FISCAL PARADISE: FOREIGN TAX HAVENS AND AMERICAN BUSINESS*

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The tax haven affiliates of American corporations account for more than 20 percent of U. S. foreign direct investment, and nearly a third of the foreign profits of U. S. firms. American companies report extraordinarily high profit rates on their tax haven investments in 1982. This behavior implies that the revenue-maximizing tax rate for a typical haven is around 5–8 percent. American (and foreign) investment in tax havens has an uncertain effect on U. S. tax revenue, but since low tax rates encourage American companies to shift profits out of high-tax foreign countries, it is possible that low foreign tax rates ultimately enhance U. S. tax collections.

I. INTRODUCTION

The behavior of multinational corporations reflects the pursuit of after-tax profits, of which tax minimization is one aspect. Partly in response to local tax climates, American firms locate a significant part of their foreign operations in tax havens, a group of countries with unusually low tax rates that has been extremely successful at attracting U. S. business.

Some American observers have expressed concern that the widespread use of tax havens could threaten the long-run sustainability of the U. S. domestic tax base, since multinational corporations may be able to shift some of their U. S.-source income to low-tax offshore jurisdictions.[1] This concern stems from the premise that firms have the ability to report their profits in the most tax-preferred locations. In addition, there is a related concern that multinational firms might shift the use of productive factors, such as employment, to low-tax countries.

This paper evaluates these two concerns by examining the closely related issue of the ability of U. S. firms to shift their reported profits and real business activities between high-tax foreign countries and low-tax foreign tax havens. The results, described in Section IV of the paper, imply that reported profit rates are sensitive to local tax rates, even adjusting for firm

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1. See, for example, Lohr [1992].

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financial structure and levels of productive inputs (labor and capital) employed. In addition, U. S. multinational firms appear to adjust their employment of productive inputs in response to local tax rates.

The ability of tax havens to attract business activity and reported profits through low tax rates carries implications for the design of international tax policy. Section V of the paper evaluates the attractiveness of low tax rates for the governments of would-be tax havens by examining the effect of low tax rates on tax collections and on local employment of business factors. The estimated coefficients imply that very low tax rates—in the neighborhood of 5–8 percent—may represent revenue-maximizing rates for some jurisdictions.

Section VI examines the effect of low foreign rates on U. S. tax revenue. It is often assumed that tax havens attract investment and tax revenue sources from American and foreign investors who would otherwise have invested in, and paid taxes to, the United States. The implication, that tax haven policies reduce U. S. tax collections, is difficult to assess, in part because profitable business operations in tax havens might stimulate complementary business investment in the United States. What is clear is that the U. S. system of worldwide taxation with provision of foreign tax credits means that the U. S. government obtains very little corporate tax revenue from the profits of U. S. firms in high-tax countries, since taxable profits in those countries generate foreign tax credits that erase any residual U. S. tax liability. By contrast, the tax haven profits of American corporations generate very few foreign tax credits. As a consequence, a large fraction, roughly 40 percent, of the U. S. revenue from taxing the foreign profits of U. S. corporations comes from taxing their tax haven profits. In addition, the low tax rates available in tax havens encourage U. S. firms to shift their operations, and their taxable profits, away from high-tax foreign areas and into the tax havens. Unless the existence of tax havens also encourages an important shift of taxable profits out of the United States, their low tax rates may enhance U. S. tax collections.

II. The Tax Havens

We identify 41 countries and regions as tax havens for the purposes of U. S. businesses. Their combined population amounts to only 30 million (1.2 percent of the West's population) and they

produce just 3.0 percent of the West's GDP. Table I presents some characteristics of their economies, along with detail on local U. S. corporate operations. In analyzing the tax haven operations of American business, we rely on U. S. Commerce Department data for 1982.[2]

There are several ways to gauge the magnitude of business operations; by one measure, gross assets, tax havens account for over one-quarter ($359 billion) of the $1.35 trillion of corporate activity conducted worldwide by the overseas affiliates of American firms (Table I, column (3)). This amount substantially exceeds American direct investment in all of (nonhaven) continental Europe. Since gross assets exclude liabilities, it is useful to consider the stock of U. S. equity in tax havens (Table I, column (4)). By the equity measure, the tax havens account for a somewhat smaller share of foreign direct investment, 21 percent. But the net income share of tax haven affiliates is larger than their asset share: 30.8 percent ($11.1 billion) of U. S. firms' total foreign-source income of $36.0 billion arises in tax haven countries.

Since assets, equity, and income include purely financial transactions, they need not reflect the level of U. S. multinationals' physical presence in tax haven countries. U. S. affiliates' employment and property, plant, and equipment in tax havens appear to mirror tax havens' share of world GDP.[3] Columns (6) and (7) of Table I reveal that, out of 6.82 million overseas employees of U. S. affiliates, only 0.29 million (4.3 percent) work in tax haven affiliates. Similarly, of the $227.9 billion of property, plant, and equipment owned worldwide by U. S. foreign affiliates, only $9.6 billion (4.2 percent) is located in havens.

The economies of the 41 tax havens differ considerably, making it useful to distinguish the several relatively large tax havens from the many small havens. Together the seven tax havens with populations greater than one million (Hong Kong, Ireland, Liberia, Lebanon, Panama, Singapore, and Switzerland) account for 80 percent of total tax haven population and 89 percent

2. See Appendix 1 for a description of the data and our process of identifying tax havens. For our purposes, the "West" excludes the erstwhile Socialist countries, sub-Saharan Africa (except South Africa), and the major oil exporters. Unfortunately, 1982 was a recession year around the world and may in some instances suggest conclusions that are sensitive to business cycle conditions.

3. U. S. data on overseas property, plant, and equipment are available only for nonbank affiliates of nonbank parents. Similarly, equity measures omit the equity of banking affiliates. While these omissions are unfortunate, it should be noted that, even in tax havens, these affiliates account in aggregate for 98.5 percent of net income and 92.5 percent of employment.

TABLE I
TAX HAVENS IN THE WORLD[a] ECONOMY

	(1) Share of world[a] population (percent)	(2) Share of world[a] GDP (percent)	Share of U. S. corporations' foreign operations (3) Assets (percent)	(4) Equity[b] (percent)	(5) Net income[c] (percent)	(6) Employment (percent)	(7) Plant, property, and equipment[d] (percent)
All havens	1.2	3.0	26.0	21.4	30.6	4.3	4.2
Excluding Big-7[e]	0.3	0.3	16.9	12.2	17.4	0.5	0.6
In comparison:							
Continental Europe	10.7	34.5	18.0	19.4	14.8	27.7	24.2
U. K.	1.7	6.3	20.8	12.4	12.4	12.6	13.7
Canada	1.0	4.7	8.9	17.0	8.5	13.4	18.5
Japan	3.2	15.2	5.6	3.8	3.4	4.5	5.3
Developing countries[f]	62.2	17.0	8.7	17.6	11.6	18.2	10.8

a. "World" excludes Socialist economies, sub-Saharan Africa (except South Africa), major oil exporters, and the United States.
b. Equity data are collected only for nonbank firms.
c. Includes repatriated and unrepatriated income.
d. Plant, property, and equipment data collected only for nonbank firms. Excluding bank employment (to improve the comparability of columns (6) and (7)) changes column (6) only negligibly.
e. The Big-7 tax havens are Hong Kong, Ireland, Liberia, Lebanon, Panama, Singapore, and Switzerland.
f. Excludes major oil exporters and tax havens.
Source. U. S. Department of Commerce [1985].

of tax haven GDP. They appear to be the locus of most of the physical activity undertaken by U. S. haven affiliates, much of it in the nonfinancial sectors.

The remaining havens are tiny, their median 1982 population was only 200,000 inhabitants. Nonetheless, as Table I indicates, these dot-sized countries still account for about 60 percent of the assets, equity, and net income in tax havens. We refer to these smaller havens as "Dots," and to the larger havens as the "Big-7."

The sketchy available evidence suggests that U. S. firms dramatically increased their use of tax havens in the early 1980s. U. S. Department of Commerce [1981, 1985, 1992] data show that the share of the U. S.-owned stock of foreign capital located in tax havens more than doubled between 1977 and 1982: in 1977 U. S. firms located 11 percent of their foreign assets in tax havens; while in 1982 they located 26 percent of their foreign assets in tax havens. By 1989 the fraction of foreign assets located in tax havens fell to 20 percent. It is noteworthy that, over the same period, the tax haven share of the foreign employment of U. S. firms was roughly stable, rising from 4.0 percent in 1977 to 4.3 percent in 1982, and returning to 4.0 percent by 1989.

