

CROSS-COUNTRY COMPARISONS OF CORPORATE INCOME TAXES

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We use publicly available financial statement information for 11,602 public corporations from 82 countries from 1988–2009 in an attempt to isolate the impact of domicile on corporate taxes. We find that the country in which the parent of a multinational is located and to a lesser extent its subsidiaries are located substantially affects its worldwide effective tax rate (ETR). Japanese firms always face the highest ETRs. U.S. multinationals are among the highest taxed. Multinationals based in tax havens face the lowest taxes. We find that ETRs have been falling over the last two decades; however, the ordinal rank from high-tax countries to low-tax countries has changed little. We also find little difference between the ETRs of multinationals and domestic-only firms. Besides enhancing our knowledge about international taxes, these findings should provide some empirical underpinning for ongoing policy debates about the taxation of multinationals.

Keywords: corporate income taxes, effective tax rates, domicile, multinational

JEL Codes: H25, M41, K34

I. INTRODUCTION

This paper estimates the impact of a company's location on its global tax burden. Increasingly mobile capital and innovative international tax planning are reportedly eroding tax differences arising from the physical location of the firm. Intracompany transfer prices, hybrid entities, tax havens, the strategic placement of debt and intangibles, and the timing of repatriations, among other tax avoidance activities, enable at least some multinationals to shelter large portions of their worldwide income from their high-tax home countries.¹ Some assert that by separating the places where firms make

¹ For examples, see Drucker's (2010) discussion of Google and Kocieniewski's (2011) analysis of General Electric.

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their profits from the places where they report their taxable income, these international tax plans largely undo the statutory differences in tax laws across countries (Kleinbard, 2011; Johnston, 2008; Desai, 2009). Others claim that the statutory differences are so great and the costs of tax avoidance so high that companies located in high-tax countries cannot compete with their counterparts domiciled in less heavily taxed countries — as discussed in Samuels (2009), and Carroll (2010), among many others.² The purpose of this paper is to provide some empirical underpinnings for this debate by quantifying the extent to which tax domicile affects worldwide tax liabilities.

We use firm-level financial statement information to estimate the extent to which the domicile of a corporation affects its global corporate income taxes. We measure corporate income taxes by estimating country-level effective tax rates (ETRs). In particular, we regress firm-level ETRs (based on cash taxes paid and current and total tax expense as reported in firms' financial statements) for 28,343 firm-years spanning 82 countries on categorical variables for the domicile of the parent and whether the company is a multinational. The regression coefficients on the categorical variables provide estimates of country-level ETRs for both domestic firms (those operating in only one country) and multinationals. The estimates enable us to compare the ETRs of domestic-only firms and multinationals and examine variations in ETRs over time and across industries.

We find that the ETRs for multinationals domiciled in high-tax countries are roughly double those in low-tax countries. Multinationals domiciled in Japan face the highest ETRs, followed by those domiciled in the United States, France, and Germany. Not surprisingly, multinationals domiciled in tax havens usually enjoy the lowest ETRs. In some countries, multinationals face higher ETRs than their domestic counterparts; in others, multinationals face lower ETRs. There is no global pattern and the differences are relatively small. Our findings indicate that ETRs have steadily declined worldwide over the last two decades (most notably in Japan), but the ordinal rank from high-tax countries to low-tax countries has changed little. In addition, we find that ETRs vary widely across industries throughout the world with retailers and construction firms typically facing ETRs much higher than those of miners and information firms.

In subsequent tests, we then add categorical variables that denote the location of the firm's foreign subsidiaries, enabling us to isolate the marginal ETR impact for every domicile of foreign subsidiaries, including tax havens. We find the ETR for a multinational is greater if its subsidiaries are located in high-tax countries than if its subsidiaries are located in low-tax countries. For example, U.S. multinationals can reduce their ETR by locating a subsidiary in a tax haven. Having a subsidiary in Singapore (Ireland) reduces the cash ETR of the typical U.S. multinational by 2.0 (1.6) percentage points.

² Tax domicile is the location of the firm for tax purposes. There is no standard definition of domicile. For example, domicile is the legal residence or site of incorporation in the United States, but the location of operational headquarters in the United Kingdom. Throughout the paper we will use the terms location and domicile interchangeably. Note, however, that we cannot observe the tax domicile of a firm. We can observe its country of incorporation and operations and assume that these countries are the domicile of its parent and subsidiaries.

We infer from these findings that unprecedented capital mobility and aggressive multinational tax planning have yet to fully undo the substantial cross-country differences in tax law. In fact, the results suggest remarkable stability in light of globalization and technological change. The same countries that were high-tax years ago are high-tax today. Although the spreads between high-tax and low-tax countries are narrowing, they remain statistically significant. Tax differences across industries are remarkably similar across countries. Together, these results suggest that the costs of tax planning must be large enough (at least for now) to continue to at least partially offset the leveling forces created by globalization.

This study is made possible by the recent availability of financial statements from companies around the world. Data limitations have thwarted prior attempts to isolate the effects of domicile on ETRs. For example, compared with Collins and Shackelford (1995, 2003), whose research design provides the basic structure for this study, this paper examines recent data for more companies and countries, is not dominated by American companies, can actually observe cash taxes paid for many companies, and has information about foreign subsidiaries.³ Two other studies compare (total income tax expense) ETRs across countries. Lu and Swenson (2000) and Lee and Swenson (2008) document average ETRs for a wide range of countries for 1995–1998 and 2006–2007, respectively. Using Global Vantage and Compustat Global databases, they calculate country-level ETRs and use them as a basis for comparison for the Asia-Pacific countries that were the focus of their studies. Neither study separates domestic-only and multinational corporations or has information on the location of firms' subsidiaries. As a result, inferences in both studies are limited to cross-country comparisons at the aggregate and industry levels.

Dyreng and Lindsey (2009) exploit text-searching software to collect foreign operations information for all U.S.-incorporated firms in the Compustat database for 1995–2007 and estimate the average worldwide, federal, and foreign tax rates on U.S. pre-tax income. Their estimate of a 1.5 percentage point reduction in ETRs for U.S. companies that have activities in a tax haven is comparable with our tax haven estimates. A limitation of their study is that they do not have access to data for companies domiciled outside the United States.

The remainder of the paper is organized as follows. Section II develops the regression equation used to estimate the ETRs, while Section III details the sample selection. Sections IV, V, and VI present the empirical findings. Closing remarks follow.

