8 Income Shifting in U.S. Multinational Corporations

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By their very nature, multinational corporations trade goods, services, financial capital, and intangible assets across national borders within their enterprise. By using artificial transfer prices in these transactions and concentrating debt financing in highly taxed subsidiaries, a multinational can shift taxable income within its group of companies to reduce its overall tax burden and to achieve other objectives, such as bypassing capital controls. From a country-policy perspective, such behavior can affect tax revenues and the level and location of investment and employment. From a firm-policy perspective, questions arise as to the mechanics, costs, benefits, and thus optimality of such behavior.

Surprisingly little evidence on income shifting based on firm-level data is available. In this paper, we present such evidence. We find that U.S. manufacturing firms with subsidiaries in low-tax countries have relatively low U.S. tax payments per dollar of assets or sales. Furthermore, having a subsidiary in a high-tax region is associated with higher U.S. tax payments. These results suggest that U.S. manufacturing companies do engage in this sort of income shifting.

After reviewing the limited existing empirical literature in section 8.1, we

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present our empirical framework and data in section 8.2. In section 8.3, we report cross-firm regression results that are consistent with the notion that multinational firms shift income from high-tax locations to the United States and from the United States to low tax locations, thus reducing their overall tax liabilities. In sections 8.4 and 8.5, we discuss statistical and economic issues that might affect our results. In section 8.6, the economic significance of our results is addressed. Section 8.7 concludes the paper.

8.1 Review of the Literature

There is a substantial literature on the extent to which the internal pricing policies of multinationals are influenced by tax factors. Alworth's (1989) review of this literature suggests the importance of tax considerations but also points to the impact of market structure, the nature of product markets, and limitations on profit repatriation.

Considerable anecdotal evidence suggests that tax-motivated income shifting by U.S. multinationals occurs. Wheeler (1988) describes U.S. tax court cases where income was apparently shifted for tax reasons. In one example, G. D. Searle in 1975 had an average return on employed assets of −42.3 percent in the United States and 119 percent in Puerto Rico—a zero effective tax rate jurisdiction. Of course, anecdotal evidence does not establish the economywide prevalence of income shifting.

There have been two recent empirical attempts to uncover systematic evidence of income shifting by examining observable variables that should be affected by it. Grubert and Mutti (1991), using cross-country aggregate data on U.S. multinationals' affiliates, regress two measures of affiliate profitability in 1982 against the host country's statutory corporate income tax rate (or tax holiday rate if one was generally available). They run similar regressions on a measure of the average tax rate: the ratio of foreign taxes paid to book income of U.S.-controlled corporations with positive profits. The growth of the host country's gross domestic product is included as a proxy for economywide pretax profitability.

They find a significant and large negative relationship between either measure of foreign taxes and either measure of foreign affiliate profitability. In other words, firms declare more income in low-tax jurisdictions. This is consistent with income shifting. The magnitude of the estimated effect is noteworthy. In their favored regression, a drop in the statutory tax rate from 40 percent to 20 percent implies an increase in the ratio of after-tax profits to sales from 5.6 percent to 12.6 percent and an increase in the after-tax rate of return on equity from 14.2 percent to 20.7 percent. Clearly, these results imply that a lower tax rate is associated with a higher pretax rate of return and do not simply reflect a smaller slice taken by taxation out of an unchanging level of profitability.

Hines and Rice (1990) also analyze country-level aggregate data from 1982

on U.S. nonbank majority-owned foreign affiliates. They investigate the effect of host-country tax rates[1] on the location of U.S. multinationals' pretax nonfinancial profits, pretax financial profits (i.e., net interest income), total profits, and factors of production. Using regression analysis, they find a negative relation between all of these variables and host-country average tax rates.

The results in both Grubert and Mutti (1991) and Hines and Rice (1990) are consistent with the hypothesis that the reported income of U.S. multinationals' foreign affiliates tends to appear in countries with low corporate income tax rates. Moreover, Hines and Rice argue that the apparent success of tax haven countries in attracting taxable income is not obviously a bad thing for U.S. welfare. Because the U.S. taxes its resident multinationals on a residual basis, moving the location of their income from a high-tax foreign country to a low-tax foreign country may increase the total taxes paid that are received by the U.S. Treasury. However, to the extent that taxable income migrates from the United States to a foreign country, the U.S. Treasury is a clear loser. In any case, neither Grubert and Mutti nor Hines and Rice directly address the extent of income shifting between the United States and other countries. Both focus on income shifting between foreign affiliates. A more complete picture of income shifting by U.S. multinationals requires an assessment of income shifting to and/or from the U.S. parent. That is the issue we address in this paper.

7.2 Methodology

Our objective is to uncover systematic evidence of income shifting, using firm-level data. Because shifted income is by nature difficult to observe directly, we attempt to predict its impact on observable variables, a methodology not different from that in Grubert and Mutti (1991) or Hines and Rice (1990).

We start with a firm's current U.S. tax, denoted as $T_U = \tau_U R_U$, where τ_U is the U.S. statutory corporate tax rate and R_U is reported U.S. taxable income. For simplicity of exposition, we assume a linear tax function. R_U can be decomposed into

$$R_U = Y_U - Y_{UL} + Y_{HU},$$

where Y_U is actual U.S. income, Y_{UL} is income shifted from the United States to subsidiaries in low-tax jurisdictions, and Y_{HU} is income shifted from subsidiaries in high-tax regions to the United States. Total U.S. tax liability, $T_U = \tau_U(Y_U - Y_{UL} + Y_{HU})$, unlike its component parts, is reported by most firms and is therefore readily observable. The relationship between

1. They define the average tax rate as the lesser of the benchmark survey tax rate and the statutory rate. For some tax-haven countries where these data are unavailable, they obtain the tax rate from the *Economist*'s *Tax Havens and Their Uses*.

$\tau_U(Y_U - Y_{UL} + Y_{HU})$ and a firm's presence in locations with tax rates different from the U.S. tax rate reveals information about Y_{UL} and Y_{HU}. Hence, we attempt to use regression analyses to uncover the relation between a U.S. firm's U.S. tax payment and the firms' presence in foreign locations with different tax rates.

As a starting point, we assume that the choice of where to operate is exogenous and unrelated to the income shifting decisions with which we are primarily concerned. This is meant as a simplifying assumption, not as a statement about how we think the world works. The empirical implications of it not holding are discussed in sections 8.5 and 8.6.[2] This assumption allows us to treat the location of foreign operations as independent variables in the following regression:

$$\left(\frac{T_U}{S_U}\right)_{ft} = g^H d^H_{ft} + g^L d^L_{ft} + bz_{ft} + \varepsilon_{ft},$$

where T_U is U.S. tax liability, S_U is a scaling factor; f and t are firm and time subscripts, respectively; d^H_{ft} and d^L_{ft} are vectors of dummy variables indicating firm f's presence in various high-tax and low-tax regions, respectively, in period t; z_{ft} is a vector of control variables; g^H, g^L, and b are vectors of regression coefficients; and ε_{ft} is an error term.

The hypothesis we test is that the elements of g^H are positive, while those of g^L are negative. This hypothesis presumes that operating in a high-tax country induces income shifting *to* the United States and that operating in a low-tax country induces income shifting *from* the United States.

Our sample consists of two hundred U.S. manufacturing firms selected randomly from the SIC 3000 industries of the primary, supplementary, and tertiary industry file listing of Compustat. Compustat data from 1984 through 1988 are supplemented with data from company annual reports.[3]

The dependent variable is the firm's current taxes payable to the federal government net of investment tax credits. It is retrieved from Compustat (item 63) and then verified by cross-checking with annual reports and tax notes.[4]

2. Our empirical investigation focuses on the relationship between income shifting and the locations of a firm's foreign affiliates. Investment decisions are based mainly on very long run considerations such as expected future input costs, the availability of infrastructure, nontax government policies, and expected product market growth. There are long lags in formulating and implementing investment plans, and there are also large adjustment costs to altering ongoing investment strategies. Thus, decisions about the location of foreign direct investment are arguably only tangentially related to income shifting opportunities. Our future research is aimed at exploring this issue.

3. Data obtained from annual reports are dated according to the Compustat dating convention, as described in the *Industrial Compustat User's Manual* published by Standard and Poor's Compustat Services, Englewood, CO 80112.

