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Journal of Public Economics 88 (2004) 2727–2744

JOURNAL OF
PUBLIC
ECONOMICS

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Foreign direct investment in a world of multiple taxes

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Received 19 July 2001; received in revised form 5 August 2003; accepted 11 August 2003
Available online 29 December 2003

Abstract

Governments impose multiple taxes on foreign investors, though studies of the effect of tax policy on the location of foreign direct investment (FDI) focus almost exclusively on corporate income taxes. This paper examines the impact of indirect (non-income) taxes on FDI by American multinational firms, using affiliate-level data that permit the introduction of controls for parent companies and affiliate industries. Indirect tax burdens significantly exceed the foreign income tax obligations of foreign affiliates of American companies. Estimates imply that 10% higher local indirect tax rates are associated with 7.1% lower affiliate assets, which is similar to the effect of 10% higher income tax rates. Affiliate output falls by 2.9% as indirect taxes rise by 10%, while higher income taxes have more modest output effects. High corporate income tax rates depress capital/labor ratios and profit rates of foreign affiliates, whereas high indirect tax rates do not. These patterns reveal the impact of indirect taxes and suggest the mechanisms by which direct and indirect taxes affect FDI.

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JEL classification: H87; H25; F23

Keywords: Foreign direct investment; Indirect taxation; International taxation; Foreign tax credit

1. Introduction

Governments have at their disposal many tax instruments that can be used singly or in concert to finance their activities. These tax alternatives include personal and corporate

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income taxes, sales taxes, value-added taxes, property taxes, excise taxes, and numerous others. It is not uncommon for a country to impose all of these taxes simultaneously. In choosing what tax instruments to use and what rates to impose, governments are typically influenced by their expectations of the effects of taxation on investment and economic activity, including foreign direct investment (FDI).

There is by now extensive evidence that high corporate income tax rates are associated with low levels of FDI, though it is not entirely clear how to interpret the causal effects that underlie this association, as several channels are operative, and their possible effects can be contradictory. This empirical literature has considerably less to say about the association between FDI and high rates of taxes other than corporate income taxes, even though such taxes are large and have the potential to influence FDI. The role of non-income taxes may be particularly important for FDI, since governments of many countries (including the United States) permit multinational firms to claim foreign tax credits for corporate income taxes paid to foreign governments but do not extend this privilege to taxes other than income taxes. As a result, taxes for which firms are ineligible to claim credits may well have greater impact on decision-making than do (creditable) income taxes. Since the foreign indirect tax obligations of American multinational firms are more than one and a half times their direct tax obligations, there is obvious scope for indirect taxes to influence their behavior.

This paper investigates the effect of multiple host country taxes on foreign investment activity by American multinational firms. Specifically, the empirical work focuses on comparing the effects of corporate income taxes to the effects of indirect taxes. This investigation has two purposes. The first is to measure the extent to which levels of FDI and rates of indirect taxation are associated, in order to assess the potential importance of indirect taxes for FDI. The second purpose is to compare the effects of indirect taxes and corporate income taxes in order to refine the interpretation of existing evidence of the negative association between corporate income tax rates and levels of FDI. In particular, differences in the responsiveness of FDI to income taxation and indirect taxation provide a starting point for disentangling alternative explanations for why tax rate differences appear to have the effects that they do on FDI.

The likely impact of indirect taxes on FDI differs from that of corporate income taxes in three important ways. First, indirect tax obligations are not functions of reported income and are therefore little, if at all, affected by the financing of foreign affiliates and by the prices used for intra-firm transfers. Hence the measured effect of indirect taxes on FDI is unlikely to reflect the use of FDI to engage in tax-motivated financing and transfer pricing. Second, income taxes encourage firms to reduce their capital/labor ratios (and therefore FDI), while indirect taxes do so to a much lesser degree. Third, American firms are ineligible to claim foreign tax credits for indirect tax payments, so they are likely to be as sensitive to indirect tax rate differences as are local firms. These three features of the incentives created by indirect taxes—the absence of transfer pricing motives, the modest impact on capital/labor ratios, and the absence of any alleviation of tax burdens through credits—narrow the range of channels through which indirect taxes are likely to affect FDI.

The empirical results indicate that high tax rates are associated with reduced FDI by American multinational firms, and that this association is apparent for all types of taxes, including taxes other than corporate income taxes. Indirect tax rates are negatively

correlated with investment levels—as measured by assets—roughly to the same degree as are corporate income tax rates. The estimates imply that American affiliates located in countries with 10% higher indirect tax rates have 7.1% fewer assets, and those in countries with 10% higher corporate income tax rates have 6.6% fewer assets. These effects on investment levels are mirrored in effects on output, as 10% higher indirect tax rates are associated with 2.9% less output, and 10% higher income tax rates are associated with 1.9% less output. High income tax rates depress affiliate capital/labor ratios and profit rates, while high indirect tax rates have no discernable effects on these variables. Hence it appears that high income tax rates are associated with low levels of FDI because they impose additional costs on investments, encourage taxpayers to substitute labor for capital, and affect the returns to reallocating taxable income. High indirect tax rates reduce FDI only by imposing additional costs, but the magnitude of their impact is comparable to that of income taxes, reflecting, in part, the non-credibility of indirect tax payments.

The analysis uses confidential, affiliate-level data collected by the Bureau of Economic Analysis (BEA) of the United States Department of Commerce on the activities of American multinational firms. These data permit the inclusion of parent company and affiliate industry fixed effects in estimating the impact of tax differences. Tax effects then reflect the distribution of investment between affiliates of the same parent company located in countries with differing tax rates. The advantage of using such a method is that doing so implicitly controls for any unobserved attributes, including parent overall financial health and industry features. Unfortunately, while income taxes are precisely defined in the BEA data, indirect taxes represent a combination of different obligations, so the estimated effects of indirect taxes reflect the averaged impact of several types of taxes.