³ Specifically, Collins and Shackelford (1995) are limited to four countries (Canada, Japan, the United Kingdom, and the United States), 10 years (1982–1991), and two-thirds of their sample are American companies. Subsequently, Collins and Shackelford (2003) add Germany and estimate ETRs from 1992–1997; however, with data for only eight Japanese firm-years and 36 German firm-years, they are effectively limited to studying three countries. In contrast, this study examines information from 82 countries, 22 years (1988–2009), and has only one-third of its sample from the United States. Furthermore, unlike Collins and Shackelford (1995), this study has actual cash taxes paid for many companies, enabling us to look at tax liabilities, not just accounting measures of tax expense. Finally, neither Collins and Shackelford study has any information about the location of corporate subsidiaries, preventing them from undertaking two of the major tests in this paper, which look at the effects of subsidiary domicile on the firm's global tax burden.

II. REGRESSION EQUATION

To isolate the impact of domicile on the tax rates of multinationals and domestic firms across countries and to determine whether multinationals and domestics in the same country face different tax rates, we could simply use the actual firm-level ETRs. However, erroneous inferences about the level of taxation across countries could be reached because companies are not randomly assigned across countries. For example, if the technology sector faces relatively low taxes throughout the world because of tax incentives for research, then countries with disproportionately large numbers of technology firms might appear to have lower levels of taxation than other countries when the difference actually arises because of industry mix. Therefore, to control for such possible industry, year, and firm size differences across countries, we estimate a modified version of the pooled, cross-sectional regression equation developed in Collins and Shackelford (1995)⁴

$$(1) \quad ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{1j} (COUNTRY_{it}^j * MN_{it}) \\ + \sum \beta_{2k} INDUSTRY_{it}^k + \sum \beta_{3m} YEAR_{it}^m + \sum \beta_{4n} SIZE_{it}^n + \varepsilon_{it},$$

where

- ETR_{it} = the ETR for firm i in year t .
- $COUNTRY_{it}^j$ = an indicator variable equal to 1 if firm i is domiciled in country j in year t , and equal to 0 otherwise.
- MN_{it} = an indicator variable equal to 1 if firm i has a foreign subsidiary in year t , and equal to 0 otherwise.
- $INDUSTRY_{it}^k$ = an indicator variable equal to 1 if firm i is identified as being in industry k (by two-digit North American Industry Classification System (NAICS)) in year t , and equal to 0 otherwise.
- $YEAR_{it}^m$ = an indicator variable equal to 1 for firm-years for which $t = m$, and equal to 0 otherwise.
- $SIZE_{it}^n$ = the percentile rank of the size of variable n for firm i in year t , where $n = \{\text{Assets, Revenue, Owners' Equity}\}$.

We suppress the intercept so that the coefficients on the *COUNTRY* variables can be interpreted as the marginal cost of domiciling in a country, i.e., the ETR for domestic

⁴ Collins and Shackelford's (1995) regression model includes categorical variables indicating whether the firm's income statement is consolidated or restated in accordance with U.S. Generally Accepted Accounting Principles (GAAP). We exclude all unconsolidated firm-years from our sample to avoid potentially including both parents and their subsidiaries as separate observations. We cannot include the restatement variable because our data do not include it.

firms.⁵ Throughout the paper, we refer to the coefficient on the *COUNTRY* variable as the *domestic ETR*. Suppressing the intercept also means that the coefficient on the *COUNTRY * MN* variables is the incremental tax cost for multinationals (as compared with the domestic-only firms) in that country. Positive values are consistent with multinationals in a country facing higher ETRs than those faced by their domestic counterparts. Negative values are consistent with domestic firms in a country facing higher ETRs than their multinational counterparts. Throughout the paper, we refer to the sum of the coefficients on the *COUNTRY* and the *COUNTRY * MN* variables as the *multinational ETR*.⁶

The coefficients on *INDUSTRY* and *YEAR* are used to determine whether ETRs vary across industries and time. Three control variables are intended to capture size (*SIZE*): the percentile ranks of Total Assets, Revenues, and Equity. Prior studies of the impact of size on ETRs have been inconclusive. Rego (2003), Omer, Molloy, and Ziebart (1993), and Zimmerman (1983) find a negative relation, consistent with economies of scale and political costs. Conversely, Armstrong, Blouin, and Larcker (2011), Jacob (1996), Gupta and Newberry (1997), and Mills (1998) find no relation.

The ETRs are collected from each firm's financial statements. The ETR denominator is net income before income taxes (NIBT). We use three different ETR numerators: (1) actual cash taxes paid (cash ETR); (2) current worldwide income tax expense (current ETR); and (3) total worldwide income tax expense (total ETR). Because the focus of this study is on the actual corporate income taxes paid, cash ETR is the superior numerator. Unfortunately, not all countries require firms to disclose the actual taxes paid during that year in their financial statements. Thus, to expand our sample, we turn to the current ETR in some tests. However, it too is not a mandatory disclosure in all countries. Thus, to maximize the observations in the study, we also report the total ETR. Conclusions are qualitatively identical whether cash taxes paid, current tax expense, or total tax expense is the numerator.

That said, all of these ETR measures are flawed. Ideally, we would divide actual cash taxes paid throughout the world by a measure of the economic activity that created those taxes. Unfortunately, no such measure exists. While cash taxes paid are available for many companies, those taxes typically relate to economic activity over multiple years because financial and tax accounting vary and also because a substantial portion of the cash taxes paid in a year arise from audits of prior years' tax returns.

This mismatching is not a problem for current or total income tax expense because the accounting earnings related to these accounting measures of taxes are computed over

⁵ To estimate (1), one industry and one year have to be excluded from the regression. To determine which industry to leave out, we calculate the mean *ETR* in each industry (two-digit NAICS) and then determine the median of those means. The industry with the median mean is the one left out. We implement a similar procedure on the years.

