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Geographic Income Shifting by Multinational Corporations in Response to Tax Rate Changes

KENNETH KLASSEN, MARK LANG, AND MARK WOLFSON*

1. *Introduction*

We investigate geographic income shifting by 191 U.S. multinational corporations in response to worldwide changes in tax rates during 1984–90. Between 1984 and 1986, the United Kingdom reduced corporate tax rates from a maximum of 45% to 35%, and in 1985 France reduced rates from 50% to 45%. Following these reductions in European rates, the United States reduced top corporate tax rates from 46% to 34% between 1986 and 1988. Canadian rates increased between 1984 and 1986 and then decreased through 1989. Beginning in 1988, numerous countries enacted tax cuts, apparently in response to those that occurred earlier in other countries.[1]

As discussed in section 3, differential changes in tax rates provide incentives for geographic income shifting by multinational firms. We identify two subperiods during 1984–90 in which relative tax rate changes

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[1] For a discussion of the causal link among countries' tax rate changes around 1986, see Whalley [1990].

allow us to test for geographic income shifting by U.S. multinationals. In particular, the 1985–86 reductions in U.K. and French tax rates, along with concurrent increases in Canadian tax rates, lead us to test for income shifting by U.S. multinationals from Canada and to Europe.[2] Similarly, in 1987, with the reduction in U.S. tax rates, we predict income shifting to the United States from all other tax jurisdictions. From 1988 to 1990, the incentives for income shifting are less clear, as many countries reduced tax rates during the period. Therefore, we provide primarily descriptive evidence on shifting during 1988–90.

Our results are consistent with geographic income shifting in response to tax rate changes during the 1980s. Controlling for the underlying profitability of firms doing business in the various geographic regions during the period, we provide evidence that U.S. multinational firms shifted income to the United States from Canada and from the United States to Europe in 1985 and 1986, consistent with increasing Canadian rates and decreasing rates in Europe. In 1987, when U.S. rates decreased and rates elsewhere were relatively constant, our evidence suggests that the sample firms shifted income to the United States. For 1988, the results generally suggest shifting from the U.S. to non-U.S. operations other than Europe and Canada, perhaps reflecting tax decreases in other countries, such as Japan and Australia. In 1989, consistent with substantial decreases in Canadian tax rates, the evidence suggests shifting to Canada from other non-U.S. operations. The extent of income shifting is generally significant, both statistically and economically. For example, the shifting we document is in the range of 2% to 4% of shareholders' equity per year on an average pretax return on equity of approximately 20%, which suggests shifting of 10% to 20% of income.

Research on the effects of income shifting in response to tax rate changes is important for several reasons. First, it provides evidence on the revenue consequences of changes in tax rates. Our evidence suggests that the revenue reduction resulting from lower U.S. tax rates may have been mitigated by a shifting of taxable income to the U.S. from other tax jurisdictions.

In addition, this research provides evidence on the extent of tax-induced geographic income shifting by multinationals. Concern has long been expressed that the United States receives too small a share of income taxes on worldwide income.[3] Stricter enforcement of income reporting by multinationals operating in the United States has been proposed as a means of increasing U.S. tax revenues, as well as

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[2] Because our analysis uses geographic segment data, which are generally not reported on a country-by-country basis, we focus on income shifting across four general regions: United States, Europe, Canada, and "other."

[3] See, for example, Martz and Thomas [1991] and Wartzman [1992] for discussions.

achieving greater tax fairness. However, there is relatively little evidence on the extent to which income shifting occurs.

Second, from a managerial perspective, this research provides indirect evidence on the trade-offs between tax and nontax factors in reporting profits. Shifting profits geographically can have implications for internal performance evaluation and incentives of managers in different countries.[4] Similarly, to the extent competitors, investors, and other financial statement users cannot distinguish tax-planning-based interruptions in the time-series process of reported profits from real changes in underlying profitability, significant nontax costs can arise from attempts to reduce the global tax burden.[5]

Third, from a research standpoint, this paper provides insights into the use of financial statement data in addressing issues of multinational taxation for U.S. firms. Financial statement information on geographic profitability and taxes presents an opportunity to investigate the effects of taxes on geographic reporting of profits by multinationals.[6] Such an investigation, however, must be undertaken with caution because of the many measurement issues involved; we discuss a number of such issues and present alternative approaches to dealing with them.[7]

In the next section, we discuss related research. In section 3, we outline the structure of taxation in the United States, along with the tax rate changes in major countries during 1984–90, and discuss the tax-planning incentives created by the changes. In section 4, we describe the data employed and the research design used to test for income shifting. Results of a simplified geographic shifting estimation procedure are presented in section 5 to provide intuition for the more detailed tests that follow in section 6. Then, we incorporate additional controls into our tests of geographic income shifting among multiple regions in section 7. Finally, we present tests of differential income shifting across firm size categories in section 8 and concluding remarks in section 9.

2. *Related Research*

Most published research on the effects of changes in tax rates on corporate behavior has focused on the U.S. Tax Reform Act of 1986

[4] See, for example, Bushman and Indjejikian [1993] and Sloan [1993] for discussions of the use of accounting information in management compensation contracts.

[5] A related issue is the usefulness of geographic data in drawing inferences about firm value. To the extent financial statement data capture the effects of income shifting for tax purposes, their usefulness in conveying information about regional profitability may be compromised.

[6] An alternative would be direct access to tax data reported to the Internal Revenue Service. Given the confidential nature of those data, however, access by researchers is generally limited.

[7] Wilkie [1991] also considers measurement issues encountered in estimating taxable income from financial statement income.

(TRA).[8] In addition to enacting tax rules with incentive consequences for a myriad of operating and financing decisions, TRA also created incentives to undertake intertemporal and geographic income shifting. Scholes, Wilson, and Wolfson [1992] examine gross profits and selling, general, and administrative expenses surrounding the implementation of TRA, and provide evidence that firms shifted income forward, consistent with the incentives provided.

Tax rate changes in the 1980s also created incentives for multinational corporations to shift income across tax jurisdictions. While tax regulations are intended to limit discretion in firms' geographic reporting of profits, it appears that discretion remains and that firms, in establishing their transfer-pricing, financing, and operating policies, consider both tax and nontax implications. For example, Wilson [1991] and Katz and Wilson [1992] present case studies illustrating trade-offs between tax and nontax factors in transfer-pricing, operating, and financing decisions.[9]

While anecdotal evidence of income shifting by multinationals has been widely reported (see, for example, Wheeler [1988] and Martz and Thomas [1991]), there is relatively little empirical research to support these reports. Harris et al. [1991] find that U.S. tax liabilities, as a fraction of both U.S. sales and U.S. assets, are lower for U.S. multinationals with subsidiaries in low-tax-rate countries than for those with subsidiaries in high-tax-rate countries. This suggests that the subsidiaries facing low foreign tax rates tend to shift income out of the United States, while those facing high foreign tax rates tend to shift income into the United States.

In addition, Grubert and Mutti [1991], using data from *U.S. Direct Investments Abroad: 1982 Benchmark Survey Data*, present evidence that U.S. multinational affiliates report more income (as a percentage of sales or shareholders' equity) in low-tax than in high-tax jurisdictions. They estimate that a drop in the statutory tax rate from 40% to 20% implies an increase in after-tax return on sales from 5.6% to 12.6% and an increase in the after-tax return on equity from 14.2% to 20.7%. These results are striking because they imply *pretax* rates of return that are higher in low-tax countries.[10] In the absence of strategic income shifting, one would expect competition and nontax costs of operating in tax haven countries to result in *lower* pretax income in these juris-

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[8] For example, Slemrod [1990] contains analyses of the effects of TRA on a wide range of economic activity. In addition, research has considered the effect of TRA on corporate reorganization activity (e.g., Scholes and Wolfson [1990]), research and development expenditures (e.g., Hines [1991]), capital structure (e.g., Givoly et al. [1992]), and the effect of changes in the alternative minimum tax rules on financial reporting strategies (e.g., Boynton, Dobbins, and Plesko [1992]).

[9] Other papers (e.g., Diewert [1985]) explicitly model trade-offs between tax and nontax factors in setting transfer prices.

[10] Hines and Hubbard [1990] document similar results.

dictions.[11] In the context of this study, these results suggest that a drop in tax rates of the magnitude experienced internationally during the 1980s could have a significant effect on corporate decisions regarding location of investment activities and transfer pricing. On the other hand, their evidence is based on cross-sectional analysis; to the extent that transfer-pricing and financial and operating policies are path-dependent (and they are likely to be significantly so), one might not expect to observe substantial changes in geographic income shifting as tax rates change.[12]

Our paper differs from those that present cross-sectional evidence of multinational tax-planning behavior in that we focus on *changes* in reported profitability across jurisdictions in response to specific tax law changes. Cross-sectional analysis captures primarily equilibrium relations between tax rates and reported profitability, while an investigation of reactions to changes in tax regimes captures the process of adjustment.

Our analysis is based on financial statement measures of geographic profitability and taxes paid. Other studies have employed financial statement data on taxes payable for U.S. operations (e.g., Harris et al. [1991]) or cross-sectional data for a single year (e.g., Grubert and Mutti [1991]). While the research question partly determines which data are preferred, an advantage of the data we use is that they provide a publicly available breakdown of reported profitability by geographic region on an ongoing basis. This feature allows verification of results, as well as extensions that build a body of evidence over time. A disadvantage of financial statement data for this type of research, discussed in more detail in the next section, is that taxable income by geographic region is not reported publicly and must be estimated. Further, our ability to identify shifting across specific countries is limited by the substantial discretion exercised by firms in defining the regions for which geographic segment data are reported.

Concurrent research by Harris [1993] addresses questions related to ours. He examines, for U.S. multinationals, the effects of TRA on capital location, as well as income shifting between U.S. and non-U.S. operations. While his results provide little evidence of income shifting for the sample as a whole, he does find evidence of increased profitability

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[11] However, higher *nontax* costs (e.g., currency and other risk) in low-tax countries would lead to higher pretax income. See Scholes and Wolfson [1992] for a more complete discussion.

[12] Other papers providing evidence of tax planning using cross-sectional data include Hines and Hubbard [1990], which documents that relatively few U.S. multinationals repatriate income through dividends from foreign subsidiaries, Hines and Rice [1990], which provides evidence that U.S. multinationals report relatively high profit rates on real and financial investments in tax haven countries, and Hines [1992], which provides evidence that U.S. multinationals tend to restrict their equity stakes in foreign subsidiaries and finance new investment with debt.

of U.S. operations for firms identified as having "high flexibility" in income shifting (based on levels of interest, research and development, rent, and advertising), although there is little evidence that the increased profitability comes at the expense of profits from non-U.S. operations.