4. Raw Compustat data and cross-checked data generate similar results. Note that current U.S. federal taxes as reported in a company's annual report are an estimate of the actual tax liability made at the time the report is published (usually January). Dworin (1985) finds that this estimate is generally greater than the actual tax payment. The principal causes of this discrepancy are the inclusion of a "cushion" in the financial tax provision for possible audit adjustments and differences in the extent of consolidation in financial reports versus IRS tax reports. To the extent that the audit cushion is larger for firms that are more aggressive tax minimizers, it should reduce our chances of finding evidence of income shifting. Consolidation for financial reporting is more extensive than for IRS tax reporting. Important affiliates included in the former but not in the latter are foreign affiliates with U.S. income, domestic international sales corporations (DISCs), Puerto Rican corporations, and some financial affiliates such as insurance, investment, and real estate companies. Given our objective, the more extensive consolidation for financial reports is appropriate. Note that provisions for future repatriated income in financial statements are considered deferrals and thus are not included in estimated current tax expenses.

We drop observations where the firm's current U.S. federal tax liability is zero, because firms in this situation may face different income shifting incentives from those described above.[5] After excluding these cases and observations with missing data, we obtain a sample of 486 firm-years that are quite evenly distributed over the five sample years.

A firm's U.S. income is likely to be roughly proportional to the size of its U.S. operations. We want to explain income shifting, $Y_{HU} - Y_{UL}$, using total U.S. federal taxes, $T_U = \tau_U(Y_U - Y_{UL} + Y_{HU})$. Dividing the latter variable by the size of U.S. operations allows us to interpret variations in the resulting ratio (after controlling for other obvious predictors of U.S. taxable income) as due to income shifting. This procedure also reduces the potential for heteroscedasticity problems. The scaling variables used, total U.S. sales and the total book value of U.S. assets, are obtained directly from financial statements. A company must report a rough geographic breakdown of its sales and assets if foreign sales or assets exceed 10 percent of U.S. sales or assets. If a geographical breakdown is not reported in a given year and the firm has no foreign subsidiaries at that time, its total sales and assets are treated as U.S. sales and assets. If foreign subsidiaries exist but no geographical breakdown of sales and assets is presented, we exclude the observation on the grounds of missing data.

In some specifications, we include seven independent variables to control for differences in firm characteristics that may have direct or indirect effects on a firm's pretax profitability and tax position. The variables are research and development spending, advertising spending, depreciation and amortization, rental expenses, investment tax credits, interest expenses, and number of employees. The last variable is meant to capture wage expenses, which are unavailable in Compustat for over 90 percent of our observations. All the control variables are obtained from Compustat[6] and are worldwide consolidated fig-

5. In this panel, 68 percent of the firm-years have positive U.S. federal taxes, 13 percent have negative U.S. federal taxes, and 19 percent have zero U.S. federal tax. Our results are similar for the full sample, for the subsample without observations with zero U.S. federal tax, and for the subsample including only observations with positive U.S. federal taxes. For the subsample that includes only observations with negative U.S. federal taxes, the results are similar to those we report but are less significant.

6. These variables are assumed to be zero if the Compustat reports 0.0001 (unavailable observation) or 0.0008 (insignificant observation) and all other financial data are available. The number of employees is considered missing if Compustat reports 0.0001 or 0.0008.

ures.[7] These control variables are scaled by either the firm's worldwide sales or its worldwide assets to match the scaling factor used in the dependent variable.

All of these independent variables have a tax shield effect and should therefore be related to lower U.S. tax liabilities. However, some of them may also capture other effects that increase tax liability. Research and development spending or advertising spending may proxy for the presence of intangible assets that increase the return to foreign direct investment (Morck and Yeung 1991, 1992).

Finally, in certain specifications, we introduce industry dummies based on three-digit standard industrial classification (SIC) codes to control for interindustry differences in profitability and tax burdens.

The independent variables that we focus on are the elements of d_{fi}^{H} and d_{fi}^{L}. They are categorical variables indicating a firm's presence in high-tax and low-tax jurisdictions. To operationalize this notion, we divide the non-U.S. world into thirteen regions (for descriptions, see table 8.1 footnotes), which we place in one of five groups according to how readily they can be classified as high- or low-tax jurisdictions:

1. *Regions with a statutory tax rate higher than that of the United States:* Canada, Japan, Australia and New Zealand, and high-tax countries in Western Europe
2. *Regions with a statutory tax rate lower than that of the United States:* low-tax countries in Western Europe, the "Four Dragon" Asian countries, and other noncommunist Asian countries
3. *Extremely low-tax regions:* Ireland and tax havens
4. *Regions affected by capital controls or other political concerns:* South Africa and Latin America
5. *Others:* Africa and OPEC countries

Subsidiaries in communist countries are ignored both because they are very rare and because they are subject to idiosyncratic policies on earnings repatriation.

We determine the multinational structure of each firm in each year, using various issues of the *International Directory of Corporate Affiliations*. The vectors d_{fi}^{H} and d_{fi}^{L} consist of ones and zeros indicating the presence or absence of any subsidiaries in the high-tax and low-tax regions, respectively.[8] For example, if a firm has two subsidiaries in Hong Kong, one in Japan, and three in England; the vectors contain ones in the three columns for Four Dragons, Japan, and high-tax Western Europe and zeros elsewhere.

We use indicator dummies rather than the tax rates themselves, for several reasons. First, as Hines and Rice (1990) point out, calculating a representative tax rate for a country is notoriously difficult.[9] Second, income shifting may be motivated by reasons other than tax minimization, such as risk avoidance, bypassing capital controls, or reducing tariff payments. Moreover, the effect of tax differentials on income shifting depends critically on the regulatory environment. These effects lead to nonuniform relations between tax rate differentials and shifted income and make it difficult if not impossible to devise a manageable empirical approach along these lines. By using carefully designed regional dummies, we can capture a net income shifting effect due to tax minimization and these other factors.

If the amount of income shifting depends on the size of a firm's operations in the various jurisdictions involved, our use of indicator dummies could render our results noisy and therefore less reliable. On the other hand, if income shifting requires only the firm's presence in the various jurisdictions, our specification is preferable. Since a detailed geographic breakdown of the extent of non-U.S. operations is not available in general, the point cannot be resolved here.

In table 8.1 we list the regions, their representative corporate tax rates, and the expected signs of the regression coefficients of the regional dummy variables.[10] The corporate tax rates are reported merely to provide a glimpse of the differences between the tax rates in these regions and the U.S. tax rate. In general, we expect the regression coefficients of the dummies indicating a firm's presence in higher-tax regions to be positive and those indicating a firm's presence in lower-tax regions to be negative.

The extent of income shifting is affected by its cost, holding tax rate differentials constant. Hence, our explanatory variables should include measures of this cost. Income shifting is usually conducted via artificial transfer prices[11]

7. Geographic breakdowns of these variables are not available.

8. We count only subsidiaries in measuring a firm's presence in overseas locations. Branches and representative offices are not included. For tax purposes, branch income is consolidated with that of U.S. operations. Thus, income shifting among branches is likely much less effective, if not totally ineffective, in reducing a firm's tax burden. The definition of a subsidiary is that in the *International Directory of Corporate Affiliations* (1985/1986): "A chartered business whose shares are owned, in whole or in part, by another company. The level of ownership is generally greater than 50%."

9. According to Hines and Rice, "No single measure of the corporate income tax rate can accurately capture the precise difference 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 carry forwards and carry backs, 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" (p. 42).

10. We calculate the corporate tax rates using data from *Price Waterhouse Corporate Taxes: A Worldwide Summary* (1984, 1988). For the countries in each region, we collect the corporate tax rate applicable to foreign-owned subsidiaries. The tax rates chosen apply to income arising from the manufacture and sale of goods in the host country. If progressive tax rates are provided, the highest rate is used. If there are dual rates on repatriated and retained earnings, we record the lower rate. State and local income taxes are included in the reported rate, net of federal tax deductions allowable. If more than one state tax rate is provided, a simple average is used. Value-added taxes, tariffs, and withholding taxes on dividends, royalties, and rents are excluded. Also excluded are tax holiday rates and other specialty tax rates.

11. These transfer prices include accounting prices used for intracompany exchanges of goods as well as services from intangibles, tangibles, and financial assets.