⁶ Note that the magnitude of the domestic and multinational ETRs cannot be directly compared with the actual ETRs from the financial statements, which serve as the dependent variable. The domestic and multinational ETRs are the tax rates, conditional on industry, year, and size. That said, our empirical analysis shows that the estimated ETRs are very similar to the actual ETRs from the financial statements.

the same period. However, current income tax expense and total income tax expense have their own imperfections. As with all accounting measures, income tax expense is designed to assist investors in evaluating the financial performance of corporations. It is not intended to provide researchers with an ideal measure of actual cash taxes paid. Although several studies document the difficulties of using accounting information to approximate cash taxes paid — as discussed in Hanlon and Heitzman (2010), Graham, Raedy, and Shackelford (2011), Dyreng, Hanlon, and Maydew (2008), Hanlon, (2003), Lisowsky (2009), and McGill and Outslay (2002), among others — none has advanced a superior measure. We take some comfort from studies with access to both U.S. tax return data and financial statement information that report the book numbers provide a reasonably good measure of the actual taxes on U.S. tax returns (Graham and Mills, 2008). However, other studies are less sanguine (Plesko, 2002). Our primary comfort comes from the fact that we compute the country ETR using a large sample of firms. Thus, we trust that the imperfections in any single company's ETR have limited impact on the ETR estimate for the entire country.

Another limitation arising from using financial statement information is that accounting rules vary across countries. Although many countries, though not the U.S., have adopted uniform International Financial Reporting Standards in recent years, a few country-specific rules remain. That said, the structure underlying financial accounting and the rules arising from those guidelines are similar worldwide and few major differences exist during our investigative period, 2005–2009.⁷

Finally, note that the dependent variable in this study is an average of book taxes over book profits, which financial statements and the accounting rules term an “effective tax rate.” However, it should be distinguished from other measures that economists sometimes term the “effective tax rate,” “average effective tax rate,” or “marginal effective tax rate.” Furthermore, the current ETR used in this study is not the firm's marginal tax rate, as detailed in Scholes et al. (2009), because it ignores implicit taxes, cannot assess who bears the burden of corporate income taxes, cannot capture incentives to employ new capital (Fullerton, 1984; Bradford and Fullerton, 1981), and is not related to the rates used in investment decisions developed in Devereux and Griffith (1998) and Gordon, Kalambokidis, and Slemrod (2003).

III. SAMPLE

We use two different databases to collect a sample of firms for this study. To collect information about the location of ultimately-owned subsidiaries, we use the Orbis

⁷ To provide one assessment of the impact of cross-country variation in financial reporting rules on the computation of NIBT, we repeated all of the study's tests using an adjusted net income as the ETR denominator. The adjusted net income measure was NIBT plus two key expenses (depreciation expense and research and development) whose accounting rules vary across countries. The results were qualitatively the same.

database.⁸ We include all parents that have at least one subsidiary.⁹ We then match these parents to their financial statement information in the Compustat databases. We collect three different tax variables: total tax expense, current tax expense, and cash taxes paid. The main tests in the paper use current tax expense; thus, we describe that sample here. If a firm-year does not report current tax expense but does report both total and deferred tax expense, we calculate current tax expense as total less deferred expense. As a validity check on the data, we delete all observations for which the difference between the ETR with total tax expense in the numerator and the ETR with the sum of current and deferred tax expense in the numerator is greater than one percentage point.¹⁰ We attempt to mitigate the impact of outliers and errors in the data by limiting the sample to observations with non-negative ETR less than or equal to 70 percent.

The Orbis subsidiary measure has one serious flaw. Orbis only reports subsidiary information as of the most recent updating of the information.¹¹ We are unable to assess the extent to which this data limitation affects the conclusions drawn from this study. However, to mitigate the potential for miscoding the existence and location of foreign subsidiaries, we limit the primary tests in this paper to firm-years since 2004.¹² Our logic is that the foreign subsidiary coding is correct for 2009, has fewer errors in 2008 than in 2007, and has fewer errors in 2007 than in 2006, and so forth. We arbitrarily select the last five years for which we have data as the cut-off for our primary tests in the hope that the miscoding is of an acceptable level for these most recent years. In subsequent tests, we present estimated coefficients from separate regressions for each year, and in untabulated tests, we estimate one regression that uses all of the firm-years. Conclusions are similar regardless of the sample period.

⁸ Bureau van Dijk collects information directly from annual reports and other filings. In addition, it obtains information from several information providers, including CFI Online (Ireland), Dun & Bradstreet, Data-monitor, Factset, LexisNexis, and Worldbox. The version of Orbis used in this study includes companies meeting all of three size thresholds: \$1.3 million in revenue, \$2 million in total assets, and 15 employees. Corporations below the threshold on any of these dimensions are not included in our sample.

⁹ We define an “ultimately-owned” subsidiary as one for which all links in the ownership chain between it and its ultimate parent have greater than 50 percent ownership.

¹⁰ To further reduce concerns about inaccurate data, we eliminate from the sample any country for which more than half of the observations of current tax expense are zero.

¹¹ For example, if a company had no subsidiary in Canada before 2009 (the most recent year in the database) and then incorporated a subsidiary in Canada in 2009, we would erroneously treat the company as having had a Canadian subsidiary for all years in our sample. Likewise, if a company had a subsidiary in Canada for all years before 2009 and then liquidated the Canadian subsidiary in 2008, we would erroneously treat the company as not having had a subsidiary in Canada for any year in our sample.

¹² Another advantage of limiting the analysis to recent years is that it mitigates potential survivorship bias. The Orbis database is limited to companies presently in existence. Thus, our analysis is limited to firms that have survived throughout the investigation period. By restricting the sample to firm-years since 2004, we reduce the deleterious effects of survivorship bias.

Another potential limitation of using Orbis is that it may fail to identify all of a firm's subsidiaries, a potential problem whose magnitude we are unable to fully assess.¹³ However, it seems reasonable that if Orbis were to overlook some subsidiaries that they would be those that are smaller, less significant, and potentially inactive. Since we are aggregating all firms into a single country-wide ETR, we trust that imperfections in the data will have limited impact on the conclusions. Nevertheless, despite these possible problems with using Orbis, we use it because no other publicly-available database provides as much information about as many firms and countries.

Our sample selection process yields a main sample for the years 2005–2009 of 28,343 firm-years spanning 82 countries, ranging from only one firm-year in six countries to 9,452 firm-years in Japan.¹⁴ We combine the countries with fewer than 200 observations into six categories: Africa, Asia, Europe, Latin America, Middle East, and Tax Havens. The remaining 15 countries are included on their own and our main tests are conducted and results are reported using these 21 countries and groups. For the 21 countries and groups, Table 1 reports the firm-year means of Sales, Assets, Equity, and Pretax Income, dichotomized into 13,917 domestic-only firms and 14,426 multinationals. Not surprisingly, multinational firms average more sales, assets, equity, and pretax income than domestics do.

