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FISCAL PARADISE:
FOREIGN TAX HAVENS AND AMERICAN BUSINESS

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ABSTRACT

The offshore tax haven affiliates of American corporations account for more than a quarter of US foreign investment, and nearly a third of the foreign profits of US firms. This paper analyzes the origins of this tax haven activity and its implications for the US and foreign governments. Based on the behavior of US firms in 1982, it appears that American companies report extraordinarily high profit rates on both their real and their financial investments in tax havens. We calculate from this behavior that the tax rate that maximizes tax revenue for a typical haven is around 6%. The revenue implications for the US are more complicated, since tax havens may ultimately enhance the ability of the US government to tax the foreign earnings of American companies.

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I. Introduction

Competition in the global economy has two faces: whereas US multinationals must vie with foreign firms in worldwide markets, they often benefit from their ability to invest in foreign locations. Eager for the revenue and employment that American firms can provide, many foreign governments actively try to lure US business to their shores. In response, American firms now locate a significant and growing part of their foreign operations in tax havens, a group of countries with unusually low tax rates that has been extremely successful at attracting US business.

From the standpoint of US tax policy, the widespread use of tax havens threatens the long-run sustainability of the US domestic tax base, since US multinational corporations may be able to shift some of their domestic income to low-tax offshore jurisdictions. At the same time, tax haven profits represent the richest possible foreign source of US tax revenue, since they generate few foreign tax credits to offset US tax due upon repatriation. In order to assess net impact of tax haven countries on US companies and the US government, we analyze the incentives created by their low tax rates and the ways in which American firms respond to those incentives.

Specifically, we are concerned with four issues involving tax havens. The first is whether US firms report abnormally high profit rates in low-tax foreign jurisdictions. The second is the extent to which the low tax rates available in tax havens explain the observed local levels of US firms' operations and their total reported earnings. The third issue concerns the behavior of governments: can we explain the decisions of tax havens to offer very low tax rates on the basis of revenue maximization or other considerations? And the fourth issue is the impact of tax havens on the US Treasury: what revenue does the US collect from American corporations in tax havens, and what would be the likely consequences for the US if a tax haven were to raise its tax rate?

We identify 41 countries and regions as tax havens for the purposes of US businesses.[1] Their combined population amounts to only 30 million (1.2% of the western world's population) and they produce only 3.0% of the West's GDP.[2] Table 1 presents some characteristics of their economies, along with detail on local US corporate operations. In analyzing the tax haven operations of American business, we rely on US Commerce Department data for 1982.[3]

There are several ways to gauge the magnitude of business operations; by one measure, gross assets, 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 1, Column 3). This amount substantially exceeds American direct investment in all of (non-haven) continental Europe. Since gross assets exclude liabilities, it is also enlightening to consider the stock of US equity in tax havens (Table 1, Column 4). By the equity measure, the tax havens account for a somewhat smaller share of foreign direct investment, 21%.[4] Yet in terms of net income, tax haven affiliates' share is larger than their asset share: 30.8% ($11.1 billion) of a worldwide total of $36.0 billion.

Since assets, equity and income include purely financial transactions, they may not provide a clear image of how much physical activity takes place in tax haven countries. An

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[1]Appendix A contains a complete listing and a description of our process of identifying tax havens.

[2]For our purposes, "West" excludes Socialist countries, Sub-Saharan Africa (except Southern Africa), and oil exporters.

[3]Our calculations are based on data from the US Department of Commerce' 1982 comprehensive "Benchmark Survey" of US foreign direct investment, the most current available source of data on the operations and tax liabilities of US firms. The companion publication *US Direct Investment Abroad* (US Department of Commerce, 1985) contains only a small part of the data which are essential for our analysis. However, the Department's Bureau of Economic Analysis provided us with aggregate figures calculated from proprietary benchmark survey data. A full description of the data and of variable definitions appears in Appendix A.

It would, of course, be even more informative to follow the evolution of tax laws and business responses over time, but detailed information of the type needed are simply not available on anything like a consistent basis. Unfortunately, 1982 was a recession year around the world and may in some instances suggest conclusions that are sensitive to business cycle conditions.

[4]Unfortunately, there exists no measure of the "equity" of banking affiliates, and this omission is likely to understate the US-owned capital stock in offshore banking centers.

alternative is to consider the employment and "property, plant, and equipment"[5] of US corporations' foreign affiliates. According to these measures, US affiliates' employment and tangible capital in tax havens appear to be commensurate with the countries' share in world GDP. Columns 6 and 7 of Table 1 reveal that, out of 6.82 million overseas employees of US affiliates, only 0.29 million (4.3%) work in tax haven affiliates. Similarly, while the property, plant, and equipment of US foreign affiliates totals $227.9 billion worldwide, only $9.6 billion (4.2%) is located in havens.

The economies of the 41 tax havens differ considerably. For this reason, it is instructive to distinguish the several relatively large tax havens from the many small havens. Together the seven tax havens with populations in excess of 1 million (Hong Kong, Ireland, Liberia, Lebanon, Panama, Singapore, and Switzerland) account for 80% of total tax haven population and 89% of tax haven GDP. They appear to be the locus of most of the physical activity undertaken by US haven affiliates, much of it in the non-financial sectors.

The remaining havens are tiny, their median 1982 population only 200,000 inhabitants. Nonetheless, as Table 1 indicates, these dot-sized countries still account for about 60% 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."

Table 2 describes the US business activity in the nine havens with largest number of US affiliates and greatest amount of 1982 net income of US foreign affiliates: among the Big-7 countries, Switzerland, Hong Kong, Singapore, Ireland, and Panama are included; four Dots also appear: Bermuda, the Netherlands Antilles, the Bahamas, and the Cayman Islands. US firms in each of these nine countries earned net income in 1982 between $600 million and $2 billion. There was considerable variation in the physical presences of American firms: they employed more

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[5]U.S. data on overseas "property, plant and equipment" are available only for non-bank affiliates of non-bank parents. While this omission is unfortunate, it should be noted that even in tax havens these affiliates account in aggregate for 98.5% of net income and 92.5% of employment.

than 25,000 people in each of the five Big-7 countries shown in Table 2, while US employment in the Dots nowhere exceeded 8,500.

The sketchy available evidence suggests that US firms have dramatically increased their use of tax havens in recent years. The US Department of Commerce conducted earlier benchmark surveys in 1966 and 1977. While the 1966 data are not sufficiently complete to allow comparison, the 1977 data are fully comparable to data from 1982. Table 3 contrasts US direct foreign investment in 1977 and 1982: as measured by assets, tax haven affiliates have more than doubled their share of the US-owned stock of foreign capital in these five years; and in the smallest tax havens, affiliates' assets have expanded four-fold.[6] Yet their share of the overseas employment of US affiliates has remained essentially constant.

Section 2 of this paper explores in detail the means by which US multinational firms can exploit tax havens to maximize their after-tax profits. Section 3 examines the behavior of US multinationals in 1982, which appears to be consistent with predicted behavior: holding other factors constant, their earnings are extremely sensitive to the low tax rates available in havens. Section 4 then considers the tax rate policy decisions of foreign governments, finding that very low rates (about 5%) represent revenue-maximizing choices for very small countries. Section 5 offers a brief analysis of US policy toward foreign tax havens, raising the possibility that, despite appearances, the presence of foreign tax havens enhances the US Treasury's ability to collect revenue from US firms' foreign-source income. Section 6 concludes.

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[6]This phenomenon is not unique to the US: among capital-exporting countries as a whole, the very limited data seem to support the view that multinationals all over the world are rapidly increasing their use of tax havens. OECD (1987) records aggregate foreign direct investment by industrial countries in all non-oil-exporting developing host countries. From these data, we estimate the real growth rate of the stock of direct investment in developing countries to average 1.3 percent per year during the decade of 1971 to 1981. In contrast, this growth rate averages 7.8 percent per year for the Big-7 tax havens. Unfortunately, OECD (1987) does not measure FDI in a manner consistent with the Benchmark Survey. These differences imply that these data may be no more than suggestive of *trends* in total tax haven investment.

II. US Firms and the Lure of Low Tax Rates

US firms have many incentives to operate in tax havens, not the least of which are their refreshingly low tax rates. Since the rules concerning international taxation are quite complicated and can in some cases vitiate the advantages of earning profits in low-tax foreign jurisdictions, it is necessary to understand the mechanics of the tax system in order to appreciate the usefulness of tax havens to American firms.

THE SYSTEM[7]

The US taxes income on a "residence" basis, meaning that American corporations and individuals owe taxes to the US government on all of their worldwide income, whether earned in the US or not. Since foreign profits are usually taxed in host countries, US law provides a foreign tax credit for income taxes (and related taxes) paid to foreign governments in order to avoid subjecting American multinationals to double taxation. With the foreign tax credit, a US corporation that earns $100 in a foreign country with a 15% tax rate (and a foreign tax obligation of $15) pays only $19 to the US government, since its US corporate tax liability of $34 (34% of $100) is reduced to $19 by the foreign tax credit of $15. The foreign tax credit is, however, limited to US tax liability on foreign income; if, in the example, the foreign tax rate were 50%, then the firm pays $50 to the foreign government but its US foreign tax credit is limited to $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 US 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.

[7]This brief description of the tax system is excerpted from Hines (1989).

A firm has "excess credits" if its available foreign tax credits exceed US tax liability on its foreign income.[8]

Deferral of US taxation of certain foreign earnings is another important feature of the US international tax system. A US parent firm is taxed on its subsidiaries' foreign income only when returned ("repatriated") to the parent corporation, and receives "indirect" foreign tax credits ("deemed-paid credits") for foreign income taxes paid (by the subsidiaries) on income subsequently received as dividends. 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.[9] The US government taxes branch profits as they are earned, just as it would profits earned within the United States. Hence, choosing to organize a foreign operation as a branch means that the parent US firm forgoes the opportunity of deferring US taxes on foreign income.[10]

The deferral of US taxation may create incentives for firms to delay repatriating dividends from their foreign subsidiaries. In 1962, Congress enacted the "Subpart F" provisions in part to prevent indefinite deferral of US tax liability on income earned abroad that is continually reinvested merely in order to escape US taxes. Subpart F rules apply to controlled foreign corporations (CFCs), which are foreign corporations owned at least 50% by US persons holding stakes of at least 10% each. The Subpart F rules treat a CFC's passive income (and income invested in US property) as if it were distributed to its American owners, and so it is subject to immediate US

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[8]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.

[9]The nomenclature is rather involved. All foreign operations take place through affiliates; those that are separately incorporated are subsidiaries. Majority ownership can be very important from a legal, economic, and data reporting standpoint; much of the U.S. Department of Commerce data on foreign operations of U.S. multinationals is reported for majority-owned foreign affiliates, without distinguishing branches from subsidiaries. Controlled foreign corporations are the subset of subsidiaries that meet the ownership requirements described in the text; they need not be (though they usually are) majority-owned by a single parent.

[10]On the other hand, organizing as a branch permits the investor to deduct foreign branch losses from the firm's US income, and may (in some cases) reduce the burden of foreign regulations.

taxation.[11] CFCs that reinvest their earnings in active foreign businesses avoid the Subpart F restrictions and can continue to defer US tax liability on those earnings. The Tax Reform Act of 1986 further expands the coverage of Subpart F, and also makes currently taxable the income of American investors in passive foreign investment companies that do not qualify as CFCs because they do not meet the 50% ownership rule.