Section 2 of the paper describes the tax system used by the United States, and reviews the findings of earlier research on the effect of taxation on investment and other activities of multinational firms. Section 2 also considers alternative interpretations of this evidence, and its implications for the potential impact of indirect and income taxes on the locational decisions of multinational firms. Section 3 describes the affiliate-level data used to analyze the activities of American multinational firms. Section 4 presents the results of estimating the effects of direct and indirect taxes on the scope of multinational activity. Section 5 is the conclusion.

2. International income taxation in perspective

This section reviews existing systems of taxing international income, evaluates the evidence of the impact of income taxation on FDI, and considers the incentives facing American firms investing in foreign countries using multiple tax instruments.

2.1. Consequences of international tax practice

Almost all countries tax income generated by economic activity that takes place within their borders, usually doing so at the same rates that they tax local businesses. In addition, many countries, including the United States, tax the foreign incomes of their residents. In order to prevent double taxation of the foreign income of Americans, United States law

permits taxpayers to claim foreign tax credits for income taxes (and related taxes) paid to foreign governments. These foreign tax credits are used to offset United States tax liabilities that would otherwise be due on foreign-source income. The United States corporate tax rate is currently 35%, so an American corporation that earns \$100 in a foreign country with a 10% tax rate pays taxes of \$10 to the foreign government and \$25 to the United States government, since its United States corporate tax liability of \$35 (35% of \$100) is reduced to \$25 by the foreign tax credit of \$10. Since the foreign tax credit is intended to alleviate international double taxation, and not to reduce United States tax liabilities on profits earned within the United States, the foreign tax credit is limited to United States tax liability on foreign-source income. In addition, Americans are permitted to defer any United States tax liabilities on certain unrepatriated foreign profits until they receive such profits in the form of dividends. This deferral is available only on the active business profits of American-owned foreign affiliates that are separately incorporated as subsidiaries in foreign countries.

International tax rules and the tax laws of other countries have the potential to influence a wide range of corporate and individual behavior, including, most directly, the location and scope of international business activity. A sizable literature is devoted to measuring behavioral responses to international tax rules, finding that multinational firms invest less in high-tax countries than they do in otherwise-similar low-tax countries. Time-series estimation of the responsiveness of FDI to annual variation in after-tax rates of return consistently reveals positive correlations of levels of FDI and after-tax rates of return at industry and country levels.¹ The implied elasticity of FDI with respect to after-tax returns is generally close to unity, which translates into a tax elasticity of investment of roughly -0.6 . Cross-sectional estimates of the effect of tax rate differences on the location of foreign investment similarly indicate that FDI levels are negatively associated with local tax rates, the implied elasticity generally also lying close to -0.6 .² In addition, there is extensive evidence that firms arrange financial flows and intra-firm sales between parent companies and subsidiaries within controlled groups in order to reallocate taxable income from affiliates in high-tax countries to affiliates in low-tax countries.³ One noteworthy feature of this evidence is its almost exclusive focus on differences in corporate income tax rates. Whether and to what extent taxes other than corporate profit taxes influence the activities of multinational firms represent, by comparison, almost entirely open questions.⁴

The potential importance of these open questions is apparent from the relative magnitudes of foreign income taxes and non-income taxes paid by United States firms

¹ See, for example, Hartman (1984), Boskin and Gale (1987), Young (1988), Slemrod (1990) and Swenson (1994).

² See, for example, Grubert and Mutti (1991), Hines and Rice (1994), Hines (1996), Altshuler et al. (2001) and Hines (2001); Hines (1999) offers a critical survey of this literature.

³ Empirical studies of the use of financial transactions, transfer prices, and other methods to avoid corporate income taxes include Grubert and Mutti (1991), Harris et al. (1993), Klassen et al. (1993), Hines and Rice (1994), Collins et al. (1998), Grubert (1998), Clausing (2001), Swenson (2001) and Desai et al. (2001).

⁴ A related stream of literature notes the importance of corporate tax base definitions in evaluating the impact of tax incentives and tax competition; see Leechor and Mintz (1993), Hines (1994) and Mintz and Tsiopoulos (1994).

operating abroad. Indirect taxes include any type of tax other than income and payroll taxes, as the BEA survey form asks for the sum of sales, value added, and excise taxes; property taxes; and import and export duties.⁵ Fig. 1 depicts the ratio of indirect taxes to foreign income taxes paid by American multinational firms from 1982 to 1997. Throughout the sample period, indirect taxes are much larger than income taxes. This ratio exceeds 1.5 for every year of the sample across all industries and for affiliates in manufacturing. Fig. 1 also depicts a significant increase in the relative importance of indirect taxes from the middle of the 1980s through the middle of the 1990s.⁶ While indirect taxes diminish in importance during the latter part of the sample, the ratio of indirect taxes to income taxes was 2.4 across all industries and 1.7 for manufacturing affiliates in 1997.

Fig. 2 displays the ratio of indirect taxes to income taxes across all industries by country in 1994, the most recent benchmark year for which data are available, and during which the worldwide ratio of indirect taxes to income taxes was 3.5. For some countries, such as the Bahamas, this ratio is very large due to the relative unimportance of income taxes. More generally, however, several large countries that host considerable amounts of United States outbound FDI impose heavy income tax burdens but nevertheless collect indirect taxes that greatly exceed their income tax collections. In particular, indirect tax rates appear to be high in Europe, as nine of the 10 countries with the largest ratios are European. Many countries in Latin America, such as Argentina and Brazil, also have ratios of indirect to income taxes that exceed the worldwide ratio of 3.5.

The country detail in Fig. 2 suggests that indirect taxes paid by affiliates are not dominated by value added taxes. The ratio of indirect to income taxes paid is high in countries that make extensive use of value added taxes, such as France and Germany, but this ratio is also greater than one for countries that are much less reliant on value added taxes, such as Japan, Canada, and Australia. The BEA data on outbound direct investment do not, of course, cover the United States, but Christensen et al. (2001) report that indirect tax payments by American businesses in the United States greatly exceed their corporate tax payments. Since the United States does not have a value added tax, this evidence indicates that components of indirect taxes other than value added taxes have the potential to be highly significant.