III. U. S. Firms and the Lure of Low Tax Rates

It is helpful to understand the mechanics of the U. S. tax system in order to appreciate the usefulness of tax havens to American firms. This section describes the tax system, and analyzes the incentives it offers firms.

A. The System[4]

The United States taxes income on a residence basis, meaning that American corporations and individuals owe taxes to the U. S. government on all of their worldwide income, whether earned in the United States or not. The U. S. corporate tax rate is currently 34 percent. In order to avoid subjecting American multinationals to double taxation, U. S. law provides taxpayers a foreign tax credit for income taxes (and related taxes) paid to foreign governments. With the foreign tax credit, a U. S. corporation that earns $100 in a foreign country with a 15 percent tax rate pays $15 to the foreign government and only $19 to the U. S. government, since its U. S. corporate tax liability of $34 (34 percent of $100) is reduced to $19

4. The following description applies only to multinational corporations based in the United States; Hines [1991b] analyzes the factors that determine U. S. residence for tax purposes.

by the foreign tax credit of $15. The foreign tax credit is, however, limited to U. S. tax liability on foreign income; if, in the example, the foreign tax rate were 50 percent, then the firm would pay $50 to the foreign government and no taxes to the U. S. government, and the firm would not be eligible for a tax rebate from the U. S. government for the difference between $50 and $34. American corporations calculate their foreign tax credits on a worldwide basis, so that all foreign income and foreign taxes paid are added together in the computation of the foreign tax credit limit. Hence a U. S. firm receives a full tax credit for its foreign taxes paid only when it is in a "deficit credit" position, i.e., when its average foreign tax rate is less than its tax rate on domestic operations. A firm has "excess credits" if its available foreign tax credits exceed U. S. tax liability on its foreign income.[5]

Deferral of U. S. taxation of certain foreign earnings is another important feature of the U. S. international tax system. A U. S. parent firm is taxed on its subsidiaries' foreign income only when returned ("repatriated") to the parent corporation. This type of deferral is available only to foreign operations that are separately incorporated in foreign countries ("subsidiaries" of the parent) and not to consolidated ("branch") operations. The U. S. government taxes branch profits as they are earned, just as it would profits earned within the United States.

The deferral of U. S. taxation may create incentives for firms to delay repatriating dividends from their lightly taxed foreign subsidiaries. This incentive is likely to be most important in the case of controlled foreign corporations (CFCs), which are foreign corporations owned at least 50 percent by U. S. corporations holding stakes of at least 10 percent each. In order to reduce the incentive to defer profit repatriation, the United States has special "Subpart F" rules, which treat a CFC's passive income (and income invested in U. S. property) as if it were distributed to its American owners, so it is subject to immediate U. S. taxation. CFCs that reinvest their earnings in active foreign businesses avoid the Subpart F restrictions and can continue to defer U. S. tax liability on those earnings.

B. The Havens

The low tax rates of tax-haven countries appear to influence the behavior of American corporations, in spite of the complica-

5. Furthermore, income is broken into different functional "baskets" in the calculation of applicable credits and limits. In order to qualify for the foreign tax credit, firms must own at least 10 percent of a foreign affiliate, and only those taxes that qualify as income taxes are creditable.

tions just described. There are two possible reasons why the American system of worldwide taxation need not remove the attractiveness of locating in tax havens. The first reason is that firms can apply foreign tax credits earned in high-tax countries to their tax-haven earnings, thereby eliminating U. S. tax liability on tax-haven earnings. The second reason is that firms with tax-haven profits can earn interest on their residual U. S. tax liability for as long as they defer repatriation of those profits. Both possibilities can be attractive, although they are exclusive, in that the first is triggered by repatriation, the second by deferral.

The first possibility applies to U. S. corporations with excess foreign tax credits. A parent company with excess foreign tax credits reduces its overall tax liability if it can attribute to a haven affiliate profits that were actually earned in a high-tax country. Total taxes would thereby decline by an amount equal to the difference between the two tax rates.

The second possibility is of most value if haven subsidiaries can find active uses for their funds, but such uses are not essential to make deferral attractive. Suppose that a haven subsidiary with profits to reinvest cannot find worthwhile active investments to make in the haven, but instead invests its profits in the world capital market, earning a rate of return r^* (possibly different from r, the U. S. domestic interest rate). To rule out cases in which firms have incentives to send all their profits abroad, we assume that $r^* \leq r$.

If $r^* = r$, the firm's optimal strategy is to defer repatriation of the untaxed portion of its foreign profits. Passive returns earned abroad and included as Subpart F income are not subsequently taxed again when ultimately repatriated to the United States, and so the firm is not penalized if it repatriates interest as earned.

Suppose that the foreign subsidiary has after-foreign-tax earnings equal to M. The after-U. S.-tax present value of those earnings, if immediately repatriated, is $M(1 - \tau)/(1 - \tau^*)$, in which τ is the U. S. tax rate and τ^* is the foreign tax rate. If, instead, the subsidiary repatriates interest as earned but not the principal, the parent receives an after-all-tax annual payment of $Mr^*(1 - \tau)$. The present value of this infinite stream, discounted at the domestic after-tax discount rate of $r(1 - \tau)$, is

$$(1) \qquad \sum_{j=1}^{\infty} M \frac{r^*(1 - \tau)}{[1 + r(1 - \tau)]^j} = M \frac{r^*}{r}.$$

If $r^* = r$, then this present value equals M. Thus, the subsidiary should never repatriate its principal (M), which just equals the

present value of the after-tax interest it generates. If $r^* < r$, then foreign reinvestment obviously becomes less attractive, but as long as $r^*/r > (1 - \tau)/(1 - \tau^*)$, the firm does better to reinvest its earnings abroad than it does to repatriate the earnings.[6]

If tax minimization is the primary motive for firms to generate profits in tax havens, then one might reasonably expect havens to contain few active investment opportunities,[7] leaving profitable multinationals with the choice between passive investments and immediate repatriations. If the world capital market is efficient, then a passive investment is likely to represent the optimal choice. And in practice, the tax haven subsidiaries of U. S. corporations place a significant fraction of their earnings in passive investments in spite of the Subpart F rules.[8]

C. Devices that Move Taxable Earnings to Tax Havens

Many U. S. firms would reduce their total tax liabilities if they were to earn the same profits in tax havens rather than in the United States or in high-tax foreign countries. To the extent that they are able, firms have incentives to use various financial devices to attribute to havens their taxable profits actually earned in high-tax locations. There are three notable devices: the use of debt contracts, adjustment of transfer prices, and conversion of U. S. export income into tax haven income.

Firms are able to use debt contracts to change the locations of their tax burdens. Since interest costs represent deductions from taxable profits, and these deductions are usually more valuable in

6. Firms have a third alternative, which is to reinvest their profits in active lines of business, thereby deferring U. S. tax liability on those profits. Hartman [1985] analyzes a firm's decision of whether to reinvest foreign profits in an active business or to repatriate profits as dividends. He finds that firms should reinvest until the after-foreign-tax marginal productivity of foreign capital equals the rate at which the firm discounts after-tax flows in the home country. Similar reasoning (reported in Hines and Rice [1990] and Scholes and Wolfson [1992]) suggests that subsidiaries with after-tax profits to invest will make active investments so long as the after-foreign-tax marginal product of (active) capital is no less than the after-home-tax interest rate on passive investments. If not, then the subsidiary chooses between passive investments and dividend repatriations based on the calculations described in the text.

7. Firms with subsidiaries in low-tax locations may anticipate the difficulty of finding active investment opportunities there, and purposefully underinvest initially in order to provide opportunities to reinvest funds. This strategy may entail the use of debt financing, which is not considered here. See Hines [1992] for an analysis.

8. In 1982, U. S.-controlled foreign corporations in the nine largest tax havens (listed in Table 2 of Hines and Rice [1990]) had $1.6 billion in Subpart F income, out of a total $8.9 billion in earnings and profits. Since Subpart F encompasses a number of activities, most but not all of this income is likely to represent returns to passive investments. One way to gauge its significance is that Subpart F income for subsidiaries in those havens was two-thirds the size of aggregate dividends paid to U. S. parents and their domestic subsidiaries ($2.2 billion).

higher tax countries, it generally makes sense to finance subsidiaries in high-tax countries with as much debt as possible, while financing tax haven subsidiaries with as little debt as possible. The U. S. government makes it costly for subsidiaries in low-tax foreign countries to adjust their debt levels, since interest received by those subsidiaries is subject to Subpart F treatment (while interest paid does not reduce Subpart F liabilities).