Table 8.1 Regions and Their Mean Statutory Corporate Tax Rates

Region	Mean Statutory Corporate Tax Rate[1] 1984	1988	Comparison to the U.S. Rate	Expected Sign[2]
Canada	47%	41%	Higher	+
Japan	50	50	Higher	+
Four Dragons[3]	30	26	Lower	−
Rest of Asia	48	49	Higher	−?[4]
Low-tax Western Europe[5]	31	29	Lower	−
High-tax Western Europe	49	47	Higher	+
Ireland[6]	50	50	Lower	−
Australia/New Zealand	48	47	Higher	+
Latin America	38	39	Lower	?[7]
South Africa	46	50	Higher	+
Africa	43	43	Lower	?[7]
Tax havens[8]	22	21	Lower	−
OPEC	47	47	Lower	?[7]
United States	46	34		

[1]These are average corporate tax rates based on *Price Waterhouse Corporate Taxes: A Worldwide Summary* (1984, 1988). See text footnote 10 for details.

[2]Expected signs of regression on coefficients for dummy variables indicating presence of subsidiaries there.

[3]Hong Kong, South Korea, Singapore, and Taiwan. Tax holidays are available in all except Hong Kong, so statutory rates overstate the tax burden.

[4]India and Pakistan skew the mean upward. Most countries here have lower rates than the United States.

[5]Switzerland, Luxembourg, and Malta. Tax holidays are not factored into the rate reported.

[6]A rate of 0 percent applies if the firm qualifies for a tax holiday.

[7]While the tax differentials for these regions appear to be negative, these regions are well known to have significant political risks or capital controls. Hence, the sign for the regression coefficient of these regions is uncertain.

[8]Tax havens include Andorra, Antigua, Bermuda, Bahamas, Barbados, British Virgin Islands, Cayman Islands, Channel Islands, Cyprus, Gibraltar, Grenada, Kiribati, Liechtenstein, Netherlands Antilles, other Caribbean, St. Kitts–Nevis, St. Vincent, and Vanuatu. Substantial tax holidays are available, so statutory rates greatly overstate the actual tax burden.

that deviate from true economic prices. Caves (1986, ch. 8, 246–47) argues that there are two constraints on such behavior. First, the use of artificial transfer prices and multiple books can lead to internal confusion and suboptimality in a firm's operation. Second, income shifting is constrained by tax collectors' monitoring efforts. While the validity of the former is an empirical issue, the second constraint is undeniable.[12]

In dividing the world into regions, we attempt to control for differences in

12. Wilson (ch. 6 in this volume), in a case study of nine firms with sophisticated tax planning procedures, finds that some firms do use multiple sets of books and that tax collectors' efforts to restrict transfer pricing have been stepped up in recent years.

the cost of income shifting. We bundle together countries that have similar business climates and tax enforcement regimes, as well as similar statutory tax rates. The SIC code dummies introduced to control for interindustry differences in tax burdens may also control, to some extent, for interindustry differences in the cost of income shifting.

Still, substantial differences in income shifting costs might exist within industries. The presence of intangible assets may reduce the cost of income shifting. Intangible assets, by their very nature, do not have readily available arm's-length prices, and therefore the usual regulatory guidelines for establishing transfer prices are not easily enforceable. Furthermore, the prices applied to transferring intangibles can often be set as lump sums (e.g., patent fees) so that no wedge is driven between marginal costs and benefits related to production. Some of our independent variables capture the presence of intangible assets. Research and development spending proxies for the presence of technological expertise, while advertising expenditure proxies for marketing skill.

Debt financing may also facilitate income shifting. Tax deductions relating to interest expenses can be concentrated in highly taxed subsidiaries. Thus, interest expenses may also proxy for a low cost of income shifting.

We therefore investigate the interaction effect of these measures of the cost of income shifting with the location dummies. We expect that indicators of low-cost income shifting should increase the absolute values of the regression coefficients of the regional dummies.

8.3 Empirical Evidence

Table 8.2 contains univariate statistics for the variables described above. The ratio of U.S. federal tax to U.S. assets has a mean of .0314, while the ratio of U.S. federal tax to U.S. sales has a mean of .0231. Both have sizable standard deviations of about 1.5 times their means. Negative values of these variables exist because of tax refunds.

In 50.6 percent of our observations, the firm is multinational, having at least one foreign subsidiary. In 49.8 percent of the observations, there is at least one subsidiary in high-tax European countries—the most popular location for foreign direct investment. Canada is the second-most popular host country: 41.6 percent of the observations record at least one subsidiary there. Following Canada are Latin America (27.8 percent), Japan (26.1 percent) and Australia/New Zealand (24.5 percent). Among the low-tax regions, the Four Dragons are the most popular (19.8 percent), followed by low-tax European countries (15.8 percent), with the noncommunist Asian countries being the least popular (9.3 percent). Ireland (13.0 percent) appears to be more popular than the other tax haven countries (9.1 percent). The least popular location overall for subsidiaries is Africa (2.7 percent).

Table 8.3 reports unweighted average U.S. federal tax liabilities (scaled

Table 8.2 Descriptive Statistics

Variable	Sample Size	Mean	Standard Deviation	Minimum	Maximum
Dependent Variables					
U.S. tax/U.S. assets	475	0.0314	0.0445	−0.1673	0.2799
U.S. tax/U.S. sales	486	0.0231	0.0347	−0.2212	0.1922
Multinational structure dummies					
Multinational dummy	486	0.5062	0.5005	0.0000	1.0000
Canada	486	0.4156	0.4923	0.0000	1.0000
Japan	486	0.2613	0.4398	0.0000	1.0000
Four Dragons	486	0.1975	0.2985	0.0000	1.0000
Asia	486	0.0926	0.2902	0.0000	1.0000
Low-tax Europe	486	0.1584	0.3655	0.0000	1.0000
High-tax Europe	486	0.4979	0.5005	0.0000	1.0000
Ireland	486	0.1296	0.3362	0.0000	1.0000
Australia/New Zealand	486	0.2449	0.4304	0.0000	1.0000
Latin America	486	0.2778	0.4484	0.0000	1.0000
South Africa	486	0.0967	0.2959	0.0000	1.0000
Africa	486	0.0267	0.1615	0.0000	1.0000
OPEC	486	0.0576	0.2333	0.0000	1.0000
Tax havens	486	0.0906	0.2873	0.0000	1.0000
Control variables scaled by worldwide sales					
R&D/sales	486	0.0342	0.0387	0.0000	0.1804
Advertising/sales	486	0.0137	0.0263	0.0000	0.1705
Depreciation/sales	486	0.0382	0.0222	0.0030	0.1372
Employee/sales	480	0.0116	0.0045	0.0027	0.0315
Rent/sales	486	0.0132	0.0116	0.0000	0.0690
ITC/sales*	486	0.0019	0.0035	0.0000	0.0338
Interest expenses/sales	486	0.0182	0.0173	0.0000	0.1256
Control variables scaled by worldwide assets					
R&D/assets	475	0.0381	0.0388	0.0000	0.1659
Advertising/assets	475	0.0193	0.0391	0.0000	0.2949
Depreciation/assets	475	0.0436	0.0188	0.0093	0.1407
Employees/assets	469	0.0146	0.0073	0.0023	0.0625
Rent/assets	475	0.0162	0.0149	0.0000	0.0841
ITC/assets*	475	0.0022	0.0034	0.0000	0.0226
Interest/assets	475	0.0210	0.0175	0.0000	0.1396

Note: The multinational firm indicator and regional dummies are zero or one. Their means are the fraction of firms that are multinational and the fraction of firms that have at least one subsidiary in the indicated region. The countries included in each region are listed in the footnotes to table 8.1.

*ITC = Investment tax credits.

separately by U.S. assets and U.S. sales) for firms grouped by the locations of their subsidiaries. For instance, the first row reports these two values for the firms in our sample with at least one subsidiary in Canada. These first-pass results generally conform to expectations. Compared to the average tax ratios of purely domestic U.S. firms (reported in the last row), the average U.S. tax ratios of firms with subsidiaries in higher-tax locations are higher,

Table 8.3 Unweighted Average U.S. Federal Tax per Dollar of U.S. Assets and of U.S. Sales, by Location of Foreign Subsidiaries*

Location of Subsidiary	U.S. Taxes / U.S. Assets	U.S. Taxes / U.S. Sales
Canada	0.03493	0.02271
Japan	0.03658	0.02784
Four Dragons	0.02812	0.01768
Asia	0.02807	0.01894
Low-Tax Europe	0.03733	0.02476
High-Tax Europe	0.03308	0.02392
Ireland	0.02751	0.01756
Australia/New Zealand	0.03204	0.02102
Latin America	0.03502	0.02171
South Africa	0.04574	0.02782
Africa	0.02289	0.01211
OPEC	0.01832	0.01109
Tax havens	0.01278	0.00947
All multinationals†	0.03300	0.02401
Purely domestic firms‡	0.02991	0.02232

*Note that a firm with several subsidiaries may be included in more than one group.