Our analysis of income shifting differs from his in several ways. First, while he focuses on aggregate U.S. and non-U.S. profitability, we disaggregate non-U.S. operations by region in order to identify regions that are the most likely candidates for income shifting. Second, while Harris [1993] focuses exclusively on TRA, we consider the effects of international tax rate changes more generally, which are likely to confound the effects of TRA. Using profitability by region, we are able to incorporate changes in tax rates in other countries into our research design. Third, we conduct our analysis based on estimated taxable income while Harris uses unadjusted financial reporting income. Finally, we incorporate control samples of both U.S.- and non-U.S.-domiciled firms to control for differences in underlying profitabilities across regions and time. Harris incorporates only a control for U.S. operations, which limits his ability to distinguish between geographic income shifting and intertemporal shifting of U.S. income by larger firms (a result documented by Scholes, Wilson, and Wolfson [1992]).

3. Tax Rate Changes and Incentives

Expectations about changes in income-shifting behavior during our sample period depend on both the U.S. tax system and changes in tax rates in the major economies where U.S. corporations operate. A brief discussion of the factors which drive our research design and empirical tests follows.[13]

The United States imposes taxes on worldwide profits. For foreign-source income, the tax credit allowed for foreign taxes paid is limited to the amount that would have been due if taxed at the U.S. tax rate. Therefore, as a first approximation, the tax rate faced by U.S. corporations on income earned outside the United States is the higher of the U.S. and foreign tax rates. If the foreign tax rate is less than the U.S. rate, however, the tax on foreign-source income typically can be deferred until the income is repatriated to the United States. Therefore, in practice the effective tax rate (computed in a present value sense) for income first taxed in a low-tax-rate country is typically lower than if the income were first taxed in the United States. The net result is that U.S. corporations generally have an incentive to shift income from high-tax to low-tax jurisdictions. To the extent U.S. tax rates decreased

[13] The discussion of tax-planning incentives in this section is simplified to capture the most likely effects of changes in tax rates on corporate income shifting. For a more complete discussion of corporate tax planning, see Scholes and Wolfson [1992].

during the sample period relative to tax rates elsewhere, we predict income shifting from foreign operations to the United States.[14] Similarly, to the extent relative tax rates changed among countries in which non-U.S. operations were located, income should be shifted to the countries that lower their tax rates.[15]

These incentives are mitigated by various nontax costs associated with altering an established pattern of earning income. For example, while transfer pricing can be used to shift income between geographic regions, the ability of a corporation to alter its transfer-pricing mechanism can be limited by the taxing authorities. In 1988, Proposed Regulations for Section 482 of the U.S. Internal Revenue Code (embodied in the so-called *White Paper*) were designed to give the IRS significant new powers to fight corporations viewed as reporting artificially low taxable profits in the United States. Similarly, other countries, such as the United Kingdom and New Zealand, increased their efforts to limit tax avoidance through international income shifting.[16] Income can also be shifted via restructured financing arrangements. While taxing authorities have greater difficulty attacking this method, there can be significant costs associated with issuing new debt in one jurisdiction to retire debt or equity in another. Thus, it is not obvious how large a change in relative tax rates is necessary to induce changes in financing behavior.

To be more specific about the likely timing and direction of corporate income shifting, it is necessary to review changes in tax rates during the period of study. Figure 1 presents the 1984–90 time series of top corporate tax rates in the United States, Canada, Japan, Australia, and major European countries. The period 1984–86 appears to represent a single regime in which U.S. tax rates were basically constant; rates in Europe (particularly the United Kingdom and France) were falling; and rates in Canada were increasing slightly. Thus, it would

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[14] In addition to changes in enacted tax rates, changes in expected tax rates also affect the incentives to shift income. For example, the United States cannot lower tax rates significantly without expecting a reaction from other countries, as Whalley [1990] documents. To the extent that other countries were expected to lower tax rates in response to the U.S. rate changes, and tax-reducing strategies are costly and difficult to reverse, incentives to respond to the U.S. tax rate changes would have been reduced.

[15] There is an important exception to this general conclusion. As the overall tax rate in the United States was reduced, many corporations faced binding foreign tax credit limitations for the first time. These limitations provide a new incentive for corporations to shift income into low-tax-rate jurisdictions, because the United States allows worldwide averaging of foreign tax rates in calculating the foreign tax credit limit. If income is shifted into the United States from a high-tax-rate country, the savings will be the difference between the two rates; however, if the income is shifted into a low-tax-rate country, the savings will be the same difference plus the additional foreign tax credit limitation freed up by reducing the average worldwide tax rate.

[16] For a discussion of the specifics of the new policies in the United Kingdom and New Zealand, see Turro [1998] and Bell [1987].

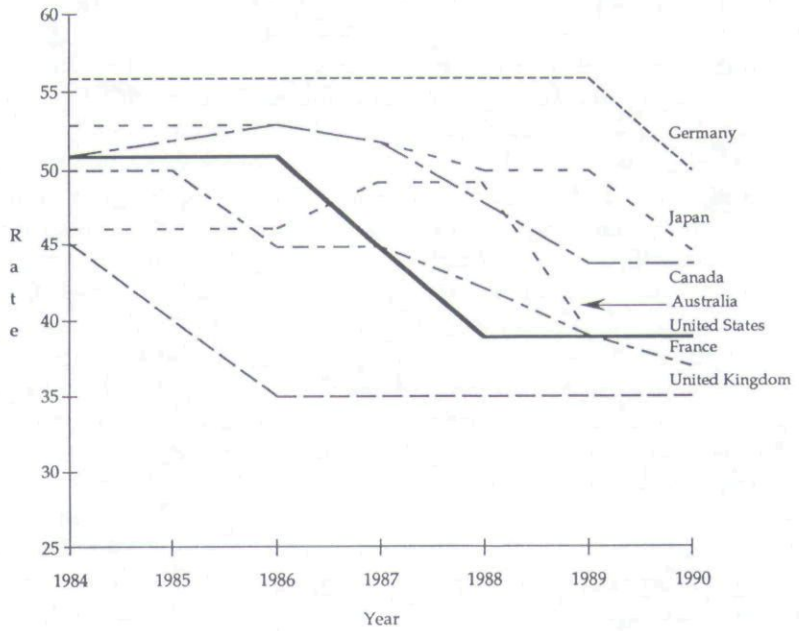

FIG. 1.—Corporate income tax rates for selected countries. This figure presents the top statutory corporate tax rates for selected countries. The tax rates are combined national and local income tax rates stated in percentages. Where different, rates used are for undistributed profits only. Tax on distributed profits is 36.0% in Germany, ranges from 50.0% in 1984 to 42.0% in 1990 in France, and ranges from 33.3% in 1984 to 35.0% in 1990 in Japan. For the United States and Japan, the rates take into account the deductibility of local tax from national tax. For Canada, the rates presented are for nonmanufacturing corporations; tax for manufacturing corporations are slightly lower. In addition, the Canadian rate assumes a provincial tax rate of 15.5% (approximately equal to the Ontario rate). Sources for this figure are the Brookings Institution [1988] and Price Waterhouse [1984–90].

seem that incentives for shifting income would be from Canada and to Europe. From 1986 to 1987, U.S. corporate tax rates were declining while rates elsewhere were unchanged or falling less significantly than in the United States.

In 1988, many countries began to adjust their rates; most notably, Canada, France, and Australia reduced their rates significantly.[17] Since U.S. rates continued to fall, overall incentives to shift income are not

[17] The pervasiveness of tax reform during this period was highlighted at the World Tax Reform Conference hosted by the Brookings Institution's Center for Public Policy Education on November 12 and 13, 1987. The conference discussed tax reform in the United States, Australia, Canada, Denmark, France, West Germany, Italy, Japan, Netherlands, Sweden, and elsewhere. See also Brookings Institution [1988] and Ernst & Whinney International [1988].

clear, and firms might face significantly different situations, depending on specific countries of operation, foreign tax credit positions, and fiscal year-end (since many tax reforms phased in tax rate changes differently for different firms depending on their fiscal year-ends). After 1988, U.S. rates leveled off, but rates in other countries continued to fall. The analysis of tax rate changes leads to clear predictions of income shifting only in the time periods 1984–86 and 1986–87. After 1987, no clear prediction is evident.

4. Research Design

We compare changes in profitability of the U.S. and non-U.S. operations for U.S. multinational firms during 1984–90. We test for increases in taxable profits in regions experiencing relative reductions in tax rates and decreases in taxable profits in regions experiencing relative increases in tax rates. We take account of differences in the underlying strength of local economies by employing two control samples—one composed of U.S.-domiciled firms (none of which overlaps with our sample firms) and another composed of non-U.S. firms.[18] Compared to our sample firms, our control firms are domestically concentrated. Consequently, while they operate in economically similar environments to our sample firms, our control firms' overall profitability should be unaffected by geographic income shifting.[19]

4.1 SAMPLE

Our sample selection begins with all U.S.-domiciled firms on *Compustat* that reported U.S. and non-U.S. identifiable assets and pretax income for all years, 1984–90 (395 observations). Firms are eliminated if book equity is below $1 million in any year (leaving 322 firms). Firms with tax loss carryforwards (*NOLs*) in any year are also excluded (leaving 201 observations). Finally, firms with estimated taxable return on shareholders' equity exceeding 1.5 in absolute value in any year are excluded, leaving 191 firms.[20]

Firms with *NOLs* are excluded from the primary analysis for several reasons. First, *NOL* firms face different tax-based incentives for income shifting, relative to incentives faced by firms paying taxes currently. Further, we do not generally know whether the carryforwards are domestic or foreign, and this information is critical to the incentives for

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[18] Although differences in accounting practices for non-U.S. firms may yield differences in reported profitability, tests based on *changes* in profitability should be relatively unaffected by accounting differences (as long as accounting rules do not change systematically over the sample period).

[19] Any geographic shifting by control firms would not affect our results since we consider only their worldwide profitability.