American law contains numerous provisions concerning the location of income for tax purposes. The regulations that implement Section 482 of the Internal Revenue Code provide that international transfers of goods and services between related parties (such as a parent corporation and one of its affiliates) must be conducted at "arm's-length" prices, that is, prices that unrelated firms would have used in an identical transaction. There are, however, many international transactions for which arm's-length prices do not exist, making enforcement of the law very difficult. Section 482 and other rules governing international transfer pricing leave ample scope for U. S. multinationals to benefit from transferring valuable goods, especially intangible assets, to tax haven subsidiaries.[9]

Foreign sales of goods produced in the United States often create opportunities to shift taxable income to tax havens. A common practice of U. S. firms is to sell receivable accounts to finance subsidiaries incorporated in tax havens. Finance subsidiaries are "factors"; the difference between the sale price of a receivable account and the present value of the money ultimately collected is "factoring income." Until 1984 the international factoring income of controlled foreign corporations was not includable income under Subpart F provisions. Furthermore, many of these receivable accounts may have been sold to finance subsidiaries in havens at generous discounts.[10]

9. See, for example, Frisch and Horst's [1989] description of Bausch and Lomb's establishment of a manufacturing subsidiary in Ireland and its subsequent profitability. Under previous law, U. S. firms were permitted to transfer intangible property developed in the United States to tax haven affiliates without triggering U. S. tax liability, as long as the goods produced by the intangibles were sold outside the United States. The Deficit Reduction Act of 1984 rescinded this exemption.

10. American law changed in 1984 to include factoring income under Subpart F, which the Joint Committee on Taxation [1984] estimated would earn the U. S. Treasury $700 million a year by 1989. Factoring income remains foreign-source income for tax purposes. Another method of converting U. S. export profits into tax haven profits is to establish a foreign trading corporation as a joint venture with a foreign partner to escape the 50 percent requirement for a controlled foreign corporation. A third is to establish a haven subsidiary that performs some real service in the production of the final product, however trivial its actual value added, since in practice it is difficult for the U. S. government to enforce Subpart F and Section 482 with precision.

D. Empirical Evidence

Earlier empirical work suggests that multinational firms adjust their reported profits in response to local tax rates. Lall [1973] documents extensive overpricing of pharmaceutical imports in Colombia, and Kopits [1976] finds that the pattern of royalty payments by foreign subsidiaries of U. S. multinationals is consistent with tax-avoiding behavior. Jenkins and Wright [1975] observe that U. S. petroleum companies report above-average profit rates in tax-advantaged locations. Harris et al. [1991] report that U. S. multinationals with affiliates in certain (generally low-tax) foreign countries appear to pay unusually low amounts of tax to the U. S. government.

In the only comprehensive study of the tax rate sensitivity of *total* foreign earnings, Grubert and Mutti [1991] examine aggregate data on U. S. manufacturing affiliates in 33 foreign countries. They regress two profit rate measures—the ratio of profits to local sales, and the ratio of profits to local equity—on local tax rates. The results suggest that reported profits are sensitive to tax rate differences, though they must be interpreted with caution.[11]

IV. Evidence on Tax Havens and Tax Rates

In this section we test whether U. S. firms locate profits and physical operations in tax havens and other low-tax venues to a greater extent than normal business conditions dictate. Recall that low tax rates attract foreign business and foreign profits in two ways. The first is that firms have incentives to transfer profits from high-tax locations where much of their productive physical activity takes place to low-tax locations where, for lack of economic opportunities, it does not. The second is that operations that would be unprofitable at normal tax rates might become profitable at very low rates. We analyze these channels of tax rate influence separately, starting with transfers.

11. Grubert and Mutti's [1991] use of sales in the denominator of their profitability measure is difficult to justify theoretically, since firms differ widely in their purchases of intermediate inputs. In addition, sales figures may be affected by tax-induced transfer price changes. It is more satisfactory to scale profits by equity, but, as Grubert and Mutti note, equity figures are measured with a great deal of error. Furthermore, reported equity is influenced by profit-shifting activities, since local equity includes (reported) local retained earnings. Finally, firms with profitable operations in high-tax locations have incentives to finance their affiliates with high debt-equity ratios. Hence a finding that the return on equity is high in low-tax locations may simply reflect sensible (and legal) financing decisions by parent firms.

A. Tax Rates and Reported Profits

Let ρ_i represent before-tax profits earned in country i ($i = 1, \ldots, n$) by factors located there. Suppose that a firm adjusts its transfer prices to allocate an additional ψ_i in profits to location i. This process is likely to be costly, for reasons described earlier: firms may need to set up additional facilities to make transfer prices seem plausible, legal costs may be incurred, and (inefficient) intrafirm trades may take place to facilitate profit-shifting. We hypothesize that the marginal cost of shifting profits into a location is very small at first, but rises in proportion to the ψ_i/ρ_i ratio. Letting a denote this factor of proportionality, the total cost of adjusting local reported profits equals $(a/2)(\psi_i^2/\rho_i)$. Hence the reported profitability of affiliate i, π_i, is

$$\pi_i = \rho_i + \psi_i - \frac{a}{2}\frac{(\psi_i)^2}{\rho_i}. \tag{2}$$

Note that $\psi_i < 0$ for an affiliate that transfers some of its profits out to other locations. The firm is constrained to have the sum of the ψ_i's nonpositive, since transfers do not create additional profits.

Consider the behavior of a multinational firm that plans to reinvest its foreign profits in the world capital market. Such a firm chooses its profit transfers (ψ_i) to maximize after-foreign-tax profits, taking as fixed the profits earned by its factors (ρ_i):

$$\max_{\psi_i} \sum_{i=1}^{n} (1 - \tau_i)\pi_i = \sum_{i=1}^{n} (1 - \tau_i)\left[\rho_i + \psi_i - \frac{a}{2}\frac{(\psi_i)^2}{\rho_i}\right] \tag{3}$$

subject to

$$\sum_{i=1}^{n} \psi_i \leq 0,$$

yielding the first-order condition,

$$(1 - \tau_i)[1 - a(\psi_i/\rho_i)] = \lambda \qquad \forall i = 1, \ldots, n, \tag{4}$$

in which λ is the Lagrange multiplier corresponding to the constraint in (3). Then (4) implies that

$$\psi_i = \rho_i \left[\frac{1 - \tau_i - \lambda}{a(1 - \tau_i)}\right]. \tag{5}$$

Combining (5) and (2),

$$\pi_i = \rho_i \left[1 + \frac{1}{2a} - \frac{\lambda^2}{2a(1 - \tau_i)^2} \right]. \tag{6}$$

Equation (6) indicates that reported profitability (π_i) is a function of before-tax earnings (ρ_i) and local tax rates. Unfortunately, ρ_i is not directly observable; it can be estimated on the basis of inputs, however, and for this a log transformation is very useful.

Taking logs of both sides of (6) yields[12]

$$\log \pi_i = \log (\rho_i) + \log \left[1 + \frac{1}{2a} - \frac{\lambda^2}{2a(1 - \tau_i)^2} \right]. \tag{7}$$

In order to estimate (7), it is helpful to transform the second term on the right side into a linear function of tax rates. Note that if $\tau_i = (1 - \lambda)$, then this term is zero. Taking a first-order Taylor expansion of (7) in τ_i, around the point at which $\tau_i = (1 - \lambda)$, yields

$$\log \pi_i \approx \log (\rho_i) + \frac{1 - \lambda}{a\lambda} - \frac{\tau_i}{a\lambda}. \tag{8}$$

A different estimable approximation to (7) can be derived by taking a first-order Taylor expansion of (7) in $1/(1 - \tau_i)^2$, around the point at which $(1 - \tau_i)^2 = \lambda^2$, which yields

$$\log \pi_i \approx \log (\rho_i) + \frac{1}{2a} - \frac{\lambda^2}{2a(1 - \tau_i)^2}. \tag{9}$$

In order to estimate (8) and (9), it is necessary to evaluate log (ρ_i), and this requires a production function specification. Suppose that firms produce output Q, measured in dollars, with a Cobb-Douglas function $Q = c A^{\epsilon} L^{\alpha} K^{\phi} e^{u}$, in which c is a constant term, A is the level of productivity in the local country (proxied by local per capita income),[13] L is labor input, K is capital input, and u is a normally distributed stochastic term with mean zero. The local

12. The log operator is sensible only if $\rho_i > 0$ and $(2a + 1)(1 - \tau_i)^2 > \lambda^2$. This second condition is the requirement that adjustment costs a be large enough that affiliates not transfer more than all of their profits out of the highest tax location. In practice, this does not appear to happen.