There are several ways in which subsidiaries repatriate their profits. Payment of dividends from a subsidiary to its shareholding parent is the most common, and offers the advantage that the parent receives an indirect foreign tax credit for the foreign taxes that were paid on the income that generated the dividend. For subsidiaries that borrow funds from their parent corporations, the interest and principal payments represent flows back to the United States. The repayment of interest principle is untaxed; foreign interest earned by the parent is taxed, and is not eligible for indirect credits, but has the advantage of deductibility in host countries. In addition, astute use of transfer pricing by a multinational allows it to shift earnings from a subsidiary to the parent or to other subsidiaries enjoying more advantageous tax treatments. Royalty payments to the parent can serve a similar function. Foreign governments often impose moderate taxes on dividend, interest, rent, and royalty payments from foreign affiliates to their American parents, and these withholding taxes are fully creditable against foreign tax liabilities of the US taxpayer.

THE HAVENS

Tax havens can offer two tax advantages to US corporate taxpayers. The first is that earnings located in tax havens (as well as in other foreign countries) raise measured foreign earnings for the purpose of calculating the foreign tax credit limitation. The second is that firms with haven profits can earn interest on their residual US tax liability for as long as they defer

[11]Note that Subpart F treatment differs from actual repatriation in that the former does not result in taxation of the passively-invested principal, if that principal was itself earned by an active investment.

repatriations 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 advantage of tax havens is to exploit a US parent's excess foreign tax credits. The parent reduces its overall tax liability if it can attribute to a haven affiliate profits actually earned in a high-tax country; total taxes thereby decline by an amount equal to the difference between the two tax rates. In order to illustrate this effect, consider a case in which the haven profits are repatriated immediately to the US and the parent firm's excess foreign tax credits are used to offset any US tax liability associated with the repatriation.

Let θ represent the present value of a foreign tax credit carried forward into the next year,[12] and q the profit earned in the tax haven. Letting τ denote the US tax rate, the lost after-tax US earnings of the one dollar investment is then $(1 - \tau)$. The haven affiliate earns before-tax profits of q and pays τ^*q to the tax haven government (where $\tau^* < \tau$). In the absence of an excess foreign tax credit, the US tax obligation on the repatriated profits would then be $(\tau - \tau^*)q$; instead, the parent firm uses its excess foreign tax credits to offset that obligation, in the process losing the value of excess credit carryforwards equal to $\theta(\tau - \tau^*)q$. The firm is just indifferent to this action if:

$$\underset{\substack{\text{foregone}\\ \text{after-tax}\\ \text{domestic income}}}{(1 - \tau)} = \underset{\substack{\text{after-tax}\\ \text{tax haven}\\ \text{income}}}{q\,(1 - \tau^*)} - \underset{\substack{\text{foregone}\\ \text{foreign tax credit}\\ \text{carryforwards}}}{q\,[\,\theta(\tau - \tau^*)\,]} \qquad (1)$$

If the left side of (1) exceeds the right, then the firm has no incentive to engage in this activity; if the right side exceeds the left then on net the action is profitable. If $\theta = 0$ then there is no cost to using foreign tax credits and the critical value of q is $[(1-\tau)/(1-\tau^*)]$: firms locate investments on the basis of local after-tax profits. Alternatively, if $\theta = 1$ then the critical value of q is unity: there is no tax advantage to haven profits. One expects that the typical value of θ lies

[12]Excess foreign tax credits can be carried forward only five years, and at zero interest.

somewhere between zero and one, but it obviously depends on many factors, including (possibly) the level of foreign investment induced by the firm's excess credit position.

The second advantage of tax havens is to facilitate the deferral of US tax liability. Suppose that a haven subsidiary with profits to reinvest cannot find any active investments to make in the haven, but has the option of investing its profits in the world capital market, earning a rate of return r^* (possibly different from r, the US domestic interest rate). To rule out the boundary case in which firms want to send all their profits abroad, 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-US-tax present value of those earnings if immediately repatriated is $M\,(1 - \tau)/(1 - \tau^*)$. If, instead, the subsidiary repatriates interest as earned but not the principal, the parent receives an after-all-tax annual payment of $M\,r^*(1 - \tau)$. The present value of this infinite stream, discounted at the domestic after-tax discount rate of $r\,(1 - \tau)$, is:

$$\sum_{j=1}^{\infty} M \frac{r^* (1 - \tau)}{[1 + r(1 - \tau)]^j} = M \frac{r^*}{r} \qquad (2)$$

If $r^* = r$, then this present value equals M. Thus the subsidiary should never repatriate the principle (M) it earns abroad, and the present value of those earnings is unaffected by the US tax rate.

It is perhaps more likely that $r > r^*$, reflecting the greater variety of uses that US parents have for funds than do their foreign subsidiaries.[13] At what value of r^* is the incentive to defer

[13]Domestic firms may, for example, be constrained in their use of credit markets, and so encounter times at which the marginal productivity of an internal investment exceeds the market rate of return. For a survey of recent suggestive evidence, see Fazzari et al (1988).

repatriation just offset by the greater (before-tax) return available in the US? Setting $(1 - \tau)/(1 - \tau^*)$ equal to r^*/r, the critical condition is equality of after-tax returns in the two countries:

$$r^* (1 - \tau^*) = r (1 - \tau) \tag{3}$$

If the left side of this equation exceeds the right, firms should defer repatriation of principal indefinitely. Otherwise, repatriation should be immediate. If the firm defers repatriation, then a higher r^* corresponds to a higher after-tax value of profits earned in a tax haven jurisdiction.

Foreign subsidiaries can dispose of their after-foreign-tax profits in three ways: repatriate profits immediately, invest them in passive assets, or (possibly) reinvest them abroad in active investments. The knife-edged decision rule just derived looks very similar to the standard Hartman (1985) condition for a foreign subsidiary's active investments. Hartman demonstrates that foreign subsidiaries choosing between paying dividends and actively investing in a low-tax country should invest up to the point that $f'(1 - \tau^*) = r(1 - \tau)$, in which f' is the marginal product of the subsidiary's investment. The result in (3) is analogous.

Both the Hartman result and condition (3) describe the choice facing a firm with an alternative of immediate repatriation. There is an additional dichotomous choice: whether to make an active or a passive reinvestment. Analyzing this choice is somewhat complicated by the possibility that a firm making an active reinvestment might want to defer repatriating its profits until the infinite future, or the possibility that the marginal profitability of reinvested profits might change in the future. Assuming that neither of these conditions hold, the firm's problem can be analyzed by comparing a passive investment today with the alternative of an active investment for one period followed by passive investment of the returns along with the principle. Comparing the two, the critical condition is:

$$\frac{M r^*}{r} = \frac{M [1 + f'(1 - \tau^*)] r^*}{[1 + r(1 - \tau)] r} \tag{4}$$

or:

$$r (1 - \tau) = f' (1 - \tau^*) \tag{5}$$

which is rather familiar from the Hartman finding: firms making active reinvestments raise their values by the right side of (5); this comes at the cost of delaying whatever may be the alternative uses of the stock of profits, a cost equal to the left side of (5).

Combining these results, it appears that there is the following hierarchy: if the right side of (5) exceeds the left, then the subsidiary should use its after-tax earnings to make active reinvestments. If not, then the subsidiary should consult (3) and make passive investments if the left side exceeds the right.[14] Otherwise, the firm repatriates its earnings as dividends.[15] In general, one expects the returns to active investments in haven locations to diminish quickly, leaving profitable multinationals with the choice between a passive investment and immediate repatriation. If the world capital market is efficient, then a passive investment is likely to represent the optimal choice. And in practice, tax haven subsidiaries of US corporations do seem to place a significant fraction of their earnings in passive investments, despite the punishing implications of Subpart F treatment.[16]

DEVICES FOR MOVING TAXABLE EARNINGS TO THE HAVENS

Almost all US firms stand to benefit from earning their profits in havens rather than in the US or a high-tax alternative. Firms with current or prospective excess foreign tax credits can use them as described in (1); those with deficit credits may be able to benefit from deferral, as

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[14]Readers of an earlier draft inform us that Scholes and Wolfson (forthcoming) also draw these conclusions, using a similar setup. See Horst (1977) for alternative decision rules derived from a model with additional financing constraints.

[15]These calculations ignore the prior choice by the parent firm on the amount of debt finance to use for its subsidiary. This choice is quite likely to be affected by tax rates and other tax-related considerations. See Hines (1989) for a more complete analysis.

[16]In 1982 US controlled foreign corporations in the nine major tax havens listed in Table 2 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 those havens was two-thirds as large as were dividends paid to US parents and their domestic subsidiaries ($2.2 billion).

described in (3) and (5). In both cases firms choose foreign investment projects to maximize the after-foreign-tax profits. The implication is that they will locate more activity in tax havens than business conditions would warrant in the absence of tax differences, since firms are willing to accept lower marginal products of capital in tax havens than in high-tax countries. Another implication is that, to the extent they are able, firms will use financial devices to attribute to havens their taxable profits actually earned in high-tax locations. We identify three avenues for these moves: the use of debt contracts, manipulations of transfer prices, and conversion of US export income into tax haven income.

Debt Contracts

Firms have the ability to use debt contracts to adjust the locations of their tax burdens. Since interest costs represent deductions from taxable income, and these deductions are usually more valuable in 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. Several factors complicate this procedure, however: many countries tax cross-border interest flows to related parties and limit the deductible level of interest payments by local subsidiaries, while start-up subsidiaries may find it difficult to borrow heavily from unrelated banks. Furthermore, the US government makes it costly for subsidiaries in low-tax foreign countries to adjust their debt levels, since interest received is subject to Subpart F treatment (while interest paid does not reduce Subpart F liabilities). In general, the tax-minimizing debt level in a subsidiary is a complicated function of its history and of local taxes and regulations.[17] Of course, once debt is in place, parent companies prefer that their loans to tax haven subsidiaries carry low interest rates, and that those to heavily taxed subsidiaries carry high interest rates. Multinationals have a certain amount of leeway in choosing the terms of their debt contracts, subject to the same rules that govern intrafirm transactions of goods and services.

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[17]Hines (1989) describes optimal financing choices over the lifetimes of foreign subsidiaries in low-tax locations.

Transfer Pricing and its Opportunities

The tax advantages of haven locations make it attractive to move taxable profits there, if necessary by expedients such as purchasing paper clips from a haven subsidiary at $10 million each. Such a transaction reduces taxable US income by the amount of the purchase. Since the US tax rate is higher than haven tax rates, the tax saving produced by the $10 million deduction in the US exceeds the tax cost of $10 million of haven profits. Of course, governments with high tax rates are aware that firms may try to perform such sham transactions, and do their best to prevent them.

US law contains numerous provisions concerning the location of income for tax purposes. Section 482 of the Internal Revenue Code provides 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. Hence the IRS would disallow the sale of a paper clip for $10 million, since unrelated parties would not buy one for that price. There are, however, many international transactions for which arm's length prices do not exist. Take the case of a parent firm that licenses a unique patent to a foreign affiliate for production and sale: how much is the patent worth? Since it is impossible to observe market prices for the license -- there is no market -- Congress stipulates that an equivalent price must be used: one based on the value or cost the good or service transferred. In the Tax Reform Act of 1986, this notion of an appropriate transfer price was refined to a price "commensurate with the income attributable to the intangible." But this concept is difficult to apply in practice.[18]

Section 482 and other rules governing international transfer pricing leave ample scope for US multinationals to benefit from transferring valuable assets, particularly intangible assets, to tax

[18]Not to mention difficult to define in theory. See Hines (1988) for a proposed solution. The IRS also requires firms to use "arm's length" interest rates, but similar difficulties attend the choice of appropriate interest rates for (possibly) risky intrafirm debt contracts.

haven subsidiaries and subsequently deferring US taxation of the profits earned abroad thereon.[19] The recent case of Bausch & Lomb. Inc.'s Irish subsidiary is a useful illustration.[20] In 1981, Bausch & Lomb established a subsidiary in Ireland to manufacture contact lenses using a technique developed in New York. The lenses manufactured in Ireland were sold to the American parent company and to affiliates in other countries. In return, the subsidiary paid the American parent a royalty equal to 5% of net Irish sales.