†Overall means for firms with any foreign subsidiary anywhere.

‡Overall means for firms without any foreign subsidiaries.

while those of firms with subsidiaries in lower-tax locations are lower. The average tax ratios of firms with tax haven subsidiaries are by far the lowest. One exception to this pattern is that average tax ratios of firms with subsidiaries in low-tax European countries are higher than those of domestic firms. Note also that the average U.S. tax ratios of firms with South African subsidiaries are higher than those of domestic firms. This suggests income shifting from South Africa to the United States.

Table 8.4 presents our key regression results. In regressions (1) through (4), the dependent variable is U.S. federal taxes paid per dollar of U.S. assets; in (5) through (8), the dependent variable is U.S. federal taxes paid per dollar of U.S. sales. Even-numbered regressions include three-digit SIC code dummies. Regressions (3), (4), (7), and (8) include the seven control variables described above.

The results are almost uniformly consistent with income shifting. The dummy variables for the three most unambiguously low-tax regions—labeled Dragon, Ireland, and tax havens—all have significant negative coefficients, suggesting that U.S. multinationals operating there shift income out of the United States to these regions. The dummy variables for the two most unambiguously high-tax regions—Japan and high-tax Europe—are positive and significant, suggesting that U.S. multinationals operating there shift income from these regions into the United States. Furthermore, multinationals operating in South Africa have increased U.S. tax liabilities, suggesting that non-

Table 8.4 **OLS Regressions Explaining U.S Federal Taxes Scaled by U.S. Assets or U.S. Sales**

	U.S. Federal Tax per $ of U.S. assets				U.S. Federal Tax per $ of U.S. Sales			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Canada	.0031	−.0147	.0013	−.0107	−.0096	−.0215	−.0072	−.0173
	(0.36)	(1.53)	(.15)	(1.17)	(1.49)	(3.04)	(1.19)	(2.66)
Japan*	.0161[a1]	.0152[b1]	.0113[b1]	.0083	.0184[a1]	.0169[a1]	.0117[a1]	.0100[b1]
	(2.53)	(2.21)	(1.82)	(1.22)	(3.76)	(3.18)	(2.50)	(1.95)
Dragon*	−.0090[c1]	−.0139[b1]	−.0139[b1]	−.0218[a1]	−.0102[b1]	−.0193[a1]	−.0126[a1]	−.0216[a1]
	(1.33)	(1.78)	(2.14)	(2.88)	(1.96)	(3.26)	(2.26)	(3.91)
Asia	.0011	−.005	−.0019	.0028	.0055	.0017	.0080	.0029
	(0.11)	(0.05)	(0.21)	(0.26)	(0.74)	(0.19)	(1.16)	(0.37)
LT Eur.	.0129[c]	.0094	−.0167[b]	.0153[b]	.0082	.0024	.0024	−.0008
	(1.85)	(1.23)	(2.37)	(2.02)	(1.52)	(0.41)	(0.46)	(0.13)
HT Eur*	−.0017[d]	.0130[c1]	.0047[d]	.0259[a]	.0084	.0195[a1]	.0102[b1]	.0255[a1]
	(0.23)	(1.44)	(0.65)	(2.96)	(1.49)	(2.97)	(1.91)	(4.10)
Ireland*	−.0135[b1]	−.0109[c1]	−.0141[b1]	−.0145[a1]	−.0116[b1]	−.0155[a1]	−.0143[a1]	−.0186[a1]
	(1.84)	(1.32)	(2.01)	(1.81)	(2.05)	(2.42)	(2.72)	(3.10)
Aus./N.Z.	−.0110	−.0089	−.0161[b]	−.0144[c]	−.0067	−.0077	−.0059	−.0050
	(1.43)	(1.12)	(2.16)	(1.88)	(1.12)	(1.25)	(1.06)	(0.86)
L. Amer.	.0059	.0101	.0051	.0070	−.0005	.0035	−.0024	.0011
	(0.85)	(1.39)	(0.75)	(1.00)	(0.09)	(0.64)	(0.48)	(0.21)
S. Afr.*	.0344[a1]	.0318[a1]	.0363[a1]	.0307[a1]	.0207[a1]	.0277[a1]	.0222[a1]	.0271[a1]
	(3.71)	(3.11)	(4.12)	(3.15)	(2.87)	(3.46)	(3.33)	(3.68)
Africa	−.0179	−.0308	−.0140	−.0383[b]	−.0110	−.0062	−.0136	−.0106
	(1.15)	(1.70)	(0.94)	(2.22)	(0.90)	(0.44)	(1.20)	(0.81)
OPEC	−.0068	.0006	.0090	.0136	−.0060	.0021	−.0002	.0039
	(0.69)	(0.05)	(0.93)	(1.08)	(0.77)	(0.21)	(0.03)	(0.41)
Havens*	−.0340[a1]	−.0439[a1]	−.0315[a1]	−.0391[a1]	−.0244[a1]	−.0286[a1]	−.0177[a1]	−.0180[a1]
	(3.67)	(4.06)	(3.54)	(3.71)	(3.38)	(3.44)	(2.63)	(2.21)
R&D			.0018	.0032			.1475[a]	.1162[c]
			(0.03)	(0.04)			(2.67)	(1.74)
Adv.			.1815[a]	.1748[a]			−.0313	−.1267[c]
			(3.45)	(3.00)			(0.53)	(1.88)
Deprec.			−2649[b]	−.3217[b]			−.0173	−.0128
			(2.31)	(2.55)			(0.20)	(0.13)
Empl.			−.2880	.2521			−1.165[a]	−.8221[b]
			(1.01)	(0.73)			(3.59)	(2.01)
Rent			−.0836	−.4234			−.4655[a]	−.7086[a]
			(0.51)	(2.32)			(3.08)	(4.11)
ITC†			.2134	−.1083			.9114[b]	.5847
			(0.34)	(0.18)			(1.99)	(1.28)
Interest			−.7471[a]	−.6694[a]			−.5767[a]	−.5786[a]
			(5.94)	(5.10)			(5.93)	(5.50)
Intercept	.0299[a]		.0580[a]		.0224[a]		.0461[a]	
	(10.8)		(8.39)		(10.4)		(9.24)	
SIC dummies	No	Yes	No	Yes	No	Yes	No	Yes
Sample	475	475	469	469	486	486	480	480
R^2	.0867	.2587	.2041	.3605	.0814	.2487	.2459	.3944

Note: Numbers in brackets are *t*-ratios. Control variables are scaled by worldwide total assets in (1) through (4) and by worldwide total sales in (5) through (8).

*Regression coefficients are significant and consistent with hypothesis.

†Investment tax credit.

[a, b, c]Significant at 1%, 5%, and 10%, respectively.

[a1, b1, c1]Significant at1%, 5%, and 10%, respectively, in one-tailed tests.

[d]High-tax Europe is significant in (1) and (3) if firms with subsidiaries in only one region are excluded.

tax reasons such as avoiding capital controls or political instability may also drive income shifting.

The existence of subsidiaries in other Asian countries, Latin America, Africa, and the OPEC countries does not significantly affect U.S. tax liabilities. Multinationals operating there face conflicting incentives. On one hand, they have tax incentives to shift income from the United States into these regions, which generally have lower statutory tax rates than the United States does. On the other hand, multinational firms also have incentives to shift income out of these regions into the United States because of currency risks, political risks, capital controls, and so on.

One initially surprising result is the negative coefficient for Canada, which had statutory rates comparable to but slightly higher than the U.S. rate during the sample period. However, Glenday and Mintz (1990) point out that a large and increasing proportion of Canadian firms were in surplus tax loss situations during the early 1980s—as high as 61.4 percent in 1984—so their effective marginal tax rates were lower than the statutory corporate rates. The same explanation applies to Australia and New Zealand in this period. Finally, the coefficient for low-tax Europe is positive and is significant in regressions (1), (2), and (4). Tax rates there are lower than in the United States because of generous tax holidays and other provisions. This result is puzzling, and we can only speculate that firms may be so constrained in using these schemes that their effective tax rates are actually not lower than in the U.S.

