Altered States: Taxes and the Location of Foreign Direct Investment in America

By JAMES R. HINES, JR.*

This paper compares the distribution between U.S. states of investment from countries that grant foreign tax credits with investment from all other countries. The ability to apply foreign tax credits against home-country tax liabilities reduces an investor's incentive to avoid high-tax foreign locations. State corporate tax rate differences of 1 percent are associated with differences of 9–11 percent between the investment shares of foreign-tax-credit investors and the investment shares of all others, suggesting that state taxes significantly influence the pattern of foreign direct investment in the United States. (*JEL* H87, H73, H25, F23)

One of the striking economic developments of the 1980's was the sudden appearance of a large volume of foreign direct investment (FDI) in the United States. One common explanation is that tax changes during the 1980's greatly encouraged foreigners to invest in America. If it is true that tax changes are partly responsible for the FDI inflow, then future tax reforms might significantly influence patterns of FDI; but little is known about the effect of taxation on the volume of foreign direct investment.

This paper examines the effect of state tax rates on the distribution of foreign direct investment within the United States. Foreign investors in the United States pay state taxes on their investment income at (roughly) the same rates that U.S. investors pay on theirs. Investors from certain foreign countries receive home-country credits for income taxes paid in the United States and consequently have reduced incentive to avoid American tax obligations. The idea behind this paper is to compare the pattern of their (more lightly taxed) investments in the United States with the pattern of investments from other countries (including investments by Americans) that are fully taxed.

The results suggest that state tax rates significantly influence the location of FDI in the United States. All other things equal, it appears that a difference of 1 percent in state tax rates is associated with a difference of 9–11 percent in shares of manufacturing capital owned by lightly taxed and fully taxed investors. State tax rate differences of 1 percent are also associated with differences of 3 percent in the proclivities of lightly taxed and fully taxed investors to establish affiliates. While it is not quite correct to extrapolate these figures to conclude that increasing a state tax rate from 6 percent to 8 percent would reduce total investment by 20 percent, the estimated effects are nevertheless large and important in the context of evaluating the impact of tax changes.

The impact of tax differences on investment is most pronounced at low tax rates. Five of the 50 American states had zero corporate tax rates during the sample period, and the investment results are strongly influenced by behavior in these states, in the sense that removing from the sample observations from these five states makes the estimated effect of taxation on capital ownership statistically indistinguishable from zero. Removing observations from zero-tax states does not, however, influence the estimated effect of taxation on numbers of affiliates.

* John F. Kennedy School of Government, Harvard University, 79 John F. Kennedy St., Cambridge, MA 02138, and NBER. I thank Jeffrey Geppert and Joanne Siu for outstanding research assistance, and Lawrence Katz, James Poterba, Jonathan Skinner, and two anonymous referees for helpful comments on earlier drafts. Financial support from NSF Grant No. SES-9209373 is gratefully acknowledged.

This paper examines two related issues: the first is the effect of international taxation on FDI, and the second is the effect of subnational taxation on business location. Both issues are considered simultaneously, by exploiting the rather small differences between U.S. states in the tax rates they impose on corporate profits earned within their boundaries. Previous researchers have had difficulty finding *any* effect of state taxation on business location. There are various explanations for the absence of an apparent tax effect, but the simplest explanation has to do with the difficulty of controlling for important unobservable variables. For example, both New York and California have high tax rates, and they both have high levels of investment; the high tax rates are not responsible for the high investment levels, but do not excessively discourage investment either, since both states include locations (e.g., Manhattan and Silicon Valley) that are very attractive to investors in spite of the high tax rates. As long as the unobservable attributes of states are roughly the same for all investors, then it is possible to compare the behavior of more lightly taxed foreign investors to the behavior of other investors who are fully influenced by tax rates, in order to identify the impact of taxation on investment location. In such a setting, even small tax rate differences may yield significant differences in observed investment patterns, since other considerations are held constant.

Section I of the paper describes the tax systems that countries and states use to tax domestic and foreign firms within their borders, and it reviews the findings of earlier research on the effect of taxation on business location, both internationally and within the United States. Section II presents the model of investment that is used in the statistical work and describes the data that are available on tax rates and the allocation of investments between states. Section III presents the estimation results, and Section IV is the conclusion.

I. Taxes and Business Location: National and International

The recent growth in the importance of foreign direct investment in the United States is illustrated by Figure 1, which plots the ratio of FDI to total gross private domestic investment (GPDI) in the United States for the years 1960–1991.[1] FDI in the United States was negligible relative to GPDI until the mid-1970's; it grew significantly in the 1980's and remained high until the 1990's. Many observers note that the years of largest jumps in the FDI ratio (1981 and 1986) were also years of important tax changes in the United States. Whether those tax *changes* are able to explain the FDI movements is unclear—just as it is unclear what factor is responsible for the recent drop in the FDI ratio. But in order to understand the role that tax policy plays in influencing foreign investments, it is necessary to examine the rules that govern the taxation of international income.

A. *International Tax Systems*

Multinational firms are subject to taxation by the countries in which they locate their activities, and taxation by their home countries. Consequently, a Japanese firm operating a subsidiary in the United States must pay corporate taxes on its U.S. profits to the United States and to Japan.

Under such systems, firms may be double-taxed, perhaps prohibitively, on their foreign investments.[2] Governments are aware of this problem and use different methods of relieving double taxation.

One method of reducing international double taxation is to provide foreign tax credits for taxes paid to foreign governments. Several OECD countries use this system, including the

[1] The U.S. Commerce Department recently changed its historical series of FDI in the United States; the revised figures, from which Figure 1 is constructed, are reported in Howard Murad (1992). The definition of FDI changed somewhat after 1981, making the 1960–1981 series not perfectly comparable to the 1982–1991 series, but by any definition, FDI increased in the 1980's. Gross private domestic investment is not the only natural scaling variable for the FDI ratio (others include GDP, GNP, and NNP), but all yield roughly the same picture.

[2] Double taxation reduces the incentive to invest and may encourage corporations to change their countries of residence in order to escape home-country taxation of foreign earnings. Tax laws are often designed to prevent corporations from changing their residences; see Hines (1991) for an analysis.

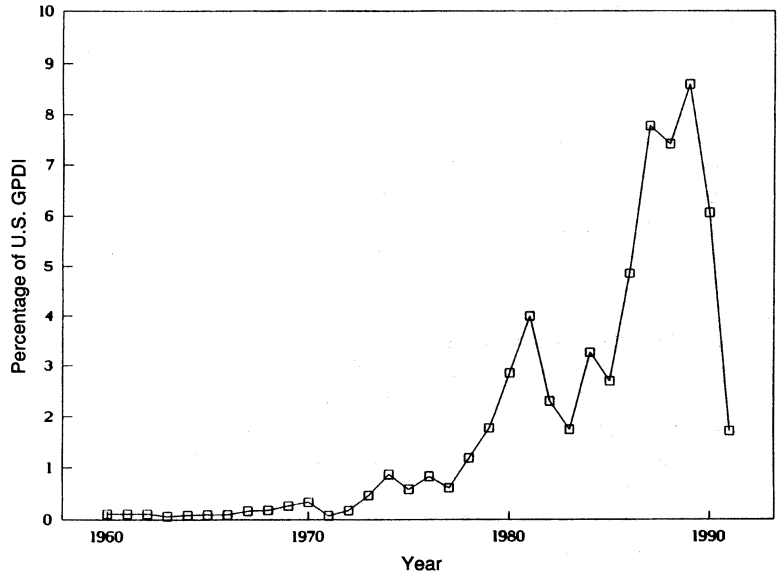

FIGURE 1. FOREIGN DIRECT INVESTMENT IN THE UNITED STATES

Note: The figure depicts annual ratios (expressed as percentages) of foreign direct investment to total U.S. gross private direct investment.