[20] Most observations that failed this screen were excluded by the first two filters. The remaining ten observations were, for the most part, large one-time losses.

geographic income shifting.[21] In particular, domestic *NOLs* typically create incentives to shift income into the United States while non-U.S. *NOLs* create incentives to shift income out of the United States. Second, firms with *NOLs* may face marginal tax rates ranging from 0% (if the *NOLs* are certain to expire unused) to rates well above those for profitable firms (if the *NOLs* will not be used up until a year in which marginal tax rates for profitable firms are higher than at present). Incentives for *NOL* firms to shift income to the United States following a reduction in U.S. tax rates could therefore range from very little to a great deal, depending on the particular circumstances of the *NOL* firm.[22] Third, the presence of *NOLs* suggests that the firm probably has had recent losses. This negative change in earnings will give the appearance of income shifting from the tax jurisdictions in which losses are experienced *by construction.* As a consequence, it is difficult to make predictions for the *NOL* firms. Nevertheless, for descriptive purposes we also report results for firms with *NOLs.* Although the sample sizes are small (ranging from 51 in 1984–85 to 72 in 1987–88), the results are generally consistent with those reported for the sample as a whole.

We require U.S. and non-U.S. control firms to have pretax income, tax expense, and book equity reported on *Global Vantage* for all years, 1984–90.[23] In addition, observations are excluded if book equity is less than $1 million (based on exchange rates at year-end). Finally, observations are excluded if estimated taxable return on shareholders' equity exceeds 1.5 in absolute value. The resulting control samples contain

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[21] A reading of the 1989 tax footnotes for the *NOL* firms suggests that most *NOLs* were domestic. Of 66 firms with *NOLs* in 1989, 55 disclosed a location, of which 31 were U.S., 15 were non-U.S., and 10 were both U.S. and non-U.S. While these statistics are based on *NOLs* computed for financial reporting purposes and our interest is in *NOLs* for tax purposes, we know of no reason to expect the distribution of *NOLs* to differ materially for tax and financial reporting purposes.

[22] For example, suppose a firm had a $1 *NOL* in the United States at year-end 1986, and it expected to earn $1 in U.S. profits in the future. In the absence of TRA, shifting $1 from foreign operations to the United States would eliminate the tax on that $1, but would mean that the tax on the $1 to be earned in the future would be taxed at the current rate. Therefore, if the foreign rate was below the current U.S. rate, the firm might opt not to shift into the United States. With the reduction in U.S. tax rates under TRA, shifting that $1 into the United States would become more attractive, because the value of the tax shield that is forgone by shifting income today would be reduced. Therefore, some of the shifting that would otherwise have been forgone might now be undertaken. In this case, TRA created an incentive to shift for the *NOL* firm; in other circumstances, however, TRA might not create this incentive.

[23] *Global Vantage* is essentially an international version of *Compustat.* In general, variable definitions are consistent with those for *Compustat.* However, geographic segment data are not included in the *Global Vantage* data base, perhaps reflecting the fact that geographic segment data are generally not as readily available internationally as in the United States. The data base includes approximately 7,000 industrial firms, of which 3,000 are domiciled in the United States and an additional 4,000 are distributed across 32 other countries.

1,446 U.S. firms and 2,095 non-U.S. firms. For non-U.S. corporations, balance sheet amounts are translated into dollars using year-end exchange rates, and income statement amounts are translated at average exchange rates for the year. This approximates the "current rate" method used by most U.S. corporations in translating financial results for their U.S. subsidiaries to dollars.[24]

Table 1 presents a summary of the distributions of several variables within these four groups: U.S. and non-U.S. operations of U.S. multinationals, U.S. control companies, and non-U.S. control companies. On average, the U.S. multinational corporations are larger than the companies in the control samples. While the non-U.S. operations of our sample of U.S. multinationals are roughly the same size as the two control samples, the U.S. operations of our sample multinationals are approximately twice as large as the control firms.[25]

4.2 ESTIMATED TAXABLE INCOME AND THE RETURN METRIC

Our interest is in the shifting of *taxable* income, as opposed to income reported to shareholders. The timing of revenues and expenses can differ significantly for these two purposes.[26] Using financial statement data, we estimate taxable income (TI) in year t for firm j in region i, by applying the following general formula:

$$TI_{t,i,j} = PTI_{t,i,j} + \frac{DT_{t,i,j}}{TR_{t,i,j}} \tag{1}$$

where (dropping the firm-specific subscript):

i = {U.S., non-U.S.};
t = {1984, 1985, 1986, 1987, 1988, 1989, 1990};
$PTI_{t,i}$ = pretax income for financial reporting purposes;
$DT_{t,i}$ = deferred tax expense if reported, and zero otherwise;[27]

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[24] This method assumes that all sample firms apply the local currency as their functional currency in translating foreign operations to U.S. dollars. The dollar is the functional currency for some non-U.S. operations of our sample firms, and our approach will add noise to the control sample in these cases. As a sensitivity check, we also conduct our tests using year-end exchange rates to translate all non-U.S. denominated items (essentially preserving return on equity as reported in the home country), with very similar results.

[25] Because firm size may affect profitability and the incentives and ability to shift income, we explicitly control for firm size in the analysis that follows.

[26] Financial statement income also differs from taxable income because of permanent differences. As a sensitivity check, for a subset of our tests we estimate the effects of permanent differences as the difference between tax expense as reported and pretax income multiplied by the statutory tax rate. The results are very similar to those reported.

[27] Firms are required to report deferred tax expense if it is material. Where deferred taxes are not reported, we set their value to zero. While such an assumption may add some noise to the analysis, it should not bias the results.

TABLE 1

Summary of Size and Return Distributions of Sample and Control Firms

Variable	Number of Observations	Mean	Standard Deviation	Median
U.S. Operations of Sample Corporations				
Book Equity ($ M)	191	1,488	3,177	376
Pretax Return on Book Equity	191	0.226	0.238	0.230
Change in Return on Book Equity	191	−0.017	0.220	−0.013
Non-U.S. Operations of Sample Corporations				
Book Equity ($ M)	191	611	1,654	129
Pretax Return on Book Equity	191	0.273	0.205	0.257
Change in Return on Book Equity	191	0.002	0.185	0.004
U.S. Control Corporations				
Book Equity ($ M)	1,446	497	1,429	95
Pretax Return on Book Equity	1,446	0.170	0.270	0.204
Change in Return on Book Equity	1,446	−0.026	0.265	−0.018
Non-U.S. Control Corporations				
Book Equity ($ M)	2,095	591	1,922	163
Pretax Return on Book Equity	2,095	0.199	0.190	0.183
Change in Return on Book Equity	2,095	0.011	0.165	0.005

Data are for the U.S. and non-U.S. operations of the 191 sample firms and the 1,446 U.S. and 2,095 non-U.S. control firms. Sample firms' and control firms' data are from the *Compustat* and *Global Vantage* data bases, respectively. Statistics are based on pooled data for 1984–90. Book Equity is the book value of total shareholders' equity. For the sample firms, the firm-wide book value of shareholders' equity is allocated based on the proportion of identifiable assets reported for U.S. and non-U.S. segments in the geographic segment reporting. Pretax Return on Shareholders' Equity is estimated taxable income divided by book equity. Change in Return on Book Equity is the change from the preceding year in the pretax return on book equity.

$TR_{t,i}$ = effective tax rate for the corporation, computed as $TR_{t,i} = \frac{TE_{t,i}}{PTI_{t,i}}$ if $TR_{t,i}$ is in the range 0.20–0.75 and the average for that region and year otherwise;[28] and

$TE_{t,i}$ = income tax expense.

This approach reflects the fact that, under *Statement of Financial Accounting Standards No. 96: Accounting for Income Taxes* (FASB [1987]), the tax applicable to temporary differences must be recorded as an expense (or reduction of an expense) based on the current statutory tax

[28] We use the effective tax rate rather than the statutory rate for two reasons. First, the appropriate statutory rate is not clear for the non-U.S. operations of U.S. firms. Second, this approach implicitly adjusts for permanent differences since the difference between the statutory and effective tax rates reflects permanent differences. We conducted a preliminary analysis using U.S. statutory tax rates for the sample firms with similar results.

rate. Therefore, pretax timing differences can be estimated by dividing deferred tax expense by the tax rate.[29]

Our tests are based on estimated taxable income as a percentage of shareholders' equity.[30] Because this quantity is not reported separately for U.S. and non-U.S. operations, we allocate shareholders' equity based on U.S. and non-U.S. assets reported in the geographic segment disclosures.[31] The change in taxable return on equity is computed as:

$$\Delta ROE_{t,i,j} = \frac{TI_{t,i,j}}{BE_{t,i,j}} - \frac{TI_{t-1,i,j}}{BE_{t-1,i,j}} \tag{2}$$

where (dropping the firm-specific subscript):

i = {U.S., non-U.S.};
t = {1985, 1986, 1987, 1988, 1989, 1990};
$TI_{t,i}$ = estimated taxable income (as defined in equation (1));
$BE_{t,i}$ = book value of stockholders' equity; for our sample of U.S. multinational firms, it is computed as:

$$BE_{t,i} = SHE_t \times \frac{IA_{t,i}}{IA_{t,US} + IA_{t,Non\text{-}US}};$$

SHE_t = book value of stockholders' equity for the entire company; and
$IA_{t,i}$ = identifiable assets.

Table 1 indicates that our sample of U.S. multinationals is generally more profitable than the control companies and that U.S. operations are less profitable than non-U.S. operations. Pooling all seven years, the

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[29] Companies that had not adopted *SFAS No. 96* would reverse timing differences at the historical tax rate, in which case our measure would tend to be overstated. However, since this procedure was applied to the control firms as well, the effect of the mismeasurement should only increase the noise in the tests.

[30] We also conduct tests using return on assets and return on market equity as our dependent variables. Given that taxable income is computed after interest expense, shareholders' equity would seem to be a more appropriate deflator than assets. Because market value of equity is sensitive to changes in price–earnings multiples and our sample period includes the stock market crash of 1987, book value of equity would seem to be a more appropriate deflator than market value. Conclusions are not sensitive to the choice of deflator, however.

[31] A potential concern in using assets to allocate equity is that *SFAS No. 94* changed the criteria for consolidation, requiring the consolidation of finance subsidiaries. This change should not generally affect profitability (since most of the sample firms include income from equity method investments in pretax income). However, to the extent that finance subsidiaries are concentrated in the United States, a change in consolidation policy could affect the worldwide distribution of assets in the financial statements, and hence the allocation of equity. For our sample, 3 changed consolidation policy in 1987, 32 in 1988, and 3 in 1989. Reestimating the regressions excluding those firms does not change the conclusions.

taxable return on book equity has a mean of 22.6% and 27.3% for the U.S. and non-U.S. operations of the U.S. multinationals, respectively, while the means are only 17.0% and 19.9% for the U.S. and non-U.S. control firms, respectively.[32] The *change* in taxable return on equity, our dependent variable, however, is more similar for sample and control firms: −1.7% and 0.2% versus −2.6% and 1.1% for U.S. and non-U.S. operations of sample and control firms, respectively.