As discussed above, the presence of both intangibles and debt financing make income shifting easier. We examine this idea by introducing a cross-term between the regional dummies and a dummy indicating the presence of these cost-reducing factors. Research and development spending per dollar of total sales, or of total assets, is used to proxy for production-related intangibles. Similarly, advertising spending per dollar of total sales, or of total assets, is used to proxy for marketing-related intangibles. A firm with high interest expenses per dollar of total sales or assets has more opportunities to shift income by concentrating its debt financing in highly taxed subsidiaries. To capture these effects, we create a dummy variable equal to one for observations in which any of these three variables is in the highest quartile of the whole sample, and zero otherwise.[13] This dummy indicates that the cost of income shifting may be low.[14] We repeat regressions (4) and (8), adding cross-terms between this "low-cost" dummy and the thirteen regional dummies in our regression analyses. The results are reported in table 8.5.

These factors do appear to facilitate income shifting. Indeed, the movement of income to the United States from high-tax Europe and Japan seems to rely solely on them. The regional dummies themselves have insignificant coefficients, while the cross-terms are positive and significant. Similar regression results for South Africa imply that income is shifted from there to the United States via these same factors. Our results also indicate that firms shift income to the United States from Africa, Ireland, and the Four Dragon countries (although the Four Dragon coefficient is insignificant) via these channels. The

13. We experimented with other definitions of this interactive dummy variable and obtained results similar to those reported below.

14. Of the multinational firms in our sample, 69 percent are classified as having low cost in income shifting, while 63 percent are classified as such in the full sample.

Table 8.5 **OLS Regressions Explaining U.S. Federal Taxes Scaled by U.S. Assets or U.S. Sales: Cross-term Indicating Low-Cost Income Shifting Channels**

	U.S. Federal Tax per $ of U.S. Assets		U.S. Federal Tax per $ of U.S. Sales	
	Dummy	Cross-term[1]	Dummy	Cross-term[1]
Canada	.0071	−.0255	.0038	−.0284[c]
	(0.39)	(1.23)	(0.29)	(1.191)
Japan*	−.0199	.0352[c1]	−.0138	.0312[a1]
	(0.87)	(1.48)	(0.98)	(2.14)
Four Dragons*	−.0083	−.0117	−.0143	−.0092
	(0.52)	(0.67)	(1.15)	(0.68)
Rest of Asia	.0546[a]	−.0654[a1]	.0117	−.0156
	(2.69)	(2.93)	(0.85)	(0.95)
Low-tax Europe	.0224	−.0107	.0027	−.0049
	(1.21)	(0.54)	(0.20)	(0.34)
High-tax Europe*	−.0063	.0348[b1]	.0112	.0144
	(0.43)	(2.11)	(1.11)	(1.29)
Ireland*	.0094	−.0274	.0012	−.0245[c1]
	(0.35)	(0.99)	(0.09)	(1.60)
Australia/N.Z.	−.0120	.0193	−.0094	.0164
	(0.56)	(0.85)	(0.58)	(0.95)
Latin America	.0036	−.0075	−.0029	−.0028
	(0.25)	(0.47)	(0.25)	(0.21)
South Africa*	−.0139	.0454[c1]	.0100	.0206
	(0.45)	(1.38)	(0.67)	(1.22)
Africa*	−.0168	−.0797[b1]	−.0084	−.0257
	(0.64)	(2.27)	(0.42)	(0.93)
OPEC	−.1634[a]	.1668[a]	−.0276	.0359
	(4.12)	(4.39)	(1.20)	(1.56)
Tax havens*	−.0394[b1]	−.0123	−.0025	−.0170
	(1.78)	(0.51)	(0.13)	(0.87)
Control variables	Yes		Yes	
SIC code dummies	Yes		Yes	
Sample size	469		480	
R^2	.4695		.4304	

Note: Numbers in brackets are *t*-ratios.

*Results are consistent with hypothesis.

[1]Regional dummy × dummy indicating low-cost income shifting channel.

[a, b, c]Significant at 1%, 5%, and 10%, respectively.

[a1, b1, c1]Significant at1%, 5%, and 10%, respectively, in one-tailed tests.

income shifting from the United States to Canada detected in table 8.4 also appears to involve intangibles and/or debt-related channels. Note, however, that these factors may play a less critical role in income shifting to tax havens. The cross-term for the tax haven dummy is insignificant.

The results in table 8.5 are not, however, nearly as statistically strong as those in table 8.4. The results for Australia and New Zealand, Latin America, and the low-tax European countries are not significant at all. The weakness of these results may be due to the inevitable collinearity between the cross-term and the regional dummies themselves.

8.4 Statistical Issues

In this section, we examine the robustness of our results, focusing on the regressions reported in table 8.4, especially (4) and (8), and their statistical reliability.

First we investigate the possibility that our results might be driven by outliers. Using regressions (4) and (8), we identify a firm as an outlier if its studentized residual is greater than three.[15] There are four outliers in regression (4) and seven in regression (8).[16] Both regressions were repeated without the outliers. The coefficient for the Japan dummy in (8) becomes insignificant but is still positive. In (4) with no outliers, Japan remains positive and significant. Other regression results are not changed materially. We conclude that our results are probably not driven by outliers.

There may be heteroscedasticity and missing-variables problems in our regression. Heteroscedasticity could be caused by less than perfect scaling of the dependent variable or by missing variables. However, heteroscedasticity-consistent t-statistics (see White 1980) are not materially different from the simple t-statistics we report.

Missing variables can also bias the coefficient estimates. Recall that the numerator of our dependent variable can be expressed as $\tau_U(Y_U - Y_{UL} + Y_{HU})$, where Y_U is a firm's U.S. income and both Y_{UL} and Y_{HU} are shifted income. The problem of missing variables may arise if we do not adequately control for variations in Y_U. Indeed, given the simple specification of our regression equations, it is likely that we do not capture all relevant control variables.

We examine the missing-variables issue by repeating regressions (4) and (8), using a fixed-effects model. In other words, we regress the deviations of firms' U.S. tax ratios from their sample period means (1984–88) on the deviations of the independent variables from their respective sample period means. This procedure eliminates the impact on the dependent variable of firm-specific but time-invariant missing variables that affect the dependent variable additively.

15. In (8), one of the identified outliers actually has a studentized residual of 2.975 and a Cook's D statistic of 0.084. No nonoutliers have Cook's D statistics greater than 0.025, and all but two have Cook's D's below 0.02.

16. Two of the four outliers in regression (4) are multinational firms, as are four out of the seven outliers in regression (8). For the multinational firms, the prediction errors are all positive. Of the five uninational firms, three have positive prediction errors.

Using this fixed-effects model, we obtain a positive coefficient for Canada, high-tax Europe, Australia/New Zealand, and Latin America; we obtain a negative coefficient for Japan, Four Dragons, other Asian countries, low-tax Europe, Ireland, South Africa, Africa, and tax havens.[17] No estimate is very significant. This is not surprising; we are suppressing much information with this technique, and it ignores any lags between incorporation of an affiliate and the onset of income shifting. Except for Japan and Latin America, the sign of a coefficient is positive when the corresponding region's tax rate is higher than in the United States and is negative when its tax rate is lower than in the United States. These results are consistent with the hypothesis that multinational firms shift income out of high-tax countries to the United States and into low-tax countries from the United States.

A subsidiary in Latin America increases U.S. tax liabilities in both the fixed-effects model and the simpler specifications reported in table 8.4. This again suggests that income may be shifted out of Latin America to avoid political risks and capital controls, even though tax rates there are generally lower than in the United States. The negative sign for the Japan dummy indicates that our previous estimates of the impact of having a subsidiary in Japan on U.S. tax liability may not be robust.

The coefficients for Canada and Australia/New Zealand now have positive signs, as our income shifting hypothesis predicts. This suggests that the negative effect subsidiaries in these regions have on U.S. tax liability may be due to tax losses carried forward by older subsidiaries. New subsidiaries owned by firms first entering these regions may not be in this situation and thus face the actual higher statutory tax rate.[18] As a consequence, these firms shift income out of these regions to the United States.

The fixed-effects model does not completely eliminate the problem caused by not fully controlling for a firm's profits, because of nonadditive or time varying effects. This is not just a statistical problem but also an economic issue. We therefore defer a more complete discussion to the next section.

We conclude that the regression results reported in table 8.4 do not appear to be driven by heteroscedasticity or missing-variables problems. The effect that having Japanese subsidiaries has on U.S. tax liabilities is not, however, very robust.

8.5 Economic Issues

We now turn our attention to the economic interpretation of our results. The question we address is whether or not there are sensible economic interpretations for our findings other than income shifting.