The IRS challenged the legality of the 5% royalty rate, claiming that it was unreasonably low and designed to permit the firm to shift profits to Ireland, where Bausch & Lomb operated under a 10-year tax holiday, at the expense of the United States, a high-tax country. There is no doubt that the Irish subsidiary was profitable: in 1982, its rate of return on investment was 106% *per annum*. The court found that a 20% royalty was appropriate, on the premise that it permitted Bausch & Lomb's Irish subsidiary an ample pre-tax annual rate of return of 27%. This is a very generous rate of return, particularly for a firm that enjoys a tax holiday. In fact, the 27% rate was calculated on the basis of pessimistic assumptions for the subsidiary,[21] and suggests the lenient kind of correction that a US firm might expect if called to account for transferring intangibles to a manufacturing subsidiary in a tax haven.

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[19]Until 1984 US firms were permitted one overt procedure to do so: firms could transfer intangible property developed in the US to tax haven affiliates without triggering US tax liability, as long as the goods produced by the intangibles were sold outside the US. The Deficit Reduction Act of 1984 rescinded this exemption.

[20]See Frisch and Horst (1989) for a detailed summary of the court case and its interpretation in the light of the U.S. Treasury Department's recently proposed regulations, and *Bausch & Lomb, Inc. and Consolidated Subsidiaries v. Commissioner of Internal Revenue*, 92 T.C. No. 33 (March 23, 1989). Other studies of transfer pricing, including Jenkins and Wright (1975), Kopits (1976), and Grubert and Mutti (forthcoming), draw similar conclusions about the ability of US firms to transfer profits away from high-tax locations.

[21]Frisch and Horst (1989) argue that in fact the judge's calculations were flawed and that the true annual rate of return under a 20% royalty would be much higher than 27%. This further complication illustrates some of the difficulty the government may have in enforcing Section 482 and other transfer-pricing rules in practice.

Factoring Income and Other Exports

Foreign sales of goods produced in the US often create opportunities to shift taxable income to tax havens. A common practice of US firms is to sell the receivable account to its finance subsidiary incorporated in a tax haven. The finance subsidiary is the "factor;" the difference between the sale price of the receivable account and the present value of the money ultimately collected is factoring income.

Until 1984, US courts held that international factoring income of controlled foreign corporations was not includable income under Subpart F provisions. As a result, interest earned by finance subsidiaries was untaxed by the US until repatriated (and in the meantime only minimally taxed by tax havens). Furthermore, it seems likely that many of these receivable accounts were sold to finance subsidiaries in havens at generous discounts. Congress changed the law in 1984 to include related-party factoring income under Subpart F; the profits of foreign finance subsidiaries are therefore currently taxable (and subject to special basket limitations in addition). As an indicator of the magnitude of tax deferral through factoring, the Joint Committee on Taxation (1984) estimated that including factor income under Subpart F would earn the Treasury $673 million a year by 1989.

Even after the passage of the Deficit Reduction Act of 1984, there are still numerous means by which American firms can transfer export income earned in the United States into tax haven income. One method is to establish a foreign trading corporation as a joint venture with a foreign partner to escape the 50% requirement for a controlled foreign corporation. Another is to establish a haven subsidiary that performs some real service in the production of the final product, however trivial its actual value added. In practice, it is difficult for the US government to enforce Subpart F and Section 482 with precision. An important question is the limit to which firms can push the government: as the Bausch & Lomb case illustrates, a corporation's international transactions must to some extent be defensible before the tax authorities.

III. Evidence on Tax Havens and Tax Rates

In this section, we test whether US firms locate income and physical operations in tax havens and other low-tax venues to a much 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.

If it is costly for firms to transfer income between affiliates, reported income in country i might look like:

$$\pi_i = \rho_i + \psi_i - \frac{a}{2}\frac{(\psi_i)^2}{\rho_i} \qquad (6)$$

in which ρ_i represents the return to local factors and ψ_i the profits earned elsewhere but attributed for tax purposes to local operations. Note that $\psi_i < 0$ for a country whose corporations transfer some of their profits to other locations. The specification (6) indicates that there are positive costs ($a > 0$) of transferring profits in either direction, which are assumed constant across all affiliates. Consider a firm's transfer decision, taking as fixed its simultaneous problem of allocating real resources (ρ_i):

$$\max V = \sum_{i=1}^{n} (1 - \tau_i)\,\pi_i = \sum_{i=1}^{n} (1 - \tau_i)\left[\rho_i + \psi_i - \frac{a}{2}\frac{(\psi_i)^2}{\rho_i}\right] \qquad (7)$$

$$\text{subject to } \sum_{i=1}^{n} \psi_i \leq 0 . \qquad (8)$$

yielding the first-order condition

$$(1 - \tau_i)\left[1 - a\frac{\psi_i}{\rho_i}\right] = \lambda \qquad \forall\ i = 1, \ldots, n \qquad (9)$$

in which λ is the Lagrange multiplier corresponding to constraint (8). Then (9) implies:

$$\psi_i = \rho_i \left[\frac{1 - \tau_i - \lambda}{a\,(1 - \tau_i)} \right]. \qquad (10)$$

Combining (10) and (6):

$$\pi_i = \rho_i \left[1 + \frac{1}{2a} - \frac{\lambda^2}{2a\,(1 - \tau_i)^2} \right]. \qquad (11)$$

Taking logs of both sides of (11) yields:[22]

$$\log \pi_i = \log (\rho_i) + \log \left[1 + \frac{1}{2a} - \frac{\lambda^2}{2a\,(1 - \tau_i)^2} \right]. \qquad (12)$$

One way to evaluate the second term on the right side of (12) employs a second-order Taylor series expansion in τ_i, around the tax rate t at which $\psi = 0$ (and the bracketed term in (12) is unity), yielding

$$\log \pi_i = \log (\rho_i) - \frac{\lambda^2 (\tau_i - t)}{a\,(1 - t)^3} - \frac{3\,\lambda^2 (\tau_i - t)^2}{2a\,(1 - t)^4}. \qquad (13)$$

Equation (9) implies that $\lambda^2 = (1 - t)^2$, so that (13) can be rewritten

$$\log \pi_i = \log (\rho_i) + \frac{1 + t^2/2}{a\,(1 - t)^2} - \tau_i \frac{(1 + 2t)}{a\,(1 - t)^2} + \tau_i^2 \frac{3}{2a\,(1 - t)^2}. \qquad (14)$$

In order to evaluate the first term on the right side of (14), it is necessary to specify a production function. Suppose firms produce output Q, measured in dollars, with a Cobb-Douglas function $Q = c\,A^{\epsilon}\,L^{\sigma}\,K^{\phi}\,e^{u}$, in which c is a constant term, A is the level of productivity in the local

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[22]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.

country (represented by per capita income), L is labor input, K is capital input, and u is a normally distributed stochastic term with mean zero. The local affiliate hires labor to maximize profits

$$Q - wL = (1 - \alpha)\, c\, A^{\epsilon} L^{\alpha} K^{\phi} e^{u}. \qquad (15)$$

Assuming for the moment that the affiliate is not financed by debt, then (15) represents taxable returns (ρ_1) in the absence of transfers ψ_1. Combining (14) and (15) yields

$$\log \pi_i = \beta_1 + \beta_2 \log L_i + \beta_3 \log K_i + \beta_4 \log A + \beta_5 \tau_i + \beta_6 \tau_i^2 + u, \qquad (16)$$

in which $\beta_1 = [(t + t^2/2) / a(1 - t)^2 + \log c + \log (1 - \alpha)]$, $\beta_2 = \alpha$, $\beta_3 = \phi$, $\beta_4 = \epsilon$, $\beta_5 = -(1 + 2t) / [a(1 - t)^2]$, and $\beta_6 = 3 / 2a(1 - t)^2$.

A second approximation to (12) yields a useful estimating equation that is similar to (16). Taking a first-order Taylor expansion in $(1 - \tau_1)^{-2}$ around t, and using (15) yields

$$\log \pi_i = \beta_1 + \beta_2 \log L_i + \beta_3 \log K_i + \beta_4 \log A + \beta_5 (1 - \tau_i)^{-2} + v, \qquad (17)$$

in which $\beta_1 = [\log c + \log (1 - \alpha)]$, $\beta_2 = \alpha$, $\beta_3 = \phi$, $\beta_4 = \epsilon$, and $\beta_5 = -\lambda^2 / 2a$.

We estimate (16) and (17) using country-level aggregate data on US nonbank majority-owned affiliates in 1982, treating all foreign affiliates in a country as if owned by a single taxable parent. The sample consists of the countries listed in Appendix Table B: the seven "Big-7" tax havens, twenty-six "Dots," seventeen industrialized countries, and fifty-eight developing countries.[23] In order to separate that part of income representing returns from financial resources, we subtract

[23] In some cases, certain individual data cells were suppressed by the Commerce Department for confidentiality reasons, which has the effect of shrinking some regression samples to as few as 59 countries. Appendix A discusses at length the construction of our sample.

from reported income interest received and add back interest paid. Interest receipts are themselves analyzed separately below.

Columns (1) - (4) of Table 4 report OLS estimates of four variants of (16) and (17). Each regression controls for capital and labor inputs, and finds the tax variable to exert a negative effect on reported nonfinancial profits. In addition, Column (3) reports a significant positive coefficient on $(Tax)^2$, as predicted in (16). Similarly, the significant negative coefficient on $(1 - Tax)^{-2}$ reported in Column (4) is consistent with our alternative specification (17). The results of Columns (1) - (4) are consistent with the assumed decreasing returns to scale technology, since factor coefficients sum to about 0.8. The scaling factor for local productivity, log (GDP per capita), is unimportant to the regression, and the results are virtually identical when log(GDP per capita) is replaced with log(GDP).

The curvature of the tax effect is noteworthy. Based on the coefficients reported in Column (3), raising a tax haven's tax rate from zero to 1% would lower reported nonfinancial earnings by 7%, holding the returns to real factors (capital and labor) constant. The impact of a 1% rise is smaller at higher tax rates, levelling off to zero (taking the quadratic approximation perhaps a bit too literally) at a tax rate of 45%. Our model predicts that at lower tax rates an increasing fraction of an affiliate's reported earnings represents profits earned elsewhere but locally attributed for tax purposes; so it is not surprising that lightly-taxed profits are the most sensitive to tax rates.[24]

There are many reasons to be wary of such literal interpretations of the tax coefficients. These results aggregate many industries,[25] firms, and activities together, all of them likely to be in different economic and tax situations. Our measure of "the" tax rate for a country represents

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[24]These regressions exploit the tax rate variation available in the whole sample, but do not necessarily demonstrate that tax differences among havens affect reported earnings. In order to confirm the existence of a tax effect among low-tax countries, all regressions reported in Tables 4 - 6 were run using only the low-tax third of the sample (to avoid simultaneity bias, we selected the subsample on the basis of population rather than their tax rates). The subsample results were strikingly similar, and in no case were statistically significantly different from the full-sample coefficients, although the tax coefficients and standard errors tended to be larger.

[25]Commerce Department data suppressions make it impossible to run an econometric analysis based on data disaggregated by industry. However, it would be interesting for future research to obtain data from the Department on manufacturing-affiliates-only, in order to re-run this experiment on what would probably be a more homogenous sample.