Fig. 3 shows the ratio of the indirect to income tax payments of United States affiliates by industry group. Indirect taxes paid exceed direct taxes paid in nine of the 12 industry

⁵ With respect to indirect taxes, the survey form asks respondents to quantify their aggregate indirect tax burdens in the following manner: “Taxes (other than income and payroll taxes) and non-tax payments (other than production royalty payments)—report all such taxes and non-tax payments whether or not included in revenues or expenses in the income statement. Include amounts paid or accrued for the year, net of refunds or credits, to foreign governments, their subdivisions and agencies for (a) sales, value added, consumption, and excise taxes collected by the affiliate on goods and services that the affiliate sold; (b) property taxes and other taxes on the value of assets or capital; (c) any remaining taxes (other than income or payroll taxes); and (d) import and export duties, license fees, fines, penalties and all other payments or accruals of non-tax liabilities (other than production royalty payments).”

⁶ The magnitude of indirect taxation carries a number of important implications. The relative importance of non-income taxes in tax competition dynamics is highlighted by Slemrod (1995) and documented in Desai (1999). Furthermore, the importance of non-creditable taxes relative to creditable taxes is implicit in Gordon's (1992) analysis of tax competition that is governed by the actions of a large capital-exporting country that uses a partial foreign tax credit system.

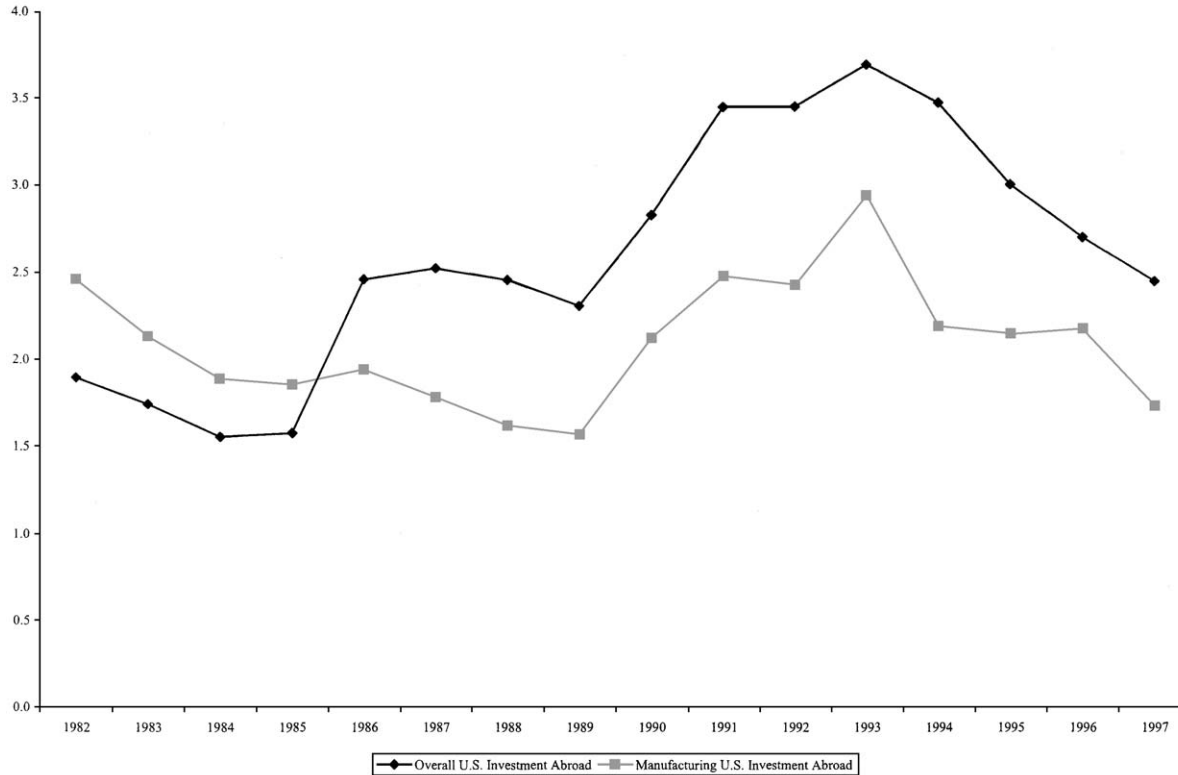


Fig. 1. The ratio of indirect taxes to income taxes for U.S. multinational affiliates, 1982–1997. The figure presents the ratio of indirect taxes to income taxes from 1982 to 1997 for all affiliates of U.S. multinationals and for affiliates in the manufacturing sector.