13. The model assumes that the productivity of an investing multinational firm is unaffected by the activities of other multinational investors. If foreign investors compete against each other in local markets, then the tax coefficients in Tables II and IV are biased toward zero, and the GDP coefficients reflect competition as well as national productivity. Similarly, the model takes local per capita GDP to be exogenous, even though it can be affected by foreign investment. The evidence presented in Section V suggests that the impact of foreign investment on local GDP is small. If local GDP is affected by foreign investment, the tax coefficients in Tables II–IV are biased toward zero.

affiliate hires labor to maximize profits, implying that

$$Q - wL = (1 - \alpha)cA^{\epsilon}L^{\alpha}K^{\phi}e^{u}. \tag{10}$$

Assuming for the moment that the affiliate is not financed by debt, then (10) represents taxable returns (ρ_i) in the absence of transfers ψ_i. Taking logs of both sides of (10), and adding (8),

$$\log \pi_i \approx \beta_1 + \beta_2 \log L_i + \beta_3 \log K_i + \beta_4 \log A + \beta_5 \tau_i + u, \tag{11}$$

in which

$$\beta_1 = \log c + \log (1 - \alpha) + (1 - \lambda)/a\lambda,$$
$$\beta_2 = \alpha,\ \beta_3 = \phi,\ \beta_4 = \epsilon, \text{ and } \beta_5 = -1/a\lambda.$$

Combining (9) and (10) yields

$$\log \pi i \approx \beta 1 + \beta 2 \log Li + \beta 3 \log Ki + \beta 4 \log A + \beta 5(1 - \tau i)2 + v, \tag{12}$$

in which

$$\beta_1 = \log c + \log (1 - \alpha) - \tfrac{1}{2}a,\ \beta_2 = \alpha,\ \beta_3 = \phi,$$
$$\beta_4 = \epsilon, \quad \text{and} \quad \beta_5 = -\lambda^2/2a.$$

We estimate (11) and (12) using country-level aggregate data on U. S. nonbank majority-owned affiliates in 1982, treating all foreign affiliates as if owned by representative U. S. parent firms.[14] Since the real input measures used in (11) and (12) exclude financial capital, it is important to remove financial earnings from reported profitability figures. Profits are adjusted by subtracting reported income interest received and adding back interest paid.[15]

14. Underlying firm heterogeneity changes the interpretation of the results in two ways. One way is that, if there are important firm-specific productivity differences, some of what appears to be extraordinary profit rates in tax havens might reflect higher productivity of firms with tax haven operations. The second way is that, since not all firms do business in all countries, the shadow values of the income-transfer constraints (the λ's) in (4) could differ for different firms. The use of aggregate data introduces measurement error that biases against finding significant tax parameters. (Note that, under the hypothesis of no tax-motivated profit shifting, all λ's are equal.)

15. The profitability measure used in the regressions is total pretax net income, which is defined in U. S. Department of Commerce [1985], and which we take to represent the profits that firms maximize. Financial returns are excluded because available financial data are not as reliable as or as comprehensive as the data used to estimate (11) and (12), and their inclusion would only complicate the functional forms used in the estimation. Many of the same tax incentives that encourage American firms to report nonfinancial profits in haven affiliates are likely to affect their reported financial profits in a similar way. Hines and Rice [1990] test for the influence of local tax rates on intrafirm debt contracts, finding that reported financial rates of return are inversely related to local tax rates.

The sample consists of the countries listed in Appendix 4: the Big-7 tax havens, 26 Dots, 17 industrialized countries, and 58 developing countries.

Columns (1) and (2) of Table II report OLS estimates of two variants of (11). Both regressions control for capital and labor inputs, and find the tax variable to exert a negative effect on reported pretax nonfinancial income. The estimates imply that a one percentage point higher tax rate reduces reported profits by 3 percent. Column (3) reports estimated coefficients from a variant of (11) in which a quadratic tax term is included; the results suggest that the tax effect is strongest at low tax rates.[16] The significant negative coefficient on $(1 - \text{Tax})^{-2}$ reported in column (4) of Table II is consistent with our alternative specification (12). The results are consistent with the assumed decreasing returns to scale technology, since factor coefficients sum to about 0.8. Inclusion of the scaling factor for local productivity, log (GDP per capita), does not significantly influence the estimated tax coefficients, and the results (not reported) are virtually identical when log (GDP per capita) is replaced with log (GDP).

There are many reasons to be careful in interpreting the estimated tax coefficients. Our measure of "the" tax rate for a country represents an average annual rate for all affiliates, not a subtler index that might apply to the marginal dollar of earnings transferred from abroad or earned by capital located within.[17] Our sample excludes countries with investments from so few U. S. firms that confidentiality requirements prohibit the release of data; truncating the dependent variable at the bottom end is likely to flatten the regression line and reduce the estimated effect of taxes. We also do not account for the effect of nontax attributes of tax havens—such as bank secrecy laws and low auditing and reporting requirements—on local financial activity, in part because our data

16. The quadratic tax term emerges in a second-order Taylor approximation to (7); see Hines and Rice [1990] for a derivation.

17. Appendix 1 describes the method used to calculate tax rates. We construct a single average tax rate (with some adjustments) to measure effective tax rates. The details of income tax systems can imply that the effective tax rates on new investments and on income transfers differ from each other, and differ from reported average tax rates, but the prevalence of firm-specific tax arrangements such as tax holidays makes it extremely difficult to determine the effective rate of taxation of various activities in certain countries. (Bond [1981] and Bond and Samuelson [1986] describe and analyze tax holiday arrangements.) The use of average tax rates ensures that the tax variable captures all but recent changes in tax base definitions. The regressions reported in Tables II–IV were rerun replacing average tax rates with statutory tax rates (reported in Price Waterhouse [1983] and Doggart [1983]), without significantly affecting the results.

TABLE II
EFFECT OF TAX RATES ON LOCATION OF NONFINANCIAL PROFITS

	Dependent variable: log (pretax nonfinancial income)							
	Ordinary least squares estimation				Instrumental variable estimation[a]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.36	0.17	1.30	−0.72	1.62	0.82	−0.41	0.60
	(0.35)	(0.92)	(1.02)	(0.88)	(0.41)	(1.61)	(4.00)	(0.32)
Tax	−2.83	−2.25	−7.41		−3.65	−2.97	−24.92	
	(0.59)	(0.71)	(2.41)		(0.88)	(1.63)	(24.28)	
$(\text{Tax})^2$			8.32				49.73	
			(3.72)				(54.32)	
$(1 - \text{Tax})^{-2}$				−0.19				−0.41
				(0.09)				(0.32)
log (plant, property and equipment)	0.41	0.48	0.41	0.56	0.35	0.42	0.78	0.43
	(0.19)	(0.20)	(0.19)	(0.21)	(0.20)	(0.24)	(0.68)	(0.28)
log (compensation)	0.43	0.30	0.40	0.17	0.49	0.39	−0.12	0.35
	(0.19)	(0.21)	(0.20)	(0.21)	(0.20)	(0.28)	(0.86)	(0.34)
log (GDP per capita)		0.16	0.06	0.26		0.09	0.34	0.15
		(0.11)	(0.12)	(0.11)		(0.17)	(0.49)	(0.19)
S.E.E.	0.70	0.70	0.67	0.72	0.72	0.70	1.65	0.77
Adjusted R^2	.87	.87	.88	.86				
$n = 59$								

a. Instruments for Tax and Tax^2 are Log Population and $(\text{Log Population})^2$.
Notes. Standard errors appear in parentheses. The dependent variable is total pre-tax net income plus interest payments minus interest receipts.

measure only the *reported* operations of U. S. firms. The real prices of capital and labor are likely to vary widely between countries and in ways that we cannot measure; the available data simply capture U. S. dollar values, translated at exchange rates that may ignore currency controls. But since some of these reasons are likely to reduce the estimated effect of taxes on profitability, it is striking that the tax effect appears as consistently large and significant as in Table II.[18]

There is an additional complication in the OLS estimation that concerns host countries' tax rate choices. The OLS specifications in Table II take the local tax rate on U. S. firms to be exogenously determined and therefore uncorrelated with the error terms in equations (11) and (12). If, instead, countries set their tax rates in response to the unobservable variables captured in the residual—for example, if governments in locations with large amounts of tax-insensitive U. S. investment choose high tax rates—then the OLS coefficients will be biased and the estimated tax effect is likely to understate the true effect. On the other hand, if tax obligations are endogenous to firms' commitments of legal and accounting resources, then measured tax rates are likely to be lower in profitable locations, and our estimated tax coefficient overstates the true value.