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. In some countries, certain new investments receive favorable tax treatment with accelerated depreciation allowances or tax holidays for which older investments are no longer eligible.[26] Our sample excludes countries with so little US investment 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 non-tax attributes of tax havens -- such as bank secrecy laws and law auditing and reporting requirements -- on local financial activity, in part because our data measure only the *reported* operations of US 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 capture simply US 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 4.

There is an additional complication in the OLS estimation that concerns the host countries' choice of tax rates. The OLS specifications in Table 4 assume the local tax rate on US firms to be uncorrelated with the error term. 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 US investment choose high tax rates in order to profit from this investment -- 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 to a certain degree endogenous to firms' commitment 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, we estimated equations (16) and (17) by an instrumental variables technique, using the log of host country

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[26]Bond (1981) and Bond and Samuelson (1986) analyze some of the effects of tax holidays. As we report in Appendix A, our results are not significantly different when we use statutory tax rates instead of average tax rates.

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.[27] Note that this argument concerns the supply of world capital, not just that from the US. If the population of a country does not itself affect the rate of return, then population can itself be used as an instrument for the local tax rate.[28]

Columns (5) - (8) of Table 8 contain the IV estimates. The IV specifications of Columns (5), (6) and (8) look quite similar to their OLS analogs. Note however that the IV procedure encounters a difficulty when the $(Tax)^2$ term is included, as in Column (7): when $[\log Population]^2$ instruments for $(Tax)^2$, it is not powerful enough to provide reliable estimates; as a result, the standard errors are very large and the coefficients imprecisely estimated. Hausman tests of equality between the estimated OLS parameters in Columns (1) - (4) and the corresponding IV estimates in Columns (5) - (8) fail to reject the OLS specification.

THE SENSITIVITY OF FINANCIAL EARNINGS

The same tax advantages that impel firms to shift nonfinancial earnings into haven affiliates are likely to affect their reported financial earnings in a similar way. Unfortunately, available financial data are not as comprehensive as data concerning other operations; based on the information we were able to assemble, US multinationals do appear to shift financial earnings into affiliates in havens and other low-tax countries.

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[27]See Huizinga (1987) who hypothesizes that small countries face a highly elastic supply of foreign capital and so maximize corporate tax revenue by levying at low corporate tax rates. He confirms empirically that corporate tax rates are indeed positively associated with (population) size.

[28]In a number of auxiliary regressions (not reported), we examined the power of the population instrument in explaining tax rates and its exogeneity to the investment function. In simple regressions, log population significantly outperformed log GDP, log GDP per capita, and other aggregates in explaining tax rates. The coefficients on log population when included as right-side regressors in all of the OLS regressions reported in Tables 4-6 were insignificant, including respecifications of the OLS regressions in Tables 4-6 with log GDP broken into log population and log GDP per capita.

Under ordinary circumstances, investors in world capital markets should expect to receive similar if not identical before-tax rates of return on their financial investments. Since multinationals have a certain amount of discretion in choosing the terms of intrafirm debt contracts, but can do so only at the cost of possible legal and regulatory action, expected financial returns in country i (R_i) will be

$$R_i = E_i \left[r + \delta_i - \frac{\eta \delta_i^2}{2r} \right], \tag{18}$$

in which E_i represents net financial capital invested in country i, r is the world market interest rate, δ_i is the amount by which the world rate is raised or lowered by the firm for tax reporting purposes in country i, and η influences the transaction cost of this adjustment. The firm chooses δ_is to maximize after-tax returns:[29]

$$\max V = \sum_{i=1}^{n} E_i \left[r + \delta_i - \frac{\eta \delta_i^2}{2r} \right] (1 - \tau_i) \tag{19}$$

$$\text{s.t.} \quad \sum_{i=1}^{n} E_i \delta_i \leq 0 . \tag{20}$$

The maximization yields the first-order condition

$$E_i \left[1 - \frac{\eta \delta_i}{r} \right] (1 - \tau_i) = \omega E_i \text{ for all } i \tag{21}$$

in which ω is the multiplier associated with (20). Combining (18) and (21):

$$R_i = E_i r \left[1 + \frac{1}{2\eta} - \frac{\omega^2}{2\eta(1 - \tau_i)^2} \right] \tag{22}$$

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[29] If the firm does not have excess foreign tax credits then there is no particular advantage attached to interest receipts in tax havens, since they are treated immediately as Subpart F income and taxed at the US rate. The maximand (19) is therefore only an approximation of the behavior of parents with and without excess credits.

which is analogous to (11) in the case of non-financial earnings; the difference between (22) and (11) being that E_i is more readily observable than is ρ_i.

To measure the effect of tax rates on reported financial earnings, we estimate

$$I_i = \beta_1 E_i + \beta_2 \frac{E_i}{(1 - \tau_i)^2} \qquad (23)$$

in which I_i is reported interest receipts minus interest payments, $\beta_1 = r(1 + 2\eta) / 2\eta$, and $\beta_2 = -r\omega^2 / 2\eta$. The variable E_i is reported equity in affiliates of US parent firm located in country i, minus the property plant and equipment of those affiliates; E_i therefore represents net investment not tied up in physical assets.

Columns (1) and (3) of Table 5 report OLS and IV estimates of (23). As predicted, both regressions find β_1 to be positive and significant and β_2 negative and significant: firms earn positive interest on their financial earnings, and the (reported) interest rate is higher in countries with lower tax rates. Since $\eta > 0$ implies that $\beta_1 > r$, the OLS estimate of $\beta_1 = 0.10$ seems rather low given the high interest rates in the early 1980s, and the IV estimate of $\beta_1 = 0.14$ is more reassuring. A Hausman test rejects the OLS specification in Column (1) in favor of the IV estimates in Column (3).

The specification of (23) relies on the assumption that dollar-denominated market interest rates are the same in every country. If instead we allow the interest rate in country i to incorporate a risk premium, it might be more reasonable to specify the interest rate as a decreasing (linear) function of per capita GDP:

$$r_i = \nu_1 + \nu_2 \, GDP_i \, . \qquad (24)$$

Then (22) becomes

$$R_i = E_i [\, \nu_1 + \nu_2 \, GDP_i \,] \quad [\, 1 + \frac{1}{2\eta} - \frac{\omega^2}{2\eta(1 - \tau_i)^2} \,] \, , \qquad (25)$$

and (25) can be estimated by

$$I_i = \beta_1 E_i + \beta_2 E_i GDP_i + \beta_3 \frac{E_i}{(1 - \tau_i)^2} + \beta_4 \frac{E_i GDP_i}{(1 - \tau_i)^2}, \qquad (26)$$

in which $\beta_1 = \nu_1(1 + 2\eta) / 2\eta$, $\beta_2 = \nu_2(1 + 2\eta) / 2\eta$, $\beta_3 = -\nu_1 \omega^2 / 2\eta$ and $\beta_4 = -\nu_2 \omega^2 / 2\eta$. The specification (26) can also be used to test the restriction that $\beta_1\beta_4 = \beta_2\beta_3$.

Columns (2) and (4) in Table 5 present estimates of the unconstrained version of (26). Again, a Hausman test rejects the OLS specification in favor of the IV equation. All the parameters are significant and of expected sign, so that interest receipts are higher in low-tax countries ($\beta_3 < 0$), and there is a negative effect of GDP on reported interest ($\beta_4 > 0$). Indeed, one should expect these two effects to be complementary: the presence of country-specific factors in interest rates eases the firm's job of choosing advantageous interest rates on intrafirm debt contracts since heterogeneity adds noise to the regulator's problem.

TAX RATES AND AGGREGATE EARNINGS

From the viewpoint of tax haven governments, our results confirm the ability of US firms to report income in low-tax jurisdictions even when corresponding physical activity does not take place there. But that is only the first part of the story that interests governments. The regressions reported in Tables 4 estimate the profitability of local affiliates holding constant local inputs such as labor and plant and equipment. In practice firms choose their physical inputs simultaneously with choosing the level of profits they declare. We suspect that these choices are very simultaneous indeed: firms that minimize taxes by shifting profits to havens might do well also to establish significant physical operations in the same havens. Hence there should be a significant relationship between tax rates and levels of employed factors, a relationship we now explore.

A foreign government can lure US business to its shores with a variety of attractions, especially but not exclusively low tax rates. One of the best nontax inducements is a vibrant economy in which firms can make profits. Thus we assume that a foreign government chooses its corporate income tax rate in part to stimulate greater foreign activity, conditional on the state of its economy. One expects American firms to earn more aggregate profit in Germany than in the Netherlands, despite the similarity of their tax rates and their per capita GDPs, because the German market is so much larger. The calculations presented in Appendix B derive from our model the following specification of the aggregate earnings equation, using a second-order Taylor approximation:

$$\log \pi_i = \beta_1 + \beta_2 \tau_i + \beta_3 \tau_i^2 + \beta_4 \log GDP_i + e. \qquad (27)$$

The model predicts that $\beta_1 > 0$, $\beta_2 < 0$, $\beta_3 > 0$, and $\beta_4 > 0$.

Table 6 presents the results of estimating (27); the OLS estimates in column 2 are consistent with the predicted signs of our coefficients. The estimated β_1 and β_2 again suggest that there is significant curvature in the effect of tax rates on reported earnings: they imply that raising the tax rate from zero to 1% lowers earnings by 20%, and that the marginal effect of taxes dies down to zero as the tax rate reaches 43%. An estimate of the linear version of (27) appears in Column (1); its negative coefficient on the tax rate variable is consistent with the result in Column (2).

Columns (3) and (4) of Table 6 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.

The model presented in Equation (7) implies that the factor demand equations take particular forms; Appendix B derives second-order approximations to those equations. The approximations imply that log K_i and log L_i should be negative functions of tax rates and positive functions of tax squared; further, log GDP_i should enter with a positive coefficient. Table 7 presents estimates of these equations.

As predicted, Columns (2) and (6) of Table 7 report significant negative coefficients on tax variables in the labor and capital regressions, along with coefficients on tax squared that are positive but not significant. 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_i is always significant and its coefficient is estimated to be very close to unity. Hence it appears that tax policy affects the location of productive factors,[30] but not with the same kind of powerful nonlinearity observed for reported earnings.

COMPANIES WITH TAX HAVEN OPERATIONS

For two reasons it is valuable to supplement our regression results with a closer examination of the behavior of haven affiliates: one, because data limitations have prevented us from including banking affiliates in our regression sample, and two, in order to explore whether firms in fact use the income-shifting channels available to them. Fully 40% of US companies with foreign affiliates had at least one affiliate in a tax haven venue (Table 8). And although tax haven use is substantial in every industrial grouping, there is significant variation among industries. For instance, almost all US banking and international shipping corporations locate at least one affiliate

[30]Columns (9)-(12) report estimates of the labor demand equation with total employment as the dependent variable; the equations fit very poorly, particularly when compared to the equations (reported in Columns (1)-(4)) that use employee compensation as the dependent variable. This is consistent with -- though of course not a confirmation of -- our prior that compensation better reflects labor input.

in a tax haven country, as do a majority of petroleum companies, while only about a third of firms in other industries had one or more tax haven affiliates. An alternative perspective is similarly impressive: out of 18,339 US foreign affiliates located throughout the world, almost one in six is located in a tax haven. Again, there is substantial variation across industries. Nearly all international shipping affiliates and almost 40% of banking affiliates are in tax havens, while firms in other industries cluster quite close to the "all industries" percentage.[31]

It comes as no surprise that assets and equity in tax havens are relatively heavily weighted toward the financial sector (Table 9). While the financial sector constitutes 40 - 50% of US FDI assets, it accounts for 84% of the assets of tax haven affiliates. Though gross assets may exaggerate financial sector investments, especially in banking, the equity position of tax haven affiliates[32] is similarly skewed toward finance (63%, versus 14% in other industrial countries and 5% in other developing countries). In contrast, the sectoral distribution of employment in tax haven affiliates is quite similar to that in other US foreign affiliates. The non-financial sectors are overwhelmingly important as employers, although the small share of financial sector employment is still much larger than its counterparts in non-haven countries.