United States, the United Kingdom, and Japan. Numerous other countries, including Australia, Canada, France, Germany, the Netherlands, and Switzerland, effectively exempt the foreign earnings of their firms from domestic taxation.[3] Governments that use foreign-tax-credit systems require firms to pay taxes on profits earned in foreign countries but permit them to claim credits against home-country tax liabilities for taxes paid to foreign governments. Consider, for example, a Japanese investment in the United States that earns a profit of $100 and is taxed by the United States at the statutory tax rate of 35 percent. The net corporate tax rate in Japan is approximately 52 percent. The firm pays $35 to the U.S. government and has an obligation of $52 to the Japanese government, but it can claim a foreign tax credit of $35, reducing its net obligation to the Japanese government to $17 ($52 − $35).

In practice, foreign tax credit systems contain a large number of complications. For example, it is common for home countries to defer their own taxation of foreign profits until the profits are effectively repatriated from the foreign locations in which they are earned. Countries may also limit the foreign tax credits firms can claim.

B. *Effects of International Taxes*

There exists a body of work that analyzes the effect of international taxation on foreign direct investment. Examples include the time-series investment studies of David G. Hartman (1981, 1984), Michael J. Boskin and William G. Gale (1987), Timothy Scott Newlon (1987), and Joel Slemrod (1990a, b). Additionally,

[3] Strictly speaking, not all of these countries exempt all foreign income from home-country taxation. For example, tax treaties effectively exempt Canadian and German investments in the United States from home-country taxation. The earnings of Swiss branches in the United States are exempt from home-country taxation, but profits earned by U.S. subsidiaries of Swiss corporations are subject to home-country taxation without the ability to claim foreign tax credits for U.S. taxes paid. (Some of the Swiss provisions vary by canton.)

the study by Hines and Eric M. Rice (1994) considers the effect of taxation on the cross-sectional distribution of capital and labor employed by U.S. multinationals in foreign countries.

These investigations encounter difficulties in identifying the effects of taxes on the factor demands of multinational firms. Cross-sectional variation in national tax rates and tax systems may be correlated with countless observable and unobservable national differences in economic variables that influence investment and labor demand. Time-series variation in tax rates may not be adequate to identify tax effects either, since tax rates change infrequently and tax changes may be endogenous to unobservable economic conditions that affect factor demands.[4]

C. *State Taxes*

There is a source of tax variation other than cross-sectional and intertemporal differences in national tax rates: differences between state corporate income tax rates in the United States. Corporate income taxes vary in rate and design between states; for example, in 1987, five states exempted corporate income from direct taxation, while 45 states taxed corporate income at rates ranging from 3.4 percent to 12 percent. Foreign firms are subject to these taxes, with two complications. The first complication is that some states, over some time periods, impose taxes on the basis of worldwide rather than U.S.-based profits.[5] The second complication is that foreign investors from foreign-tax-credit countries can credit state corporate income taxes against their home-country tax liabilities. Other types of state taxes, such as sales taxes, are not creditable.

Analysts typically find little or no effect of subnational taxes on the location of business activity. An example is Dennis W. Carlton's (1983) study of the determinants of new firm locations, in which high tax rates appear not to discourage new firms. Others, including Robert J. Newman (1983), Timothy J. Bartik (1985), L. Jay Helms (1985), and Leslie E. Papke (1987, 1991) present evidence that taxes significantly influence the location choices of new businesses, but the bulk of the studies surveyed in Michael Wasylenko (1981, 1991) report little in the way of strong support for the view that state taxes have important effects on business location within the United States.[6]

It is not altogether surprising that it has been difficult for analysts to identify a strong effect of subnational taxes on business activity. There are numerous attributes that make locations attractive and unattractive for business, many of which are imperfectly, if at all, observable to the econometrician. Furthermore, it is not clear what correlation one might expect between tax rates and business activity. If higher business taxes represent part of a fiscal package that includes greater spending on infrastructure and other items that benefit business, then higher taxes might be positively correlated with business activity.[7] Or if state income is correlated with business activity, and the demand for public goods has greater than unit income elasticity, then business activity will be associated with high tax

[4] Another possibility is that tax policy does not affect FDI, or else has only a trivial effect, as Norman J. Glickman and Douglas P. Woodward (1989) and Edward M. Graham and Paul R. Krugman (1991) suggest in their surveys of FDI in the United States.

[5] These states apply formulas to allocate worldwide corporate income to their state tax bases. The constitutionality of this method of state taxation has been under court review for most of the last 15 years. Currently, only Alaska, California, Montana, and North Dakota impose worldwide unitary tax systems, and all but Alaska make its use optional for taxpayers. See Charles E. McLure, Jr. (1984) for an economic analysis of the impact of worldwide tax formulas, and see Roger H. Gordon and John D. Wilson (1986) for a welfare analysis of formula apportionment in general.

[6] Newman and Dennis H. Sullivan (1988) conclude that the modeling and estimation limitations of existing studies make it difficult to reject the hypothesis that taxes influence business location (or, for that matter, many other hypotheses) with the available information. Cletus C. Coughlin et al. (1991) do not find state tax rates to exert a significant effect on the location of FDI within the United States; but this study does not distinguish investments by country of origin, nor does it include state fixed effects. Using a different methodology that also omits state fixed effects, Jan Ondrich and Wasylenko (1993) find evidence that state corporate tax rates influence the location of new FDI.

[7] Helms (1985) offers some evidence that supports this hypothesis.

rates—possibly including high business tax rates.

D. *Interaction of Foreign Taxes and State Taxes*

Foreign-owned corporations pay state taxes in the United States, but owners from foreign-tax-credit countries are eligible to claim credits for these taxes. Many of these owners will have little reason to avoid paying state taxes, since state tax payments generate offsetting reductions in home-country tax liabilities. There are others who can claim foreign tax credits but will nevertheless prefer to avoid the tax liabilities associated with locating operations in high-tax states. Any of three circumstances might make state taxes costly for investors from foreign-tax-credit countries. Some firms cannot use foreign tax credits for taxes paid to U.S. states because they face binding foreign-tax-credit limits imposed by their home governments. Other firms finance their investments out of unrepatriated foreign earnings, in which case the home-country credit should not affect marginal investment decisions.[8] And still others plan to reinvest any foreign profits they earn, thereby deferring home-country taxation.[9]

In spite of these possibilities, it is likely that, on average, investors from foreign-tax-credit countries will exhibit greater willingness to operate in high-tax states than will investors from other countries.[10] Firms with current excess foreign tax credits can typically use them in subsequent years or apply them toward earlier years' tax obligations. Foreign direct investment in the United States in the 1980's was so large relative to the FDI stock at the start of the decade that almost all of it was financed out of new transfers of investment funds rather than reinvested profits. Also, some firms have limited opportunities to defer repatriation of their foreign profits. Aggregate FDI in the United States reflects the behavior of investors in many different situations, but those from foreign-tax-credit countries are the most likely to receive something in return for taxes paid to U.S. states.