The next two columns of Table 1 present the mean and median ETRs, respectively, where $ETR = \text{Current Tax Expense} / \text{Pretax Income}$. These are the *actual* ETRs from the firms' financial statements, not ETRs coefficients from estimating (1). The domestics (multinationals) have mean ETRs of 28 percent (27 percent) and median ETRs of 30 percent (28 percent). The next column presents the average statutory tax rates for the country-years in the sample.¹⁵ The final column shows the marginal effective tax rates (METRs) from the Chen and Mintz (2010) study for those countries for which rates are available.

In general, the different tax rates paint a similar picture — high tax countries with one measure are high tax countries with another measure and vice versa. The Pearson

¹³ In an attempt to assess the potential magnitude of this problem (at least for U.S. firms), we compare the list of the countries that Orbis identifies with the list of countries that Dyreng and Lindsey (2009) identify using a search of the 10-K, Exhibit 21, filed by U.S. multinationals. Dyreng and Lindsey (2009) list the percentage of U.S. multinationals having material operations in each foreign country. When we calculate that same percentage using the Orbis data, we find that our calculated percentage is within 10 percentage points of that of Dyreng and Lindsey (2009) for 84 of the 92 countries reported in both studies. This gives us some assurance that the data are reasonably complete, at least for U.S. firms, but the differences indicate that there are imperfections in our data.

¹⁴ An advantage of investigating this period is that it includes both economic expansion (2005–2007) and contraction (2008–2009), potentially permitting us to generalize beyond a single phase of the business cycle.

¹⁵ We use the combined corporate statutory tax rate calculated for the 30 OECD countries and available at OECD, Taxation of Corporate and Capital Income, Table II.1, "Corporate Income Tax Rate, 2011," www.oecd.org/dataoecd/26/56/33717459.xls. For the non-OECD countries in our sample, we use the maximum rate in data kindly provided by Kevin Hassett.

correlation between the mean current ETR and the statutory tax rates is 73 percent, indicating that countries with high statutory tax rates have companies with high ETRs. Two exceptions are Canadian and German domestic companies, which have mean current ETRs that are 21 (20) percentage points lower than their statutory rates, consistent with a high statutory rate but a narrow tax base for those companies. The mean current ETR and the Chen and Mintz (2010) METRs have a Pearson correlation of 43 percent.¹⁶ The biggest differences are for Indian multinationals and Canadian domestic firms, which have current ETRs that are 20 (19) percentage points below their METRs.

IV. PRIMARY FINDINGS

A. Do the ETRs Estimated from the Regression Coefficients Differ from the Actual ETRs?

Table 2 presents the domestic-only ETRs, which are the *COUNTRY* coefficients from estimating (1), and the multinational ETRs, which are the sum of the *COUNTRY* and the *COUNTRY*MN* coefficients. Results are presented using all three numerators, cash taxes paid (cash ETR), current income tax expense (current ETR) and total income tax expense (total ETR).

The actual ETRs from the financial statements (those shown in Table 1) are reported in columns immediately to the left of the estimates.¹⁷ There is little difference between the mean of the actual ETRs and the estimates from (1). For the six pairings of actual and estimated ETRs (domestic cash ETRs, multinational cash ETRs, domestic current ETRs, multinational current ETRs, domestic total ETRs, and multinational ETRs), the correlation is never less than 94 percent. Furthermore, the difference between the actual ETR and the estimated ETR is never more than 6 percentage points.¹⁸ Thus, we infer from the similarity between the actual and estimated ETRs that the control variables (for industry, year, and size) have little impact on the coefficients of interest. This pattern holds throughout the paper, suggesting that the inferences drawn in this study would be similar whether we used the actual ETRs from the financial statements or the ETRs estimated in the regression. For brevity, we will focus exclusively on the estimated ETRs in the remainder of the paper.

¹⁶ Chen and Mintz (2010) compute METRs on capital using a model that assumes multinational companies maximize value for their projects around the world using debt and equity financing from international markets.

¹⁷ To illustrate, for Australian companies, using cash taxes paid, the mean raw ETR from the financial statements for domestic-only firms is 26 percent, while the estimated cash ETR for domestics is 23 percent. The same figures for multinationals are 24 percent (raw) and 22 percent (estimated). The remaining columns are when the numerator is current ETR and total ETR, respectively.

¹⁸ Interestingly, when the numerator is cash taxes paid (current income tax expense), the estimated ETR never (only once) exceeds the raw ETR. The pattern is reversed when the numerator is total tax expense. There, the estimated ETR exceeds the raw ETR in all but two cases.

Table 1
Summary Statistics by Country/Group, 2005-2009
 (Dollar Figures in U.S. Millions)

	N	Revenue	Assets	Equity	Pretax Income	Mean Current ETR (%)	Median Current ETR (%)	Statutory Tax Rate (%)	Marginal ETR (%)	Doing Business Profit Tax Rate (%)
Full sample	13,917	993	2,266	543	93	28	30	39	33	27
	14,426	5,309	14,386	2,553	587	27	28	39	33	27
Australia	104	1,416	2,404	563	125	22	25	30	26	26
	342	2,311	12,549	1,775	505	22	26	30	26	26
Bermuda	29	1,004	2,546	1,566	276	5	2	0		
	289	840	1,307	474	110	12	9	0		
Canada	568	997	1,809	641	118	14	7	35	33	9
	603	2,359	7,062	1,936	417	21	21	35	33	9
Cayman Islands	9	201	308	215	42	10	8	0		
	198	312	454	259	52	13	11	0		
France	150	389	4,109	594	69	25	28	35	34	8
	212	17,583	67,342	8,325	1,828	23	25	35	34	8
Germany	116	3,837	2,347	506	100	16	13	36	29	19
	324	13,431	51,792	5,902	1,060	24	25	37	29	19
India	113	597	1,657	363	109	22	23	34	36	25
	269	774	1,350	491	135	17	14	34	37	25
Japan	6,194	703	2,574	377	45	37	41	40	33	27
	3,258	5,563	11,256	2,308	341	36	37	40	33	27
Malaysia	174	465	1,503	374	61	19	19	27	19	17
	107	615	6,346	650	144	17	18	27	20	17
South Africa	71	575	1,203	729	165	18	19	29	15	24
	150	2,466	9,150	1,342	422	25	26	29	15	24