While banking and finance account for a majority of the corporate assets and equity in tax havens, the primary users of havens are non-financial parent corporations. As Table 10 shows, many financial affiliates belong to non-financial parent companies.[33] In fact, only a minority (28.7%) of the affiliates of non-financial parents is in the same industry as its parent. While few non-banks own banking affiliates, many possess affiliates for shipping and wholesaling their products and for handling the finances of the parent and its related network of affiliates. And of

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[31]In terms of the havens' share of worldwide US foreign direct investment, investment is again skewed across industries: Table 13 indicates that while more than 90% of US foreign direct investment in shipping is located in tax havens, along with more than one third of banking and non-bank financial investment, only 6.2% of US foreign industrial investment is in havens.

[32]The Commerce Department does not collect data on bank equity.

[33]One might prefer to use assets, rather than the number of affiliates, to measure the pattern of tax haven affiliates owned by non-financial parent companies. This measure produces similar results, presented in Appendix Table B, except that it is more heavily weighted toward financial affiliates.

course, the potential for tax reduction offers one of the best reasons to locate such operations in a tax haven.

IV. The Interests of Tax Havens

Tax havens are likely to be particularly sensitive to the revenue implications of their capital taxation policy. If the tax rate on foreign multinationals can be set independently of other tax rates, revenue maximization would imply unitary elasticity of the tax base with respect to the tax rate. If the elasticity exceeds one, then lowering the tax rate would increase revenue. Small countries, particularly the Dots, may have elastic corporate tax bases at most positive values,[34] since taxable income in a haven depends on both the volume of profitable physical activity and the level of profits earned elsewhere but claimed locally.

The regressions described in Table 6 of Section 2 suggest that revenue maximizing tax rates are very low, roughly on the order of actual rates in havens. Denote taxable income in country i by $Y(\tau_i)$; tax revenue equals $\tau_i Y_i$, which is maximized with respect to τ_i when

$$Y_i + \tau_i \, dY_i/d\tau_i = 0. \tag{28}$$

In the quadratic specification (Column 2), $dY_i/d\tau_i$ equals $\beta_1 Y_i + \beta_2 \tau_i Y_i$. From (28), this implies

$$\beta_1 \tau_i + 2\beta_2 \tau_i^2 + 1 = 0. \tag{29}$$

and solving for τ_i:

$$\tau_i = \frac{-\beta_1 - (\beta_1^2 - 8\beta_2)^{1/2}}{4\beta_2} \tag{30}$$

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[34] Kotlikoff and Summers (1987) infer from this observation that the burdens of their capital taxes are likely to fall on local immobile factors and on world capital.

which, evaluated at the parameter estimates in Column (2) of Table 6, yields a revenue-maximizing tax rate of 5.72%.[35] Country-specific conditions no doubt affect local tax base elasticities, but the fact that many havens have tax rates close to this benchmark 6% suggests that their behavior is consistent with tax revenue maximization without local rate adjustments.

Considerations other than corporate income tax revenue are likely to influence a government's choice of tax rate. Even in zero-tax locations, governments often collect "fees" from local corporations. Moreover, taxation of the labor income of local and expatriate workers, and of their consumption and imports, offers a potentially much larger source of revenue. In addition, local workers earn rents if employed by foreigners at wages that exceed reservation levels. Furthermore, foreign firms and workers may purchase local goods and services, thereby stimulating local economies, and may have beneficial spillovers through the diffusion of new technologies or production techniques. On the other side of the ledger, foreign business activity may also be associated with negative externalities, such as pollution, dissipative rent-seeking by local workers, and (from the point of view of local officials) undue political power concentrated among foreign firms.

Despite the attractiveness of US business for foreign governments and the magnitude of US firms' foreign operations, US multinationals play only a small part in the economy of a typical host country. Table 11 presents median values of the fraction of countries' populations employed by US firms, along with other indicators of their significance. US firms in 1982 employed 0.4% of the population in the median industrialized country, and 0.04% in the median developing country.[36]

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[35]The second-order condition guarantees that this, the larger of the two roots of (29), represents the revenue-maximizing tax rate. Formally, the second-order condition is that the derivative of the left side of (28) with respect to τ_L is negative; this derivative is $2\,(dY_L/d\tau_L) + \tau_L\,(d^2Y_L/d^2\tau_L)$. In the quadratic specification $(d^2Y_L/d^2\tau_L) = (\beta_1 + 2\beta_2)\,(dY_L/d\tau_L) + 2\,\beta_2\,Y_L$. Since the first-order condition guarantees that $dY_L/d\tau_L = 0$, and Y_L and τ_L are assumed to be positive, the second-order condition imposes that $\beta_2 < 0$. From inspection of (30) it is clear that the smaller root of (29) is negative, a possibility we rule out by assumption.

[36]These are country medians, so that, for example, the value 0.862% represents the employment/ population ratio for the country with the fourth highest ratio among the Big-7 group. Of course, these median calculations obscure large variations in employment effects across countries.

This contrasts with a much higher 0.9% for the median Big-7 country, but only 0.05% for the median Dot (the latter being of comparable magnitude to that for other developing countries).

US firms do pay their employees relatively well, however, and in that way may exert more (though still limited) influence over local economies. Median US employee compensation represented about 1% of GDP in industrialized countries and again only 0.4% in developing countries, while in havens compensation amounted to 2.5% of GDP in the Big-7 countries and 1% in the Dots. Median US value added was 2.5% of GDP in developed countries, 1.5% of GDP in developing countries, but 4% in the Dots and almost 5% among the Big-7. Tax haven governments take only a small part of this value-added: median taxes paid by US firms was 1.2% of GDP in developed countries and 0.7% in developing countries -- the equivalent in both groups to about half of US affiliates' value added. Haven governments collected similar shares of their GDP from taxation of local US affiliates -- 1.1% among the Big-7 and 0.6% in the Dots -- but these revenues constituted a burden of only 22% and 14% of the affiliates' value added, respectively.

In order to judge how tax havens have fared in their arrangements with US firms, one must speculate about how they would have done if they had not elected to be havens. For the major Dots, the correct yardstick is probably the performance of non-haven developing countries. By this standard, they have done well in terms of employment and value added, and comparably in terms of tax revenue. However, it seems that the Big-7 tax havens may enjoy the largest rewards: US firms employ more of their labor force and produce more of their economies' value added than they do in each of the other country groupings; and this comes at little apparent net cost in overall tax revenue.

V. Implications for the United States

AGGREGATE TAX REVENUES

A capital-exporting country like the US prefers that its own firms locate domestically, since their profits are then subject to home taxation and their operations may generate other positive externalities. If firms do earn their profits abroad, then the US government benefits most from profits earned in tax havens, since fewer foreign tax credits are available on haven profits than on profits earned in high-tax foreign countries.

Aggregate revenue figures confirm the importance of tax haven profits as sources of US tax revenue. Table 12 presents tabulations of total taxable foreign income in 1982 from all sources (including repatriated dividends, branch profits, interest income, Subpart F income, and others). Applying a 46% US corporate income tax rate to this income, the US government received total net-of-tax-credit revenues of $7.94 billion, of which $2.99 billion, or 38%, was located in the sixteen most important tax havens.

This simple exercise of course ignores the common practice of applying excess foreign tax credits against haven earnings. Reporting limitations make it impossible to know by exactly how much that device reduces US tax revenue from repatriated tax haven earnings; three reasons suggest that its impact is small, however. The first is that there is nothing special about tax haven profits from the standpoint of firms with excess foreign tax credits making repatriation decisions; what matters is the residual tax liability of the repatriated profits. Hence even if excess tax credits carried forward from previous years significantly reduced US tax liabilities in 1982, tax havens should still be expected to account for 38% of the remaining revenue. The second reason is the opportunity cost of using excess foreign tax credits: credits used this year cannot be carried forward into next year. Tax havens that absorb excess credits this year indirectly contribute to tax revenues next year. The third reason is that, in practice, tax haven income does not appear to be washed out by excess foreign tax credits. Goodspeed and Frisch (1989) report that in 1984

50% of US foreign-source income was associated with parent corporations with excess foreign tax credits; in their country breakdown only 32% of foreign-source income from identifiable tax havens (Ireland, Switzerland, Singapore, Hong Kong, Caribbean, and Central America) was received by US parents with excess foreign tax credits.

REVENUE EFFECT OF FOREIGN TAX CHANGES

The longstanding negotiating position of the US government is that it supports bilateral agreements that reduce source-basis taxation of profits earned by multinationals. As a traditional capital exporter, the US has been understandably eager to substitute residence for source-basis taxation.[37] The preceding argument suggests, however, that the US government may not always benefit from reductions in foreign tax rates. Lower foreign tax rates may attract business abroad that otherwise would be located in America. Furthermore, changes in one foreign country's tax rate may affect firms' taxable incomes in other countries, thereby changing the revenue ultimately collected by the US government when the income is repatriated.

In order to analyze the issues involved, consider the case of a US firm with deficit foreign tax credits that organizes its foreign operations as wholly-owned subsidiaries. Suppose that this firm's motivation to locate operations and profits in tax havens is their favorable tax rates, and that it would get little return from reinvesting any of its haven earnings in plant and equipment. Plant and equipment located there serves partly as "cover" for transfer pricing, factoring, and other activities designed to move profits to haven locations. If the haven subsidiaries have access to world capital markets that offer the same pre-tax returns as those available in the US, then from (3) and (5), it is clear that subsidiaries will passively reinvest all of their profits, and the present value to the parent firm of these reinvested profits just equals M, the after-foreign-tax earnings of subsidiaries.

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[37]It remains to be seen whether this attitude persists in the changing international regime in which the United States is now the world's largest capital importer.

What tax revenue would the US government earn from these profits? Since the optimal strategy of firms is to repatriate their (after-foreign-tax) passive income as earned, and firms are eligible for tax credits for foreign tax obligations associated with this passive income, the US government receives a fraction ($\tau_{US} - \tau^*$) of the (before-foreign-tax) passive foreign income. The annual flow of US tax revenue is ($\tau_{US} - \tau^*$) r M , so if the government discounts at r, the present value of US tax revenue is ($\tau_{US} - \tau^*$) M. Since M represents after-tax foreign profits from active operations, the present value of US tax revenue equals:

$$PV_{us} = (\tau_{US} - \tau^*)\ \pi\ (1 - \tau^*) \qquad (31)$$

All other things equal, the US government receives far more tax revenue from the before-tax profits that US firms earn in low-tax countries than from the profits they earn in high-tax countries. There are two avenues for this effect: the present value of repatriated foreign earnings equals $\pi(1-\tau^*)$, a negative function of the foreign tax rate; while the foreign tax credit earned by those repatriations is a positive function of the foreign tax rate.

The second of these effects separates the interests of US firms from those of the US government. Firms following the passive-repatriation strategy maximize their after-foreign-tax profits, $\pi\ (1 - \tau^*)$. From their point of view, the foreign tax rate *per se* is immaterial; what matters is after-tax profitability. From the US government point of view τ^* is very important, since it greatly influences the present discounted value of its tax revenues.