II. Data and Estimation

This section describes the model to be estimated and the data used to test the model. Certain aspects of the available data require the estimation strategy to be sensitive to the possibility of zero investment from certain foreign countries in certain (generally small) states.

A. *Model and Estimation*

In order to estimate the effect of state taxes on FDI, it is necessary to specify a model of investment behavior. Bearing in mind the possible heterogeneity of investors and their motivations, I consider the following reduced-form model of investment (I_{ij}) in state i by investors from country j:

$$(1) \quad I_{ij} = \alpha_i\gamma_j + \beta_j s_i \gamma_j(\tau_i - \underline{\tau}) + \gamma_j u_{ij}$$

in which α_i is a constant (for all j), reflecting the general size of business activity in state i; α_i is assumed to be unobservable and is measured in (1) as a share, so $\Sigma_i\ \alpha_i = 1$. The variable s_i in (1) is also assumed to reflect the

[8] Hartman (1985) demonstrates that high foreign tax rates discourage FDI financed out of retained foreign earnings in spite of investors' abilities to claim foreign tax credits.

[9] Investors often can defer home-country taxation of their foreign profits as long as the profits are reinvested in foreign lines of business. Hines and R. Glenn Hubbard (1990) found that U.S. investors frequently do so: 84 percent of the controlled foreign corporations of U.S. multinationals paid zero dividends to their U.S. parent companies in 1984. But that paper also reports that the tax cost of repatriation influences dividend payments, implying that deferral is costly. Rosanne Altshuler et al. (1995) provide evidence that much of the observed effect of taxation reflects the timing of dividend payments around transitory fluctuations in associated tax costs. Their findings suggest that cross-sectional estimates of dividend payout behavior could overstate the true costs of deferral.

[10] The view that state taxes might channel certain foreign business activity into high-tax states is similar to the argument of Myron S. Scholes and Mark A. Wolfson (1992) that the Tax Reform Act of 1986 encouraged foreign direct investment through its effects on tax-base definitions. Deborah L. Swenson (1994) offers some evidence in support of the Scholes and Wolfson hypothesis, but Alan J. Auerbach and Kevin Hassett (1993) and Kristen Leigh Willard (1994) find the hypothesis to be inconsistent with other data.

size of business activity in state i; the reason that s_i differs from α_i is that s_i is assumed to be observable (e.g., the fraction of the U.S. population residing in state i), while α_i may have unobservable components (e.g., the productivity of the local workforce, the quality of the business climate, etc.); it is possible, though not necessary, that $\alpha_i = s_i$. Also, γ_j is a constant for country j, τ_i is the tax rate in state i, and $\underline{\tau}$ is the average state tax rate in the United States, weighted by shares s_i: $\underline{\tau} \equiv \Sigma_k \tau_k s_k$. The tax variable is interacted with s_i to reflect that a 1-percent change in the California tax rate is likely to have a bigger effect than would a 1-percent change in the Vermont tax rate, simply because California is economically larger and therefore has a larger capital stock.[11]

The specification of (1) includes a censored residual (u_{ij}), since it is not possible for a country to have a negative amount of property, plant, and equipment (PPE) in a state. Some countries' investors do, however, own zero amounts of PPE in certain states, and one interpretation of such instances is that those investors demand negative PPE, but this demand is realized as zero ownership. The observed residual, u_{ij}, can then be thought of as a transformation of a residual ε_{ij} in the equation that determines desired investment, with ε_{ij} normally distributed with zero mean and finite variance, and u_{ij} taking the following form:

$$(2) \quad u_{ij} = \begin{cases} \varepsilon_{ij} & \text{if } \varepsilon_{ij} \geq -[\alpha_i + \beta_j s_i(\tau_i - \underline{\tau})] \\ -[\alpha_i + \beta_j s_i(\tau_i - \underline{\tau})] & \text{otherwise.} \end{cases}$$

Summing (1) over i yields $I_j = \gamma_j(1 + \eta_j)$, in which I_j is country j's total investment in the United States, and $\eta_j \equiv \Sigma_k u_{kj}$ is the mean value taken by u_{ij} for country j. It is helpful to define a new variable, σ_{ij}, equal to the share of country j's total U.S. investment located in state i: $\sigma_{ij} \equiv I_{ij}/I_j$. Dividing both sides of (1) by I_j yields

$$(3) \quad \sigma_{ij} = \frac{\alpha_i + \beta_j s_i(\tau_i - \underline{\tau}) + u_{ij}}{1 + \eta_j}.$$

Taking η_j to be close to zero, and taking s_i to be roughly equal to α_i, a first-order Taylor approximation to the value of the first term on the right-hand side of (3) transforms the equation to

$$(4) \quad \sigma_{ij} \approx \alpha_i - c_j s_i + \beta_j' s_i(\tau_i - \underline{\tau}) + u_{ij}'$$

in which c_j is a country-specific constant equal to η_j, $\beta_j' \equiv \beta_j/(1 + \eta_j)$, and $u_{ij}' \equiv u_{ij}/(1 + \eta_j)$. The idea that underlies the empirical work is to estimate variants of (4), using observable variables for s_i and a Tobit procedure to correct for the censoring of the residuals. It is possible to obtain consistent (though slightly inefficient) estimates of β_j' by estimating the c_j variables in (4) without the restriction that $c_j = \eta_j$; this simplifies the estimation, and it is the strategy followed in the empirical work.

Since the state fixed effects (the α_i's) are unobservable, they must be estimated in fitting equation (4) to the data. As a consequence, it is not possible to identify the β_j' coefficients separately from the state fixed effects, though it is possible to identify *differences* between the β_j''s of different countries. Equation (4) cannot be estimated as written because the system is not of full rank; intuitively, the fixed effects (the α_i's) reflect the impact of tax rates on general business activity to the same degree as does the average β_j'. Equation (4) can, however, be used to estimate differences between investors in their tax rate sensitivities, and to do so, it is necessary to fix one (or more) of the β_j''s equal to 0, interpreting the remaining β_j''s as differences from the excluded category.

In some specifications it is useful to modify the state-specific constants to reflect the match between the industries located within a state and the industries in which different

[11] The reason that (1) does not impose $\alpha_i = s_i$ is that the goal is to estimate β_j. The small number of foreign countries for which FDI data are available makes it difficult to identify the α_i's precisely, so interacting β_j with α_i introduces additional uncertainty in the β_j estimates. The estimation is more straightforward when interacting β_j with observable s_i instead of unobservable α_i; and the point of the interaction is simply to capture the economic sizes of different states, for which several different measures of s_i might be appropriate (see footnote 20).

foreign investors concentrate their U.S. investments. Let μ_{jk} denote the fraction of country j's U.S. manufacturing investment in industry k (so $\Sigma_k \mu_{jk} = 1, \forall j$), and let λ_{ik} denote the fraction of foreign-owned manufacturing PPE in industry k that is located in state i (so $\Sigma_i \lambda_{ik} = 1, \forall k$). A high degree of correlation between μ_{jk} and λ_{ik} indicates that, based on the industries in which country j invests, one expects country j to own more PPE in state i than it would otherwise. Using investment data disaggregated into n industries, one can define a new variable, ψ_{ij}, that reflects this correlation:

$$(5) \qquad \psi_{ij} \equiv \frac{\sum_{k=1}^{n} \mu_{jk}\lambda_{ik}}{\sum_{i=1}^{50} \sum_{k=1}^{n} \mu_{jk}\lambda_{ik}}$$

in which ψ_{ij} is constructed so that $\Sigma_i \psi_{ij} = 1$, $\forall j$. Then ψ_{ij} can be included as a variable on the right-hand side of (4) or, alternatively, can be used to replace σ_{ij} on the left-hand side of (4) with $(\sigma_{ij} - \psi_{ij})$, thereby controlling for differences between countries in the industrial composition of their U.S. investments.