Taken at face value, these mean comparisons are consistent with a small amount of geographic income shifting to the United States from foreign tax jurisdictions during 1984–90. Specifically, the change in U.S. taxable return on equity is 0.9% per year higher (and the change in non-U.S. taxable return on equity is 0.9% per year lower) for our sample firms relative to our control firms.[33] This "shift" is equal to 4% of average pretax return on equity. Our primary interest, however, is to test for income shifting during periods immediately following changes in tax rates. Moreover, we wish to adjust for other factors that may differ between our sample and control firms.

4.3 TESTING PROCEDURE: SHIFTING INCOME TO AND FROM THE U.S.

To investigate whether income was shifted from one area to another, we compare the change in taxable income, normalized by book equity (ΔROE), for U.S. multinational operations and the control firms. Our tests are based on a regression of the change in *ROE* on dummy and control variables. Our design incorporates the notion that income shifting implies that one region's gain in income is another region's loss, so the dependent variable (ΔROE) enters the regression with opposite signs for different geographic locations. With the addition of geographic and size control vectors (*GEO* and *SIZE*), our basic regressions to test for shifting to or from the U.S., estimated cross-sectionally year to year, take the form:

$$k \cdot \Delta ROE_{t,i,j} = \alpha_t + \beta_t\, GS_{i,j} + \gamma_{1,t}\, GEO_{t,i,j} + \gamma_{2,t}\, SIZE_{t,i,j} + \varepsilon_{t,i,j} \quad (3)$$

where:

i = {U.S., non-U.S.};

t = {1985, 1986, 1987, 1988, 1989, 1990};

k = $\begin{cases} 1 \text{ when } i = \text{U.S., denoting U.S. observations;} \\ -1 \text{ when } i = \text{non-U.S., denoting non-U.S. observations;} \end{cases}$

$\Delta ROE_{t,i}$ = change in estimated taxable income deflated by book equity as defined in equation (2);

GS_i = the geographic shift variable:
$\begin{cases} 1 \text{ for sample firms;} \\ 0 \text{ for control firms;} \end{cases}$

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[32] These differences are statistically significant at the 0.01 level in a two-tailed test.

[33] These differences are jointly significant at the 0.05 level in a two-tailed test.

$GEO_{t,i}$ = vector of six geographic variables representing the proportion of the non-U.S. assets in Africa, Asia, Europe, the Pacific, Canada, and South America for the sample firms;[34] for non-U.S. control firms, this is a vector of zeros except for the area of domicile, in which case the independent variable takes on a value of one; for U.S. operations of sample firms and U.S. control firms, this is a vector of zeros; and

$SIZE_{t,i}$ = vector of dummy variables corresponding to the largest four size quintiles as defined by the sample firms.

The coefficient on *GS* is of primary interest, while *GEO* and *SIZE* are included to control for differences in profitability changes due to geographic location and firm size. β_t captures the extent to which the difference in ΔROE between the U.S. and non-U.S. operations of the U.S. multinational firms diverges from the mean difference in ΔROE between the U.S. and non-U.S. control firms. If firms shift income into the U.S., β_t should be positive.

The data set contains two observations per sample firm per year, one for U.S. and one for non-U.S. operations, assuming the profitabilities of the two regions are independent absent tax-based income shifting. To the extent U.S. and non-U.S. profitability are negatively correlated, the number of degrees of freedom in the data is less than the nominal number of observations. For our sample, however, the profitabilities of U.S. and non-U.S. operations are, in fact, *positively* correlated at the 0.12 level for the entire period, which should bias against our finding evidence of geographic income shifting. The positive correlation is not surprising, given that many influences on profitability are likely to be common across regions (e.g., brand recognition, production efficiencies, and corporate management). Similarly, the allocation of indirect costs such as interest and selling, general, and administrative expenses across regions is likely to induce positive correlation in profitability.

4.4 GEOGRAPHIC SEGMENT INFORMATION

We use the geographic segment disclosures of our sample companies in two ways. First, we use geographic regions to improve the control for cross-sectional differences in the underlying profitability of local economies, as discussed in detail in this section. Second, we use geographic information to identify more specifically where income is being shifted to or from. Because changes in tax rates outside the United States are not perfectly correlated across countries, we are able to test differential predictions of income shifting across non-U.S. regions, using the geographic segment data.

It is important to include geographic control variables since there is significant worldwide variation in the underlying profitability of corporations. To construct indicator variables for U.S. multinationals,

[34] The sum of the elements of this vector is one for the non-U.S. operations of sample firms.

TABLE 2

Distributions of Sample and Control Firms by Continent, Size, and Industry

	Sample Firms		U.S. Control Firms		Non-U.S. Control Firms	
Variable	Number	Percentage	Number	Percentage	Number	Percentage
Panel A: Continent						
Africa	N/A[a]	3.7			68	3.2
Asia	N/A	10.6			616	29.4
Europe	N/A	48.8			1,094	52.2
Pacific	N/A	6.4			108	5.2
North America	N/A	21.5			205	9.8
South America	N/A	9.0			4	0.2
Total Non-U.S.	191.0	100.0			2,095	100.0
United States	191.0	100.0	1,446	100.0		
Panel B: Book Value of Shareholders' Equity						
Quintile 1	38	19.9	621.0[b]	43.0	118.0[b]	5.6
Quintile 2	38	19.9	313.1	21.6	360.1	17.2
Quintile 3	39	20.4	237.7	16.4	622.6	29.7
Quintile 4	38	19.9	157.5	10.9	542.2	25.9
Quintile 5	38	19.9	116.7	8.1	452.1	21.6
	191	100.0	1,446.0	100.0	2,095.0	100.0

six regions (roughly following *Compustat*'s codification) are defined: Africa, Asia (which includes Japan), Europe, Pacific, Canada, and South America (including Mexico and Central America). Identifiable assets are then used to determine the proportion of operations in each area. If two or more areas are aggregated in the segment disclosure, the assets are allocated equally among the disclosed continents or countries. When *Compustat* records the assets as coming from "other" countries, these assets are allocated to areas not otherwise disclosed, in the proportions found in the entire U.S. multinational sample.[35]

For non-U.S. control firms, geographic segmental disclosures are not common outside North America. Therefore, even though many of the control firms are multinational to some degree, the geographic control variables take on the value one when the control firm is incorporated in a country in this area, and zero otherwise. While some noise is introduced by these allocation rules, we believe that the potential importance of geographic control variables outweighs the inaccuracies introduced.[36] A summary of the geographic control variables is found in table 2, panel A. The table suggests that Europe is the largest region

[35] This allocation is: Africa, 2.4%; Asia, 9.8%; Europe, 53.0%; Pacific, 5.7%; Canada, 21.3%; and South America, 7.8%. Approximately 10% of the assets were allocated in this manner.

[36] Results for income shifting between U.S. and non-U.S. operations are generally similar when no attempt is made to control for the specific locations of non-U.S. operations.

TABLE 2—*continued*

Variable	Sample Firms		U.S. Control Firms		Non-U.S. Control Firms	
	Number	Percentage	Number	Percentage	Number	Percentage
Panel C: Primary Industry						
Mining	0	0.0	18	1.2	95	4.5
Oil and gas	10	5.2	48	3.3	84	4.0
Construction	3	1.6	32	2.2	147	7.0
Food	7	3.7	49	3.4	162	7.7
Textiles	1	0.5	52	3.6	66	3.2
Wood and paper	8	4.2	55	3.8	84	4.0
Publishing	4	2.1	40	2.8	41	2.0
Chemical products	36	18.9	69	4.8	169	8.1
Plastics and rubber	5	2.6	34	2.4	33	1.6
Cement, clay, etc.	1	0.5	8	0.6	85	4.1
Metals	12	6.3	80	5.5	142	6.8
Industrial machinery	21	11.0	70	4.8	118	5.6
Computers	12	6.3	100	6.9	33	1.6
Electronic products	11	5.8	81	5.6	113	5.4
Transportation	13	6.8	50	3.5	80	3.8
Instruments	21	11.0	90	6.2	72	3.4
Public services	4	2.1	247	17.1	182	8.7
Retail trade	7	3.7	208	14.4	284	13.5
Credit and brokers	7	3.7	9	0.6	4	0.2
Services	8	4.2	106	7.3	101	4.8
	191	100.0	1,446	100.0	2,095	100.0

[a]N/A = not applicable. Since sample firms typically have operations in more than one continent, the *number* of non-U.S. sample operations in each continent is not meaningful.

[b]Firms may change quintiles from year to year. These are averages over the entire period, 1984–90.

Data are for the 191 sample firms and the 1,446 U.S. and 2,095 non-U.S. control firms during 1984–90. Sample firms' and control firms' data are from the *Compustat* and *Global Vantage* data bases, respectively. Number is the number of observations in a given category and Percentage is the proportion of the total in that category. The geographic distribution across continents for the non-U.S. operations of the sample firms in panel A is based on the estimated proportion of the identifiable non-U.S. assets of the firm in each continent from the geographic segment disclosure. For the non-U.S. control firms, classification is based on country of incorporation. The U.S. operations of the sample firms and the U.S. control firms are classified as U.S. Size distribution is determined using the book value of shareholders' equity and firms are categorized into quintiles based on the distribution of book value of equity for the U.S. and non-U.S. operations of sample firms. Primary Industry classification is based on the primary SIC code classification for the firm.

for the non-U.S. operations of the sample firms and for the non-U.S. control firms, accounting for approximately 50% of the operations for each sample. However, the non-U.S. operations of the sample firms and the non-U.S. control firms differ somewhat in terms of their representation in Asia (11% of the sample firms' non-U.S. assets versus 29% of the control firms'), North America (22% of the sample firms' non-U.S. assets versus 10% of the control firms') and South America (9% of the sample firms' non-U.S. assets versus 0% of the control firms').[37]

[37] The empirical tests explicitly control for profitability by region, which should eliminate any effect of the differences in regional representation for the sample and control firms.