Total US taxes paid by American multinationals depend in part on the taxation of US earnings. Domestic income of π_{US} earns the US Treasury $\tau_{US}\pi_{US}$ in tax revenue immediately. If US corporations then invest their after-tax profits of $(1 - \tau_{US})\ \pi_{US}$ at the interest rate r and pay tax on the interest as earned, then the present value of tax receipts from reinvested earnings is τ_{US} $(1 - \tau_{US})\ \pi_{US}$. Hence the present value of total tax revenues generated by domestic profits of π_{US} equals $\tau_{US}\ (2 - \tau_{US})\ \pi_{US}$.

Consider American multinationals with subsidiaries in n foreign countries, earning active foreign profits of π_i in each country i and earning π_{US} in the US. The present value of US tax revenues produced by these profits, inclusive of taxes on future interest earnings, equals:

$$PV_{us} = \sum_{i=1}^{n} (\tau_{US} - \tau_i)\, \pi_i\, (1 - \tau_i) + \tau_{US}\, (2 - \tau_{US})\, \pi_{US} \qquad (32)$$

The impact of a small change in the tax rate of country j is:

$$\frac{d\,(PV_{us})}{d\tau_j} = \sum_{i=1}^{n} (\tau_{US} - \tau_i)\, \frac{d\pi_i}{d\tau_j}\, (1 - \tau_i) - \pi_j\, (1 + \tau_{US} - 2\,\tau_j) + \tau_{US}\, (2 - \tau_{US})\, \frac{d\pi_{US}}{d\tau_j}. \qquad (33)$$

In order to evaluate (33) it is necessary to measure the effect of a change in j's tax rate on profits in each country i. Under the best of circumstances this would be a daunting task; the cross-sectional nature of the available data makes a complete evaluation impossible, especially insofar as in predicting the effect of a small change in τ_j on the taxable domestic profits of US firms. Let δ_j represent $d\pi_{US} / d\tau_j$. Suppose that a small change in τ_i affects the location of worldwide profits but not the aggregate volume of profits. Then $\delta_i + \sum_{n=1}^{n} d\pi_i/d\tau_j = 0$. If $d\pi_i/d\tau_j$ were known, and as a first approximation the tax change shifts income into other locations in proportion to their local profits, then $d\pi_i/d\tau_j = \alpha\, \pi_i$, with $\alpha = [-\, d\pi_i/d\tau_j - \delta_j] \,/\, [\sum_{i \neq j} \pi_i\,]$.

Consider the impact of a tax change in a small tax haven with an initial tax rate of zero and a very small fraction of US overseas business. The value of the summation $\sum_{i=1}^{n} (\tau_{US} - \tau_i)$ $(1 - \tau_i)\, \pi_i$ in (33) is \$3.6 billion, while total foreign earnings were \$30.9 billion; the estimate in column 2 of Table 6 implies that $d\pi_j/d\tau_j$ equals $-0.20\, \pi_j$. The change in US tax revenue is, therefore,

$$\frac{d(PV_{us})}{d\tau_j} = (0.12)\, [\frac{d\pi_j}{d\tau_j} - \delta_j] + \tau_{US}\, \frac{d\pi_j}{d\tau_j} - \pi_j\, (1 + \tau_{US}) + \delta_j\, (2 - \tau_{US})\, \tau_{US} \qquad (34)$$

Applying the 1982 tax rate $\tau_{US} = 0.46$ and the estimated $d\pi_j / dr_j = (-0.2)\,\pi_j$, then (34) becomes $d(PV_{US}) / dr_j = (0.59)\,\delta_j - (1.58)\,\pi_j$.

For any reasonable parameter values, this expression is negative, indicating that US tax receipts would be reduced by higher tax rates in the havens. Note in particular that even if $\delta_j = -d\pi_j / dr_j$, so that all of the profits that shifted out of the haven were shifted into the US, $dPV_{us} / dr_j = -1.4\,\pi_j$. Hence a 1% increase in the haven tax rate reduces US tax revenues by 1.4% of haven income; since US revenues were 46% of haven income, this represents a 3% reduction in revenues. This result arises because income is not sufficiently mobile to fully offset the greater foreign tax credits generated by the new, higher tax rate in country j. And in the realistic case in which some haven income flows into high-tax foreign countries, the outcome is even worse for the US Treasury.

These results illustrate the cost to the US of high foreign tax rates, though of course 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 US tax change that, for example, raised bilateral withholding tax rates with *all* of our treaty partners. Furthermore, in response to large changes, firms are likely to find alternative tax-avoiding practices within the United States.[38]

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[38]Including expanded use of Puerto Rico, other US possessions, and "on-shore" locations and activities that receive favorable tax treatment. Many of the same issues discussed in this paper also apply to the Puerto Rico case, though a number of the specifics differ. See US Treasury (1989) for an analysis of US business operations in Puerto Rico and other possessions covered by Section 936 of the Internal Revenue Code.

VI. Conclusion

The evidence presented here offers a consistent view of the pattern of tax haven use by US multinational corporations. As measured by reported income, American companies locate a sizeable fraction of their foreign activity in tax havens. It appears, however, that this fraction includes reported profits that would not normally be earned by the quantities of factors employed by US firms in the havens. This relationship between low tax rates and abnormally high profit rates consists of the reported financial earnings of tax haven affiliates as well as their nonfinancial earnings.

The ability to shift reported earnings 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 earnings 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 6% represents a revenue-maximizing choice.

It is undoubtedly true that some American business operations are drawn away from the mainland US by the lure of low tax rates in tax havens; nevertheless, on net the policies of tax havens appear to enhance the US Treasury's ability to collect tax revenue from American corporations. In the available data from 1982, 38% of the tax revenue due the US government from foreign operations of US corporations is attributable to tax haven affiliates. Furthermore, our regressions imply that higher tax rates on the part of havens would cost the US government tax revenue by generating additional foreign tax credits.

The future of American relations with the tax havens may, however, 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 may be the recent attention directed at perceived abusive tax practices by US affiliates

of foreign parents. Current relations between the United States and the tax havens offer a delicate balance of advantages and disadvantages, one that may well evolve with future economic conditions and legislative reforms.

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APPENDIX A: DATA AND VARIABLES

Almost any country can serve as a tax haven to certain classes of investments under certain circumstances. An often cited example of this truism is the classification of the US as a tax haven for foreign flight capital since the US eliminated its withholding tax on dividends and interest paid to foreigners. For this reason, any tax haven listing must necessarily be somewhat arbitrary.

In general, tax havens are locations with low tax rates, and as such they are attractive to business. However, since rational firms maximize after-tax profits -- which is not the same thing as minimizing taxes (the latter for example satisfied by making losses) -- low tax rates alone do not successful havens make. The business literature usually describes tax havens in terms of four attributes that, taken together, make a location particularly desirable: (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 at the margin. We take as a point of departure the *Internal Revenue Manual*'s list of 32 countries that it identifies as tax havens for purposes of US businesses.[39] We then use data from States (1986-7) to delete from our tax haven list countries in which foreign corporate taxes paid by US companies is greater than 20% of pre-tax income (actually, the average tax rate is on the order of 50% in each country eliminated).[40] These countries were presumably identified as havens not because of low tax rates, but for other characteristics, such as bank or commercial secrecy, an absence of exchange controls, or low *personal* income tax rates. We eliminate three countries on this basis: Austria, Costa Rica and the Netherlands.

Beauchamp's (1983) listing of tax havens (without specific reference to the US) includes all of the IRS-designated countries, plus 15 others. We also include these countries, but restrict them

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[39]Glautier and Bassinger (1987) suggests that this list "should be treated as the guideline to tax havens identified as such by the United States," although the IRS notes that the list should not be considered exhaustive.

[40]For countries whose average tax rate could not be obtained, we instead used corporate statutory tax rates of less than 10 percent, as revealed in either Price-Waterhouse (1983) or Doggart (1983).

to countries in which the average tax rate was less than 10% for US companies. This list consists of Anguilla, Andorra, Jordan, Lebanon, Macao, Monaco, St. Martin. In addition, this 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 US businesses (see Appendix Table A).

Note that there are seven countries not classified as havens -- Argentina, Bangladesh, Ecuador, French Islands (Pacific), South Korea, Taiwan and Uruguay -- whose corporate tax rates are comparable to those of the relatively high-tax havens. Recall that tax rates do not constitute the only criterion of tax haven status. In particular, none of these seven countries is generally recognized as a tax haven, nor do they so promote themselves. Further, nearly all of their US-source direct investment is in manufacturing, with essentially no finance, wholesale trade or international shipping sectors. Finally, most of them have lacked other essential preconditions for being a tax haven, such as freedom from capital controls and other regulations, an unfettered domestic financial market, or an advanced system of international communications.

Our analysis relies on the latest available data concerning foreign direct investment, gathered in the US Department of Commerce' 1982 comprehensive "Benchmark Survey." The Benchmark Survey is conducted on an irregular basis every several years, using a balance of payments framework as its foundation. Firm participation in the survey is obligatory and includes all firms with affiliates whose assets exceed $3 million. The US Department of Commerce (1985) publishes only a small part of the data which are essential for our analysis in its *US Direct Investment Abroad*. However, the Department's Bureau of Economic Analysis provided us with aggregate figures calculated from proprietary benchmark survey data. (Variable means and standard deviations are included as Appendix Table B.)

For confidentiality reasons, substantial elements of the Benchmark Survey data are unavailable to the public. These suppressed data were included in the preparation of all of the paper's non-econometric analysis, since this was presented in aggregated form. However, the restriction on the use of suppressed data does limit our econometric analysis in some respects.

It does not constrain the samples of either "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.[41] Moreover, even among the observations for which most data were available, suppressions of certain individual data cells had the effect of shrinking the regression samples in some cases to as few as 58 countries.

The econometric analysis also required data on population and gross domestic product, neither of which are contained in the benchmark survey data. For the most part, these could be obtained from the IMF's *International Financial Statistics* and *Government Finance Statistics*. However, these sources do not include several of the smallest countries; additional data were obtained from either UNESCO's *Statistical Yearbook* or *The Statesman's Year-book*.

The tax rates calculated for regressions are presented in Appendix Table C. 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.[42]

We used two complementary sources to obtain these data, the benchmark survey itself and Price-Waterhouse' (1983) *Corporate Taxes: A Worldwide Summary*. The benchmark survey data provide a first approximation: corporate income taxes paid by all US affiliates in a country, divided by their total pre-tax 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

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[41]We also exclude from the sample three categories of countries on the grounds that the nature of foreign investment in these groups is likely to be guided by unique or idiosyncratic considerations. These are oil exporters, Sub-Saharan Africa (except Southern Africa), and Socialist countries.

[42]Moreover, since some of each corporation's tax payments typically are returned in the form of government-provided services and subsidies, a complete measure of the tax burden would have to account for the burden of taxes net of subventions. Unfortunately, they are impossible to measure in practice.

calculation actually 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 obtain the tax rate from the Economist's *Tax Havens and their Uses* (Doggart, 1983).

As a check of robustness we also ran each regression using only statutory tax rates (from Price Waterhouse (1983) and Doggart (1983)) as an alternative tax measure. In no case did the alternative tax coefficients differ significantly from the coefficients on our preferred tax variable. This result is consistent with the findings of Grubert and Mutti (forthcoming) using a different specification run on a small extract of the same data set.