17. A dummy for OPEC is not included, because no firms have changed their presence there.

18. This is certainly true of greenfield expansions. However, Canadian tax law allows the transfer of some tax losses under some circumstances following acquisitions.

Our dependent variable is a firm's current U.S. federal tax liability divided by either its U.S. assets or its U.S. sales. Due to repatriated income from foreign subsidiaries, this tax ratio may be higher for a multinational firm than for a domestic firm. U.S. tax laws imply that income repatriated from a subsidiary in a low-tax location increases federal taxes net of foreign tax credits, while income repatriated from a subsidiary in a high-tax location does not. Hence, income repatriation alone should lead to a positive, rather than negative, regression coefficient for the lower-tax regional dummies, while the higher-tax regional dummies should have a nonpositive impact on our dependent variable. However, we obtain negative regression coefficients for the low-tax regional dummies and positive coefficients for the high-tax regional dummies. Thus, our results are clearly not due to income repatriation.

Our results might be driven by macroeconomic factors such as regional economic performance and changes in exchange rates. It is conceivable that such changes in the economic situation of a foreign host country might have a significant impact on the firm's U.S. profits and, thus, on its U.S. taxes. To ascertain that our results are not due to transitory macroeconomic changes, we repeat regressions (4) and (8) in table 8.4 using year-by-year data. The results are reported in tables 8.6 and 8.7.

The year-by-year regressions generate very consistent results. The signs of the regression coefficients for the separate years are identical and are also identical to the full-sample estimates except for Japan, low-tax Europe, and Latin America. However, as should be expected given the much smaller sample sizes, the statistical significance of the coefficients is attenuated. The lack of consistency in the coefficient estimates for low-tax Europe and Latin America is also not particularly surprising given that we do not obtain significant results in the pooled sample analysis. Japan aside, our findings do not appear to be driven by transitory regional macroeconomic factors.[19]

Another possible problem is that there might be a relationship between firm profitability and the location of subsidiaries. If affiliate locations and actual U.S. profits are both related to unobservable differences in a firm's profitability, then the estimated coefficients of table 8.4 will be biased estimates of the magnitude of income shifting made possible by multinational operation. The ideal procedure for dealing with this problem is to construct a structural model of the joint decisions of where to locate and how much income shifting to do, estimated perhaps by a two-stage least squares procedure where, in the equa-

19. Because our data include years before and after the Tax Reform Act of 1986 (TRA86), it is also potentially instructive to look at any differences in the estimated relationships across the two periods. TRA86 lowered the corporate statutory tax rate from 46 percent to 40 percent in 1987 and to 34 percent in 1988 and thereafter. This change by itself should increase the amount of income shifting from high-tax countries into the United States and decrease the amount of income shifting from the United States to low-tax countries. TRA86 also increased the likelihood that a firm will be in excess foreign tax credit status. This development increases the payoff to income shifting, because it reduces the likelihood that changes in taxes paid to foreign governments will trigger offsetting changes in the amount of foreign tax credit granted by the U.S. government. In the aggregate, then, following TRA86 there should be more income shifted out of high-tax foreign countries, while the change in income shifted into low-tax countries is less certain. No such pattern is apparent in table 8.7. However, two further considerations make the story more complicated. First, TRA86 also restricted the ability to average foreign taxes in the calculation of foreign tax credits. Second, because of the gradual phase-in of the tax rates, there were important incentives to change the timing of income realizations. This renders data from 1987 and 1988 somewhat suspect as an indicator of steady-state behavior and makes 1986 data suspect as a sample of typical pre-TRA86 behavior. For a more detailed discussion of TRA86, see Slemrod (1990). Harris (1991) analyzes the effect of TRA86 on income shifting.

Table 8.6 **Year-by-Year OLS Regressions of U.S. Federal Tax/U.S. Assets, 1984 through 1988.**

	Year				
	84	85	86	87	88
Canada	−.0616[c]	−.0119	.0004	−.0113	−.0103
	(1.99)	(0.34)	(0.01)	(0.44)	(0.54)
Japan	−.0018	.0193	−.0148	.0111	.0043
	(0.10)	(0.76)	(0.73)	(0.63)	(0.29)
Four Dragons*	−.0421[b1]	−.0274	−.0241	−.0220	−.0058
	(1.82)	(0.97)	(1.06)	(1.11)	(0.35)
Rest of Asia	.0036	.0063	.0163	−.0017	.0091
	(0.11)	(0.17)	(0.59)	(0.06)	(0.34)
Low-tax Europe	.0137	.0336	.0110	.0270	.0094
	(0.73)	(1.03)	(0.46)	(1.28)	(0.55)
High-tax Europe*	.0469[b1]	.0311	.0386	.0207	.0253[c1]
	(1.82)	(0.92)	(1.51)	(0.87)	(1.47)
Ireland*	−.0158	−.0337	−.0354[c1]	−.0158	−.0091
	(0.76)	(1.21)	(1.36)	(0.74)	(0.53)
Australia/N.Z.	−.0099	−.0540[c]	−.0156	−.0118	−.0175
	(0.46)	(1.95)	(0.64)	(0.57)	(1.08)
Latin America*	.0354[c]	.0023	−.0023	.0088	.0051
	(1.75)	(0.10)	(0.91)	(0.43)	(0.30)
South Africa*	.0581[b1]	.0626[b1]	.0372	.0438[c1]	.0125
	(2.01)	(1.87)	(1.22)	(1.60)	(0.42)
Africa*	−.0223	−.0364	−.0865[c1]	−.0483	−.0514
	(0.41)	(0.59)	(1.64)	(1.10)	(1.42)
OPEC	.0399	.0069	.0113	.0144	.0359
	(0.83)	(0.11)	(0.31)	(0.49)	(1.31)
Tax havens*	−.0452[c1]	−.0344	−.0257	−.0307	−.0404[c1]
	(1.53)	(0.81)	(0.72)	(1.07)	(1.58)
Control variables	Yes	Yes	Yes	Yes	Yes
SIC code dummies	Yes	Yes	Yes	Yes	Yes
Sample size	97	92	93	93	94
R^2	.6530	.5873	.5887	.5985	.5616

Note: Numbers in brackets are *t*-ratios.

*Sign of coefficient is significant with hypothesis in all years.

[a, b, c]Significant at 1%, 5%, and 10%, respectively.

[a1, b1, c1]Significant at 1%, 5%, and 10%, respectively, in one-tailed tests.

Table 8.7 **Year-by-Year OLS Regressions of U.S. Federal Tax/U.S. Sales, 1984 through 1988.**

	Year				
	84	85	86	87	88
Canada	−.0737[a]	−.0165	−.0193	−.0224	−.0091
	(2.89)	(0.64)	(1.03)	(1.54)	(0.95)
Japan	.0172	.0209	.0040	.0042	−.0048
	(1.09)	(1.12)	(0.27)	(0.38)	(0.57)
Four Dragons*	−.0303[c1]	−.0259[c1]	−.0215	−.0137	−.0210[a1]
	(1.52)	(1.28)	(1.26)	(1.17)	(2.51)
Rest of Asia	.0130	−.0140	.0128	.0050	.0194
	(0.44)	(0.52)	(0.60)	(0.27)	(1.32)
Low-tax Europe	−.0173	−.0147	−.0002	.0097	.0033
	(1.13)	(0.61)	(0.01)	(0.72)	(0.32)
High-tax Europe*	.0495[b1]	.0292	.0248[c1]	.0259[b1]	.0252[a1]
	(2.31)	(1.24)	(1.35)	(1.93)	(2.85)
Ireland*	−.0070	−.0142	−.0357[b1]	−.0236[b1]	−.0079
	(0.38)	(0.67)	(1.78)	(1.79)	(0.83)
Australia/N.Z.	.0023	−.0235	−.0098	−.0032	−.0072
	(0.12)	(1.14)	(0.55)	(0.26)	(0.81)
Latin America	.0310[c]	−.0011	−.0028	−.0020	−.0054
	(1.82)	(0.07)	(0.19)	(0.17)	(0.57)
South Africa*	.0446[b1]	.0451[b1]	.0376[c1]	.0327[b1]	.0089
	(1.76)	(1.83)	(1.61)	(1.95)	(0.52)
Africa*	−.0249	−.0058	−.0294	−.0202	−.0236
	(0.53)	(0.12)	(0.75)	(0.75)	(1.15)
OPEC	.0310	.0114	.0032	−.0072	.0099
	(0.75)	(0.24)	(0.12)	(0.40)	(0.64)
Tax havens*	−.0283	−.0196	−.0303	−.0058	−.0137
	(1.11)	(0.59)	(1.16)	(0.32)	(0.94)
Control variables	Yes	Yes	Yes	Yes	Yes
SIC code dummies	Yes	Yes	Yes	Yes	Yes
Sample size	99	93	94	95	99
R^2	.6796	.5726	.5728	.6918	.7163

Note: Numbers in brackets are *t*-ratios.