4.5 SIZE CONTROL VARIABLES

Because firm profitability may be a function of firm size, we include size quintiles, based on book value of equity, as a control variable. The portfolio cutoffs are determined based on the size quintiles of the U.S. and non-U.S. operations of the sample firms each year. A summary of the average number of firms in each portfolio is reported in panel B of table 2. The proportion of U.S. control firms ranges from 43% in the smallest quintile to 8% in the largest quintile, reflecting the fact that U.S. control firms are, on average, smaller than the sample firms. The criteria for inclusion in the sample effectively select large multinational firms. The non-U.S. control firms are more evenly split over the four largest size quintiles, but relatively few (6%) appear in the smallest size quintile, probably reflecting the *Global Vantage* focus on large non-U.S. corporations.[38]

5. *Results for Shifting to and from the United States*

Figures 2 and 3 present the average taxable return on equity, after controlling for size and geographic location, for four groups of companies: figure 2 shows the U.S. operations of U.S. multinationals and U.S. control firms, while figure 3 contains the non-U.S. operations and non-U.S. control firms. The values were determined by using the statistically fitted changes in return on equity from equation (3) and the average 1984 return on equity as a starting level. For the initial two periods, the U.S. multinational and control companies perform approximately the same both in the United States and abroad, although the non-U.S. operations of the U.S. multinationals perform somewhat better than their non-U.S. counterparts in 1985. During 1987, however, systematic differences are apparent. In particular, the U.S. operations of U.S. multinationals perform better than their U.S. control counterparts, while their non-U.S. operations perform worse—consistent with income being shifted into the United States. In 1988, however, the U.S. operations of the multinationals perform *worse* than their U.S. control counterparts, while their non-U.S. operations perform *better.* In the remaining two years, the changes in profitability return to a pattern consistent with modest shifting to the United States.

These patterns are evident from figure 4, which presents the difference in the change in pretax return on equity for the U.S. multinationals and the control companies.[39] For the control sample, the difference in profitability drops consistently, indicating a growing profitability gap between the U.S. and non-U.S. operations. Similarly, the profitability difference for U.S. multinational operations drops for 1984–85 and

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[38] Our use of the size controls should eliminate potential problems with size differences between the sample and control firms.

[39] Basically this is a plot of average $\Delta ROE_{t,US}$ minus average $\Delta ROE_{t,non\text{-}US}$ for the sample and control companies.

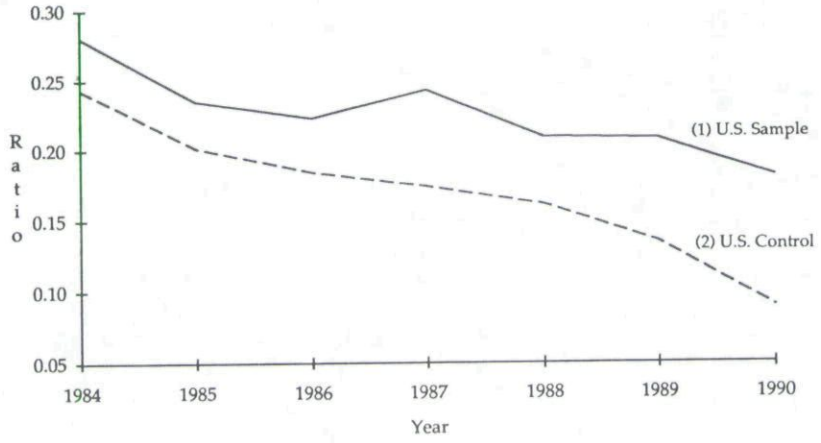

FIG. 2.—Pretax return on book equity for U.S. operations of sample companies and U.S. control companies. A more positive slope for the sample companies, relative to the control companies, is consistent with shifting income to the U.S. operations of the sample companies.

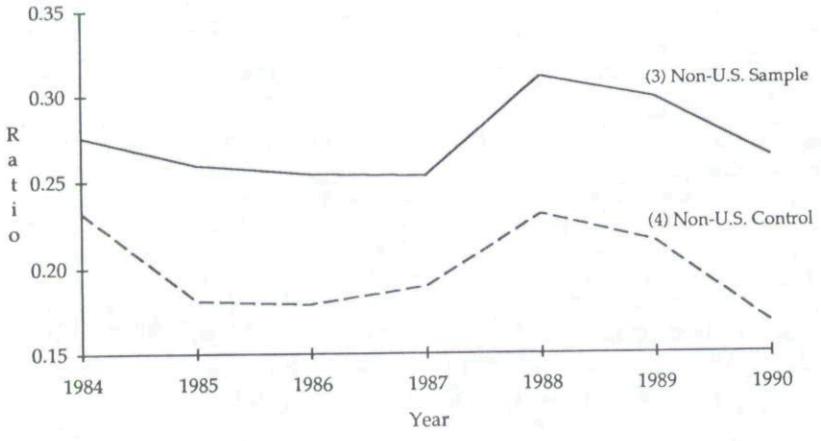

FIG. 3.—Pretax return on book equity for non-U.S. operations of sample companies and non-U.S. control companies. A more positive slope for the sample companies, relative to the control companies, is consistent with shifting income to the non-U.S. operations of the sample companies.

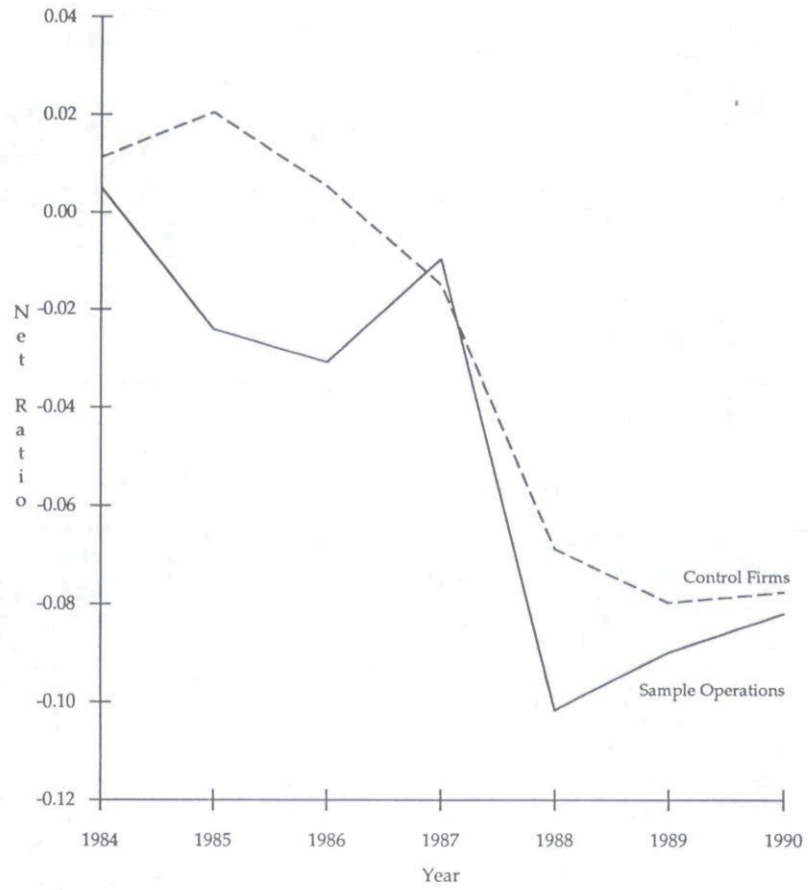

FIG. 4.—Difference in pretax return on book equity between U.S. and non-U.S. sample operations and control firms. The lines on this graph represent the difference between the average U.S. and non-U.S. taxable return on equity. A positive slope means the U.S. operations (companies) performed relatively better than the non-U.S. operations (companies). A more positive slope for the sample operations, relative to the control firms, is consistent with shifting income into the United States.

1985–86. The profitability difference then jumps in 1986–87, indicating an increase in the relative profitability for the U.S. operations of these firms, consistent with TRA-induced geographic income shifting in 1987.

Results of estimating equation (3) for our sample and control firms are presented in table 3. The primary focus of this table is the coefficient in the *GS* variable; positive values signify shifting of income to the United States. The coefficient of 0.023 is significantly positive (*t*-value of 1.97) in 1986–87 as predicted.[40] This suggests that, on average, there

[40] In the discussion of the empirical results that follow, significance is determined based on the 0.05 level in a two-tailed test unless stated otherwise.

TABLE 3

Regression Results Testing for Income Shifting between the U.S. and Aggregate Non-U.S. Operations of Sample Firms[a,b]

$$k \cdot \Delta ROE_{t,i,j} = \alpha_t + \beta_t\, GS_{i,j} + \gamma_{1,t}\, GEO_{t,i,j} + \gamma_{2,t}\, SIZE_{t,i,j} + \varepsilon_{t,i,j}$$ [c]

Variable	1984–85	1985–86	1986–87	1987–88	1988–89	1989–90
Regression Coefficients						
Intercept	−0.039	−0.008	−0.011	−0.013	−0.021	−0.044
	(−5.403)	(−1.074)	(−1.502)	(−1.672)	(−2.769)	(−5.635)
GS:						
Non-U.S. to (from)	−0.013	0.001	0.023	−0.019	0.010	0.002
the U.S.	(−1.102)	(0.090)	(1.974)[d]	(−1.652)[e]	(0.816)	(0.136)
GEO:						
Africa	0.144	−0.017	−0.020	−0.069	0.035	0.154
	(5.779)	(−0.626)	(−0.757)	(−2.674)	(1.328)	(5.768)
Asia	0.104	0.025	−0.013	−0.023	0.023	0.065
	(9.935)	(2.268)	(−1.184)	(−2.115)	(2.101)	(5.897)
Europe	0.098	0.013	0.005	−0.041	0.047	0.090
	(11.890)	(1.528)	(0.595)	(−4.842)	(5.424)	(10.086)
Pacific	0.024	0.042	−0.004	0.023	0.014	0.107
	(1.180)	(1.962)	(−0.210)	(1.099)	(0.662)	(5.016)
Canada	0.061	0.046	−0.026	0.039	0.054	0.116
	(4.159)	(2.969)	(−1.755)	(2.584)	(3.498)	(7.430)
South America	0.022	0.084	−0.061	−0.099	0.041	0.009
	(0.309)	(1.083)	(−0.797)	(−1.334)	(0.532)	(0.122)
SIZE:						
Size 2	0.002	−0.029	−0.004	0.007	−0.015	0.002
	(0.218)	(−2.647)	(−0.344)	(0.661)	(−1.352)	(0.176)
Size 3	−0.004	−0.005	0.007	0.002	0.003	−0.007
	(−0.414)	(−0.486)	(0.612)	(0.210)	(0.255)	(−0.611)
Size 4	−0.012	−0.008	0.009	−0.009	−0.000	0.009
	(−1.095)	(−0.677)	(0.804)	(−0.812)	(−0.041)	(0.809)
Size 5	−0.001	−0.010	0.008	−0.011	−0.007	0.007
	(−0.098)	(−0.814)	(0.672)	(−0.907)	(−0.607)	(0.598)
R^2	.054	.006	.003	.016	.011	.045

[a]The regression results reported here are based on U.S. and non-U.S. operations of the 191 sample firms and the 1,446 and 2,095 firms in the U.S. and non-U.S. control firms. *T*-statistics are noted in parentheses.