B. *Tax Rates*

In order to tax the income a corporation earns in a state, it is necessary to define the income of the corporation or, in the case of a corporation that earns some of its income from operations outside the state, that *portion* of the corporation's income that is taxable by the state. Most states employ roughly the U.S. federal income-tax definition for taxing their resident corporations. There is variation, of course: as of 1987, three states did not permit firms to use the same depreciation methods provided by the Internal Revenue Code in calculating capital cost allowances, ten states imposed (very moderate) minimum taxes on resident corporations, seven states permitted corporations to deduct their federal income tax liabilities in calculating state taxable income, and there were numerous other idiosyncratic differences. In the empirical work that follows, I take the state tax rate to be the top statutory rate on taxable corporate income in the state, correcting for depreciation rules and federal deductibility.[12] Some experimentation with adjusting the state corporate tax rate for features such as alternative depreciation-allowance formulas produced results that were virtually identical to those obtained using statutory rates.

There is an additional complication that arises in taxing corporations with income in more than one state. If the corporation's operations are determined to be unitary, then it is necessary to allocate income between states. States determine their own shares of the profits of unitary businesses using rather ad hoc formulas; the most common formula allocates a unitary corporation's income to the state's taxing jurisdiction on the basis of the state's share of the corporation's national sales, capital in place, and labor compensation (one-third each). Adjustment of tax rates to reflect features of these formulas (described in Hines, 1993) produced virtually the same results as those obtained using unadjusted tax rates.

C. *Investment Data*

The Bureau of Economic Analysis (BEA) of the U.S. Commerce Department conducts comprehensive benchmark surveys of foreign direct investment in the United States on a periodic basis. A recent survey covered the year 1987. Data for 1987 can be used to test the model described earlier in this section, since 1987 is also the year of an industrial census in the United States, and therefore afford a comparison of foreign and domestic investment. The disadvantage of using data for 1987 is that the passage of the Tax Reform Act of 1986 significantly changed many firms' incentives to invest in the United States, particularly during 1987, which was a transition year for the tax changes introduced. Nevertheless, the Tax

[12] The tax rates of states that permit corporations to deduct their federal tax liabilities were multiplied by $(1 - 0.46)$, reflecting the 46-percent federal tax rate applicable from 1979 until January 1987. The tax rates of the three states using depreciation schedules less generous than the federal Accelerated Cost Recovery System (ACRS; in effect during 1981–1986) were further multiplied by 1.25 to reflect the higher effective rate on investments. See Sheldon Gordon (1988) for data on state tax rates and allocation formulas.

Reform Act of 1986 did not affect state taxation directly (except through tax-base definitional changes), and the infrequency of changes in individual state tax rates suggests that the allocation of capital in 1987 represents something like an equilibrium distribution in response to prevailing state tax rates.[13]

BEA provides information, aggregated by country of investor, on the gross book value of PPE used by foreign-owned U.S. affiliates in all industries, as well as the value of PPE in manufacturing.[14] The statistical work that follows uses only the manufacturing PPE figures, in an attempt to attenuate the difficulties that arise in interpreting investment patterns in heterogeneous industries. The BEA data also indicate numbers of foreign-owned affiliates (in all industries) with nonzero PPE.

Table 1 offers two measures of the relative importance of different foreign investors in the United States. The first data column reports year-end 1991 figures for FDI in the United States, while the third column reports the stock of foreign-controlled manufacturing PPE in the United States as of fiscal year 1987. The columns differ because they cover different years and different industries (FDI includes industries other than manufacturing) and represent different ownership concepts. Both measures (FDI and manufacturing PPE) tell the same story, however.

The major investing countries in the United States are Australia, Canada, France, Germany, Japan, the Netherlands, Switzerland, and the United Kingdom. BEA provides usable state-by-country detail for all eight of these major investing countries, and only for these eight countries. The empirical work that follows analyzes the behavior of investors from seven of these countries; it excludes the Netherlands. The exclusion is motivated by the role of Dutch base companies in international tax avoidance, and the resulting difficulty of identifying the home countries (for tax purposes) of Netherlands-controlled U.S. investments. Because the Netherlands exempts foreign income from taxation and has an extensive network of low-tax-rate bilateral treaties, investors from many countries route their investments in the United States (and elsewhere) through Dutch corporations.[15] In theory, data reported by BEA identifies the ultimate beneficial owner of foreign-controlled PPE, but in practice, the large capital stocks reported for various tax havens (including the Netherlands) reflect the imprecision of this identification.[16] Since investors from foreign-tax-credit countries who invest in the United States through Dutch base companies are still eligible to claim credits against home-country tax liabilities for state taxes paid in the United States, it is not clear what effect state taxes should have on Netherlands-controlled U.S. investments. The simplest procedure is to exclude them from the sample.

Together, the seven remaining countries account for 78 percent of the manufacturing PPE controlled by foreign investors in the United States in 1987. Of the 350 (7×50) state-by-country observations, 33 indicate zero manufacturing PPE in 1987. In addition, BEA suppresses 78 state-by-country observations

[13] Over time, states change their corporate tax rates very little relative to each other. The Advisory Commission on Intergovernmental Relations (1980) reports information on state corporate taxes in 1980. The correlation between state corporate tax rates in 1987 and state corporate tax rates in 1980 is 0.93. Of the 25 states with the highest corporate tax rates in 1987, 21 were among the highest in 1980. Recalculating the regressions using 1980 tax rates in place of 1987 tax rates does not significantly change the results.

[14] An affiliate is defined to be foreign-owned if one or more foreign investors own at least 10 percent each. Book values are not adjusted for inflation and other market value changes, but this is unlikely to be a serious problem, since a large part of the FDI in the United States occurred in the 1980's.

[15] Alberto Giovannini (1989) analyzes the role of Dutch conduit companies in reducing the taxation of foreign direct-investment income. Bruce Reynolds and Alan Shapiro (1993) explain that "the extensive use of Dutch entities by third-country residents to make U.S. investments and conduct U.S. operations" is part of the motivation for a revision of the United States–Netherlands tax treaty.

[16] Robert E. Lipsey (1993) documents some of the statistical anomalies created by tax-motivated routing of foreign direct investment in the United States through tax havens, including the Netherlands. Many studies of country-level determinants of foreign direct investment in the United States find Netherlands investments to be outliers, possibly for this reason (see e.g., Michael W. Klein and Eric Rosengren, 1994 pp. 384–85).