Sweden	DOM	94	243	682	284	61	10	2	28	21	16
	MNAT	196	2,268	9,033	1,545	386	18	20	28	21	16
Switzerland	DOM	50	1,461	3,127	1,591	394	17	15	21	17	9
	MNAT	164	8,574	62,774	4,848	1,093	19	18	21	17	9
Taiwan	DOM	207	1,139	1,887	718	111	20	20	25	25	14
	MNAT	689	1,993	1,984	795	147	18	17	25	25	14
United Kingdom	DOM	1,047	344	683	306	60	20	22	29	29	23
	MNAT	892	5,452	34,334	3,211	788	24	26	30	29	23
United States	DOM	3,830	1,655	2,366	771	152	23	25	39	33	28
	MNAT	5,244	6,358	11,496	2,964	804	28	30	39	32	28
Africa	DOM	13	269	1,026	189	51	21	23	26	26	28
	MNAT	25	471	3,042	532	128	21	21	30	30	28
Asia	DOM	210	826	1,662	444	110	21	20	32	32	28
	MNAT	67	1,981	5,736	1,130	240	18	19	30	30	28
Europe	DOM	556	642	1,327	440	97	21	21	22	22	28
	MNAT	842	5,325	22,379	2,458	616	21	22	29	29	28
Latin America	DOM	166	1,366	1,976	815	159	21	21	29	29	28
	MNAT	111	4,179	8,632	2,070	849	24	22	27	27	28
Middle East	DOM	47	480	1,771	325	104	11	10	16	16	28
	MNAT	110	965	5,473	898	192	17	11	31	31	28
Tax Havens	DOM	169	1,297	5,393	2,509	367	10	8	18	18	28
	MNAT	334	1,788	9,465	2,179	328	15	14	18	18	28

Notes: This table presents the means of the variables by country/group and firm type (DOM = domestic, MNAT = multinational). ETR = current tax expense/pre-tax income. Statutory rate is the weighted average maximum corporate rate for the group, weighted by number of observations. Marginal ETR is the weighted average Marginal Effective Tax Rate on Capital Investment calculated by Mintz and Chen (2010), weighted by number of observations.

Asia	26	24		21	20	18	16	23	23	21	21*
Europe	26	24	23	21*	21	20	21	18	25	25	26
Latin America	19	19	19	16	21	18	24	19	24	23	23*
Middle East			11	11			17	14	13	18	19*
Tax Havens			18	16	10	10	15	13*	16	17	18
Adjusted R-squared	0.71				0.80				0.87		
N	12,509				28,343				41,642		

Notes: This table presents the results of estimating $ETR_{it} = \sum \beta_0 COUNTRY_{it} + \sum \beta_1 (COUNTRY_{it} * MN_{it}) + CONTROLS$ on three separate samples, each with *ETR* calculated as the tax measure in the column heading scaled by pretax income. The subcolumns titled Actual report the mean *ETR* as reported on the financial statements. The subcolumns titled Estimate report the estimates of the coefficients. The Domestic Estimate is the estimate of β_0 for each country/group. The Multinational Estimate is the estimate of $(\beta_0 + \beta_1)$ for each country/group. All available observations were included in the estimation, but estimates are only reported for countries/groups having 50 or more observations. An asterisk indicates that β_1 is statistically significant at the 5% level, i.e., that the number in the Domestic Estimate column is statistically different from the number in the corresponding Multinational Estimate column. For example, the estimate of the cash *ETR* for Canadian domestic firms (14%) is statistically different from the estimate for Canadian multinational firms (19%).

B. Do ETRs Differ between Domestic and Multinationals?

Next, we use Table 2 to compare the estimated ETRs for domestic-only firms with those for multinationals. (Asterisks indicate statistically significant differences between the multinational and domestic estimates.) We have enough firm-years to report estimated domestic cash ETRs for eight countries or groups of countries (Australia, Canada, Malaysia, United Kingdom, United States, Asia, Europe, and Latin America).¹⁹ All estimated domestic cash ETRs for these countries (Table 2, column 2) are within 5 percentage points of their multinational counterparts (Table 2, column 4), and the correlation between the two sets of ETRs is 84 percent. In three cases, the multinational and domestic cash ETRs are statistically significantly different from each other at the 0.05 level: (1) cash ETRs for Canadian multinationals (19 percent) exceed those for its domestics (14 percent); (2) the ETRs for Europe are lower for their multinationals (21 percent versus 24 percent), and (3) the U.S. multinational cash ETR estimate is statistically significantly greater than the U.S. domestic cash ETR estimate, although by just 1 percentage point (21 percent versus 20 percent).

As mentioned above, there are more firm-years when current income tax expense or total income tax expense are used as the numerator. This larger number of observations enables us to report 17 (20) domestic (multinational) current ETRs and 18 (21) domestic (multinational) total ETRs. The correlation between these domestic ETRs and their multinational counterparts is 73 percent for the current ETRs and 89 percent for the total ETRs. The mean of the absolute values of the difference between the domestic and the multinational ETRs is 3 (2) percentage points for both current (total) ETRs with no difference exceeding 6 percentage points.

Twelve of the 17 countries with both domestic and multinational current ETRs have domestic and multinational ETRs that are statistically different from each other. However, no clear directional pattern exists. In seven cases the multinationals ETR are larger; in five cases the domestic ETRs are greater. A similar split exists among the total ETRs. Multinational total ETRs exceed domestic ones for five countries/groups while domestic total ETRs are larger in six cases. Among U.S. firms, multinationals face a 23 percent current ETR, while domestics have a 19 percent current ETR, but the total ETRs for U.S. multinationals and domestics are the same (30 percent).

We infer from this analysis that although about half of the countries have domestic and multinational ETRs that are statistically different from each other, the direction is not consistent (i.e., sometimes the domestics have higher ETRs and sometimes the multinationals do). In other words, the evidence supports neither assertions that multina-

¹⁹ Although we have enough observations (216) for Japan to report their cash ETRs, we chose to omit them from Table 2 because there appear to be errors in the data. Only 3 percent of the Japanese companies reporting current tax expense also report cash taxes paid. This suggests that either few companies report cash taxes paid in Japan (and they may not be representative of the Japanese population) and/or the data are incomplete or erroneous for this item. Either explanation could lead to erroneous inferences about the cash taxes paid by Japanese companies; thus, we err on the side of caution and do not report these figures. Such dramatic differences are not found for any other country.

tionals consistently pay lower taxes nor claims that multinationals consistently operate at a tax disadvantage compared with their domestic counterparts.