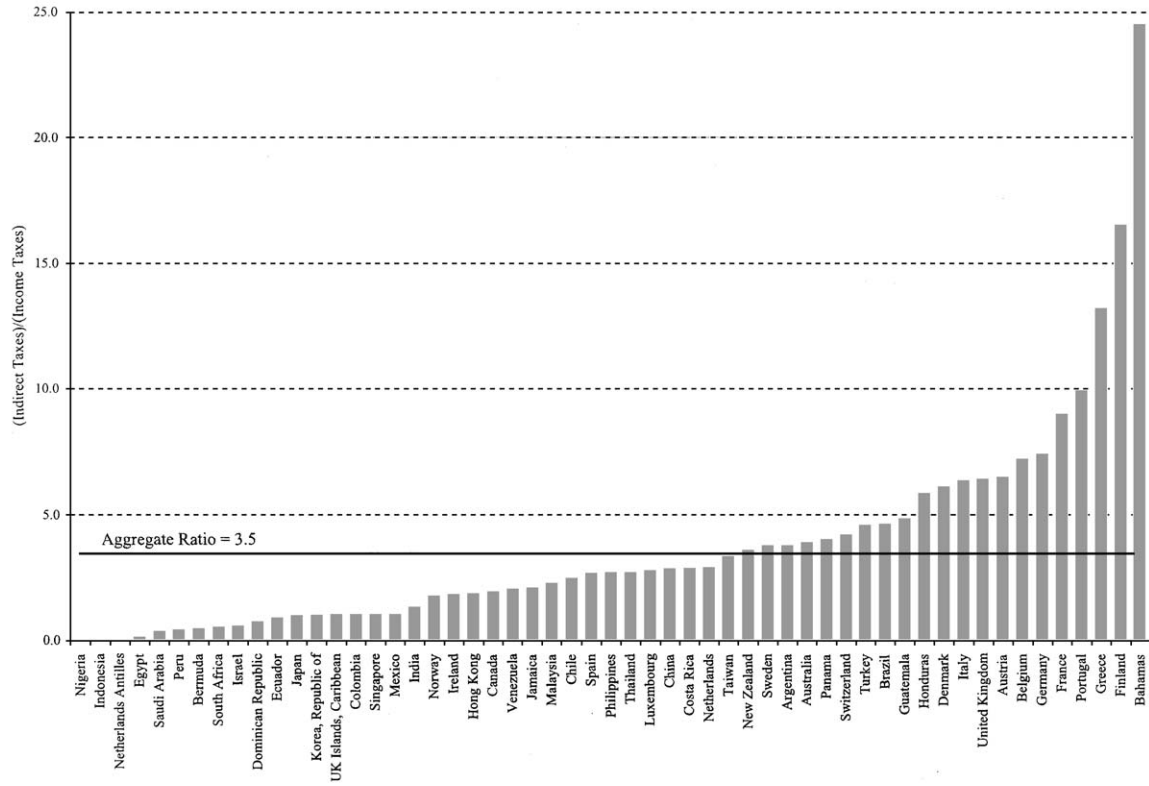


Fig. 2. The ratio of indirect taxes to income taxes for U.S. multinational affiliates, by country, 1994. The figure presents the ratio of indirect taxes to income taxes, by country, in 1994, for U.S. multinational affiliates. The aggregate ratio is the ratio of indirect taxes to income taxes paid worldwide by affiliates.

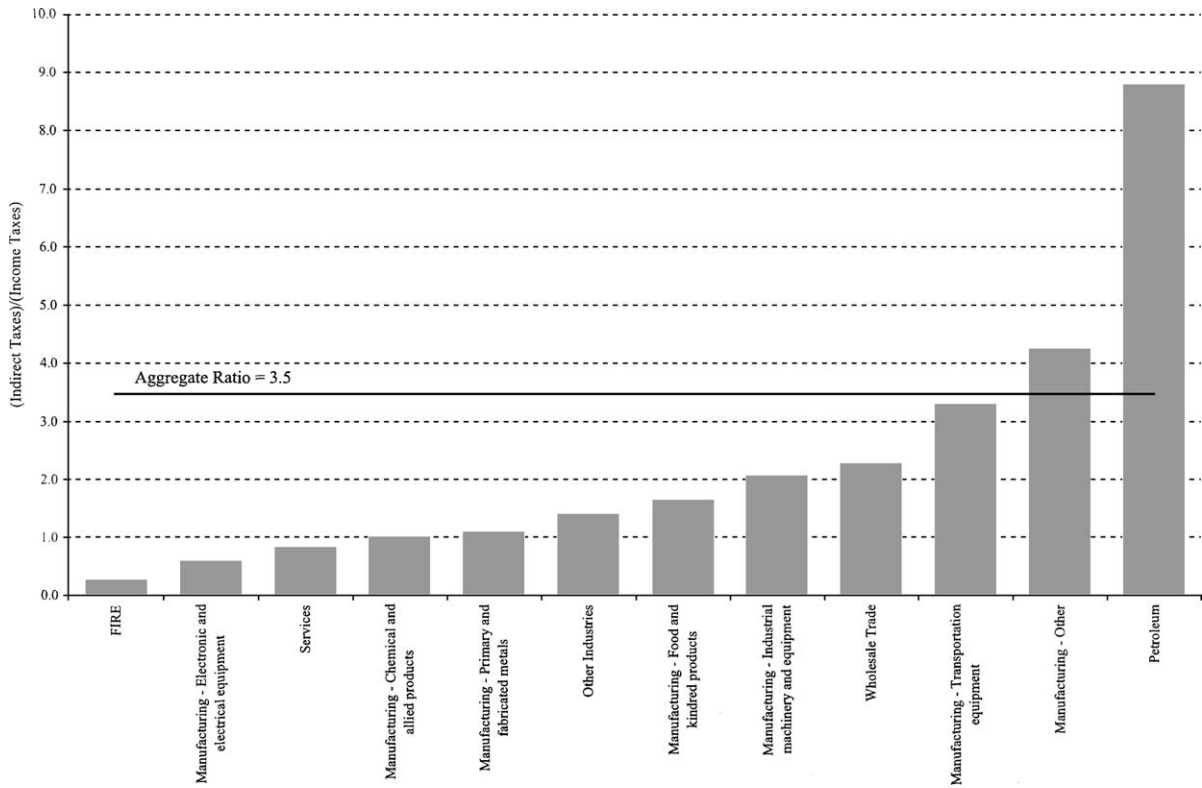


Fig. 3. The ratio of indirect taxes to income taxes for U.S. multinational affiliates, by industry, 1994. The figure presents the ratio of indirect taxes to income taxes, by industry, in 1994, for U.S. multinational affiliates. The aggregate ratio is the ratio of indirect taxes to income taxes paid worldwide by affiliates.

groups depicted. There is also substantial variation in the incidence of indirect taxes across industries. The relative burden of indirect taxes is largest in the petroleum sector, where indirect taxes are more than eight times larger than income taxes. While the extreme relative importance of indirect taxes in the petroleum sector is presumably the result of the high excise tax rates often placed on oil and gas, indirect taxes are also particularly high relative to income taxes in the manufacturing of industrial machinery, the manufacturing of transportation equipment, and wholesale trade. Indirect taxes are notably lower than income taxes in financial services and other service industries.