TABLE 1—FOREIGN INVESTMENTS IN THE UNITED STATES, BY COUNTRY OF ORIGIN

Country	Foreign direct investment (1991)		Manufacturing PPE (1987)	
	Billions of 1991 dollars	Percentage of foreign total	Billions of 1987 dollars	Percentage of foreign total
Australia	$6.63	1.63	$2.21	1.71
Belgium	3.65	0.90	2.00	1.55
Bermuda	1.32	0.32	0.08	0.01
Canada	30.00	7.36	28.20	21.87
Denmark	1.22	0.30	0.14	0.11
France	22.74	5.58	11.26	8.73
Germany	28.17	6.91	16.03	12.43
Hong Kong	1.27	0.31	0.26	0.20
Ireland	1.29	0.32	1.86	1.44
Italy	2.86	0.70	0.84	0.65
Japan	86.66	21.26	12.94	10.03
Netherlands	63.85	15.67	11.94	9.26
New Zealand	0.13	0.03	1.30	1.01
Sweden	5.60	1.37	2.41	1.87
Switzerland	17.59	4.32	8.50	6.59
United Kingdom	106.06	26.02	20.90	16.21
Total other foreign	28.54	7.00	8.10	6.28

Note: The first data column reports year-end 1991 stocks of FDI (on a historical-cost basis) by country; the third column reports gross book values of foreign-owned manufacturing property, plant and equipment as of year-end 1987.
Sources: Russell B. Scholl et al. (1992) and U.S. Department of Commerce (1990).

for confidentiality reasons, presumably in order not to identify the activities of any one firm to its competitors and to others. There is no clear pattern to the suppressions, other than a general tendency to suppress observations in cells with a small predicted amount of PPE.[17] In the empirical work, the suppressed observations are treated in two ways: first, as though they represent observations of zero PPE; and second, by excluding them from the sample. The results differ very little between these two treatments.

The 1987 Census of Manufactures provides state-level data on the gross book value of depreciable assets owned by all manufacturing establishments in the United States. There is no adjustment made for inflation and other price changes. Coverage differs somewhat from the PPE series reported by BEA, since nondepreciable assets such as inventories are included in PPE. Furthermore, U.S.-owned investment in the United States is not quite as concentrated in recent years as is foreign-owned investment in the United States, so the differences between book and market values may be more pronounced for the capital stocks reported in the Census of Manufactures than for the PPE ownership reported by BEA. The Census of Manufactures data include foreign-owned depreciable manufacturing PPE, so the foreign stock of PPE in each state in 1987 is subtracted from the Census figures in order to obtain the U.S.-owned portion of each state's manufacturing capital. For comparison purposes, the Census reports the gross book value of depreciable assets owned by all manufacturing establishments in the United States to be $921.7 billion in 1987, while BEA reports the gross book value of manufacturing PPE controlled by foreigners to be $129.0 billion in 1987

[17] The suppressed observations often represent small countries investing in small states, but need not. For example, BEA does not report Canadian-controlled manufacturing PPE in Minnesota in 1987, despite the presence (according to BEA) of 72 Canadian manufacturing affiliates with PPE there. Similarly, BEA does not report manufacturing PPE for the 49 German-controlled manufacturing affiliates with PPE in Colorado in 1987.

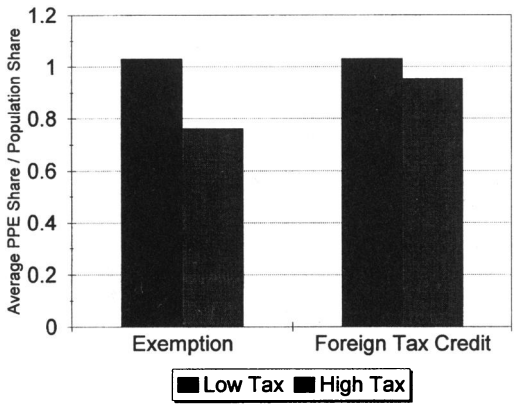

FIGURE 2. INVESTMENT-TO-POPULATION RATIOS IN 25 HIGH-TAX STATES AND 25 LOW-TAX STATES

Notes: The figure exhibits average ratios of PPE ownership to state population, expressed as shares, and calculated separately for each investing country. The lightly shaded bars depict averages of these ratios in the 25 high-tax (7.0 percent and higher) states, while the darkly shaded bars depict the ratios in the 25 low-tax states. The two bars on the left describe the average behavior of investors from countries that exempt foreign-source income from taxation (Australia, Canada, France, Germany, and Switzerland), while the two bars on the right describe the average behavior of investors from countries that tax foreign-source income and provide foreign tax credits (Japan and the United Kingdom).

III. Estimation Results

This section analyzes the correlation between the state pattern of foreign ownership of manufacturing PPE in 1987 and the tax incentives facing different investors. By all measures, the data are consistent with a sizable effect of state tax rates on investment patterns. One very rough way to examine the effect of state taxes is to divide the U.S. states into two groups, high-tax and low-tax states, and to compare the average proclivities of exemption investors and foreign-tax-credit investors to own PPE in either group of states.

Figure 2 illustrates this comparison for the case in which the high-tax states are taken to be the 25 states with the highest tax rates (7.0 percent and higher) and the low-tax states are the other 25 states. The bars in the figure are constructed from ratios of PPE ownership to population, expressed as shares and calculated for each state separately by investing country. The darkly shaded bars represent averages of these ratios in low-tax states, while the lightly shaded bars represent average ratios in high-tax states. The two bars on the left describe the behavior of investors from exemption countries (Australia, Canada, France, Germany, and Switzerland), while the two bars on the right describe the behavior of investors from foreign-tax-credit countries (Japan and the United Kingdom).[18]

There is a noticeable difference between the average investment patterns of different foreign investors. Both groups of foreign investors appear to concentrate (relative to population) their investments in low-tax states rather than high-tax states, but the difference is much more pronounced for exemption investors. Of course, Figure 2 is an imprecise illustration of the effect of taxation on investment, since the figure obscures the effect of within-group heterogeneity of state tax rates.

Figure 3 illustrates a similar comparison, in which the low-tax states are rather arbitrarily defined to be the five states with no corporate income tax, and the high-tax states are the 13 states with tax rates exceeding 8.8 percent.[19] Here the difference is considerably more dramatic: investors from exemption countries own PPE in low-tax states almost in double proportion to the states' populations, while they own PPE in high-tax states less than in

[18] Data suppression complicates the construction of the bars pictured in Figure 2. Each bar is constructed first by calculating country averages based on nonsuppressed data in the appropriate cells. For example, one component of the leftmost bar in Figure 2 is France's ratio of its PPE share to population in the 25 lowest-tax states. BEA suppresses data on French-owned manufacturing PPE in six of these states, so the numerator of the ratio is calculated by dividing total French PPE in the 19 states for which data are available by total French-owned PPE in the United States; the denominator of the ratio is the fraction of the U.S. population in the 19 states. The bar in Figure 2 is an unweighted average of these ratios for all five exemption countries. Due to missing observations, the bars need not have mean values of unity.

[19] The low-tax states in Figure 3 are Nevada, South Dakota, Texas, Washington, and Wyoming. The high-tax states are (in descending order of tax rates) Iowa, Connecticut, North Dakota, Arizona, West Virginia, California, Minnesota, Alaska, Ohio, Vermont, New York, New Jersey, and Maine.