Two caveats bear mentioning. First, these inferences depend critically on the data correctly classifying firms as multinational and domestic and, as acknowledged above, the data are imperfect. Second, the decision to operate abroad is endogenous. It is possible that the firms that expand into foreign markets are those with the best ability to avoid the higher tax costs that arise from being a multinational. Alternatively, the firms that choose to become multinationals may be those with the best ability to exploit the tax advantages arising from being able to spread income across multiple countries. Thus, readers should be cautious in interpreting these coefficients as the change in ETRs that would arise if domestics became multinationals or multinationals reverted to domestic-only status.

C. How Much Does the Location of the Parent Affect a Multinational's ETR?

Table 2, column 4 reports estimated multinational cash ETRs for 13 countries, ranging from 11 percent (Middle East) to 22 percent (Australia, France, Germany, and United Kingdom), with a mean (median) [standard deviation] of 18 percent (18 percent) [4 percent]. The U.S. multinational cash ETR is 21 percent. The 20 estimated multinational current ETRs (column 8) range from 9 percent for Bermuda (followed by 10 percent for the Cayman Islands and 13 percent for the Tax Havens) to a high of 31 percent for Japan (which exceeds the next highest, the United States, by 8 percentage points) with mean (median) [standard deviation] of 17 percent (17 percent) [5 percent]. The polar countries are similar when we shift from current to the estimated multinational total ETRs (column 12), which range from 16 percent for the Cayman Islands (followed by Bermuda at 17 percent and the Tax Havens at 18 percent) to 39 percent for Japan (followed by the United States at 30 percent) with mean (median) [standard deviation] of 24 percent (25 percent) [5 percent]. We infer from this analysis of cash, current, and total multinational ETRs that the domicile of the multinational significantly affects a firm's ETR. The estimated ETRs for the highest taxed countries are always at least double those for the least heavily taxed countries.

Hereafter, current ETRs alone are reported because they allow us to study more countries than would be possible with cash ETRs, and, although total ETRs would enable us to add Africa to the analysis, current ETRs better approximate the more desirable but too often unobservable measure, actual cash taxes paid.²⁰ In addition, no distinction is made between domestic and multinational ETRs because we find no consistent differences between them.

Table 3 presents the results of F-tests comparing the current ETRs for each country generated by estimating (1) without the multinational interaction terms (i.e., by pool-

²⁰ The inferences drawn from using current and total ETRs are identical, as would be expected since the Pearson correlation coefficient between the two estimated ETRs is 95 percent. The correlation between cash and current (total) ETRs is 73 percent (86 percent).

ing domestics and multinationals in each country). These statistical results confirm the visual impression from Table 2, i.e., there are widespread differences among the coefficients from estimating (1). A star in a cell of Table 3 indicates that the current ETR for the row country is statistically significantly different from the current ETR of the column country. For example, the star in the upper left-hand corner indicates that the current ETRs for Australia and Bermuda are significantly different at the 5 percent level.

In summary, these findings are consistent with the location of a firm's headquarters continuing to affect its global tax burden. We infer that, contrary to the assertions of some and despite many successful strategies for reporting the profits from activities in high-tax countries as taxable income in low-tax jurisdictions, companies domiciled in high-tax countries still pay higher global taxes.

D. Have ETRs Changed Over Time?

The findings above are for firm-years from 2005–2009. By combining years, we increase the number of observations per country, enabling us to study more countries. However, by combining years, we may mask cross-temporal changes in tax law. Thus, we next report annual estimated current ETRs, using the complete sample of domestic and multinational firm-years and modifying (1) to allow annual estimates for each country and dropping the separate estimates for multinationals (*COUNTRY * MN*). These estimated regression coefficients enable us to analyze the changes in ETRs from 1988–2009 for each country.²¹ By examining more than two decades of ETRs, we can see their sensitivity to expansions and recessions.

Table 4 reports the annual estimated current ETRs. Percentages are only presented if there are at least 20 observations, but all available firm-years are included in the regressions. We find that the high-tax to low-tax rank across countries has changed little over the two decades. In 1988, the first year for which we have data, the Japanese ETR was the highest at 44 percent (20 percentage points ahead of the next country, United Kingdom). In the most recent year for which we have data, 2009, they were the highest at 30 percent (5 percentage points higher than France, the country with the next largest ETR). In fact, in every year Japanese current ETRs are substantially higher than those in any country.²² Ignoring Japan, the United States, United Kingdom, France, and Germany have had the highest current ETR in 19 of the 22 years, and none of those countries'

²¹ As noted above, the widespread adoption of International Financial Reporting Standards has mitigated differences across countries in accounting practice. However, in the 1980s and 1990s, considerably more differences existed, including so-called "one-book" countries, such as Germany, where the financial statements doubled as the tax reports. Thus, comparability of accounting information across countries diminishes as we move back in time.

²² Though beyond the scope of this study, Japan's remarkable ability to sustain substantially higher tax rates than its trading partners throughout two decades warrants further investigation. Ishi (2001) and Griffith and Klemm (2004) (among others) document the gap, but we are aware of no study that attempts to ascertain the reasons why the gap has persisted for such a long period.