[b]Coefficients are significant at the 5% level for *t*-values greater than 1.96, in absolute value, using a two-tailed test and 1.65 using a one-tailed test (a one-tailed test is used for geographic shifting where expectations can be unambiguously determined, two-tailed for all others). Coefficients are significant at the 1% level for *t*-values greater than 2.57 and 2.33, in absolute value, for one-tailed and two-tailed tests, respectively.

[c]ΔROE is the change in estimated taxable income over book equity. k is equal to 1 for U.S. operations of the sample firms and the U.S. control firms, and −1 for non-U.S. operations of the sample firms and the non-U.S. control firms. *GS* takes on the value 1 for the sample firms and 0 for control firms. The coefficient on this variable can be interpreted as the amount of return on equity shifted to (from) the United States in a given year. The *GEO* variables include Africa, Asia, Europe, Pacific, Canada, and South America. They take on values equal to the proportion of non-U.S. assets in these areas for sample firms and 1 for the control firm incorporated in these areas (otherwise 0). The four size variables (size 2, size 3, size 4, and size 5) are equal to 1 if the firm falls in the second, third, fourth, and fifth size quintile, respectively (otherwise 0). Quintiles are determined using the allocated book value of shareholders' equity of the sample firms.

[d]Significant at the 2.4% level (one-tailed test).

[e]Significant at the 9.9% level (two-tailed test).

was a 2.3% increase in the U.S. profitability of U.S. multinationals relative to their purely domestic counterparts. Based on an average return on equity of 22.6% (from table 1), the 2.3% increase suggests a 10% increase in the profitability of U.S. operations as a result of income shifting. This magnitude of shifting seems both feasible and economically significant.

The shifting variable largely reverses in 1987–88 and is statistically significant at about the 0.10 level. This reversal may seem unexpected given that U.S. tax rates continued to fall in 1988. Recall, however, that tax rates elsewhere also began to fall then. Therefore, it is possible that U.S. multinational corporations shifted income into the United States in 1987 to capture the relatively low rates in that year, and then began to reverse their strategy as rates around the world declined. We probe this pattern in our examination of shifting to specific geographic areas outside the United States, reported in the next section.[41]

With the addition of the geographic area controls for the regressions reported in table 3, the intercept represents the average ΔROE for U.S. observations (also depicted in figure 2, panel A), after taking into account the geographic income shifting and size variables. In 1984–85, the geographic area (*GEO*) coefficients are all positive, and most are statistically significant. These coefficients are determined by the profitability of non-U.S. operations relative to that of U.S. operations; however, since the sign of ΔROE is the reverse of that for non-U.S. observations, the *GEO* coefficients are basically the sum of $\Delta ROE_{t,US}$ and $\Delta ROE_{t,region}$. Thus, a coefficient of 0.098 for Europe in 1984–85 means that the average ΔROE for European observations, controlling for size and shifting, was −0.059 (calculated as $-\alpha_{1984-85} - \gamma_{EUR,1984-85}$). This indicates that during 1985, changes in profits outside the United States, particularly in Europe and Asia, were large and negative. The same picture emerges from 1985–86 but to a lesser degree. In 1986–87 the geographic area coefficients are generally negative and insignificant, which (combined with a negative intercept) implies an average positive ΔROE for non-U.S. firms. In 1987–88, results are mixed: the coefficients for Europe, Africa, and Asia are significantly negative, while the coefficient for Canada is significantly positive. In 1988–89 and 1989–90, the pattern is similar to 1984–85 and 1985–86, as the coefficients are consistently positive and generally significant.

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[41] The pattern in coefficient estimates on the *GS* variable is generally consistent for the sample of firms reporting *NOLs* in a given year, although there is no evidence of a reversal in 1987–88:

	1984–85	1985–86	1986–87	1987–88	1988–89	1989–90
GS:						
Coefficient	−0.022	0.014	0.038	0.027	−0.002	0.025
(*t*-value)	(−1.069)	(0.695)	(2.097)	(1.495)	(−0.092)	(1.209)
[*N*]	[51]	[63]	[69]	[72]	[66]	[66]

The four size coefficients are determined relative to the smallest size quintile. With the exception of the second quintile in 1985–86, the estimated coefficients are not statistically significant. One interpretation of this finding is that once the other factors are considered, there is not a significant difference in the dependent variable across the five size classifications. Thus, while the control companies are smaller than the U.S. multinational companies, this difference is apparently unimportant in explaining *changes* in profitability.

6. *Industry Control Issues*

One potential source of cross-sectional variation not controlled for in the above regressions is industry membership. A review of the industry composition (in panel C of table 2) suggests that, while both the sample and control firms are distributed across a wide range of industries, there are some differences in industry concentrations. Such differences are expected, since the U.S. multinational sample consists only of multinational firms while the control samples are primarily domestic-only firms. In particular, it seems likely that industries differ in the extent to which they exhibit economies or diseconomies of globalization.

For example, table 2 suggests that public service (e.g., public transportation and utilities) and retail trade companies are underrepresented in the test sample relative to the control sample, while chemical companies are overrepresented. This is probably to be expected given that, in general, the operations of public service companies tend to be very localized and retail trade is unlikely to enjoy economies of globalization given the reliance on local tastes and distribution channels, while chemical manufacturers and pharmaceutical companies are more likely to enjoy strong economies of globalization because demand is relatively invariant across countries and the production process is global in nature. Therefore, a simple attempt at industry control is likely to be ineffective (e.g., domestic-only and multinational pharmaceutical companies are likely to differ systematically as evidenced by their locational choices). As a result, our primary tests do not specifically incorporate industry controls, although tests with industry controls were conducted with results similar to those reported here.

An alternative to a standard industry control is to control for "multinationality." That is, if multinational corporations are systematically more or less sensitive to changes in the underlying economies in which they operate, or if they are overrepresented in some industries for which the underlying economic environment differs from that faced by the industries more heavily represented by the control firms, then the results reported in table 3 may reflect these confounding effects. To mitigate this possibility, a separate intercept is fitted for the U.S. multinational firms, as compared with the control firms. This procedure

should also capture differences in overall profitability as a result of differences in industry composition across the samples.

In addition to controlling for multinationality, the tests that consider shifting to more than one geographic area factor in the notion that income shifted from one jurisdiction must match income shifted to another (i.e., the sum of all income shifted must equal zero). By forcing the regression coefficients to have this relationship, we are able to ensure that the tests are not capturing some other differences between the U.S. multinational operations and their control counterparts. Thus, like the separate intercepts, this constraint addresses the potential problem that makes industry controls desirable. To ensure that the income-shifting relationship holds, we constrain our regression coefficients to satisfy this netting condition. In the next section, the specific form of the constraint is described.

7. *Tests of Shifting among Multiple Geographic Areas*

From our review of global changes in tax rates, we argue that managers of U.S. multinational corporations had incentives to shift income from Canada and to Europe during 1984–86, and then shift income to the United States from the rest of the world during 1986–87. Changes in tax rates in many countries after 1987 suggest further incentives for shifting, although a direction is more difficult to predict ex ante. In this section we present tests of the hypotheses relating to 1984–86 and 1986–87. We also discuss findings for the period after 1987.

While geographic segment information can be used in these specific tests, Europe and Canada are the only regions for which there are sufficient observations to construct tests of income shifting. Therefore, we conduct tests of income shifting among the United States, Europe, Canada, and "other" countries for a subset of the observations. To implement this test, four variables are constructed for U.S., Europe-only, Canada-only, and "other" operations (*US*, *EUR*, *CDA*, and *OTH*, respectively). For U.S. multinational firms, the U.S. variable takes a value of one for U.S. operations, the Europe-only (Canada-only) variable contains the proportion of non-U.S. assets in the Europe-only (Canada-only) segments, and the "other" variable contains the proportion of non-U.S. assets not in the Europe-only or Canada-only segments. All four variables take a value of zero for all U.S. and non-U.S. control firms. There are 99 companies that have a Europe-only segment and 49 that have a Canada-only segment. This vector of four variables replaces the *GS* variable from equation (3). Note that while *GS* took on a value of one for the non-U.S. operations of our sample firms in equation (3), the three non-U.S. components of *GS sum* to one in equation (4) below.

With this addition, plus the "multinationality" control discussed above, the regression equation becomes:

$$k \cdot \Delta ROE_{t,i,j} = \alpha_{1,t}\, k \cdot IMN_{i,j} + \alpha_{2,t}\, k \cdot ICO_{i,j} + \beta_t\, GS'_{t,i,j} + \gamma_{1,t}\, GEO_{t,i,j} + \gamma_{2,t}\, SIZE_{t,i,j} + \varepsilon_{t,i,j} \quad (4)$$

where:

i = {U.S., non-U.S.};
t = {1985, 1986, 1987, 1988, 1989, 1990};
k = {1 when i = U.S., denoting U.S. observations; −1 when i = non-U.S., denoting non-U.S. observations};
$\Delta ROE_{t,i}$ = change in estimated taxable income deflated by book equity as defined in equation (2);
IMN_i = intercept for sample firms: {1 for sample firms, 0 for control firms};
ICO_i = intercept for control firms: {1 for control firms, 0 for sample firms};
GS'_i = the geographic shift vector: {(*EUR, CDA, OTH, O*) for the non-U.S. operations of sample firms with values equal to the proportion of non-U.S. assets in Europe, Canada, and the rest of the world; (0, 0, 0, 1) for U.S. operations of sample firms; and (0, 0, 0, 0) for control firms}
$GEO_{t,i}$ = vector of six geographic variables representing the proportion of the non-U.S. assets in Africa, Asia, Europe, Pacific, Canada, and South America for the sample firms; for a control firm the variables take on a value of zero for all variables except its domicile, for which it takes on a value of one; and
$SIZE_{t,i}$ = vector of dummy variables corresponding to the largest four size quintiles as defined by the sample firms.

To incorporate the constraint that the algebraic sum of geographic income shifted is zero, the b regression coefficients are constrained in the following way:

$$BE_{EUR} \cdot \beta_{EUR} + BE_{CDA} \cdot \beta_{CDA} + BE_{OTH} \cdot \beta_{OTH} - BE_{US} \cdot \beta_{US} = 0 \quad (5)$$

where:

i = {*EUR, CDA, OTH, US*};
BE_i = average book equity of the sample firms for area i; and
β_i = coefficient relating to element i of the GS' vector.