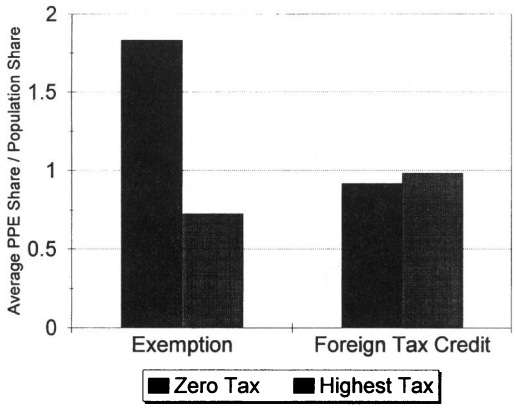

FIGURE 3. INVESTMENT-TO-POPULATION RATIOS IN HIGHEST-TAX STATES AND IN ZERO-TAX STATES

Notes: The figure exhibits average ratios of PPE ownership to state population, expressed as shares, and calculated separately for each investing country. The lightly shaded bars depict averages of these ratios in the 13 highest-tax (8.8 percent and higher) states, while the darkly shaded bars depict the ratios in the five states with no corporate income tax. The two bars on the left describe the average behavior of investors from countries that exempt foreign-source income from taxation (Australia, Canada, France, Germany, and Switzerland), while the two bars on the right describe the average behavior of investors from countries that tax foreign source income and provide foreign tax credits (Japan and the United Kingdom).

TABLE 2—STATE-TAX AND INVESTMENT-SHARE VARIABLES

Variable	Mean	SD	Observations
Tax	0.0624	0.0303	50
$(\text{Tax})^2$	0.0048	0.0035	50
Capital share (foreign only)	0.02	0.0416	350
Capital share (includes United States)	0.02	0.0396	400
Affiliates share (foreign only)	0.02	0.0184	350
ψ_{ij}, PPE (foreign only)	0.02	0.0243	350
ψ_{ij}, PPE (includes United States)	0.02	0.0242	400
ψ_{ij}, affiliates (foreign only)	0.02	0.0164	400

Note: The "tax" variable measures effective state corporate tax rates as described in the text. "Capital share" represents each state's share of the total U.S. manufacturing property, plant, and equipment (PPE) owned by each investing country, treating missing observations as zero PPE. The sample consists of investments by eight countries: Australia, Canada, France, Germany, Japan, Switzerland, the United Kingdom, and the United States. Data on U.S. investments are excluded in the calculation of the "capital share (foreign only)." "Affiliates share" represents each state's share of the total number of affiliates with property, plant, and equipment owned by investors from each of the seven foreign countries; "ψ_{ij}, PPE" measures the match between the PPE ownership of industries located in state i and the extent to which investors from country j concentrate their PPE in those industries; "ψ_{ij}, affiliates" measures the match between the number of affiliates owned by industries located in state i and the extent to which investors from country j own affiliates in those industries.

proportion to their populations. By contrast, investors from foreign-tax-credit countries exhibit a lower ratio of PPE share to population share in the low-tax states than they do in the high-tax states.

Table 3 reports the results of estimating (4) on the sample of seven investing countries, taking σ_{ij} to be the share of country j's investment located in state i, and s_i to equal state i's share of the U.S. population.[20] The estimation imposes restrictions that the β_j''s of exemption countries equal each other, and that the β_j''s of foreign-tax-credit countries equal zero; consequently, the estimated tax coefficient captures differences in the average propensities of exemption investors and foreign-tax-credit investors to avoid high-tax states. The top panel of Table 3 reports the results of regressing (4) on the sample of 350 observations, taking PPE observations suppressed by BEA to be zeros. A Tobit procedure is used to correct for the censoring of the residuals.

The regression reported in column (i) of the top panel of Table 3 suggests that foreign investors from exemption countries are considerably more responsive to state tax rates than are investors from foreign-tax-credit countries. A tax rate increment of 1 percent is associated with an 11.5-percent smaller share of PPE

[20] Table 2 presents summary statistics of the variables used in the regressions. The regressions reported in Tables 3–6 were run using alternative measures of s_i, including state i's share of total U.S. investment and state i's share of total Japanese investment. The results were almost identical to those obtained by setting s_i equal to population shares.

TABLE 3—STATE TAXES AND STATE INVESTMENT SHARES, FOREIGNERS ONLY, 1987
(DEPENDENT VARIABLE: STATE SHARE OF PPE)

	Regression			
Variable	(i)	(ii)	(iii)	(iv)
A. *Whole Sample:*				
Tax	−11.5460	−56.3805	−10.3546	−52.4167
	(3.3890)	(12.3234)	(3.3952)	(12.4310)
$(\text{Tax})^2$		347.1629		323.7031
		(91.9825)		(92.2380)
ψ_{ij}			0.6976	0.5469
			(0.3101)	(0.3064)
$\hat{\sigma}$	0.0340	0.0331	0.0336	0.0329
	(0.0016)	(0.0015)	(0.0016)	(0.0015)
log *L*:	410.643	417.627	413.154	419.212
n:	350	350	350	350
B. *Missing Observations Excluded:*				
Tax	−12.8107	−45.1949	−11.3358	−39.5186
	(3.1032)	(11.4491)	(3.0876)	(11.4974)
$(\text{Tax})^2$		250.9560		216.9360
		(85.5221)		(85.3431)
ψ_{ij}			0.8831	0.7701
			(0.2933)	(0.2928)
$\hat{\sigma}$	0.0309	0.0304	0.0304	0.0300
	(0.0014)	(0.0014)	(0.0014)	(0.0014)
log *L*:	474.544	478.778	479.008	482.198
n:	272	272	272	272

Notes: Data on U.S.-owned affiliates are excluded from the sample. Both panels report coefficients from Tobit regressions in which the dependent variable is a state's share of each country's ownership of manufacturing property, plant, and equipment (PPE). Country dummies (interacted with state sizes) and 50 state dummies are included (but not reported) in each regression. Regressions in the top panel assign zero PPE to observations for which PPE is unreported; those in the bottom panel exclude observations with unreported PPE. The "tax" variable is the state corporate tax rate (measured as a deviation from its weighted average) for observations of countries that exempt foreign-source income (Australia, Canada, France, Germany, and Switzerland); it is zero for countries that provide foreign-tax credits (Japan and the United Kingdom). The variable ψ_{ij} measures the match between the PPE ownership of industries located in state i and the extent to which investors from country j concentrate their PPE in those industries. Standard errors are in parentheses.

ownership by exemption investors than by foreign-tax-credit investors. The estimates presented in the column (ii) of the top panel reveal that this tax effect exhibits significant nonlinearity, reflecting the relative attractiveness of zero-tax states to investors from exemption countries. Forward-looking investors may feel that states without corporate income taxes are less likely to raise their tax rates in the future than are states with corporate taxes at low rates. When the Tobit regressions in Table 3 are recalculated dropping the zero-tax states from the sample, the estimated tax coefficients become insignificant. The difference

TABLE 4—STATE TAXES AND STATE INVESTMENT SHARES, FOREIGN AND AMERICAN FIRMS, 1987 (DEPENDENT VARIABLE: STATE SHARE OF PPE)

	Regression			
	(i)	(ii)	(iii)	(iv)
A. *Whole Sample:*				
Tax	−10.0873	−45.8920	−9.1788	−41.6959
	(3.0922)	(11.3365)	(3.0655)	(11.3403)
$(\text{Tax})^2$		277.2657		250.8443
		(84.5959)		(84.3329)
ψ_{ij}			0.7407	0.6396
			(0.2683)	(0.2671)
$\hat{\sigma}$	0.0318	0.0313	0.0313	0.0309
	(0.0013)	(0.0013)	(0.0013)	(0.0013)
log *L*:	522.013	527.314	525.767	530.147
n:	400	400	400	400
B. *Missing Observations Excluded:*				
Tax	−11.0701	−36.9798	−9.8772	−30.6717
	(2.8418)	(10.5258)	(2.7841)	(10.4324)
$(\text{Tax})^2$		200.7225		160.4154
		(78.5846)		(77.6044)
ψ_{ij}			1.0117	0.9372
			(0.2544)	(0.2551)
$\hat{\sigma}$	0.0291	0.0288	0.0283	0.0281
	(0.0012)	(0.0012)	(0.0012)	(0.0012)
log *L*:	593.285	596.512	600.998	603.120
n:	322	322	322	322