Table 4
Results by Year, Current Tax Expense, Multinationals and Domestics Pooled, 1988–2009

	1989	1991	1993	1995	1997	1999	2001	2003	2005	2006	2007	2008	2009
Australia	29			20	22	20	16	16	21	23	21	18	17
Bermuda					9	10	11	8	10	11	12	12	7
Canada	24	19	19	21	20	21	20	15	19	18	18	16	15
Cayman Islands								8	12	11	9	13	13
France	29	26	23	27	29	28	26	25	25	21	22	18	25
Germany					33	31	27	28	18	21	19	20	19
India		22	8	12	12	9	12	12	17	17	18	19	
Japan	52	48	43	44	43	42	38	32	34	34	34	36	30
Malaysia		32	25	25	22	5	23	18	20	17	16	17	15
South Africa					16	13	18	16	20	21	20	21	20
Sweden				15	19	19	22	15	15	15	13	15	11
Switzerland	26	27	12	20	19	19	21	19	20	17			11
Taiwan					8	8	8	11	15	15	15	18	16
United Kingdom	33	31	24	26	25	24	22	20	19	20	20	22	18
United States	32	30	23	26	25	25	23	18	24	23	24	23	20
Asia					21	18	20	14	21	22	18	20	16
Europe	27	24	17	21	22	25	24	23	22	20	20	20	17
Latin America					12	13	15	14	22	19	20	22	18
Middle East					13	13	18	15	17	18			
Tax Havens	22	18	12	16	16	16	14	14	15	14	11	13	11
Adjusted R-squared	0.92	0.91	0.89	0.87	0.87	0.84	0.82	0.77	0.79	0.80	0.82	0.81	0.79
N	2,460	2,510	2,744	3,736	4,545	4,773	4,365	5,780	6,298	7,532	5,848	4,318	4,347

Notes: This table presents the results of estimating $ETR_i = \sum \beta_0 COUNTRY_i + CONROLS$ on separate samples for each year. $ETR = Current\ tax\ expense/Pretax\ income$. Each cell reports the estimate of β_0 for each country/group. Estimates are reported for country-years with 20 or more observations. Odd-numbered years only are presented until 2005 due to space limitations.

ETRs is ever more than 9 percentage points below the penultimate ETR. In 1989 (the first year for which we report their ETRs), the Tax Havens enjoyed the lowest multinational ETR at 22 percent, 2 percentage points below the next lowest ETR (Canada's). Since then, the Tax Havens, the Cayman Islands, Bermuda, and Taiwan have never had a year where their ETR was more than 10 percentage points above the minimum ETR.

Over the two decades, ETRs fell steadily. For the nine countries with enough observations to report annual ETRs in both 2009 and 1989, all had lower ETRs in 2009 than in 1989, with a mean and median decline of 12 percentage points. The largest ETRs drops were 22 percentage points for Japan and 15 percentage points for Switzerland and the United Kingdom. The United States had a decline of 12 percentage points from 32 percent in 1989 to 20 percent in 2009. Thirteen of the 17 countries with enough observations to compute annual ETRs in both 2009 and 1999 experienced a reduction in their ETR with a mean (median) decline of 3 (5) percentage points. The largest declines in ETR were 12 percentage points (Japan and Germany). The U.S. ETR fell 5 percentage points from 25 percent in 1999 to 20 percent in 2009.²³

Of course, the relatively low ETRs in 2009 may reflect the worldwide recession. Indeed, six countries/groups (Bermuda, Japan, Sweden, Switzerland, the United Kingdom, and Europe) never experienced lower ETRs than they did in 2009. Furthermore, when we compare 2009 ETRs with those in 2006, we find that the 2006 ETRs are 2 percentage points higher, on average. Furthermore, when we compare 2006 ETRs with 1999 ETRs, we find no decline in ETRs on average. We infer from this analysis that ETRs did fall during the latest recession, whether this was caused by declining profitability (recall that we limit our sample to profitable companies) or a resumption of the long, slow slide in ETRs is indeterminable. Furthermore, it is possible that ETRs in 2006 were higher than would have been the case had the economy not been so strong during the middle years of that decade. Nevertheless, the particularly low ETRs in the latter years of the decade should be cautiously interpreted in light of the global economic downturn.

To summarize, ETRs have declined steadily over the last two decades; however, the rank order of countries has remained remarkably constant over time. Japan's ETRs continued to far exceed those of any other country. In fact, the smallest Japanese ETR over the two decades (30 percent in 2009) would have exceeded the ETR for any other country in any year since 2000. Similarly, the tax havens have consistently enjoyed the lowest ETRs. However, the spread between high-tax countries and tax havens has narrowed over the two decades because the tax havens began with low tax rates and maintained them, while all high-tax countries have reduced their ETRs. The U.S. ETR has declined at the average rate, keeping it among the highest taxed countries and substantially trailing only those in Japan.

²³ These findings are consistent with those of the 2008 study by the OECD discussed in Hodge (2008) which documented that 2008 was the 17th consecutive year in which the average statutory corporate tax rate in non-U.S. OECD countries fell while the U.S. rate remained unchanged.

E. Do ETRs Vary Across Industries?

To assess whether ETRs vary across industries, we estimate a modified version of (1) using current ETRs and industry groupings based on two-digit NAICS codes. We group two-digit codes to ensure that each reported industry has at least 800 firm-years. All observations are included in the regressions, but only cells with 20 or more observations are reported.²⁴ Manufacturers comprise 41 percent of the firm-years.

Table 5 shows considerable variation across industry ETRs.²⁵ Averaging across all countries, we find that the average current ETR ranges from Mining at 11 percent to Retail Trade at 27 percent. Retail Trade has the highest ETR in the United States and Japan. One reason that Retail Trade might be more heavily taxed is that its operations tend to require extensive fixed assets (e.g., buildings and inventory) and the location of its sales (ignoring online sales) can be easily identified. As a result, retailers probably cannot shift profits to low-tax jurisdictions as easily as firms in industries with more intangible assets and less easily identifiable sales.

When we limit the analysis to the 13 countries/groups with ETRs for at least five industries, we find that the maximum rate appears in different industries for different countries. Finance has the highest rate for three countries (France, India, and Sweden). The Other category is highest in Germany, Europe, and Latin America. The only industries that are never the highest are Manufacturing, Mining, and Real Estate.

Mining is clearly the least taxed industry. Averaging across all countries, its 11 percent ETR is 7 percentage points below Information. Moreover, for the six countries reporting Mining ETRs (Australia, Canada, Japan, the United Kingdom, the United States, and Europe), the Mining ETR is the lowest across all industries. One reason that Mining might appear to be less taxed than other industries is that this study analyzes only corporate income taxes. To the extent Mining is subject to extraction and other non-income taxes, its total corporate tax burden may be similar to other industries.

Despite the variation across industry ETRs, those countries with high ETRs in general tend to have high ETRs across most industries and those countries with low ETRs in general tend to have low ETRs across most industries. Japanese ETRs equal or exceed those from all other countries in every industry, except Mining. Consistent with its being a tax haven, Bermuda has the lowest ETRs in four of the five industries in which it has enough observations to report an ETR. The United States has the lowest Mining ETR at 6 percent.