Using the means generated by the data and normalizing by BE_{US}, the specific condition becomes:

$$0.1340 \cdot \beta_{EUR} + 0.0436 \cdot \beta_{CDA} + 0.2329 \cdot \beta_{OTH} - \beta_{US} = 0. \quad (5')$$

Table 4 contains the results from the regression in equation (4) with constraint (5′) imposed.

Results reported in table 4 are consistent with the predicted shifting from Canada and to Europe in 1984–86. The coefficient estimate of

TABLE 4

Regression Results Testing for Income Shifting between the U.S., European, Canadian, and Other Operations of Sample Firms[a,b]

$$k \cdot \Delta ROE_{t,i,j} = \alpha_{1,t}\, k \cdot IMN_{i,j} + \alpha_{2,t}\, k \cdot ICO_{i,j} + \beta_t\, GS'_{t,i,j} + \gamma_{1,t}\, GEO_{t,i,j} + \gamma_{2,t} SIZE_{t,i,j} + \varepsilon_{t,i,j}$$[c]

such that $0.1340\,\beta_{EUR} + 0.0436\,\beta_{CDA} + 0.2329\,\beta_{OTH} - \beta_{US} = 0$

Variable	1984–85	1985–86	1986–87	1987–88	1988–89	1989–90
Specific Tests:						
Canada to Europe:						
$0.0436\,\beta_{CDA} - 0.1340\,\beta_{EUR} > 0$		0.034 (1.611)[d]				
World to U.S.:						
$0.1340\,\beta_{EUR} + 0.0436\,\beta_{CDA} + 0.2329\,\beta_{OTH} + \beta_{US} > 0$			0.015 (1.912)[d]			
Regression Coefficients:						
U.S. Multinational Intercept	−0.033	−0.003	0.004	−0.021	−0.000	−0.027
	(−2.496)	(−0.204)	(0.276)	(−1.512)	(−0.020)	(−1.882)
Control Company Intercept	−0.040	−0.009	−0.011	−0.013	−0.022	−0.045
	(−5.450)	(−1.154)	(−1.496)	(−1.693)	(−2.816)	(−5.743)
GS′						
From (to) Europe	0.005	−0.070	0.044	−0.020	0.008	0.040
	(0.153)	(−2.068)	(1.372)	(−0.599)	(0.249)	(1.204)
From (to) Canada	−0.055	0.121	−0.012	0.008	−0.062	0.021
	(−0.971)	(1.987)	(−0.212)	(0.133)	(−1.064)	(0.340)
From (to) Other	−0.027	0.023	0.033	−0.039	0.030	−0.029
	(−1.115)	(0.893)	(1.328)	(−1.579)	(1.165)	(−1.139)
To (from) U.S.	−0.008	0.001	0.013	−0.011	0.005	−0.001
	(−1.203)	(0.189)	(1.912)	(−1.681)	(0.760)	(−0.079)

0.034 in the top panel (labeled "Specific Tests") suggests that, on average, the sample firms shifted income equal to 3.4% of their allocated non-U.S. book value of shareholders' equity from Canada and to Europe. Given the firms' average non-U.S. pretax return on equity of 27.3% from table 1, this suggests an average shift of 12.5% of non-U.S. pretax income, comparable with the 10% shift of U.S. pretax income during 1986–87 discussed earlier. Below the results for the specific tests, the panel labeled "Regression Coefficients" provides separate coefficient estimates for the two years, 1984–85 and 1985–86. The results suggest that the pattern over the two-year period is driven by 1985–86, where the coefficient estimates (−0.07 for Canada and 0.12 for Europe) are statistically significant and of the predicted sign.

For 1986–87, the results of the tests for shifting from non-U.S. to U.S. operations in the "Specific Tests" panel are similar to those documented in table 3 in that they suggest shifting to U.S. from non-U.S. operations.[42] Examination of the regression coefficients on the *GS′*

[42] This estimation differs from that in table 3 in that separate parameters are estimated for each region and the adding-up constraint is imposed.

TABLE 4—*continued*

Variable	1984–85	1985–86	1986–87	1987–88	1988–89	1989–90
GEO:						
Africa	0.068	−0.033	−0.041	−0.094	−0.005	0.068
	(2.397)	(−1.104)	(−1.400)	(−3.221)	(−0.171)	(2.255)
Asia	0.027	0.008	−0.035	−0.048	−0.017	−0.022
	(1.607)	(0.476)	(−1.937)	(−2.762)	(−0.974)	(−1.189)
Europe	0.021	−0.001	−0.017	−0.067	0.008	0.002
	(1.370)	(−0.079)	(−1.012)	(−4.179)	(0.493)	(0.129)
Pacific	−0.053	0.025	−0.026	−0.003	−0.026	0.022
	(−2.234)	(0.990)	(−1.039)	(−0.104)	(−1.031)	(0.851)
Canada	−0.013	0.023	−0.045	0.012	0.019	0.030
	(−0.626)	(1.098)	(−2.157)	(0.563)	(0.930)	(1.418)
South America	−0.025	0.062	−0.073	−0.115	0.020	−0.021
	(−0.315)	(0.730)	(−0.877)	(−1.420)	(0.235)	(−0.243)
SIZE:						
Size 2	0.002	−0.030	−0.005	0.008	−0.017	0.001
	(0.145)	(−2.662)	(−0.417)	(0.705)	(−1.543)	(0.123)
Size 3	−0.006	−0.005	0.006	0.003	0.000	−0.008
	(−0.571)	(−0.486)	(0.503)	(0.244)	(0.000)	(−0.756)
Size 4	−0.017	−0.008	0.008	−0.009	−0.003	0.007
	(−1.228)	(−0.694)	(0.698)	(−0.785)	(−0.273)	(0.635)
Size 5	−0.003	−0.009	0.007	−0.010	−0.010	0.005
	(−0.250)	(−0.777)	(0.562)	(−0.879)	(−0.834)	(0.409)
R^2	.057	.009	.005	.037	.012	.048

[a]The regression results reported here are based on U.S. and non-U.S. operations of the 191 sample firms and the 1,446 and 2,095 firms in the U.S. and non-U.S. control firms. *T*-statistics are noted in parentheses.

[b]Coefficients are significant at the 5% level for *t*-values greater than 1.96, in absolute value, using a two-tailed test and 1.65 using a one-tailed test (a one-tailed test is used for geographic shifting where expectations can be unambiguously determined, two-tailed for all others). Coefficients are significant at the 1% level for *t*-values greater than 2.57 and 2.33, in absolute value, for one-tailed and two-tailed tests, respectively.

[c]ΔROE is the change in estimated taxable income over book equity. k is equal to 1 for U.S. operations of the sample firms and the U.S. control firms, and −1 for non-U.S. operations of the sample firms and the non-U.S. control firms. IMN (ICO) equals 1 (0) for the sample firms and 0 (1) for control firms. GS' is composed of four variables: *EUR*, *CDA*, *OTH*, and *US*. For the non-U.S. operations of sample firms, *EUR* (*CDA*) is the proportion of identifiable assets associated with European (Canadian) operations when these are reported separately, *OTH* is the proportion of non-U.S. assets not found in *EUR* or *CDA*, and *US* equals 0 (i.e., $EUR + CDA + OTH = 1$ and $US = 0$). For U.S. operations of sample firms, *US* is equal to 1 and *EUR*, *CDA*, and *OTH* equal 0. For control firms, *EUR*, *CDA*, *OTH*, and *US* equal 0. The *GEO* variables include Africa, Asia, Europe, Pacific, Canada, and South America. They take on values equal to the proportion of non-U.S. assets in these areas for the sample firms and 1 for the control firm incorporated in these areas (0 otherwise). The four size variables (size 2, size 3, size 4, and size 5) are equal to 1 if the firm falls in the second, third, fourth, and fifth size quintile, respectively (0 otherwise). Quintiles are determined using the allocated book value of shareholders' equity of the sample firms. The weights on the constraint are designed to ensure that, on average, the coefficients preserve the geographic shifting relationship (i.e., one dollar of income shifted *from* one area equals one dollar of income shifted *to* another area).

[d]Significant at the 5.4% level (one-tailed test).

[e]Significant at the 2.8% level (one-tailed test). A specific test of the world to U.S. and Canada ($0.1340\,\beta_{EUR} + 0.2329\,\beta_{OTH} + \beta_{US} - 0.0436\,\beta_{CDA} > 0$) has a *t*-statistic of 2.067 which is significant at the 1.9% level.

variables provides insight into the sources of the shifting. The coefficients of 0.044 for Europe and 0.033 for "other" suggest that income is being shifted primarily out of those regions (although neither is individually significant at the 0.05 level), while the coefficient of 0.013 for the United States (significant at the 0.05 level) suggests that income is being shifted primarily into the United States.

The results in table 4 also provide information about the source of the income shifted into the United States during 1987. The results for 1986–87 suggest that the shifting to the United States was primarily from Europe and "other." Figure 1 shows that Canadian rates began to fall in 1987, which may account for what appears to be an insignificant amount of shifting into Canada.[43] The coarseness of the geographic segment data precludes investigating whether shifting came primarily from high-tax-rate countries or from all countries.

Table 4 also provides further insight into the apparent reversal of income shifting to the United States in 1988. Based on the estimated coefficients of −0.039 for "other" and −0.011 for the United States, it appears that shifting was primarily from the United States to "other" operations, perhaps reflecting tax rate reductions during the period in countries such as Japan and Australia. In 1988–89, shifting appears to be occurring from "other" (coefficient estimate of 0.030) and to Canada (coefficient of −0.062), although the coefficient estimates are not statistically significant. Shifting to Canada is consistent with the rapidly falling rates in that country during this period. No shifting appears to involve the U.S. operations. The same is true of U.S. operations in 1989–90; there does, however, seem to be some additional shifting from Europe (coefficient estimate of 0.040) to "other" countries (coefficient estimate of −0.029).