In order to reduce the bias possibly arising from tax rate endogeneity, equations (11) and (12) were estimated by an instrumental variables technique, using the log of host country population as an instrument for its tax rate. The rationale for using this instrument is that small countries have little locally provided capital and so face elastic capital supplies on the world market; the optimal tax rates for such countries are likely to be low and positively related to their population sizes.[19] Note that this argument concerns the supply of world capital, not just capital from the United States. If the population of a country does not affect the rate of return, then population can be used as an instrument for the local tax rate.

18. The regressions exploit the tax rate variation available in the whole sample. In order to examine the impact of tax rate differences among low-tax countries, the regressions reported in Tables II–IV were rerun using only the low-tax third of the sample (selected on the basis of population, not tax rates, to avoid simultaneity bias). The subsample results are very similar to the full-sample results, although the tax coefficients and standard errors tend to be somewhat larger.

19. Huizinga [1987] reports that corporate tax rates are positively correlated with country populations. In a number of auxiliary regressions (not reported), we find that log population significantly outperforms log GDP, log GDP per capita, and other aggregates in explaining tax rates.

Columns (5)–(8) of Table II contain the IV estimates. The estimates in the IV specifications in columns (5)–(6) and (8) look similar to their OLS counterparts, with the differences that the estimated tax effects are larger and the estimated standard errors are also larger. Note, however, that the IV procedure encounters a difficulty when the $(\text{Tax})^2$ term is included (in column (7)): $(\log \text{Population})^2$ is not a powerful enough instrument for $(\text{Tax})^2$ to provide reliable estimates, and as a result, the standard errors are very large and the coefficients imprecisely estimated. Hausman tests of equality between the estimated OLS coefficients in columns (1)–(2) and (4) and the corresponding IV estimates in columns (5)–(6) and (8) fail to reject the OLS specification.

B. Tax Rates and Aggregate Earnings

It appears that multinational firms report higher profits in low-tax jurisdictions than would normally be associated with their use of productive inputs. There are two ways in which this reporting behavior enhances the tax collections of countries with low tax rates. The first is simply that reported profits trigger local tax liabilities. The second is that the ability to shift profits encourages firms to locate physical operations in tax havens, in order to justify the profits they plan to report. This second effect operates alongside the standard incentives firms have to locate operations in low-tax jurisdictions.

The results reported in Table II do not describe the full impact of low tax rates on reported nonfinancial profits, since the regressions control for input use, thereby missing the effect of low tax rates on the levels of inputs employed. In order to estimate the effect of tax rates on the use of productive inputs, it is necessary to obtain factor demands from the model presented in equations (3) and (10). These demand equations reflect firms' incentives to locate capital where profits are lightly taxed, and firms' incentives to locate productive resources in tax jurisdictions into and out of which profits will be shifted. Factor demands can be approximated as linear and quadratic functions of local tax rates and variables (such as log GDP) that capture the economic sizes of local jurisdictions. Estimates of these equations are presented in Table III.[20]

20. For a derivation of the factor demand equations, see Hines and Rice [1990]. Note that the adjustment cost specification (2) implies that firms have incentives to move productive resources into high-tax countries in order to reduce the adjustment costs generated by shifting profits to low-tax countries. The usual incentive to avoid high-tax countries is stronger, however, so on net, firms still prefer to avoid locating capital and labor in high-tax countries.

TABLE III
EFFECT OF TAX RATES ON LOCATION OF FACTORS OF PRODUCTION

	Dependent variable: log (employee compensation)				Dependent variable: log (property, plant, and equipment)				Dependent variable: log (employment)			
	OLS		IV*		OLS		IV*		OLS		IV*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Constant	2.89	3.46	3.88	2.21	3.95	4.44	4.73	3.54	0.39	0.63	0.40	−0.38
	(0.33)	(0.43)	(0.54)	(2.15)	(0.35)	(0.46)	(0.54)	(1.67)	(0.32)	(0.43)	(0.47)	(1.09)
Tax	−2.88	−9.25	−6.87	34.08	−3.33	−9.23	−6.59	26.56	−0.99	−3.69	−1.04	18.14
	(0.98)	(3.43)	(1.92)	(38.20)	(1.08)	(3.76)	(2.00)	(31.96)	(0.95)	(3.40)	(1.68)	(19.29)
Tax^2		10.65		−88.90		9.95		−72.53		4.51		−41.65
		(5.50)		(82.13)		(6.08)		(69.21)		(5.46)		(41.48)
log (GDP)	1.08	1.11	1.23	1.42	0.99	1.03	1.12	1.27	0.89	0.91	0.89	0.99
	(0.08)	(0.08)	(0.10)	(0.34)	(0.08)	(0.09)	(0.11)	(0.28)	(0.07)	(0.08)	(0.09)	(0.17)
Adjusted R^2	.76	.77			.68	.69			.71	.71		
S.E.E.	1.15	1.18	3.65	1.31	1.30	1.31	3.14	1.40	1.15	1.14	1.84	1.14
No. of observations	72	72	72	72	73	73	73	73	72	72	72	72

*Instruments for Tax and Tax^2 are Log Population and (Log Population)^2.
Note. Standard errors appear in parentheses.

The linear regressions reported in columns (1) and (5) of Table III indicate that a 1 percent reduction in a tax rate (if, for example, the rate were reduced from 12 percent to 11 percent) is associated with approximately 3 percent greater use of labor and capital by U. S. investors. These coefficients increase in magnitude in the IV estimates reported in columns (3) and (7), and the standard errors also increase. Columns (2) and (6) of Table III report that the estimated coefficients on tax squared in the quadratic specifications are not significantly different from zero. As before, the IV regressions perform much better in the linear variants of the estimating equations than in the versions that include tax squared; a Hausman test rejects the OLS specification in column (1) against the IV specification in column (3), and nearly rejects the OLS specification in column (5) against the IV equation in column (7). Log GDP is always significant, and its coefficient is estimated to be very close to unity. Columns (9)–(12) report estimates of the labor demand equation with total employment as the dependent variable; these equations fit poorly, particularly when compared with those using employee compensation as the dependent variable.

The results reported in Tables II and III imply that high tax rates depress local profits of U. S. firms, since the determinants of total nonfinancial profits—capital and labor employed, and reported profits conditional on factor inputs—are all reduced by high tax rates. Indeed, it is notable that these components each show roughly the same responsiveness to tax rate variations: in the linear variants, raising the tax rate by one percentage point reduces factor use by 3 percent, and reduces profits conditional on factor input by 3 percent. High local tax rates are also likely to reduce reported financial profits. The model implies that the log of aggregate (financial and nonfinancial) profits can be approximated in a second-order Taylor expansion as a function of local GDP and a quadratic function of local tax rates:[21]

$$\log \pi_i = \text{Const} + \beta_1 \tau_i + \beta_2 \tau_i^2 + \beta_3 \log GDP_i + e. \quad (13)$$

Table IV presents estimates of (13); the OLS equation reported in column (1) implies that tax rates exert a strong negative effect on local reported earnings, and is of the same order of magnitude as the cumulative effects reported in Tables II and III (one percentage point tax rate changes are associated with 6 percent differences in reported profits). The estimates of β_1 and β_2

21. See Appendix B of Hines and Rice [1990].

TABLE IV
EFFECT OF TAX RATES ON LOCATION OF TOTAL PROFITS

	Dependent variable: log (net pretax total income)			
	Ordinary least squares estimation		Instrumental variables estimation*	
	(1)	(2)	(3)	(4)
Constant	4.52	5.61	5.94	4.88
	(0.40)	(0.46)	(0.68)	(2.13)
Tax	−6.29	−20.17	−12.99	16.53
	(1.27)	(3.89)	(2.76)	(43.81)
Tax^2		23.51		−65.86
		(6.30)		(96.85)
log (GDP)	0.88	0.96	1.18	1.38
	(0.10)	(0.09)	(0.16)	(0.45)
Adjusted R^2	.56	.65		
S.E.E.	1.24	1.37	3.56	1.68
$n = 59$				

*Instruments for Tax and Tax^2 are Log Population and (Log Population)^2.
Note. Standard errors appear in parentheses.

in column (2) suggest that there is significant curvature in the effect of tax rates on reported profits: they imply that raising the tax rate from zero to 1 percent lowers profits by 20 percent, and that the marginal effect of taxes dies down to zero as the tax rate reaches 43 percent.