Like the tax variable, the other measured variables represent aggregates for all US affiliates located within each sample country.[43] "Plant, property, and equipment" serves as our measure of physical capital employed by affiliates. The shortcoming of this variable, particularly for a study of tax havens, is the fact that the Commerce Department does not collect this information for the banking industry. Unfortunately, neither does any banking regulatory agency, and no alternative exits. While this problem is potentially important, it should also be noted that less than one quarter of tax haven income derives from banking, and that the capital-output ratio is in any case relatively low in the banking industry. Thus the Commerce Department variable "plant, property, and equipment" is probably reasonably accurate, even in tax havens that are known for financial activities.

"Plant, property, and equipment" is measured in dollar units. Similarly, the heterogeneity of labor inputs argues for measuring them by their dollar value. For this reason, we proxy for the independent variable "Labor" using "Total Employee Compensation," in order to better measure efficiency equivalent units of labor inputs. One restriction implied by the use of Compensation is

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[43]They do not include any income earned or factors employed outside the (foreign) country of the affiliate.

that employment and wages have the same impact on profitability. Accordingly, we also disaggregated "Employment" and "Wage" (the latter defined as Total Compensation / Employment) in each of our tests. Unlike the coefficients on "Compensation," these coefficients do not lend themselves to a straightforward interpretation as the labor share. Rather they enabled us to verify that the sign, size, and significance are similar for the alternative measure.

APPENDIX B: MATHEMATICAL DERIVATION

This Appendix presents derivations of the reduced form earnings equations and factor demand equations, the estimates of which are presented in Tables 6 and 7.

Return to the maximization problem (7) and (8), excluding as before the return to financial assets; for a firm allocating a fixed stock of capital and adjusting its transfer prices as in (10), its problem is:

$$\max V = \sum_{i=1}^{n} (1 - \tau_i)\ \rho_i(K_i)\ \left[\ 1 + \frac{1}{2a} - \frac{\lambda^2}{2a(1 - \tau_i)^2}\ \right] \qquad \text{(B1)}$$

$$\text{subject to } \sum_{i=1}^{n} K_i \leq \bar{K}. \qquad \text{(B2)}$$

yielding the first-order condition

$$(1 - \tau_i)\ \rho_i'\ \left[\ 1 + \frac{1}{2a} - \frac{\lambda^2}{2a\ (1 - \tau_i)^2}\ \right] = \mu. \qquad \text{(B3)}$$

in which ρ_i' is the marginal product of capital in country i, and μ is the Lagrange multiplier corresponding to constraint (B2). From the production function (13), the marginal product of capital is

$$\rho_i' = \alpha\, c^{1/(1-\phi)}\, \phi^{\phi/(1-\phi)}\, A_i^{1/(1-\phi)}\, K_i^{(\alpha+\phi-1)/(1-\phi)}. \qquad \text{(B4)}$$

Combining (B3) and (B4), and imposing the condition that $\rho_i = \rho_i' K_i / \alpha$ yields

$$\rho_i = \{c\phi^{\phi}\mu^{-\alpha}A_i\}^{(1/(1-\alpha-\phi))}\{(1 - \tau_i)\ \left[1 - \frac{1}{2a} - \frac{\lambda^2}{2a(1-\tau_i)^2}\ \right]\}^{(\alpha/(1-\alpha-\phi))} \qquad \text{(B5)}$$

Combining (B5) with (10) produces the following expression for non-financial taxable income as a function of local GDP and local tax rates:

$$\pi_1 = [c\phi^{\phi}\mu^{-\alpha}A_1]^{(1/(1-\alpha-\phi))}(1-\tau_1)^{(\alpha/(1-\alpha-\phi))}\left[1+\frac{1}{2a}-\frac{\lambda^2}{2a(1-\tau_1)^2}\right]^{((1-\phi)/(1-\alpha-\phi))} \quad \text{(B6)}$$

Taking logs:

$$\log \pi_1 = \frac{1}{1-\alpha-\phi}[\log(c\phi^{\phi}\mu^{-\alpha}) + \log A_1] + \frac{\alpha}{(1-\alpha-\phi)}\log(1-\tau_1) + \frac{1-\phi}{1-\alpha-\phi}\log\left[1+\frac{1}{2a}-\frac{\lambda^2}{2a(1-\tau_1)^2}\right] \quad \text{(B7)}$$

Taking a second-order Taylor expansion around the point t at which $(1 - t) = \lambda$,

$$\log \pi_1 = \frac{1}{1-\alpha-\phi}[\log(c\phi^{\phi}\mu^{-\alpha}) + a\log(1-t) + \frac{\alpha(2-t)}{2(1-t)} + \frac{(1-\phi)(t+t^2/2)}{a(1-t)^2}] + \frac{1}{1-\alpha-\phi}\log A_1 - \frac{\alpha+(1-\phi)(1+2t)/a}{(1-\alpha-\phi)(1-t)^2}\tau_1 + \frac{\alpha/2+3(1-\phi)/2a}{(1-\alpha-\phi)(1-t)^2}\tau_1^2 \quad \text{(B8)}$$

Hence nonfinancial earnings should be a negative function of local tax rates, a positive tax squared, and a positive function of local GDP.

There remains the problem of taxable local financial earnings. It is not always possible, or even desirable, for firms to separate real and financial decisions in the way we have modeled them to do. The location of financial equity is likely to be a complicated matter, generally an inverse function of the tax rate. As illustrated in Hines (1989), financial equity can be expected to accumulate in locations where profits are earned by non-financial factors, particularly if those are low-tax countries. Once financial equity is located, returns are governed by (24), also an inverse function of τ_1. As a result, we expect financial earnings to behave in the same way as non-financial earnings do in our approximation (B8), and so specify total revenues as a negative function of τ_1 and a positive function of τ_1^2.

FACTOR DEMANDS

It is also straightforward to derive the demands for productive factors as functions of tax rates and local GDP. Starting with capital, combine (B3), (B4) and the relation $\rho_i = \rho_L' K_L / \alpha$ to obtain:

$$K_i = (1/\alpha)\ [c\phi^{\phi}\mu^{\phi-1}]^{1/(1-\alpha-\phi)}\ A_i^{1/(1-\alpha-\phi)}\ \{(1-\tau_L)\ [1 + \frac{1}{2a} - \frac{\lambda^2}{2a(1-\tau_L)^2}]\}^{(1-\phi)/(1-\alpha-\phi)} \quad \text{(B9)}$$

Taking logs:

$$\log (K_L) = \{ \frac{1}{1-\alpha-\phi} \log (c\phi^{\phi}\mu^{\phi-1}) - \log \alpha \} + \frac{1}{1-\alpha-\phi} \log A_L + \frac{1-\phi}{1-\alpha-\phi} \log (1-\tau_L)$$
$$+ \frac{1-\phi}{1-\alpha-\phi} \log [1 + \frac{1}{2a} - \frac{\lambda^2}{2a(1-\tau_i)^2}] \quad \text{(B10)}$$

Taking a second-order approximation to (B10):

$$\log K_L = \frac{1}{(1-\alpha-\phi)} [\log (c\phi^{\phi}\mu^{\phi-1}) - (1-\alpha-\phi) \log \alpha + \phi \log(1-t) + \frac{\phi(2-t)}{2(1-t)} + \frac{(1-\phi)(1+t^2/2)}{a(1-t)^2}]$$
$$+ \frac{1}{1-\alpha-\phi} \log A_i - \frac{(1-\phi)\ (1 + 1/a + 2t/a)}{(1-\alpha-\phi)\ (1-t)^2} \tau_i + \frac{(1-\phi)(1 + 3/a)}{2(1-\alpha-\phi)(1-t)^2} \tau_i^2 \quad \text{(B11)}$$

The approximation (B11) implies, therefore, that local property, plant and equipment (K_i) should be a negative function of local tax rates, a positive function of tax squared, and a positive function of local GDP.

The demand for labor can be derived in a similar fashion. Recall that the constant shares property of Cobb-Douglas production functions implies that $L_i = (1 - \alpha)\ \rho_i$; applying (B5) and taking logs yields:

$$\log L_1 = \log(1-\alpha) + \frac{1}{1-\alpha-\phi}\left[\log(c\phi^{\phi}\mu^{-\alpha}) + \frac{1}{1-\alpha-\phi}\log A_1\right.$$

$$\left. + \frac{\alpha}{1-\alpha-\phi}\log(1-\tau_1) + \frac{\alpha}{1-\alpha-\phi}\log\left[1 + \frac{1}{2a} - \frac{\lambda^2}{2a(1-\tau_1)^2}\right]\right] \qquad \text{(B12)}$$

Applying the usual second-order approximation yields:

$$\log L_1 = \log(1-\alpha) + \frac{1}{1-\alpha-\phi}\left[\log(c\phi^{\phi}\mu^{-\alpha}) + \alpha\log(1-t) + \frac{\alpha(2-t)}{2(1-t)} + \frac{\alpha(t+t^2/2)}{a(1-t)^2}\right]$$

$$+ \frac{1}{1-\alpha-\phi}\log A_1 - \frac{\alpha(1+1/a+2t/a)}{(1-\alpha-\phi)(1-\tau)^2}\tau_1 + \frac{\alpha(1+3/a)}{2(1-\alpha-\phi)(1-t)^2}\tau_1^2. \qquad \text{(B13)}$$

in which local labor compensation (L_1) is a negative function of local tax rates, a positive function of tax squared, and a positive function of local GDP.

TABLE 1
TAX HAVENS' 1982 SHARE[a] OF:

			U.S. Corporations' Foreign Affiliate:				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	World Population	World GDP	Assets	Equity[b]	Net Income[c]	Employment	Plant, Property & Equipment[d]
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 Excludes Socialist economies, Sub-Saharan Africa (except Southern Africa), and oil exporters (as well as the U.S.).
b "Equity" data are collected only for non-bank firms.
c Whether or not income was repatriated to parent corporation.
d Plant, property & equipment data collected only for non-banks. If one excludes bank employment, to improve the comparability of the last 2 columns, all changes are very small and none change any of the table's implications.
e Hong Kong, Ireland, Liberia, Lebanon, Panama, Singapore, and Switzerland.
f Excluding oil exporters and tax havens.

Source: U.S. Department of Commerce (1985).

TABLE 2
U.S. AFFILIATE OPERATIONS
IN THE PRIMARY TAX HAVENS

	(1) Number of U.S. Affiliates	(2) Net Income[a] ($millions)	(3) Assets ($millions)	(4) Property, Plant & Equipment[b] ($millions)	(5) Employment (000s)
Switzerland	524	1,829	31,003	1,280	46.2
Bermuda	352	1,965	26,953	167	3.0
Hong Kong	321	841	29,833	1,957	54.1
Netherlands Antilles	315	1,370	49,140	479	3.5
Singapore	238	688	27,727	1,423	48.7
Ireland	215	758	6,025	1,197	38.9
Panama	193	678	18,124	550	25.4
Bahamas	178	1,245	91,004	402	8.5
Cayman & other U.K. Islands	156	1,252	49,524	24	0.7

"Primary tax haven" refers to the tax havens with the largest number of US foreign affiliates and the greatest amount of 1982 net income of US foreign affiliates. These data excludes shipping affiliates, which for these purposes are not attributed to individual countries.
[a]Whether or not income was repatriated to parent corporation.
[b]Plant, property & equipment data are collected only for non-bank firms.
Source: U.S. Department of Commerce (1985).

TABLE 3
TAX HAVENS IN 1977 AND 1982
(as a percentage of U.S. worldwide foreign direct investment)

	ASSETS		EMPLOYMENT	
	1977	1982	1977	1982
All Havens	11.3%	26.0%	4.0%	4.3%
Excluding Big-7	3.8%	16.9%	0.6%	0.5%

Source: U.S. Department of Commerce (1981 and 1985).