8. *Tests of Differential Shifting across Size Categories*

In the previous regression tests, we assumed that any shifting occurs equally for all companies. As Harris [1993] suggests, this is probably not the case. Size is one of the dimensions along which shifting may differ systematically. Scholes, Wilson, and Wolfson [1992], for example, provide evidence that intertemporal income shifting around the 1986 Tax Reform Act in the United States was limited primarily to the largest quintile of their sample firms. To test for possible size effects, we replace the GS' vector in equation (4) with a vector of dummy variables for firm size to capture the differential shifting across size quintiles. Specifically, we fit the following regression:

$$k \cdot \Delta ROE_{t,i,j} = \alpha_{1,t}\, k \cdot IMN_{i,j} + \alpha_{2,t}\, k \cdot ICO_{i,j} + \beta_t\, GS''_{t,i,j} + \gamma_{1,t}\, GEO_{t,i,j} + \gamma_{2,t}\, SIZE_{t,i,j} + \varepsilon_{t,i,j} \quad (6)$$

where:

i = {U.S., non-U.S.};
t = {1985, 1986, 1987, 1988, 1989, 1990};
k = {1 when i = U.S., denoting U.S. observations; −1 when i = non-U.S., denoting non-U.S. observations};

[43] A test of income shifting to the United States and Canada from Europe and Other has a t-value of 2.067, which is significant at the 1.9% level for a one-tailed test.

$\Delta ROE_{t,i}$ = change in estimated taxable income deflated by book equity as defined in equation (2);

IMN_i = intercept for sample firms: {1 for sample firms, 0 for control firms};

ICO_i = intercept for control firms: {1 for control firms, 0 for sample firms};

GS''_i = the size-differential geographic shift vector: {(S_1, S_2, S_3, S_4, S_5) for sample firms with values of one for S_p when the firm is in size portfolio p, zero otherwise; (0, 0, 0, 0, 0) for control firms};[44]

$GEO_{t,i}$ = vector of six geographic variables representing the proportion of the non-U.S. assets in Africa, Asia, Europe, Pacific, Canada, and South America for the sample firms; for a control firm the variables take on a value of zero for all variables except its domicile, for which it takes on a value of one; and

$SIZE_{t,i}$ = vector of dummy variables corresponding to the largest four size quintiles as defined by the sample firms.

The results of this regression are found in table 5. This regression is like that in table 3 in that it tests only for shifting to and from the United States, so 1986–87 is the year of primary interest. It is clear that most shifting relates to the largest two size categories with coefficients of 0.041 for the second largest and 0.035 for the largest size quintiles. Combining the largest two quantities yields a coefficient estimate of 0.038 and a t-statistic of 2.084, compared to a coefficient of 0.013 and a t-statistic of 0.874 for the smallest three quintiles. The two largest quintiles are again most significant in the 1987–88 period with a combined coefficient estimate of −0.039 and a t-statistic of −2.151 versus a coefficient estimate of −0.007 and a t-statistic of −0.446 for the three smallest quintiles combined.

Thus, geographic shifting, like intertemporal shifting documented by Scholes, Wilson, and Wolfson [1992], seems to occur primarily in larger companies. Perhaps larger multinationals are able to access the resources necessary to alter their income-location behavior more easily, or perhaps larger companies have more degrees of freedom in taxable income shifting due to the volume and scope of their businesses. Both of these reasons are consistent with the notion that larger corporations have lower nontax costs per dollar of income shifted than do their smaller counterparts. A third possible explanation is that larger corporations are inherently different from the smaller firms in ways not captured in our controls.

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[44] Essentially, GS'' is an interaction of the scalar GS from equation (3) and the $SIZE$ vector (with the smallest quintile retained).

TABLE 5

Regression Results Testing for Differential Income Shifting between the U.S. and Non-U.S. Operations of Sample Firms across Size Quintiles[a,b]

$$k \cdot \Delta ROE_{t,i,j} = \alpha_{1,t}\, k \cdot IMN_{i,j} + \alpha_{2,t}\, k \cdot ICO_{i,j} + \beta_t\, GS''_{t,i,j} + \gamma_{1,t}\, GEO_{t,i,j} + \gamma_{2,t}\, SIZE_{t,i,j} + \varepsilon_{t,i,j}$$[c]

Variable	1984–85	1985–86	1986–87	1987–88	1988–89	1989–90
Specific Tests:						
Two largest quintiles			0.038	−0.039		
$\beta_{S4} + \beta_{S5} > 0$			(2.084)[d]	(−2.151)[e]		
Three smallest quintiles			0.013	−0.007		
$\beta_{S1} + \beta_{S2} + \beta_{S3} > 0$			(0.874)	(−0.446)		
Regression Coefficients:						
U.S. Multinational	−0.026	0.000	−0.004	−0.017	−0.008	−0.029
Intercept	(−1.921)	(0.003)	(−0.258)	(−1.255)	(−0.566)	(−1.998)
Control Intercept	−0.038	−0.007	0.010	−0.016	−0.025	0.046
	(−5.040)	(−0.901)	(1.253)	(−2.029)	(−3.134)	(5.626)
GS″:						
GS by Size 1	−0.036	−0.017	0.002	0.019	0.042	0.007
	(−1.480)	(−0.642)	(0.087)	(0.767)	(1.638)	(0.273)
GS by Size 2	0.008	0.011	0.018	−0.016	0.012	−0.027
	(0.306)	(0.402)	(0.712)	(−0.640)	(0.443)	(−1.020)
GS by Size 3	0.014	0.007	0.018	−0.023	0.010	0.037
	(0.587)	(0.285)	(0.743)	(−0.928)	(0.377)	(1.416)
GS by Size 4	−0.055	0.007	0.041	−0.027	−0.009	−0.001
	(−2.225)	(0.267)	(1.612)	(−1.055)	(−0.339)	(−0.047)
GS by Size 5	0.002	−0.004	0.035	−0.052	−0.013	−0.014
	(0.069)	(−0.147)	(1.380)	(−2.027)	(−0.515)	(−0.541)

9. *Concluding Remarks*

This paper documents changes in the reporting of taxable income by 191 U.S. multinational corporations in response to worldwide relative changes in income tax rates during 1984–90. To control for changes in the underlying profitability of these corporations, we used control samples of U.S. and non-U.S. corporations, along with explicit controls for geographic area, size, and multinationality.

While explicit industry controls were not incorporated (since no industry matching seemed likely to capture the differences between U.S. global companies and the more geographically concentrated control companies), we did allow the average change in estimated taxable income, divided by book value of the shareholders' equity, to differ between the two groups. In addition, for the more detailed geographic shifting tests, the regression coefficients were constrained to ensure that the coefficients captured cross-sectional income shifting.

Our results suggest that multinational corporations respond to relative changes in tax rates in predictable ways. Changes in corporate tax rates led us to predict that corporate managers would shift income

TABLE 5 —*continued*

Variable	1984–85	1985–86	1986–87	1987–88	1988–89	1989–90
GEO:						
Africa	0.072	−0.028	−0.037	−0.102	−0.012	0.067
	(2.513)	(−0.932)	(−1.240)	(−3.450)	(−0.399)	(2.185)
Asia	0.031	0.013	−0.029	−0.058	−0.026	−0.023
	(1.766)	(0.717)	(−1.578)	(−3.167)	(−1.425)	(−1.218)
Europe	0.026	0.002	−0.012	−0.075	−0.000	0.002
	(1.619)	(0.106)	(−0.690)	(−4.488)	(−0.016)	(0.102)
Pacific	−0.049	0.030	−0.022	−0.011	−0.033	0.020
	(−2.049)	(1.172)	(−0.864)	(−0.423)	(−1.283)	(0.757)
Canada	−0.009	0.035	−0.043	0.004	0.007	0.029
	(−0.455)	(1.652)	(−1.986)	(0.192)	(0.322)	(1.331)
South America	−0.031	0.081	−0.069	−0.135	0.025	−0.048
	(−0.405)	(0.970)	(−0.840)	(−1.689)	(0.306)	(−0.581)
SIZE:						
Size 2	−0.003	−0.033	−0.006	0.011	−0.013	0.004
	(−0.277)	(−2.788)	(−0.543)	(0.991)	(−1.088)	(0.347)
Size 3	−0.010	−0.009	0.003	0.008	0.005	−0.011
	(−0.937)	(−0.744)	(0.292)	(0.666)	(0.430)	(−0.931)
Size 4	−0.012	−0.011	0.004	−0.003	0.003	0.008
	(−1.000)	(−0.916)	(−0.296)	(−0.257)	(0.287)	(0.669)
Size 5	−0.007	−0.012	0.003	−0.002	−0.002	0.007
	(−0.550)	(−0.937)	(0.214)	(−1.123)	(−0.191)	(0.564)
R^2	.059	.007	.005	.038	.013	.048

[a]The regression results reported here are based on U.S. and non-U.S. operations of the 191 sample firms and the 1,446 and 2,095 firms in the U.S. and non-U.S. control samples. *T*-statistics are noted in parentheses.

[b]Coefficients are significant at the 5% level for *t*-values greater than 1.96, in absolute value, using a two-tailed test and 1.65 using a one-tailed test (a one-tailed test is used for geographic shifting where expectations can be unambiguously determined, two-tailed for all others). Coefficients are significant at the 1% level for *t*-values greater than 2.57 and 2.33, in absolute value, for one-tailed and two-tailed tests, respectively.

[c]ΔROE is the change in estimated taxable income over book equity. *k* is equal to 1 for U.S. operations of the sample firms and U.S. control firms, and −1 for non-U.S. operations of the sample firms and the non-U.S. control firms. *IMN* (*ICO*) equals 1 (0) for the sample firms and 0 (1) for control firms. *GS″* is composed of five variables which have a value of 1 for the sample firms that are members of that size quintile (0 otherwise). The *GEO* variables include Africa, Asia, Europe, Pacific, Canada, and South America. They take on values equal to the proportion of non-U.S. assets in these areas for the sample firms and 1 for the control firm incorporated in these areas (0 otherwise). The four size variables (size 2, size 3, size 4, and size 5) are equal to 1 if the firm falls in the second, third, fourth, and fifth size quintile, respectively (0 otherwise). Quintiles are determined using the allocated book value of shareholders' equity of the sample firms.

[d]Significant at the 1.9% level (one-tailed test).

[e]Significant at the 3.2% level (two-tailed test).

from Canada to Europe during 1984–86 and then shift income into the United States from all countries during 1986–87. Despite relatively coarse data, a modest number of observations, and a relatively low-powered statistical procedure, coefficients from both tests are of the expected sign and are statistically significant at the 2% to 5% levels. We also present descriptive evidence of geographic income shifting post-1987; pervasive tax rate changes during this period preclude the testing of directional hypotheses.

We document apparent income shifting out of the United States in 1987–88, following the expected shifting *into* the United States in

1986–87. This reversal has several possible explanations. One is the reduction of income tax rates in other countries in 1988. Even though the U.S. rates continued to fall, lower rates elsewhere may have induced the companies to move back toward their pre-1986 equilibrium. Alternatively, the nontax costs of shifting income from the non-U.S. operations may have been larger than anticipated and it was only after the change was made in 1987 that the full extent of these costs was realized.

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