*Sign of coefficient is consistent with hypothesis in all years.

[a, b, c]Significant at 1%, 5%, and 10%, respectively.

[a1, b1, c1]Significant at 1%, 5%, and 10%, respectively, in one-tailed tests.

tion for reported U.S. tax paid, actual location is replaced by a predicted-location variable which is purged of the unobservable influences that may be correlated with actual U.S. parent profitability. Although ideal, this procedure is difficult, fraught with its own problems and data difficulties. It is therefore left for future research. We employ simpler techniques.

One simple approach is to repeat regressions (4) and (8) in table 8.4, including consolidated before-tax income (scaled by either worldwide total assets or worldwide sales) as an additional control variable. While this procedure is statistically problematic because it induces a correlation between the regression residual and the added explanatory variable, it nonetheless sheds light on the robustness of the coefficient estimates for the regional dummies. The regression result is that the dummy for Japan becomes insignificant in the analog of regression (8) and negative in the analog of (4). The other coefficient estimates do not change materially, and significance levels actually increase slightly.[20]

If a firm's profitability is related to the location of its subsidiaries, the relationship should also be captured in a regression of a firm's global after-tax income on the regional dummies. Results of this procedure are reported in the left panel of table 8.8. Regressions (1) and (2) explain global after-tax income, using the regional dummies and control variables including industry dummies. The dependent variable in the former is scaled by worldwide assets and in the latter by worldwide sales. The dummy for Japan in (1) has a significant positive coefficient.[21] Those for Canada, Europe, and South Africa are positive and insignificant. Subsidiaries in Asia, the Four Dragons, Ireland, Australia/New Zealand, Latin America, OPEC, Africa, and the tax havens are insignificantly related to lower U.S. taxes (the Four Dragons group borders on significance). We conclude that a relation between profitability and subsidiary location does not explain away our results.

Our results might also be capturing scale economies embedded in multinationals. An important explanation for the existence of multinational firms, the *internalization theory* (see Caves 1986), posits that having subsidiaries in *any* large foreign market leads to higher returns on certain intangibles. According to this view, multinational firms possess information-based intangible assets with public good properties. Technological know-how, marketing expertise, and exceptional management could be such goods. Due to well-known problems stemming from the economics of information, normal markets for these goods may not exist. Because of their public good properties, these assets should be applied on as large a scale as possible to maximize firm value. The solution is to expand the firm's scale: *internalizing* markets for these intangibles. Including R&D spending and advertising expenses (proxies for technology- and marketing-related intangibles, respectively) as independent variables is intended in part to control for this effect. If internalization is not entirely controlled for, however, our results could be affected.

Internalization could thus imply that having generic foreign subsidiaries increases profits and therefore taxes—especially if the subsidiaries allow access to large markets. While the positive coefficients on high-tax area dum-

20. The procedure discussed in the text does not eliminate the potential simultaneity bias but instead changes the nature of the bias and, under certain assumptions, changes its sign. Thus, the fact that the qualitative nature of the results is not altered by including the worldwide profitability variable implies that they are not an artifact of this sort of simultaneity bias.

21. Given the alleged entry barriers in Japan, it may not be surprising that successfully entering that market is correlated with high earnings.

Table 8.8 **Regressions of Global After-Tax Income and Global Taxes on Regional Dummies and Control Variables**

	Global Income		Global Tax	
	Assets (1)	Sales (2)	Assets (3)	Sales (4)
Canada	.0103	−.0034	−.0051	−.0064
	(1.19)	(0.36)	(0.83)	(0.98)
Japan	.0209	.0149	.0163	.0130
	(2.13)	(1.37)	(2.36)	(1.76)
Four Dragons	−.0171	−.0124	.0054	.0105
	(1.66)	(1.10)	(0.75)	(1.37)
Rest of Asia	−.0074	−.0040	.0018	−.0020
	(0.48)	(0.24)	(0.17)	(0.17)
Low-tax Europe	.0170	.0136	.0027	−.0013
	(1.58)	(1.12)	(0.35)	(0.16)
High-tax Europe	.0056	.0159	−.0002	−.0012
	(0.61)	(1.55)	(0.03)	(0.18)
Ireland	−.0166	−.0204	−.0127	−.0197
	(1.36)	(1.51)	(1.48)	(2.16)
Australia/N.Z.	−.0043	.0051	.0048	.0076
	(0.38)	(0.41)	(0.60)	(0.90)
Latin America	−.0049	−.0077	.0094	.0134
	(0.54)	(0.76)	(1.46)	(1.95)
South Africa	.0065	.0202	.0040	.0081
	(0.43)	(1.21)	(0.38)	(0.72)
Rest of Africa	−.0105	−.0102	−.0442	−.0377
	(0.37)	(0.32)	(2.20)	(1.77)
OPEC	−.0015	−.0113	−.0146	−.0145
	(0.09)	(0.60)	(1.21)	(1.13)
Tax havens	−.0112	−.0001	−.0231	−.0152
	(0.81)	(0.01)	(2.37)	(1.46)
Control variables	Yes	Yes	Yes	Yes
SIC codes	Yes	Yes	Yes	Yes
Sample size	475	469	475	469
R^2	.3244	.3023	.2882	.2523

Control variables are scaled by worldwide total assets in regressions (1) and (2) and by worldwide total sales in (3) and (4).
Note: Numbers in brackets are *t*-ratios.
[a, b, c]Significant at 1%, 5%, and 10%, respectively.

mies could be due in part to internalization-related profits, the negative coefficients on low-tax region dummies are unambiguous evidence of income shifting. Moreover, the low-cost income shifting indicator variable in table 8.5 also serves as an indicator of some of the assets likely to lead to internalization profits: technology and marketing ability. Internalization theory implies that the cross-product terms should all be positive. Again, this is so only for high-tax countries. Intangibles are associated with lower U.S. taxes when the firm has a subsidiary in a low-tax region. This result is consistent with income

shifting. We conclude that while our results for high-tax areas may be affected by internalization, those for low-tax regions unambiguously imply income shifting from the United States to low-tax countries.

Finally, an alternative approach to testing for income shifting is to run regressions explaining total worldwide taxes. In the absence of income shifting, dummies indicating a firm's presence in high-tax regions should have positive coefficients, while dummies indicating a presence in low-tax regions should have zero or negative coefficients, depending on how much income is repatriated. Income shifting should reduce the positive coefficients of high-tax region dummies. Indeed, enough should render them insignificant. Furthermore, income shifting implies that low-tax region subsidiaries should be associated with a reduction in worldwide tax, as does the absence of income shifting. Thus income shifting implies insignificant coefficients for high-tax regions and uninterpretable results for low-tax regions. Although we feel that this is not an ideal hypothesis for statistical verification, we present the results of such regressions in the right panel of table 8.8.

Regressions (3) and (4) explain global taxes, using regional dummies and control variables including industry dummies. The scaling factor in (3) is worldwide assets and that in (4) is worldwide sales. The general insignificance of the high-tax region dummies is consistent with income shifting. Again Japan does not fit the pattern. Also, consistent with income shifting, the coefficients of the low-tax region dummies are either negative or insignificant. We conclude that the lack of results in regressions of this form is consistent with income shifting.

In summary, our regression results are most readily interpretable as evidence for income shifting. The estimated impact of having a subsidiary in Japan on a firm's U.S. tax may, however, be due to factors other than income shifting.

8.6 Economic Significance

So far, the focus of this paper has been entirely on whether or not the pattern of signs obtained in the regression analysis is consistent with the hypothesis that multinational firms engage in income shifting. In this section, we reflect on the magnitude of the estimated coefficients and the implied economic effect. We concluded above that the various statistical and economic problems inherent in this study cannot explain away the basic result that income shifting occurs. We do not, however, deny that some of them may adversely affect the precision of our point estimates. In particular, if the scale of affiliate operations, which we are unable to control for, is related to the magnitude of income shifting, the precision of our estimates may be diminished. We therefore must proceed into the following discussion with this caveat in mind.