2.2. *Interpreting the evidence*

While the findings of the empirical literature clearly portray a negative relationship between local corporate profit tax rates and FDI, this evidence is open to multiple interpretations. There are three ways in which high profit tax rates might reduce investment: by reducing the scale of local business activity, by reducing the capital intensity of any given level of business activity, and by encouraging the relocation of assets to facilitate the relocation of profits. The first effect is that high tax rates increase total costs incurred by businesses in heavily taxed industries, so will generally lead to reduced production in order to maintain the profitability of local producers. The net impact on FDI of this reduced scale of activity is ambiguous; if production by foreign investors entails costs that are similar to those faced by local firms, then FDI should decline in a manner similar to that of local investment. If, however, foreign investors produce using different factor combinations than local producers, then the factor and output price reactions to higher tax rates will affect the profitability of FDI, which in turn might rise or fall.⁷

The second effect of corporate profit taxes is clearer: for any given level of output, high corporate profit taxes have a depressing effect on investment and FDI, since the taxation of the return to capital encourages firms to substitute away from capital inputs and toward tax-deductible inputs such as labor. Third, multinational firms have at their disposal financial and other means to reallocate taxable income from high-tax to low-tax countries. This carries investment implications, since high levels of FDI may be necessary in order to justify large profits that are reported to have been earned in low-tax locations. Hence a low corporate income tax rate makes a country an attractive location for FDI in part because it can then provide the means of reallocating taxable income from higher-tax jurisdictions.⁸

These channels for the effects of income taxes are mitigated, in the case of US multinationals, by their ability to claim credits for foreign income tax payments.⁹ Due to the foreign tax credit, the cost of higher foreign corporate profit taxes is attenuated for American investors relative to domestic investors and investors from countries that do not grant foreign tax credits. This raises the possibility that high income tax rates could even

⁷ See Gordon and Hines (2002) for an elaboration.

⁸ See Hines and Rice (1994), Gordon and Mackie-Mason (1995) and Grubert and Slemrod (1998) for analyses of incentives to locate FDI in order to facilitate the reallocation of taxable income.

⁹ The ability of American investors to defer home-country taxation of foreign profits, and the limits to the foreign tax credit, together imply that foreign tax rate differences are consequential to American firms, though not as much so as would be the case in the absence of the foreign tax credit.

make a location more attractive to American firms, since they are thereby less cost-disadvantaged than many of the firms with whom they compete. The use of foreign tax credits by a large capital exporting country such as the United States may also limit tax competition dynamics as in [Gordon \(1992\)](#). The net effect of high corporate profit tax rates on FDI from the United States then depends on the combined effect of taxes on market prices, scale of output, choice of input combination, the use of FDI to facilitate income reallocation, and the mitigating effects of foreign tax credits.

Taxes other than income taxes have the potential to affect levels of FDI through some, but not all, of the same channels as income taxes. Destination-based taxes such as value added taxes (in their rarely-seen pure forms) depress output of taxed versus untaxed goods by raising the cost of local sales, but do not influence the choice of input combinations or the desire to undertake FDI to facilitate transfer pricing operations. Other indirect taxes, such as property taxes, influence output levels and capital/labor ratios, but again do not affect the attractiveness of FDI associated with financial efforts to reallocate taxable income. Finally, the absence of foreign tax credits for indirect taxes suggests that American firms have no tax advantages over local firms in high-tax locations. As a consequence, investigating the effect of indirect taxes provides the opportunity to study the effect of taxes on FDI in a setting where transfer pricing motivations are not operative, where distortions to input choices are more limited, and where local and American firms face similar tax burdens.

3. Data

The empirical work presented in Section 4 is based on the most comprehensive available data on the activities of American multinational firms. The BEA benchmark surveys of United States Direct Investment Abroad in 1982, 1989, and 1994 provide data on the financial and operating characteristics of US firms operating abroad.¹⁰ [Table 1](#) displays information on the number of affiliates in the sample and descriptive statistics for these affiliates in benchmark years and for the entire sample. In 1994, the median affiliate assets was \$12.7 million, and median affiliate gross product was \$4.0 million; means of assets and gross product were substantially larger.¹¹ Since firms primarily engaged in financial services differ substantially from others, all affiliates in such industries are excluded from the sample.¹²

Data on foreign income taxes paid and foreign indirect taxes paid can be used to calculate foreign tax rates. The income tax rate used in the analysis in Section 4 is computed following [Hines and Rice \(1994\)](#) and [Desai and Hines \(1999\)](#). The income tax rate is calculated by taking the ratio of the sum of foreign income taxes to the sum of net income

¹⁰ Coverage and methods of the BEA survey are detailed in [Desai et al. \(2002\)](#).

¹¹ The gross product of an affiliate is its value added: gross product equals gross output (sales plus change in inventory) minus purchases of goods and services from other firms.

¹² Specifically, all affiliates primarily operating in ISI codes 600 through 679 are excluded. One of the implications of this exclusion is that results do not reflect patterns in the data driven by holding companies, since these are classified as financial firms. In order to mitigate the effects of possible reporting errors, observations of sales, assets, gross product, and owner's equity in the top 1% and bottom 1% of the sample distribution are excluded from the analysis.

Table 1
Descriptive statistics on FDI data and country tax measures

	1982	1989	1994	All years
Number of affiliates	14,918	15,243	17,898	32,342
Median assets	8397	11,105	12,712	10,632
Mean assets	26,110	37,399	48,728	38,162
Median gross product	3089	4021	3961	3663
Mean gross product	9814	13,773	14,891	13,008
Median employee compensation/assets	0.2272	0.2000	0.1965	0.2063
Mean employee compensation/assets	0.1549	0.1553	0.1367	0.1442
Median net income/owner's equity	0.1343	0.1703	0.1278	0.1445
Mean net income/owner's equity	0.1321	0.1973	0.1593	0.1671
Median average compensation per employee	19,226	28,236	33,693	23,860
Mean average compensation per employee	17,570	26,711	34,560	26,797
Median affiliate leverage	0.5574	0.5264	0.5293	0.5370
Mean affiliate leverage	0.5708	0.5442	0.5456	0.5524
Median income tax rate	0.3662	0.3352	0.2601	0.2990
Mean income tax rate	0.3500	0.3064	0.2541	0.3005
Median indirect tax rate	0.1141	0.1232	0.1200	0.1209
Mean indirect tax rate	0.1631	0.1581	0.1546	0.1583
Correlation between income and indirect tax rates	0.1604	0.1823	0.1418	0.1529
(Significance level)	0.0046	0.0014	0.0105	0.0000