Columns (3) and (4) of Table IV report IV estimates corresponding to the OLS specifications. As before, the linear version performs quite well with instrumental variables, and a Hausman test rejects the OLS specification of the linear equation (column (1)) in favor of the IV specification (column (3)). Unfortunately, the standard errors on tax and tax squared become quite large in column (4), reflecting the difficulty of identifying the two tax terms separately using our instruments.

V. The Interest of Tax Havens

Foreign investors can provide capital-importing countries with tax revenue, employment, and other valuable spillovers.[22] Host countries maximize their tax revenues from foreign investors by

22. The analysis in this section and in Section IV focuses on tax payments by multinational corporations. For a survey of other economic spillovers from foreign direct investment, see Blomstrom [1991].

choosing tax rates at which their tax bases are unit elastic with respect to tax rates.

The regression coefficients reported in Table IV imply that revenue-maximizing tax rates are very low, roughly on the order of observed rates in havens. Denoting taxable income in country i by $\pi_i(\tau_i)$, tax revenue equals $\tau_i\pi_i(\tau_i)$, and the revenue-maximizing tax rate (τ_{max}) satisfies

$$\pi_i(\tau_{max}) + \frac{\tau_{max}\, d\pi_i}{d\tau_i} = 0. \tag{14}$$

Consider the quadratic specification of the profit-location process (13), in which $d\pi_i/d\tau_i = \beta_1\,\pi_i + 2\beta_2\,\tau_i\,\pi_i$. From (14), this implies that τ_{max} satisfies

$$\beta_1\tau_{max} + 2\beta_2\tau_{max}^2 + 1 = 0. \tag{15}$$

Solving for τ_{max},

$$\tau_{max} = \frac{-\beta_1 - (\beta_1^2 - 8\beta_2)^{1/2}}{4\beta_2}, \tag{16}$$

which, evaluated at the parameter estimates in column (2) of Table IV, yields a revenue-maximizing tax rate of 5.7 percent.[23] Alternatively, the IV estimate of the linear coefficient (reported in column (3) of Table IV) implies that the revenue-maximizing tax rate is 7.7 percent. The parameter estimates apply only to the elasticity of the taxable profits of U. S. multinationals, but the responsiveness of American firms to local tax rates may be typical of foreign investors. In addition, the parameter estimates indicate the effect of tax changes in single (small) countries; if all tax havens could coordinate their behavior, then their revenue-maximizing tax rates are likely to be higher.[24] Country-specific conditions no doubt affect local tax base elasticities, but the low tax rates available in many havens may be consistent with tax revenue maximization.[25]

23. The second-order condition guarantees that this, the larger of the two roots of (5), represents the revenue-maximizing tax rate, since the other root implies a negative tax rate.

24. Hamada [1966] and Feldstein and Hartman [1979] analyze models in which there is strategic interdependence of tax rates.

25. Taken literally, the estimates imply that 5.7 percent is the revenue-maximizing tax rate for developed countries as well as tax havens. Small tax havens have the greatest ability to fine tune their tax rates on foreign direct investment, however, since foreign investment constitutes a larger share of their investment than it does of investment in developed countries, and most countries set their tax rates under the restriction that foreign and domestic investors incur the same tax treatment.

TABLE V
SIGNIFICANCE OF U. S. MULTINATIONALS TO HOST FOREIGN GOVERNMENTS, 1982

Country group	Employment divided by population (percent)	Employee compensation divided by GDP (percent)	Income taxes divided by GDP (percent)	Total taxes divided by GDP (percent)
Industrialized	0.370	1.01	0.18	1.16
Developing	0.039	0.35	0.11	0.74
Havens:				
Big-7	0.862	2.53	0.34	1.08
Dots	0.046	0.93	0.10	0.57

Notes. Entries represent group medians. Data are B.E.A. tabulations from the U. S. Commerce Department's 1982 Benchmark Survey.

Corporate tax revenue is not the only important spillover that investing firms offer host governments, but the evidence indicates that American multinationals do not play large parts in the economies of most host countries. Table V presents median values of the fraction of countries' populations employed by U. S. firms, along with other indicators of their significance. U. S. firms in 1982 employed 0.4 percent of the population in the median industrialized country, and 0.04 percent in the median developing country.[26] This contrasts with a much higher 0.9 percent for the median Big-7 tax haven, but only 0.05 percent for the median Dot.

U. S. firms appear to pay their employees relatively well: median U. S. employee compensation was about 1 percent of GDP in industrialized countries and 0.4 percent of GDP in developing countries, while compensation in havens was 2.5 percent of GDP in the Big-7 tax havens and 1 percent of GDP in the Dots. Median taxes paid by American firms were 1.2 percent of GDP in developed countries and 0.7 percent in developing countries. Tax haven governments collected similar shares of their GDP from taxation of local U. S. affiliates: 1.1 percent among the Big-7 and 0.6 percent in the Dots.

It is difficult to form the comparisons necessary to evaluate the consequences of the low tax rates available in tax havens. For the major Dots, the correct yardstick may be the experiences of

26. These are country medians, so that, for example, the value 0.862 percent represents the employment/population ratio for the country with the fourth highest ratio among the Big-7 group.

nonhaven developing countries. By this standard, they have considerably more employment in U. S. firms than they would otherwise, along with roughly similar tax revenue. However, the low tax rates in the Big-7 tax havens have the largest apparent effect on employment and little effect on total tax revenue.

VI. Tax Revenue Implications for the United States

A. Aggregate Tax Revenues

Taking the total profitability of American multinational firms to be fixed, the U. S. government collects the most tax revenue when American firms earn their foreign profits in tax havens, since fewer foreign tax credits are available on haven profits than on profits earned in high-tax foreign countries. Consequently, the ability of American multinational firms to adjust reported profits in response to local tax rates might enhance U. S. tax revenues, since American firms have incentives to report profits in jurisdictions where they generate the fewest foreign tax credits. Naturally, a complete analysis of the effect of low foreign tax rates on U. S. tax collections would need to incorporate the tax revenue implications of induced changes in domestic business activity, employment, and other variables, along with the effect of tax haven use by foreigners investing in the United States.[27] But the shifting of reported profits from high-tax foreign jurisdictions to low-tax foreign jurisdictions is one of the important consequences of low foreign tax rates.

Aggregate revenue figures confirm the importance of tax haven profits as direct sources of U. S. corporate tax revenue. American corporations reported $56.6 billion of foreign income from all sources (including repatriated dividends, branch profits, interest income, Subpart F income, and others) in 1982. American corporations also claimed aggregate foreign tax credits of $18.1 billion in that year. The sixteen largest tax havens contributed $7.8 billion of income and only $0.6 billion of foreign tax credits. Applying the 46 percent U. S. corporate income tax rate to the

27. Some of these behavioral changes affect tax collections through the personal income tax, and other taxes, in addition to the corporate income tax. For example, the offshore profits of American firms stimulate tax revenues for the U. S. government by generating dividend and capital gain income for U. S. individual taxpayers; calculations reported in Hines [1991a] imply that these indirect revenue sources may be as large as tax collections through the corporate income tax. On the other side, the U. S. government loses various other sources of tax revenue if the offshore movement of American firms reduces income earned by American persons.

income figures, the U. S. government received total net-of-tax-credit revenues of $7.9 billion from the foreign-source profits of American corporations, of which $3.0 billion, or 38 percent, arose from activities in the sixteen most important tax havens.[28]

B. Revenue Effects of Foreign Tax Changes

The long-standing negotiating position of the U. S. government is that it supports bilateral agreements that reduce source-basis taxation of profits earned by multinationals. As the tax home of many of the world's multinational corporations, the United States has been understandably eager to substitute residence for source-basis taxation. Of course, U. S. tax revenues need not rise when foreign tax rates fall, since lower foreign tax rates may attract business abroad that otherwise would be located in America. On the other hand, business operations in foreign countries may complement business operations in the United States, in which case lower foreign tax rates stimulate growth in the U. S. domestic tax base. In addition, lower tax rates in tax havens give U. S. firms incentives to transfer foreign profits from high-tax foreign locations to low-tax haven locations where they generate fewer foreign tax credits.