A second caveat is that this analysis compares the U.S. taxes of firms with various multinational structures against those of uninational firms. The inter-

nalization theory suggests that multinational operations enhance profitability. A multinational structure therefore *should* be related to higher U.S. taxes—due to higher profits—even in the absence of income shifting. On average, as table 8.3 shows, multinational firms in our sample do have higher U.S. tax liabilities than uninational firms do. The average multinational has a U.S. tax bill equal to 3.3 percent of its assets and 2.4 percent of its sales. The average uninational's tax bill is only 3.0 percent of assets and 2.2 percent of sales. Since we use uninational firms' taxes as our benchmark rather than what the multinationals' taxes would be absent income shifting, all of our estimates understate the tax reduction due to income shifting.

We use the regression results reported in table 8.4 to estimate the effect of income shifting on overall U.S. corporate tax revenues. The dot product of the vector of regression coefficients on the regional dummies with the vector of regional dummies for a firm is an estimate of the effect of income shifting on that firm's U.S. tax ratio. Multiplying this by the scaling variable gives a dollar estimate of the change in the firm's U.S. tax liability due to income shifting. Results from this calculation suggest that income shifting does reduce U.S. tax revenue. This happens even though the average tax ratios of multinationals in table 8.3 are higher than those of uninational firms. This is because multiplying through by the scaling factor reveals large dollar value tax reductions for the biggest firms in our sample. These dominate the dollar value sums. The size of the reduction in U.S. tax revenues depends on whether table 8.4's regression (4) or (8) is used. The overall reduction is 3 percent of U.S. tax liability based on regression (4) and 22 percent based on regression (8). Obviously, the difference between these two estimates shows that this exercise is not very precise.[22]

Whatever the reduction in U.S. tax receipts, it appears to be due to income shifting by very large multinationals. Firms with subsidiaries in more than five regions show lowered U.S. tax bills. Based on (4) in table 8.4, the average multinational firm with subsidiaries in more than five regions uses income

22. The individual coefficients of specific regional dummies can also be interpreted. As an example, the estimated coefficient from table 8.4's regression (4) on the regional dummy for Ireland is −0.0145. This implies, ceteris paribus, that having an affiliate in Ireland is associated with a reduction in the ratio of U.S. income to U.S. assets of .0352 (.0145 divided by the average U.S. tax rate of .412). For a multinational firm with U.S. assets equal to five times its Irish assets, the implied jump in the Irish income to assets ratio is 0.176. The aggregate income to assets ratio in 1982 for U.S. affiliates in Ireland was 0.23. This rather large estimate is consistent with the qualitative findings of the previous studies discussed in section 8.1. Of course, these estimates are for an average firm. For a multinational with a very small presence in Ireland, this technique probably produces far too high an estimate of the actual amount of income shifting. In an oral communication to the authors, Peter Wilson has suggested that firms with Irish or tax haven subsidiaries may be more likely to have Puerto Rican subsidiaries as well. Our data sources do not include Puerto Rican operations in the lists of foreign subsidiaries. It is therefore possible that the Ireland and tax haven dummies are picking up the effects of income shifting to Puerto Rico. Also in an oral communication, James Hines has suggested that firms that are more aggressive in saving U.S. taxes are more likely to have subsidiaries in Ireland and other tax havens; part of the large negative effect of these regional dummies may be explained by this.

shifting to reduce its U.S. taxes to 51.6 percent of what they would otherwise be. Based on (8), this falls to 50.6 percent. This implies that when the various control variables and industry effects are taken into account, large multinationals have lower U.S. tax bills than comparable uninational firms do.

In contrast, multinationals with subsidiaries in five or fewer regions show elevated U.S. tax bills. While the simple sums of the regression coefficients for the regional dummies are negative, −.0352 for regression (4) and −.0215 for (8), weighting the sums by the means of the regional dummies turns them positive: .0116 for (4) and .0016 for (8). This implies that when the various control variables and industry effects are taken into account, a multinational with subsidiaries everywhere has a reduced U.S. tax ratio, while the average multinational has a higher U.S. tax ratio than a comparable uninational firm.[23]

Although the uncertainties inherent in our methodology make estimates of the dollar value of income shifting imprecise, we can draw some qualitative conclusions about economic significance. First, income shifting probably reduces overall U.S. tax receipts. Second, this is largely due to the *largest* multinationals using income shifting to substantially lower their U.S. tax bills. Third, the *typical* multinational has a higher U.S. tax liability than does a similar uninational firm. The last finding could be due either to higher earnings stemming from internalization or to a net inflow of shifted income to the United States. The ability of the largest multinationals to reduce their U.S. taxes is, however, most likely due to income shifting.

8.7 Conclusions

We examine five years of data from the annual reports of two hundred U.S. manufacturing corporations. We find that U.S. tax liability, as a fraction of either U.S. sales or U.S. assets, is related to the location of foreign subsidiaries in a way that is consistent with tax-motivated income shifting. Having a subsidiary in a tax haven, Ireland, or one of the Four Dragon Asian countries (all jurisdictions with low tax rates) is associated with lower U.S. tax ratios. Having a subsidiary in a high-tax region is associated with higher U.S. tax ratios. These results suggest that U.S. manufacturing companies are able to shift income out of high-tax countries into the United States and from the United States to low-tax countries. This behavior reduces U.S. taxes substantially only for firms with an extensive multinational structure. For multina-

23. Regressions (3) and (4) in table 8.8 generate similar results. Morck and Yeung (1991, 1992) find that multinational structure and expansion increase firm value only if intangibles are present. Since firms with intangibles may be able to engage in income shifting more easily, a naïve interpretation of their results is that the increased value is due to reduced taxes. However, the average multinational pays more worldwide taxes than does a similar uninational firm, presumably because it is more profitable. The increased value must therefore be due to factors such as the internalization of foreign markets rather than to reduced taxes. Reduced taxes might explain increased value only for the largest multinationals.

tional firms as a whole, income shifting leads to a moderate reduction in aggregate U.S. tax payments. Finally, our results support the idea that multinational firms conduct income shifting for non-tax-related purposes, such as avoiding capital controls and reducing political risks.

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Comment

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This paper is a welcome addition to the literature on income shifting by multinational corporations (MNCs). Most previous work has been based on in-

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come reported by U.S. affiliates abroad, aggregated by country location. The authors instead use microdata for individual U.S. parent firms. Thus, their work does not remassage a well-used data set but introduces another perspective from which to assess the extent of income shifting. Furthermore, this approach allows explicit consideration of the extent of profit shifting out of the United States, something which could only be acknowledged implicitly in previous studies.

The paper is controversial because it finds very strong income shifting effects, not just from affiliates in high-tax countries to affiliates in low-tax countries but from the U.S. parent to affiliates in low-tax countries. This latter finding particularly might cause the policy-oriented reader to ask whether IRS enforcement of current transfer pricing regulations is ineffective. Critics of current policy might suggest that the United States should abandon its traditional reliance on arm's-length transfer pricing to determine the international allocation of income and instead should adopt some worldwide apportionment formula or otherwise impose some minimum presumptive corporate income tax.

While the authors avoid any sweeping calls for reform, they clearly want us to take their results seriously. Their central thesis, that substantial income shifting occurs, is supported in several alternative formulations of the dependent and independent variables. Also, the authors confirm that outlier observations are not driving their results. Such a focus on individual observations is always a useful check on data entry and on subsequent inferences that can be misleading when a few extreme entries account for the significance of particular variables.

In short, the authors make good use of their data set to suggest the scope and form of tax-motivated income shifting behavior. Nevertheless, there are several additional issues that merit attention with respect to the authors' methodology and the inferences to be drawn from their results.

One question rests on a simple issue of definition. Are the subsidiaries reported by the authors majority-owned subsidiaries, or do they use a lower degree of control, such as the 10 percent ownership figure used in the benchmark survey? If the latter is true, do the same costs and benefits of income shifting apply? If the former is true, do the authors lose important information regarding the way business is conducted in certain countries? For example, according to the 1982 benchmark survey, majority-owned affiliates account for less than a quarter of all U.S. affiliate sales in Japan, and less than 10 percent of all U.S. affiliate sales in Korea. Given the lack of robustness of the Japanese country dummy in the empirical results, this ownership distinction may be relevant.

A second data question involves the sample of firms considered. The choice to use parent firms in SICs 30 to 39 means that pharmaceuticals are not included in the data set. The strength of any Irish relationship is likely to be understated by this omission, and any projected effects on manufacturing par-