Notes: The top panel provides number counts and mean and median descriptive statistics for all affiliates of United States multinationals in each of the sample years (1982, 1989, 1994) and for the entire sample. Assets, gross product, employee compensation, and net income are measured in thousands of nominal US dollars. The means of employee compensation/assets and net income/owner's equity are calculated using analytical weights where weights are set equal to affiliate assets and owner's equity, respectively. Average compensation per employee is measured in nominal United States dollars, and it is the ratio of the sum of employee compensation to the sum of employees in each country and year. Affiliate leverage is the ratio of current liabilities and long term debt to assess for an affiliate in a particular year. The bottom panel provides descriptive statistics for income and indirect tax rates. The income tax rate is calculated by taking the ratio of the sum of foreign income taxes to the sum of net income and foreign income taxes in each country, industry group and year. There are three industry groupings: petroleum and related industries, manufacturing industries excluding petroleum-related industries and non-manufacturing industries excluding petroleum-related industries. The indirect tax rate is calculated by taking the ratio of the sum of indirect taxes to the sum of gross product in each country, industry group and year. The correlation coefficient between income and indirect tax rates across countries and the associated level of significance are provided in the bottom row of the bottom panel.

and foreign income taxes for all affiliates in each country, year, and major industry group. Similarly, the indirect tax rate is calculated by taking the ratio of the sum of indirect taxes to the sum of affiliate gross product for all affiliates in each country, year, and major industry group.¹³ The tax rates are specific to country–industry–year cells for three major industry

¹³ McKenzie et al. (1997) describe a similar method of calculating effective rates of indirect taxation, and offer an application to taxation in Canadian provinces. The average indirect tax rate is by necessity constructed from the sum of tax payments of many different types, and therefore may inaccurately capture tax burdens on foreign investors in certain settings, notably if there are significant export or import duties. For the purpose of constructing the direct tax rate, affiliate-year observations in which affiliates report negative net income are excluded. For the purpose of constructing the indirect tax rate, affiliate-year observations in which affiliates report negative gross product are excluded. Income and indirect tax rates are constrained to lie between 0 and 100%. Calculated rates that exceed 100% are censored and set equal to 100%.

groups: petroleum, manufacturing (other than petroleum-related), and non-manufacturing (other than petroleum-related). This classification allows the tax rates to capture a major source of heterogeneity identified in Fig. 3 but still ensures that these measures do not simply reflect the experience of only a handful of firms.

Table 1 displays sample means and medians of variables of interest, including median and mean income and indirect tax rates. Median and mean income tax rates decline over the sample period from 35% or higher in 1982 to slightly above 25% by 1994. Median and mean indirect tax rates are roughly unchanging during this time period. The bottom row of Table 1 presents correlations between income tax rates and indirect tax rates by year. Tax rates facing American multinational firms exhibit positive cross-sectional correlation, indicating that countries with high corporate income tax rates are also likely to have high indirect tax rates. The correlation is 0.16 in 1982, 0.18 in 1989, and 0.14 in 1994. All of these correlations are statistically significant, and their sizable positive values suggest that existing studies of the effect of income tax rates using these data might conflate the effects of income taxes and indirect taxes on the investment patterns of multinationals.

4. Results

This section reports the results of using data on the activities of the affiliates of American firms to estimate the extent to which higher rates of host country direct and indirect taxation reduce levels of FDI as measured by affiliate assets. The estimating equations include fixed effects for parent, industry, and year, along with controls for sizes of host economies. Direct and indirect taxes may affect FDI through different channels, and subsequent regressions are intended to distinguish these channels by examining the effect of these taxes on multinational affiliate output, capital/labor ratios, and profit rates.

The first two columns of Table 2 present the results of estimating the effects of indirect and income taxes on asset allocation. The sample consists of all observations in the benchmark sample for which there are sufficient data. The dependent variable in these regressions is the natural log of an affiliate's total assets; the independent variables in all the regressions include indirect and income tax rates as well as $\ln(\text{GNP})$, $[\ln(\text{GNP})]^2$, and $[\ln(\text{GNP})]^3$. Estimated coefficients on $\ln(\text{GNP})$, $[\ln(\text{GNP})]^2$, and $[\ln(\text{GNP})]^3$ are not reported, for the reason that they are more or less intuitive (larger economies receive greater volumes of FDI, though this relationship is generally nonlinear) and not the focus of the study. The regressions also include a full set of year dummy variables, parent company dummy variables, and dummy variables for the 3-digit industry of the affiliate, as a result of which firm-specific considerations and industry-specific considerations implicitly do not affect the reported estimates. In the regression reported in column 1 of Table 2, the -0.6205 coefficient on the income tax rate implies that 1% lower tax rates are associated with 0.62% greater affiliate assets, controlling for three powers of host country GNP.¹⁴

The regression reported in column 2 adds the indirect tax rate to the asset location equation. The estimated coefficient on the income tax rate variable is -0.6572 , while the

¹⁴ The calculation of standard errors presented in Table 2 controls for clustering at the country/industry/year level.