In order to analyze the effect of foreign tax rates on aggregate foreign tax credits, we consider the case of a U. S. firm with deficit foreign tax credits that organizes its foreign operations as wholly owned subsidiaries. Aggregate evidence indicates that foreign subsidiaries of U. S. firms repatriate about half of their foreign profits each year.[29] In order to analyze as simple a model as

28. Data are reported in Carson [1986]. These data differ from the income figures reported in Section II because the numbers reported in Section VI include foreign-source interest receipts, and exclude unrepatriated foreign profits and the foreign share of profits earned by affiliates with partial foreign ownership. The exercise in the text treats all foreign income as if received by a (representative) firm with deficit foreign tax credits. Taxpayer heterogeneity guarantees that parent firms with excess foreign tax credits receive some tax haven income, but the income sources of such firms must be heavily weighted toward high-tax foreign countries. Goodspeed and Frisch [1989] confirm that, in 1984, 50 percent of U. S. foreign-source income was associated with parent corporations with excess foreign tax credits; in their country breakdown, only 32 percent of foreign-source income from identifiable tax havens (Ireland, Switzerland, Singapore, Hong Kong, Caribbean, and Central America) was received by U. S. parents with excess foreign tax credits. Hence the 38 percent figure calculated in the text should be viewed as a lower bound to the net contribution of tax haven countries to the U. S. tax revenue from foreign sources.

29. Hines and Hubbard [1990] and Altshuler and Newlon [1991] analyze the dividend repatriation behavior of U. S. multinational corporations.

possible, we consider the case in which the subsidiaries repatriate all of their profits immediately.[30]

American tax revenue, denoted *Rev*, then equals

$$Rev = \sum_{i=1}^{n} (\tau_{US} - \tau_i)\pi_i + \tau_{US}\pi_{US}. \tag{17}$$

The effect on U. S. tax revenue of a small change in country j's tax rate is

$$\frac{d(Rev)}{d\tau_j} = -\pi_j + (\tau_{US} - \tau_j)\frac{\partial \pi_j}{\partial \tau_j} + \sum_{i \neq j} (\tau_{US} - \tau_i)\frac{\partial \pi_i}{\partial \tau_j} + \tau_{US}\frac{\partial \pi_{US}}{\partial \tau_j}. \tag{18}$$

It is possible to evaluate (18) by using some convenient assumptions and the estimates reported in Table IV. Suppose that, of the reported income that leaves country j when its tax rate rises, a fraction α moves to the United States and a fraction $(1 - \alpha)$ moves to the rest of the world (we ignore the change due to inefficiency), so $\partial \pi_{US}/\partial \tau_j = -\alpha(\partial \pi_j/\partial \tau_j)$. Denote the average tax rate on income moving to the rest of the world by τ_f, so the summation in (18) equals $-(\tau_{US} - \tau_f)(1 - \alpha)(\partial \pi_j/\partial \tau_j)$. Hence (18) becomes

$$\frac{\partial Rev}{\partial \tau_j} = -\pi_j + (\tau_{US} - \tau_j)\frac{\partial \pi_j}{\partial \tau_j} - (\tau_{US} - \tau_f)(1 - \alpha)\frac{\partial \pi_j}{\partial \tau_j} - \tau_{US}\alpha\frac{\partial \pi_j}{\partial \tau_j}. \tag{19}$$

Simplifying (19) yields

$$\frac{\partial Rev}{\partial \tau_j} = -\pi_j + [\tau_f(1 - \alpha) - \tau_j]\frac{\partial \pi_j}{\partial \tau_j}. \tag{20}$$

Equation (20) indicates that it is very unlikely that raising the foreign tax rate by a small amount will generate additional tax

30. This case is somewhat paradoxical, since deficit-credit firms that repatriate foreign profits when earned have no incentives to shift reported profits into low-tax locations, since the effective tax rate on foreign income is always the U. S. tax rate. The calculation in the text is illustrative; Hines and Rice [1990] offer a more complicated calculation in which it is assumed that foreign subsidiaries invest their after-foreign-tax foreign profits in world capital markets, repatriating interest as earned. Deferral via passive investment increases the difference between U. S. tax revenue collected on profits earned in tax haven locations and U. S. tax revenue collected on profits earned in high-tax foreign countries, since it creates a difference in the present value of foreign interest tax payments. Hence the calculations presented in equations (17)–(20) probably understate the degree to which low tax rates in tax havens enhance U. S. tax collections.

revenue for the U. S. government, since higher foreign tax payments reduce U. S. tax revenue. The most extreme case is $\alpha = 1$, in which all of the profits that leave the tax haven move to the United States. In this case, (20) implies that raising the foreign tax rate increases U. S. tax revenues only if the tax haven's initial tax rate is below its revenue-maximizing rate.

Income shifting between foreign countries raises the probability that small additions to tax haven tax rates reduce U. S. tax revenue. Consider the extreme case in which the tax haven tax rate (τ_j) is zero. Then, from (20), raising the foreign tax rate increases U. S. tax revenues only if $\tau_f(1 - \alpha)$ is below the tax haven's revenue-maximizing rate. Taking 5.7 percent to be the revenue-maximizing tax rate, and assuming that τ_f takes the sample mean value (reported in Appendix 4) of 31 percent, the critical value of α is 0.18. Hence if 18 percent or more of the income that leaves a zero-tax-rate haven when its tax rate rises moves to other foreign countries, U. S. tax collections will fall.

These results illustrate the tax revenue cost to the United States of high foreign tax rates, though there is a limit to how far one can take this kind of exercise. The estimated behavioral responses from cross-section data are valid only for small changes within a rather static environment; in particular, it would not be consistent to draw inferences from the data about the likely response of all countries to a U. S. tax change that, for example, raised bilateral withholding tax rates with *all* treaty partners. Furthermore, in response to large changes, firms might expand their use of alternative tax-favored locations, such as Puerto Rico.

VII. Conclusion

The evidence offers a consistent view of the pattern of tax haven use by U. S. multinational corporations. As measured by reported income, American companies locate a sizable fraction of their foreign activity in tax havens. It appears, however, that this fraction includes profits that would not normally be earned by the quantities of factors employed by U. S. firms in the havens.

The ability to shift reported profits into haven affiliates raises the already significant attractiveness of haven locations for ordinary business operations; as a result, tax rates are inversely related to local employment of capital and labor. The endogenous location of factors when combined with the ability to shift reported profits away from high-tax locations makes *total* taxable profits in a

country quite sensitive to tax rates. This elasticity may partly explain the behavior of tax haven governments: for a small country with a small indigenous tax base, a corporate tax rate on the order of 5–8 percent represents a revenue-maximizing choice.

It is undoubtedly true that some American business operations are drawn offshore by the lure of low tax rates in tax havens; nevertheless, the policies of tax havens may, on net, enhance the U. S. Treasury's ability to collect tax revenue from American corporations. In the available data from 1982, 38 percent of the tax revenue due the U. S. government from foreign operations of U. S. corporations is attributable to tax haven affiliates. Furthermore, the regressions imply that higher tax rates on the part of havens would very likely cost the U. S. government tax revenue by generating additional foreign tax credits. Low foreign tax rates influence business behavior in many ways, making it difficult to assess their overall impact on U. S. tax collections, but one component of their impact appears to be greater tax collections as a consequence of generating fewer foreign tax credits.

American relations with tax haven countries may be changing, as foreign direct investment into the United States increases in volume and seeks tax-minimizing channels through the same tax havens that American firms have used for years. One indication of this change is the recent attention directed at perceived abusive tax practices by U. S. affiliates of foreign parents. Relations between the United States and the tax havens offer a delicate balance of advantages and disadvantages, one that is likely to evolve with future economic conditions and legislative reforms.

Appendix 1: Data and Variables

Tax havens are often defined as locations with the following four attributes: (i) low corporate or personal tax rates; (ii) legislation that supports banking and business secrecy; (iii) advanced communications facilities; and (iv) self-promotion as an offshore financial center.