TABLE 4
EFFECT OF TAX RATES ON LOCATION OF NON-FINANCIAL PROFITS

Dependent Variable:
log (net pre-tax "non-financial" income)

	Ordinary Least Squares Estimation				Instrumental Variable Estimation*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.36 (0.35)	0.17 (0.92)	1.30 (1.02)	-0.72 (0.88)	1.62 (0.41)	0.82 (1.61)	-0.41 (4.00)	0.60 (0.32)
Tax	-2.83 (0.59)	-2.25 (0.71)	-7.41 (2.41)		-3.65 (0.88)	-2.97 (1.63)	-24.92 (24.28)	
$(Tax)^2$			8.32 (3.72)				49.73 (54.32)	
$(1 - Tax)^2$				-0.19 (0.09)				-0.41 (0.32)
log (Plant, Property & Equipment)	0.41 (0.19)	0.48 (0.20)	0.41 (0.19)	0.56 (0.21)	0.35 (0.20)	0.42 (0.24)	0.78 (0.68)	0.43 (0.28)
log (Compensation)	0.43 (0.19)	0.30 (0.21)	0.40 (0.20)	0.17 (0.21)	0.49 (0.20)	0.39 (0.28)	-0.12 (0.86)	0.35 (0.34)
log (GDP per capita)		0.16 (0.11)	0.06 (0.12)	0.26 (0.11)		0.09 (0.17)	0.34 (0.49)	0.15 (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								

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

TABLE 5
EFFECT OF TAX RATES ON LOCATION OF FINANCIAL PROFITS

Dependent Variable:
net pre-tax interest income

	Ordinary Least Squares Estimation		Instrumental Variable Estimation*	
	(1)	(2)	(3)	(4)
Net Equity	0.10 (0.01)	0.30 (0.06)	0.14 (0.02)	0.47 (0.08)
$\frac{\text{Net Equity}}{(1 - \text{Tax})^2}$	-0.020 (0.008)	-0.17 (0.05)	-0.048 (0.010)	-0.31 (0.06)
GDP per capita • Net Equity		-1.71 E-5 (0.56 E-5)		-3.10 E-5 (0.70 E-5)
GDP per capita $\frac{\text{Net Equity}}{(1 - \text{Tax})^2}$		1.31 E-5 (0.41 E-5)		2.42 E-5 (0.52 E-5)
Adjusted R^2	.51	.56		
S.E.E.	197.25	214.40	189.81	199.59
# of Observations		82	80	880

* Instruments for [(Net Equity) / $(1 - \text{Tax})^2$] and [(GDP per capita) • (Net Equity / $(1 - \text{Tax})^2$] are [Net Equity • Log Population], [Net Equity • $(\text{Log Population})^2$], [GDP per capita • Net Equity • Log Population], and [GDP per capita • Net Equity • $(\text{Log Population})^2$].

Note: Standard errors appear in parentheses.

TABLE 6
EFFECT OF TAX RATES ON LOCATION OF TOTAL PROFITS

Dependent Variable:
log (net pre-tax total income)

	Ordinary Least Squares Estimation		Instrumental Variables Estimation*	
	(1)	(2)	(3)	(4)
Constant	4.52 (0.40)	5.61 (0.46)	5.94 (0.68)	4.88 (2.13)
Tax	-6.29 (1.27)	-20.17 (3.89)	-12.99 (2.76)	16.53 (43.81)
Tax^2		23.51 (6.30)		-65.86 (96.85)
log (GDP)	0.88 (0.10)	0.96 (0.09)	1.18 (0.16)	1.38 (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 $(\text{Log Population})^2$.
Note: Standard errors appear in parentheses.

TABLE 7
EFFECT OF TAX RATES ON LOCATION OF FACTORS OF PRODUCTION

	Dependent Variable: log(Employee Compensation)				Dependent Variable: log(Property Plant & 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
# of Observations	72	72	72	72	73	73	73	73	72	72	72	72

* Instruments for Tax and Tax^2 are Log Population and $(\text{Log Population})^2$.

Note: Standard errors appear in parentheses.

TABLE 8
INDUSTRIES THAT USE TAX HAVENS

Parent Industry	Percent of Parents with Number of Parent Firms	Number of Tax Haven Affiliates	Percent of Affiliates Worldwide	Affiliates in Tax Havens
ALL INDUSTRIES	2,245	40.6%	18,339	15.8%
Banking	133	97.0%	1,061	38.5%
Shipping	12	83.3%	69	87.0%
Petroleum	143	55.2%	2,475	18.2%
Non-Financial Services [a]	160	37.5%	722	13.4%
Manufacturing	1,215	35.8%	11,240	12.3%
Wholesale Trade	168	35.1%	908	19.4%
Non-Bank Financial	234	24.4%	1,152	16.8%

[a] Excluding hotels

Source: U.S. Department of Commerce (1985) and BEA tabulations from the 1982 Benchmark Survey.

TABLE 9
SECTORAL AND GEOGRAPHIC DISTRIBUTION OF U.S. FOREIGN DIRECT INVESTMENT, 1982

BY ASSETS
($billions)

	Tax Haven Countries	Other Industrial Countries	Other Developing Countries
Banking	$218.3 (60.8%)	$291.4 (37.1%)	$ 72.5 (35.4%)
Non-Bank Financial	$84.2 (23.5%)	$90.1 (11.5%)	$ 8.6 (4.2%)
Non-Financial	$56.6 (15.8%)	$403.8 (51.4%)	$123.9 (60.4%)

BY EQUITY
($billions)

	Tax Haven Countries	Other Industrial Countries	Other Developing Countries
Non-bank Financial	$30.7 (62.5%)	$21.8 (13.7%)	$ 2.2 (4.7%)
Non-Financial	$18.4 (37.5%)	$137.7 (86.3%)	$45.0 (95.3%)

BY EMPLOYMENT
(000s)

	Tax Haven Countries	Other Industrial Countries	Other Developing Countries
Banking	20.3 (7.2%)	75.0 (1.7%)	59.7 (3.3%)
Non-bank Financial	9.0 (3.2%)	103.1 (2.4%)	16.0 (0.9%)
Non-Financial	254.7 (89.7%)	4,110.7 (95.8%)	1,715.0 (95.8%)

Note: The Commerce Department's Benchmark Survey does not collect the variable "Equity" for banks.
Source: U.S. Department of Commerce (1985), and BEA tabulations from the 1982 Benchmark Survey.

TABLE 10
TAX HAVEN USE BY NON-FINANCIAL PARENTS
(by number of firms)

Parent's Industry	Number of Parent Firms with Tax Haven Affiliates	Total Number of Their Tax Haven Affiliates	Percent of Tax Haven Affiliates in Parent's Own Industry	Shipping	Wholesale Trade	Non-Bank Financial
ALL INDUSTRIES	725	2,294	28.7%	8.2%[b]	19.1%[b]	34.4%[b]
Wholesale Trade	62	140	46.4%	14.3%	[b]	26.4%
Manufacturing	435	1,378	25.5%	4.3%	28.8%	34.5%
Petroleum[a]	79	451	30.8%	20.8%	4.7%	33.7%
Non-Financial Services	60	97	54.6%	0.0%	7.2%	28.9%

[a] Excluding Petroleum tankers, pipelines, storage and gas stations.
[b] "Parent's Own Industry" supercedes all or part of this cell.
Source: BEA tabulations from the U.S. Commerce Department's 1982 Benchmark Survey.

TABLE 11
SIGNIFICANCE OF US MULTINATIONALS TO HOST FOREIGN GOVERNMENTS, 1982

Country Group	Employment / Population	Employee Compensation / GDP	Value Added / GDP	Income Taxes / GDP	Total Taxes / GDP
Industrialized	0.370%	1.01%	2.45%	0.18%	1.16%
Developing	0.039%	0.35%	1.46%	0.11%	0.74%
Havens:					
Big 7	0.862%	2.53%	4.94%	0.34%	1.08%
Dots	0.046%	0.93%	4.00%	0.10%	0.57%

Note: Entries represent group medians.
Source: BEA tabulations from the U.S. Commerce Department's 1982 Benchmark Survey.

TABLE 12
CORPORATE TAXABLE INCOME AND FOREIGN TAX CREDITS
(1982)

	Taxable Income ($billions)	Foreign Tax Credits ($billions)
All Countries	56.6	18.1
16 Tax Havens	7.8	0.6

Source: Internal Revenue Service, Statistics of Income

APPENDIX TABLE A
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		

APPENDIX TABLE B
MEANS AND STANDARD DEVIATION OF REGRESSION VARIABLES

(in $millions, except as noted)

	Mean	Standard Deviation
Non-financial 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 & Equipment	1783	(5210)
Equity Investment	2677	(6373)
Net Equity	893.6	(2676.4)
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)

APPENDIX TABLE C
TAX RATES

BIG 7		DOTS		INDUSTRIALIZED COUNTRIES		DEVELOPING COUNTRIES			
HONG KONG	.12	ANDORRA	.00	AUSTRIA	.41	ARGENTINA	.21	MEXICO	.42
IRELAND	.04	ANTIGUA & BARBUDA	.03	AUSTRALIA	.51	BANGLADESH	.25	MOROCCO	.53
LEBANON	.22	BAHAMAS	.00	BELGIUM	.45	BOLIVIA	.30	NAMIBIA	.46
LIBERIA	.21	BAHRAIN	.13	CANADA	.52	BOTSWANA	.35	NICARAGUA	.44
PANAMA	.10	BARBADOS	.29	DENMARK	.40	BRAZIL	.35	PAKISTAN	.53
SINGAPORE	.21	BELIZE	.00	FINLAND	.49	CHILE	.49	PAPUA NEW GUINEA	.48
SWITZERLAND	.17	BERMUDA	.00	FRANCE	.50	COLOMBIA	.40	PARAGUAY	.30
		CAYMAN + OTHER UK ISLES	.01	GERMANY	.48	COSTA RICA	.50	PERU	.35
				GREECE	.43	DOMINICAN REPUBLIC	.41	PHILIPPINES	.33
		CYPRUS	.14	ITALY	.39	ECUADOR	.22	PORTUGAL	.40
		GIBRALTAR	.00	JAPAN	.52	EL SALVADOR	.30	SEYCHELLES	N/A
		GRENEDA	.03	NETHERLANDS	.40	FIJI	.38	SOLOMON ISLANDS	.35
		KIRIBATI	N/A	NEW ZEALAND	.45	FRENCH ISLANDS, CARIBBEAN	N/A	SOUTH KOREA	.24
		LIECHTENSTEIN	.02	SPAIN	.33	FRENCH ISLANDS, INDIAN	.09	SRI LANKA	.40
		LUXEMBOURG	.18	SWEDEN	.60	FRENCH ISLANDS, PACIFIC	.25	TAIWAN	.19
		MACAO	.16	SOUTH AFRICA	.46	GUATEMALA	.58	THAILAND	.44
		MALTA	.15	UK	.52	GUYANA	.50	TONGA	.43
		NAURU	.00			HAITI	.45	TUNISIA	N/A
		NETHERLANDS ANTILLES	.03			HONDURAS	.46	TURKEY	.40
		OTHER CARIBBEAN	.00			INDIA	.52	URUGUAY	.25
		ST. KITTS & NEVIS	.00			ISRAEL	.32	VENEZUELA	.39
		ST. VINCENT	.03			JAMAICA	.50	WESTERN SAHARA	N/A
		VANUATU	.00			JORDAN	N/A	WESTERN SAMOA	.42
						LESOTHO	N/A	ZAMBIA	.45
						MALAWI	.50	ZIMBABWE	.52
						MALAYSIA	.37		