Table 2
The impact of taxes on multinational affiliate activities

Dependent variable:	Log of assets		Log of gross product		Employee compensation/assets		Net income/owner's equity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	86.9505 (15.2138)	108.5724 (15.3874)	139.6411 (17.8630)	147.7262 (18.1737)	18.2452 (4.2098)	18.2822 (4.3186)	-7.8975 (20.0408)	-9.5332 (17.8446)
Income tax rate	-0.6205 (0.0983)	-0.6572 (0.0941)	-0.1792 (0.1081)	-0.1895 (0.1071)	0.1045 (0.0179)	0.1063 (0.0187)	-0.2490 (0.0921)	-0.2391 (0.0846)
Indirect tax rate		-0.7079 (0.0830)		-0.2852 (0.0990)		0.0028 (0.0164)		0.0361 (0.1454)
Log of average compensation per employee					0.0180 (0.0051)	0.0180 (0.0051)		
Parent, industry, and year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
GNP controls	Y	Y	Y	Y	Y	Y	Y	Y
No of obs	42,856	42,826	34,676	34,676	42,455	42,429	38,140	38,117
R ²	0.3455	0.3491	0.3453	0.3457	0.6651	0.6652	0.2364	0.2365

Notes: The dependent variable is the log of affiliate assets in columns 1 and 2, the log of affiliate gross product in columns 3 and 4, the ratio of employee compensation to assets of an affiliate in columns 5 and 6, and the ratio of net income to owner's equity of an affiliate in columns 7 and 8. The regressions are estimated using OLS, and all specifications include parent, industry, and year fixed effects. The income tax rate is calculated by taking the ratio of the sum of foreign income taxes to the sum of net income and foreign income taxes in each country, industry group, and year. The indirect tax rate is calculated by taking the ratio of the sum of indirect taxes to the sum of gross product in each country, industry group, and year. Average compensation per employee is the ratio of the sum of employee compensation to the sum of employees in each country and year. The specifications in columns 5–8 use analytic weights, set equal to affiliate assets in columns 5 and 6 and affiliate owner's equity in columns 7 and 8, in a way that is equivalent to multiplying through by the variable used for weighting. Three powers of log GNP are included in all specifications (coefficients not reported). Standard errors that correct for clustering of errors across observations in country/industry/year cells are presented in parentheses.

–0.7079 coefficient on the indirect tax rate implies that 1% lower indirect tax rates are associated with 0.71% greater affiliate assets. It is noteworthy that the inclusion of the indirect tax rate variable changes the estimated coefficient on the income tax rate variable very modestly, suggesting that the positive correlation of direct and indirect tax rates does not bias the estimated impact of income tax rates in studies that fail to account for indirect taxes.¹⁵

It is useful to translate these coefficient estimates into tax elasticities, in order to enhance their comparability to each other and to facilitate comparisons to estimates appearing in the literature. In these semilogarithmic specifications, the estimated elasticities of asset allocation with respect to taxation vary with the tax rates at which they are evaluated. Accordingly, it is necessary to select reference tax rates in order to calculate

¹⁵ Desai et al. (2003), an earlier version of this paper, reports specifications similar to the ones presented in columns 1, 3, 5 and 7 with indirect tax rates rather than direct tax rates as independent variables. These specifications similarly find that coefficients on indirect tax rates are not changed materially by the inclusion of the direct tax rate.

elasticities and mean tax rates are natural candidates for this purpose. The sample mean direct tax rate is 30.05%, while the sample mean indirect tax rate is 15.83%. Since the dependent variable in the regression is the log of assets, the elasticity of asset allocation with respect to one of the tax rates (evaluated at the mean tax rate) is simply the product of the coefficient estimate and the mean tax rate. It follows that the estimated elasticity of asset allocation with respect to direct taxes is 0.197, while the estimated elasticity of asset allocation with respect to indirect taxes is 0.112. The direct tax estimate is considerably smaller than the 0.6 elasticity that is commonly estimated in the literature using aggregate data, though it comes from a very different kind of specification. Since the regressions control for identities of parent companies, the estimated tax elasticities can be thought of as reflecting the substitution of assets in one location for assets in another. A Wald test rejects the hypothesis that the direct and indirect tax elasticities are equal. It should be noted that one limitation of this analysis is that it focuses on the scale of affiliate operations conditional on having affiliates, and does not examine the decision of multinationals to set up or shut down affiliates.¹⁶

The comparable effects of income and indirect taxation on investment can be further explored by analyzing their effects on output, capital/labor ratios and profitability. High rates of income taxation reduce asset demands by reducing the return to economic activity and by changing the way that multinational firms structure production. Specifically, affiliates located in countries with high direct tax rates have incentives to substitute labor for capital, since income taxes apply to the returns to capital, and they have incentives to adjust transactions with related parties in order to locate as much of their taxable profits as possible in low-tax jurisdictions. Firms are better able to report earning sizable profits in countries in which they locate significant amounts of capital, so the desire to locate profits in low-tax jurisdictions creates its own demand for assets in low-tax jurisdictions. High rates of indirect taxation likewise reduce asset demands by discouraging economic activity, but do not affect asset demands through capital/labor substitution or indirectly in order to facilitate tax-motivated profit reallocation. The ability of American firms to claim credits for foreign income taxes somewhat reduces the impact of direct taxes, so while higher direct and indirect tax rates should reduce output, the effect should be stronger for indirect taxes (for which firms are ineligible to claim credits). In contrast, capital/labor ratios and profit allocation should be largely unaffected by indirect taxation.

The regressions reported in columns 3 and 4 of [Table 2](#) measure the output effects of direct and indirect taxation. The dependent variable in these regressions is the natural log of an affiliate's gross product. Gross product, often referred to as value added, is the difference between an affiliate's sales and its purchases of intermediate output from related parties; since data on gross product are available only for majority-owned foreign affiliates, the sample in the regressions reported in columns 3 and 4 is limited to majority-owned affiliates. The independent variables in the regressions presented in these specifications include tax rates as well as the same GNP controls and parent, year, and industry dummy variables as those used in the regressions reported in columns 1 and 2. The -0.1792 coefficient reported in column 3 implies that 1% lower direct tax rates are associated with

¹⁶ Much of the empirical work on the effect of taxation on FDI measures a combination of affiliate size and affiliate location effects; [Devereux and Griffith \(2002\)](#) offer an analysis of tax effects on location choices.

0.18% greater gross product, controlling for three powers of host country GNP and parent, year, and industry fixed effects, though the tax effect is not statistically significant.