This vague characterization makes the process of classifying tax haven countries somewhat arbitrary. We take as a point of departure the *Internal Revenue Manual*'s list of 32 tax haven countries for purposes of U. S. businesses, as reported in Glautier and Bassinger [1987]. We then use data from States [1986–1987] to delete from our tax haven list countries in which the foreign corporate tax paid by U. S. companies is greater than 20 percent of

pretax income (the average tax rate is on the order of 50 percent in each country eliminated).[31] Three countries were eliminated on this basis: Austria, Costa Rica, and the Netherlands.

Beauchamp's [1983] listing of tax havens (without specific reference to the United States) includes all of the IRS-designated countries, plus fifteen others. We also include these countries, but restrict them to countries in which the average tax rate was lower than 10 percent for U. S. companies. This list consists of Anguilla, Andorra, Jordan, Lebanon, Macao, Monaco, and St. Martin. In addition, the same criterion was applied to havens discussed in the Economist Intelligence Unit's tax haven volume [Doggart 1983], resulting in the inclusion of Dominica, Maldives, Malta, Marshall Islands, and St. Lucia. By this method we identify 41 countries and regions as tax havens for the purposes of U. S. businesses (see Appendix 2).

Note that there are seven countries not classified as havens—Argentina, Bangladesh, Ecuador, French Islands (Pacific), South Korea, Taiwan, and Uruguay—with corporate tax rates comparable to those of the relatively high-tax havens. Tax rates do not constitute the only criterion of tax haven status. None of these seven countries is generally recognized as a tax haven, nor do they so promote themselves. Further, most lack other important tax haven attributes, such as freedom from capital controls and other regulations.

Our analysis relies on information concerning foreign direct investment, reported in the U. S. Department of Commerce's comprehensive benchmark survey of U. S. direct investment abroad in 1982. Firm participation in the survey is obligatory and includes all American firms with foreign affiliates whose assets exceed $3 million. The U. S. Department of Commerce [1985] publishes only a small part of the data; the Department's Bureau of Economic Analysis performed special calculations on the proprietary data for this study. (Variable means and standard deviations are included as Appendix 3.)

For confidentiality reasons, some elements of the benchmark survey data are unavailable to the public. These suppressed data

31. High tax rate countries can be identified as tax havens on the basis of some attributes, such as bank secrecy, that are not the focus of our study. If a country's average tax rate could not be calculated, the country was deleted if its corporate statutory tax rate exceeds 10 percent, as revealed in either Price Waterhouse [1983] or Doggart [1983].

were included in the preparation of all of the paper's noneconometric analysis, since this is presented in aggregate form. The restriction on the use of suppressed data does limit our econometric analysis in some respects. It does not constrain the samples of either the Big-7 tax havens or industrialized countries. Yet it reduces the number of observations on Dots to 17 from 34, and the observations on developing countries to 41 from 50.

The econometric analysis also requires data on population and gross domestic product, neither of which are contained in the benchmark survey data. For the most part, these were reported in International Monetary Fund [1987a, 1987b]. However, these sources do not include several of the smallest countries; additional data are available in either UNESCO [1984–1987] or *The Statesman's Year-book* [1984].

The tax rates calculated for regressions are presented in Appendix 4. Of course, no single measure of the corporate income tax rate can accurately capture the precise differences in tax burdens corporations face in different countries. For one thing, the complexity of tax codes (including different provisions for tax deductions, depreciation rules, loss carryforwards and carrybacks, and nonstandard income concepts) precludes the possibility of distilling a well-defined tax rate for each country. In addition, a single tax rate cannot capture industry- and firm-specific tax holidays or other features.

We used two complementary sources to obtain these data, the benchmark survey itself and Price Waterhouse [1983]. The benchmark survey data provide a first approximation: corporate income taxes paid by all U. S. affiliates in a country, divided by their total pretax net income. In principle, this has the advantage of reflecting the amount of taxes that corporate affiliates actually pay. However, since many companies in some countries have negative earnings, this measure tends to overstate the tax rate in those countries. In practice, this calculation results in average tax rates for some countries substantially exceeding top statutory marginal rates (including subnational taxes).

Since we expect this top tax rate to be an upper bound on corporations' actual tax burdens, we define the average tax rate as the lesser of the benchmark survey tax rate and the statutory rate. In addition, tax rate data are unavailable from these two sources for some of the smallest tax haven countries. For these countries we use tax rates reported by Doggart [1983].

APPENDIX 2: TAX HAVEN COUNTRIES

IRS-identified	Beauchamp	Doggart
Antigua & Barbuda	Anguilla	Dominica
Bahamas	Andorra	Maldives
Bahrain	Jordan	Malta
Barbados	Lebanon	Marshall Islands
Belize	Macao	St. Lucia
Bermuda	Monaco	
British Virgin Islands	St. Martin	
Cayman Islands		
The Channel Islands		
Cook Islands		
Cyprus		
Gibraltar		
Grenada		
Hong Kong		
Ireland		
Isle of Man		
Liberia		
Liechtenstein		
Luxembourg		
Montserrat		
Netherlands Antilles		
Panama		
St. Kitts		
St. Vincent		
Singapore		
Switzerland		
Turks & Caicos		
U. K. Caribbean Islands		
Vanuatu		

Sources. IRS-identified: Glautier and Bassinger [1987]; Beauchamp: Beauchamp [1983]; Doggart: Doggart [1983].

APPENDIX 3: MEANS AND STANDARD DEVIATIONS OF REGRESSION VARIABLES

(in $ millions, except as noted)

	Mean	Standard deviation
Nonfinancial income	508.1	(1354.1)
Financial income	−3.7	(289.0)
Total income	504.4	(1355.0)
Tax rate	0.31	(0.18)
Plant, property, and equipment	1783	(5210)
Equity investment	2677	(6373)
Net equity	894	(2676)
Employee compensation	1067	(2885)
Employment (thousands)	60.5	(142.0)
Population (millions)	27.1	(83.5)
GDP ($ billion)	76.1	(169.2)
GDP per capita ($)	4040	(4144)

Note. Sample size is 78.

APPENDIX 4: TAX RATES

Big-7		Dots		Industrialized countries		Developing countries			
Hong Kong	0.12	Andorra	0.00	Austria	0.41	Argentina	0.21	Mexico	0.42
Ireland	0.04	Antigua & Barbuda	0.03	Australia	0.51	Bangladesh	0.25	Morocco	0.53
Lebanon	0.22	Bahamas	0.00	Belgium	0.45	Bolivia	0.30	Namibia	0.46
Liberia	0.21	Bahrain	0.13	Canada	0.52	Botswana	0.35	Nicaragua	0.44
Panama	0.10	Barbados	0.29	Denmark	0.40	Brazil	0.35	Pakistan	0.53
Singapore	0.21	Belize	0.00	Finland	0.49	Chile	0.49	Papua New Guinea	0.48
Switzerland	0.17	Bermuda	0.00	France	0.50	Colombia	0.40	Paraguay	0.30
		Cayman and other U. K. Islands	0.01	Germany	0.48	Costa Rica	0.50	Peru	0.35
				Greece	0.43	Dominican Republic	0.41	Philippines	0.33
		Cyprus	0.14	Italy	0.39	Ecuador	0.22	Portugal	0.40
		Gibraltar	0.00	Japan	0.52	El Salvador	0.30	Seychelles	n/a
		Grenada	0.03	Netherlands	0.40	Fiji	0.38	Solomon Islands	0.35
		Kiribati	n/a	New Zealand	0.45	French Islands, Caribbean	n/a	South Korea	0.24
		Liechtenstein	0.02	Spain	0.33	French Islands, Indian	0.09	Sri Lanka	0.40
		Luxembourg	0.18	Sweden	0.60	French Islands, Pacific	0.25	Taiwan	0.19
		Macao	0.16	South Africa	0.46	Guatemala	0.58	Thailand	0.44
		Malta	0.15	U. K.	0.52	Guyana	0.50	Tonga	0.43
		Nauru	0.00			Haiti	0.45	Tunisia	n/a
		Netherlands Antilles	0.03			Honduras	0.46	Turkey	0.40
		Other Caribbean	0.00			India	0.52	Uruguay	0.25
		St. Kitts & Nevis	0.00			Israel	0.32	Venezuela	0.39
		St. Vincent	0.03			Jamaica	0.50	Western Sahara	n/a
		Vanuatu	0.00			Jordan	n/a	Western Samoa	0.42
						Lesotho	n/a	Zambia	0.45
						Malawi	0.50	Zimbabwe	0.52
						Malaysia	0.37		

Note. "n/a" indicates that the tax rate is not available from sources cited and could not be estimated on the basis of the data available from the U. S. Department of Commerce.

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