Press, 1990.

Summers, R. and A. Heston, "A New Set of International Comparisons of Real Product and Prices for 130 Countries, 1950-85," Review of Income and Wealth 34, pp 1-25, 1988

Young, Kan H., "The Effects of Taxes and Rates of Return on Foreign Direct Investment in the U.S.," National Tax Journal, 41, pp. 109-121, 1988.

Table 1. The Effective Tax Rate on Foreign Source Income

	Retained earnings	Parent transfers	No deferral
Residence system			
Deficit credit ($u > t^*$)	t^*	$du+(1-d)t^*$	u
Excess credit ($u < t^*$)	t^*	t^*	t^*
Territorial system	t^*	t^*	-

Notes:

t^* : Host country effective tax rate
t : Home country effective tax rate
u : Home country statutory tax rate
d : Dividend payout rate

Table 2. Predicted Sign of Estimated Coefficients

	Predicted sign	Data used in estimation
t^*	-	U.S. effective tax rate
t	+	Home country effective tax rate
u	-/0	Home country statutory tax rate (residence/territorial)
$abs(u-u^*)$	+	Difference in statutory corporate tax rates
R & D	+	Home country R & D-GDP ratios
RGDP	?	The ratio of home country GDP to U.S. GDP
REXC	-	Real exchange rate (foreign currency / U.S.$)
UCAP	+	U.S. capacity utilization rate

Table 3. Regression Results for All Sample Countries

	OLS (1)	Lag (2)	Fixed effects (3)	Between effects (4)	Random effects (5)
Constant	-2.525 (-1.04)	-1.516 (-0.56)		0.744 (0.35)	-9.852 (-1.58)
t*	-0.864 (-0.48)	-2.143 (-1.17)	0.489 (0.77)		-0.124 (-0.08)
t	0.475 (1.42)	0.584 (1.63)	-0.148 (-0.42)	0.851 (0.60)	-0.029 (-0.09)
u	-5.775 (-4.33)	-6.375 (-3.98)	-5.707 (-3.08)	-4.340 (-0.93)	-5.085 (-3.21)
abs(u-u*)	-1.764 (-0.97)	-1.110 (-0.52)	3.080 (1.89)		1.778 (1.14)
R & D	33.900 (1.84)	39.960 (1.96)	32.792 (0.95)	59.063 (1.19)	26.996 (1.05)
RGDP	5.647 (5.25)	6.221 (5.30)	13.041 (0.95)	4.239 (1.26)	5.137 (2.45)
REXC	-0.001 (-2.42)	-0.001 (-2.49)	0.001 (0.97)		-0.0003 (-0.83)
UCAP	6.095 (2.13)	5.475 (1.70)	4.265 (1.43)		4.511 (1.88)
Adjusted R-squared	0.32	0.34	0.66	0.38	0.16

Notes: 1. t-statistics are in parentheses.

2. The dependent variable is FDI x 1000 / U.S. GDP.

3. The regression using lagged independent variables is based on 90 observations, 1981-1989 by 10 countries; all others are based on 100 observations, 1980-89 by 10 countries.

4. For the between effects model, standard R-squared is reported.

Table 4. Regression Results by Tax System

	Residence system countries		Territorial system countries	
	OLS (1)	Fixed effects (2)	OLS (1)	Fixed effects (2)
Constant	-2.205 (-0.67)		-3.943 (-1.85)	
t*	-3.563 (-1.40)	-1.298 (-0.47)	2.034 (1.73)	3.892 (2.16)
t	0.671 (1.09)	0.105 (0.22)	-0.661 (-1.96)	-0.984 (-2.53)
u	-6.876 (-3.73)	-6.737 (-2.45)	1.074 (0.68)	0.717 (0.36)
abs(u-u*)	-3.195 (-1.27)	4.710 (1.98)	-3.352 (-2.11)	-3.693 (-2.25)
R & D	34.934 (1.51)	35.780 (0.81)	36.901 (1.76)	60.756 (0.94)
RGDP	7.694 (6.25)	13.498 (0.45)	-7.75 (-4.84)	-19.253 (-1.57)
REXC	-0.001 (-2.44)	0.001 (0.89)	-0.054 (-1.56)	-0.031 (-0.39)
UCAP	7.140 (1.79)	5.442 (1.20)	5.040 (2.63)	2.123 (0.81)
Adjusted R-squared	0.48	0.70	0.73	0.73

See note to Table 3.

Table 5. Altenative Measures of U.S. Effective Tax Rate (t*)

	OECD Average tax rate	Feldstein-Jun	Auerbach-Hines
	(1)	(2)	(3)
(All sample countries)			
t*	-0.864 (-0.48)	-0.893 (-0.47)	-0.805 (-0.80)
t	0.475 (1.42)	0.469 (1.41)	0.482 (1.45)
u	-5.775 (-4.33)	-5.773 (-4.32)	-5.718 (-4.29)
(Residence system countries)			
t*	-3.563 (-1.40)	-3.053 (-1.31)	-2.467 (-1.75)
t	0.671 (1.09)	0.602 (0.99)	0.693 (1.15)
u	-6.876 (-3.73)	-6.832 (-3.70)	-6.775 (-3.71)
(Territorial system countries)			
t*	2.034 (1.73)	1.663 (1.31)	0.972 (1.44)
t	-0.661 (-1.96)	-0.713 (-2.07)	-0.707 (-2.09)
u	1.074 (0.68)	1.068 (0.67)	0.776 (0.48)

See note to Table 3.

Table 6. Alternative Measures of FDI Ratios

	FDI U.S.GDP (1)	FDI U.S.Investment (2)	FDI Foreign GDP (3)
Constant	-2.525 (-1.04)	-0.088 (-0.90)	28.924 (1.05)
t^*	-0.864 (-0.48)	-0.077 (-1.06)	12.818 (0.63)
t	0.475 (1.42)	0.022 (1.61)	-4.889 (-1.28)
u	-5.775 (-4.33)	-0.246 (-4.54)	-71.745 (-4.70)
abs(u-u*)	-1.764 (-0.97)	-0.059 (-0.80)	-26.185 (-1.26)
R & D	33.900 (1.84)	1.449 (1.94)	436.027 (2.07)
RGDP	5.647 (5.25)	0.227 (5.21)	-12.905 (-1.05)
REXC	-0.001 (-2.42)	-0.00002 (-2.26)	-0.004 (-1.31)
UCAPUS	6.095 (2.13)	0.245 (2.11)	7.934 (0.24)
Adjusted R-squared	0.32	0.33	0.35

See note to Table 3.

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