The regression reported in column 4 includes both indirect taxes and income taxes as independent variables. The estimates imply that both types of taxes reduce gross product, though the estimated effect of direct taxes remains statistically insignificant. The estimated -0.1895 coefficient reported in column 4 implies that 1% lower direct tax rates are associated with 0.19% greater gross product, which translates to an elasticity of 0.057. The estimated -0.2852 coefficient reported in column 4 implies that 1% lower indirect taxes are associated with 0.29% greater gross product, corresponding to an elasticity of 0.045. These results suggest that gross product levels are inversely related to rates of direct and indirect taxation, with the impact being significant in the case of indirect taxes (though the implied tax elasticity is smaller by an insignificant margin). Again, estimated coefficients on the income tax rates in the regressions reported in columns 3 and 4 do not change significantly when indirect tax rates are included as independent variables.

Columns 5 and 6 present regressions that evaluate the impact of direct and indirect tax rates on capital/labor ratios. The dependent variable in these regressions is the ratio of total employee compensation to assets. The independent variables are the same as in the regressions reported in columns 1–4, except that average compensation per employee is added as an explanatory variable.¹⁷ The 0.1045 estimated coefficient on the income tax rate in column 5 implies that 10% higher direct tax rates are associated with compensation/asset ratios that are 0.01 higher. In order to make sense of this coefficient it is helpful to translate it into elasticity. Table 1 reports that the mean of the dependent variable is 0.1442, and the mean income tax rate is 0.3005, so the implied elasticity of capital/labor substitution is 0.51,¹⁸ which is close to the 0.40 modal estimate for United States manufacturing reported by Chirinko (2002). The 0.0180 coefficient on the log of average compensation per employee in the same regression indicates that the ratio of compensation to assets rises with wage rates, which is characteristic of production functions with capital/labor substitution elasticities that are less than unity. The positive sign of the coefficient on wage rates is, therefore, consistent with the modest magnitude of the estimated elasticity of compensation/assets with respect to the tax rate.

Column 6 reports coefficients from a regression that includes both direct and indirect tax rates as explanatory variables. The 0.1063 estimated coefficient on the direct tax rate in column 6 is almost identical to the estimated value reported in column 5, while the 0.0028

¹⁷ Since the dependent variable in the regressions reported in columns 5 and 6 is the ratio of employee compensation to assets, the table reports regressions using analytic weights equal to affiliate assets. This weighting reduces the impact of outlying values of the constructed dependent variable in a way that is equivalent to multiplying through by assets. The regressions reported in columns 7 and 8, in which the dependent variable is net income/owner's equity, are analogously weighted by owner's equity. Mean values of employee compensation/assets and net income/owner's equity reported in Table 1 are weighted means. As a specification check, the regressions reported in columns 5 and 6 were re-run without including as an independent variable the average compensation per employee; the results were very similar to those reported in columns 5 and 6.

¹⁸ This calculation takes the cost of capital for firm j in country i to be $\lambda_j/(1 - \tau_i)$, in which λ_j is firm j 's cost of funds (its required after-tax rate of return), and τ_i is the tax rate in country i . Since labor expenses are tax-deductible, changes to τ_i do not affect a firm's cost of labor (w_j). Hence the derivative of the ratio of labor costs to capital costs with respect to tax rate is given by (w_j/λ_i) , and the implied substitution elasticity is $[0.1045(1 - 0.3005)/0.1442] = 0.51$.

estimated coefficient on the indirect tax rate is small and statistically insignificant. This evidence indicates that firms' choices of capital/labor ratios respond to direct tax rates but not indirect tax rates, which is consistent with incentives created by direct taxes that tax the return to capital, and indirect taxes that tax the returns to capital and labor more or less equally.

Finally, columns 7–8 present estimated coefficients from regressions in which the dependent variable is the ratio of affiliate net (after-tax) income to owner's equity. In the absence of tax-motivated income shifting, firms have incentives to allocate equity capital so that this ratio is equal at the margin for all investments. The results reported in columns 7 and 8 indicate that the ratio of net income to assets is decreasing in direct tax rates but is unaffected by indirect tax rates.¹⁹ The estimated -0.2490 coefficient on the income tax rate variable in column 7 indicates that 10% higher tax rates are associated with 2.5% lower profit rates. Since the dependent variable has a mean of 0.1671, it follows that the elasticity of reported profits with respect to the direct tax rate, evaluated at the sample means, is -0.45 . Adding the indirect tax rate as an explanatory variable, as in the regression reported in column 8, changes the estimated impact of direct taxation very little. The 0.0361 estimated coefficient on indirect taxes reported in column 8 is actually positive, though very small and statistically insignificant. Hence higher direct tax rates are associated with lower after-tax profit rates, whereas profit rates are generally unaffected by indirect tax rates.

5. Conclusion

Taxes other than income taxes are sizable, positively correlated with direct tax rates, and strongly associated with foreign investment and production patterns. The evidence indicates that direct and indirect taxes have comparable and independent effects on asset allocation by American multinational firms, after controlling for common parent and industry effects. Both types of taxes are costly, and therefore associated with reduced FDI and output by American firms. High rates of income taxation appear to encourage firms to substitute labor for capital and to reduce levels of taxable income, whereas high rates of indirect taxation do not. These patterns suggest a sizable investment impact of indirect taxes for which firms are unable to claim foreign tax credits, and illustrate the mechanisms by which taxes influence foreign investment in the absence of transfer pricing and factor substitution incentives.

Acknowledgements

The statistical analysis of firm-level data on United States multinational companies was conducted at the International Investment Division, Bureau of Economic Analysis, United States Department of Commerce under arrangements that maintain legal confidentiality requirements. The views expressed are those of the authors and do not reflect official

¹⁹ As a specification check, the regressions reported in columns 7 and 8 were re-run including as an independent variable an affiliate's leverage ratio; the results are very similar to those reported in columns 7 and 8.

positions of the United States Department of Commerce. We thank Steve Bond, Roger Gordon, Mark Robson, participants at the World Tax Competition Conference, and two anonymous referees for helpful comments. Financial support from the Lois and Bruce Zenkel Research Fund at the University of Michigan and the Division of Research at Harvard Business School is gratefully acknowledged.

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