Notes: Data on U.S.-owned affiliates are included in the sample. Both panels report coefficients from Tobit regressions in which the dependent variable is a state's share of each country's ownership of manufacturing property, plant, and equipment (PPE). Country dummies (interacted with state sizes) and 50 state dummies are included (but not reported) in each regression. Regressions in the top panel assign zero PPE to observations for which PPE is unreported; those in the bottom panel exclude observations with unreported PPE. The "tax" variable is the state corporate tax rate (measured as a deviation from its weighted average) for observations of U.S. investments and those of countries that exempt foreign-source income (Australia, Canada, France, Germany, and Switzerland); it is zero for countries that provide foreign-tax credits (Japan and the United Kingdom). The variable ψ_{ij} measures the match between the PPE ownership of industries located in state i and the extent to which investors from country j concentrate their PPE in those industries. Standard errors are in parentheses.

stems both from the economic impact of zero-tax states and the removal of an important source of tax rate variation.[21] By contrast, the ordinary-least-squares (OLS) results reported in Table 5 change very little when zero-tax states are removed from the sample.

[21] For the whole sample, the tax rate has a mean of 6.2 percent and a standard deviation of 3.0 percent; with the zero-tax states removed, the tax rate mean is 7.3 percent, and its standard deviation is 2.1 percent. Removing zero-tax states from the sample reduces the tax rate coefficient of variation by 40 percent.

The regressions reported in columns (iii) and (iv) of the top panel add ψ_{ij} as an explanatory variable. This variable is included to control for national differences in industrial specialization within manufacturing; without such a control, the results could be influenced by coincidental correlations of the form that firms from foreign-tax-credit countries happen to specialize in manufacturing lines that are concentrated in high-tax states. The results reported in columns (iii) and (iv) indicate that a strong tax effect persists with industrial controls; the estimated tax coefficient in column (iii) indicates that a tax rate increment of 1 percent is associated with a 10.4-percent smaller share of PPE ownership by exemption investors than by foreign-tax-credit investors. The estimated coefficients on ψ_{ij} are positive, as expected, and do not differ significantly from unity.[22]

The bottom panel of Table 3 presents the same regressions reported in the top panel, with the difference that the sample includes only the nonsuppressed observations. The results are quite similar to those reported in the top panel, with the differences that the estimated linear tax effects are slightly stronger, the nonlinearities less pronounced, and the coefficients on ψ_{ij} closer to unity.

Table 4 presents additional estimates of (4) in which data on U.S.-owned PPE are included, and the United States is treated as an exemption country (since U.S. investors cannot claim tax credits for state taxes). The estimated coefficients are smaller in magnitude but otherwise similar to their counterparts reported in Table 3. For example, the regression reported in the first column of the top panel indicates that a 1-percent tax rate increment is associated with a 10.1-percent smaller share of PPE ownership by exemption investors than by foreign-tax-credit investors. Of course, the U.S. data are not perfectly comparable to foreign data, which may account for some of the difference between the results reported in Tables 3 and 4. In addition, there is reason to believe that foreign-owned corporations in the United States are audited more intensively than are equivalent U.S.-owned corporations, thereby effectively subjecting foreigners to higher tax rates and making among-state tax differences larger than those for U.S.-owned corporations.[23]

Some alternative specifications of (4), described in Hines (1993), address issues raised by the deleted observations and the homoscedastic assumption underlying the Tobit estimator. Estimating the model on a restricted sample consisting of the largest 15 states, which contains a smaller fraction of deletions and is less prone to heteroscedasticity, yields results that are qualitatively similar to those reported in Table 3. Similar results also appear when observations are weighted by inverses of state sizes, and in OLS specifications of the model.

Table 5 reports the results of estimating (4) with σ_{ij} defined to be state i's share of country j's total number of affiliates with PPE. The idea is to use an uncensored left-hand-side variable that permits the regressions to be run with OLS.[24] The results reported in Table 5 indicate that there is a significant negative effect of state tax rates on numbers of affiliates, though the estimated coefficients are considerably smaller in magnitude

[22] BEA distinguishes eight industrial categories of PPE use by manufacturing affiliates: petroleum, food and kindred products, chemicals and allied products, primary and fabricated metals, machinery, other manufacturing, wholesale trade, and other industries; the ψ_{ij} are constructed using these industrial classifications. BEA deletes roughly one-third of the reporting cells, and the ψ_{ij} are constructed assigning zero investment to deleted observations. The regressions in columns (iii) and (iv) of Table 3 were also run with $(\sigma_{ij} - \psi_{ij})$ as the dependent variable (and ψ_{ij} removed from the right-hand side); the estimated tax coefficients were very similar to those reported in columns (iii) and (iv).

[23] The Internal Revenue Service (IRS) does not disclose the audit intensities of different categories of taxpayers. However, it is widely believed that foreign-owned corporations have always faced heavier auditing than have U.S.-owned corporations; in addition, the United States General Accounting Office (1992) reports that IRS resources devoted to auditing foreign-owned corporations greatly increased during the 1980's.

[24] Numbers of affiliates with PPE include those in nonmanufacturing as well as manufacturing industries. All seven investing foreign countries had positive numbers of affiliates with PPE in all 50 states in 1987. Only one Australian-owned affiliate owned PPE in Vermont in 1987, but otherwise, the smallest country-by-state cells contain three or more affiliates. Data on numbers of affiliates appear to exhibit no bunching near zero. The number of affiliates is restricted to integer values, making the share of numbers of affiliates discontinuous; the estimation ignores this minor complication.

TABLE 5—STATE TAXES AND SHARES OF TOTAL AFFILIATED ESTABLISHMENTS, 1987
(DEPENDENT VARIABLE: STATE SHARE OF TOTAL AFFILIATES)

	Regression			
Variable	(i)	(ii)	(iii)	(iv)
Tax	−3.1596	3.8511	−3.0753	4.3682
	(0.7179)	(2.6396)	(0.7265)	(2.6753)
$(\text{Tax})^2$		−54.3027		−57.3377
		(19.6918)		(19.8527)
ψ_{ij}			0.0493	0.0733
			(0.0634)	(0.0631)
Adjusted R^2:	0.930	0.931	0.930	0.931
n:	350	350	350	350

Notes: Data on U.S.-owned affiliates are excluded from the sample. The table reports coefficients from OLS regressions in which the dependent variable is a country's ratio of the *number* of affiliates with property, plant, and equipment its investors own in a state to the total *number* of U.S. affiliates they own. Country dummies (interacted with state sizes) and 50 state dummies are included (but not reported) in each regression. The "tax" variable is the state corporate tax rate (measured as a deviation from its weighted average) for observations of countries that exempt foreign-source income (Australia, Canada, France, Germany, and Switzerland); it is zero for countries that provide foreign-tax credits (Japan and the United Kingdom). The variable ψ_{ij} measures the match between the number of affiliates owned by industries located in state i and the extent to which investors from country j concentrate their affiliate ownership in those industries. Standard errors are in parentheses.

than those presented in Table 3. The linear specification presented in column (i) implies that 1-percent tax rate differences are associated with 3.2-percent smaller shares of affiliates from exemption countries than from foreign-tax-credit countries. The inclusion of an adjustment (ψ_{ij}) for national differences in industrial specialization contributes little to the explanatory power of the equations reported in columns (iii) and (iv), due to the paucity of available information on industrial compositions.[25]

The smaller magnitudes of these estimated tax coefficients relative to those in Table 3 may reflect, in part, the measurement error introduced by using numbers of firms as an indicator of business activity. There is an economic difference as well. Tax policy influences the volume of local business capital at two margins: by influencing the number of local firms and by influencing the average capitalization of local firms. The estimates in Table 3 capture both effects, while the estimates in Table 5 capture only the first. The equations with nonlinear tax terms, presented in columns (ii) and (iv) of Table 5, differ from those appearing in Table 3, with positive (and insignificant) coefficients on the linear tax terms and negative (and significant) coefficients on the squared tax rate, implying that the effect of taxation on affiliate ownership is stronger at higher tax rates.

The regressions reported in Tables 3–5 impose restrictions that countries exempting foreign income have equal β_j''s, as do foreign-tax-credit countries. Table 6 presents PPE regressions in which the β_j''s are estimated without restriction. As before, the use of state dummy variables requires one country's β_j' to be omitted from each regression; Switzerland is the omitted country in the regressions presented in columns (i) and (iii), and the United States is the omitted country (and U.S. data are included) in the regressions presented in columns (ii) and (iv). The pattern of the results in Table 6 is generally consistent with the

[25] BEA provides information on numbers of affiliates with PPE, numbers of affiliates with manufacturing employment, and numbers of affiliates with employment outside of manufacturing. The manufacturing/nonmanufacturing breakdown is the basis of ψ_{ij} used in these regressions.

TABLE 6—STATE TAX EFFECTS BY INVESTING COUNTRY, 1987
(DEPENDENT VARIABLE: STATE SHARE OF PPE)

	Whole sample		Missing observations excluded	
Variable	(i)	(ii)	(iii)	(iv)
Australia × tax	−33.2262	−27.8220	−36.7074	−31.8696
	(5.2968)	(4.9126)	(4.8195)	(4.4731)
Canada × tax	−14.7918	−9.2952	−14.6078	−9.7063
	(5.2810)	(4.8988)	(4.6864)	(4.3502)
France × tax	−12.6754	−7.2427	−13.5785	−8.6723
	(5.2877)	(4.9048)	(4.7194)	(4.3781)
Germany × tax	−13.0566	−7.6459	−13.5074	−8.6414
	(5.2836)	(4.9018)	(4.6891)	(4.3555)
Japan × tax	−1.8550	3.6505	−1.1291	3.7759
	(5.2784)	(4.8966)	(4.6783)	(4.3403)
Switzerland × tax	—	5.4076	—	4.8337
		(4.9032)		(4.3558)
UK × tax	−4.3319	1.1856	−3.7489	1.1766
	(5.2758)	(4.8939)	(4.6737)	(4.3356)
U.S. investment used as excluded category	no	yes	no	yes
$\hat{\sigma}$	0.0313	0.0291	0.0276	0.0257
	(0.0015)	(0.0012)	(0.0013)	(0.0011)
log L:	429.258	546.170	501.111	627.842
n:	350	400	272	322

Notes: The table reports coefficients from Tobit regressions in which the dependent variable is a state's share of each country's ownership of manufacturing property, plant, and equipment (PPE). Country dummies (interacted with state sizes) and 50 state dummies are included (but not reported) in each regression. Regressions in columns (i) and (ii) assign zero PPE to observations for which PPE is unreported; those in columns (iii) and (iv) exclude observations with unreported PPE. The "tax" variable is the state corporate tax rate (measured as a deviation from its weighted average), which is interacted with separate country dummies for all but a single country in each regression. Data on U.S.-owned affiliates are included in the regression reported in columns (ii) and (iv); these regressions exclude tax interactions for U.S. investments. Data on U.S.-owned affiliates are not included in the regressions reported in columns (i) and (iii); these regressions exclude tax interactions for Swiss investments. Standard errors are in parentheses.

prior restrictions: the exemption countries (with the exception of Switzerland) have estimated β_j's that are significantly more negative than in the case of the foreign-tax-credit countries. Investors from the exemption countries appear to avoid high-tax states to a greater degree than U.S. investors do, which the theory does not predict, but this may simply reflect differences in data measurement and coverage, and the degree of tax enforcement to which foreign investors are subject.

It is possible that, despite the apparent robustness of the estimated tax effect to changes in model specification, some kind of spurious correlation is responsible for the results presented in Tables 3–6. For example, the increasing willingness of states to offer special investment incentives to attract new business investments might somehow confound the interpretation of the results, if the incentives are correlated with state tax rates *and* home countries of investors. Hines (1993) describes a simple measure of state

special investment incentives, the inclusion of which does not change the estimated tax effects reported in Table 3.[26]

IV. Conclusion

The results reported in Section III indicate that high state tax rates have a significantly negative effect on local investment. Investors who cannot claim credits for state tax payments appear to reduce their investment shares, relative to foreign-tax-credit investors, by 9–11 percent for every 1-percent rate of taxation. This result appears, in one form or another, in a variety of specifications using various subsets of the available data. It is, however, worth noting that the result is strongly influenced by investment behavior in states with no corporate taxes at all.

The magnitude of this estimated tax effect is quite large, and it is worth considering whether one should take it literally to mean that, if a state were to lower its corporate tax rate by 1 percent, it would attract 10-percent more investment. Such a response seems unlikely to materialize, due to the nature of equilibrium in local capital markets. One effect of state taxation may be to change the pattern of asset ownership without changing patterns of real investments to the same degree. Since all of the regressions reported in this paper represent comparisons between one country's investment patterns and another's, the regressions record a significant effect of taxation even if a 1-percent rise in the local tax rate merely has the effect of encouraging German investors to sell their local assets to U.K. investors.

It is nevertheless difficult to imagine that wholesale asset-ownership shifts occur without influencing patterns of real investments. Since foreign direct investment is generally a highly taxed activity, it makes economic sense for firms to undertake this activity because they have the ability to exploit fixed assets or other sources of economic rent. Consequently, tax and other considerations that influence ownership patterns are also likely to influence real investment patterns, though perhaps not to the same degree that they influence ownership.

It is not possible, with the use of cross-sectional data, to test directly whether tax factors were an important part of the explanation for the surge in FDI in the United States in the 1980's. It is, however, possible to test for the effect of tax rates on FDI patterns within the United States, and here the evidence is consistent with a very important effect of taxes on FDI. Of course, many aspects of the international economy changed at the end of the 1970's, the U.S. tax system being just one. Furthermore, foreign investors may choose between different states with considerably more sensitivity to local tax rates than they choose between countries. But the lesson of investor reactions to state taxes in the United States is that even small variations in local tax rates may have important effects on capital flows and, by implication, on the economy as a whole.

[26] See H. Brinton Milward and Heidi Hosbach Newman (1989) and Roger Wilson (1989) for surveys of the types of incentives offered and empirical estimates of their impact on local business activity. The heterogeneity and deal-specific nature of many investment incentives enhance the difficulty of assigning values to various incentives offered investors; consequently, it is not possible to include a precise (and exogenous) measure of state investment incentives on the right-hand side of equation (4). The estimates reported in Hines (1993) use simple counts of incentives offered investors.

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