Countries also differ substantially in the extent to which ETRs vary across their industries. Using the coefficient of variation for each country's industry ETRs as a

²⁴ Requiring 20 observations ensures that the reported ETR is not driven by a few country-years. However, readers should be cautious in interpreting these figures for countries with fewer observations because they may represent a handful of companies who appear in multiple years. More reliance can be placed on their countries with larger samples. Those include Canada, Japan, Taiwan, the United Kingdom, the United States, Europe, and the Tax Havens, each of which totals more than 500 observations (see Table 1).

²⁵ Bold-faced (italicized) figures indicate that the country-industry coefficient is significant lower (greater) than the mean for that industry.

Table 5
Results by Industry. Current Tax Expense, Multinationals and Domestics Pooled, 2005–2009

	Construction (23)	Finance (52)	Information (51)	Manufacturing (31, 32, 33)	Mining (21)	Other	Professional (54)	Real Estate (53)	Retail Trade (44, 45)	Transportation (48, 49)
Australia		24	26	23	8	24	24			
Bermuda		11		10		12		12		14
Canada	19	18	14	19	9	20	26		23	15
Cayman Islands				12		14				
France	27	29	15	27		24	23	15		
Germany		18	18	24		24	19	19		
India	23	27	13	19		12	12			
Japan	33	30	36	34	14	39	39	38	41	39
Malaysia	24	21		14		21				
South Africa		18		22		20				
Sweden		19	11	19		17	13	12		
Switzerland		18		18		17				
Taiwan				16		24				15
United Kingdom	26	19	17	22	15	22	25	19	24	19
United States	30	20	19	26	6	27	27	19	31	19
Africa		23								
Asia	20	22		16		24				
Europe	22	23	19	22	13	24	18	14	22	13
Latin America	19	23	17	20		24			24	
Middle East		20		14		16				
Tax Havens	11	14	14	15		16	17	17		16
Adjusted R-squared	0.80	0.74	0.78	0.84	0.63	0.84	0.83	0.79	0.89	0.83
N	1,071	2,897	1,815	11,002	812	4,229	1,522	952	1,534	919

Notes: This table reports the results of estimating $ETR_{it} = \Sigma \beta_j COUNTRY_{it}^j + CONTROLS$ for each industry (two-digit NAICS numbers included in each group are included in parentheses). Each cell reports the estimate of β_j for the given country in the given industry. All firm-years in 2005–2009 in the industry were included in the regressions. Estimates are reported for country-industries with 20 or more observations. $ETR = Current\ tax\ expense/Pretax\ income$. **Bold face** indicates the estimate is significantly lower than the subsample mean, at the 5% significance level. *Italics* indicate the estimate is significantly higher than the subsample mean, at the 5% significance level.

standardized measure of the variation in ETRs, among those countries with at least five ETRs, we find that Bermuda, at 12 percent, has the least variation among industry ETRs. India (34 percent), Australia (33 percent), and the United States (32 percent) have the most variation, suggesting that those countries have more industry-specific provisions than do other countries.

We infer from the results in Table 5 that ETRs vary widely across industries and industry ETRs vary widely within countries. Nonetheless, the relative ETR across industries seems similar across all countries. Furthermore, high-tax countries tend to tax all industries more than low-tax countries do. Finally, scholars should note that failure to control for cross-industry variation in ETRs could lead to erroneous inferences about tax burdens across countries. For example, although only 3 percent of our sample companies are in Mining, 24 percent of Canadian companies are in that industry. Since Mining income appears lightly taxed, Canada might appear to be a lower-taxed country than would be the case if its industry mix were more representative of the global mix. This difference in industry mix should not affect our earlier estimates, however, because we control for industry in (1).

F. Additional Tests

The data enable us to conduct a battery of additional tests and robustness checks, which we discuss briefly in this section. In every case, the inferences drawn above hold.

First, it is difficult to determine where the profits generated from intangible assets are earned. As a result, firms with large amounts of intangible assets may be better able to avoid taxes, as discussed in Huizinga, Laeven, and Nicodeme (2008), Mutti and Grubert (2007), and Desai, Foley, and Hines (2006), among many others. To assess whether firms with greater amounts of intangibles have lower ETRs, we would ideally sort firms based on their levels of intangible assets. Unfortunately, information about the amount of intangible assets is not publicly available. Thus, we turn to an observable figure, total research and development expenses, which, we assume, is positively correlated with the firm's level of intangibles. We estimate (1) for those firm-years with positive values for research and development expenses, modifying the equation to include a categorical variable for those firm-years where research and development expense as a percentage of total assets is above the median. Consistent with high intangible firms having lower ETRs, we find that the coefficient on the categorical variable is -2.0 percent and highly significant.

Second, some have conjectured that a territorial system collects less revenue than a worldwide system. For example, Markle (2011) finds that multinationals from territorial countries shift taxable income from high-tax to low-tax countries more than do multinationals domiciled in worldwide tax countries. This concern about the revenue implications of excluding dividend taxation under a territorial system has become of central importance in the United States since the 2008 decisions by the United Kingdom and Japan to revamp their international tax laws by shifting from a worldwide tax system to a territorial tax system. To test the impact of a worldwide system on ETRs,

we estimate (1), after adding a categorical variable equal to one if the parent country has a worldwide tax system, and zero otherwise. Contrary to expectations, the estimate of the coefficient on the worldwide indicator is -1.4 percent and significant, indicating that, on average, firms domiciled in worldwide countries face lower ETRs.

Third, in countries with imputation, the corporate income tax serves as a form of withholding tax because the corporate tax (or some part of it) can be used to offset shareholders' dividend taxes. Thus, it is possible that corporate tax planning is less important in imputation countries because firms in those countries have less incentive to lower their ETRs than do those in classical systems, such as the United States, where corporate taxes do not offset shareholder taxes. We test this possibility by modifying (1) to include a categorical variable that indicates whether the firm is domiciled in a country with any form of imputation. We find that the estimated coefficient on the imputation variable is insignificant.

Fourth, another cross-country difference is whether tax losses can be carried back to offset the prior year's taxable income.²⁶ When we add a categorical variable indicating whether a country permits losses to be carried back, we find that the coefficient on that variable is statistically insignificant.²⁷

Fifth, the corporate income tax is only one of many taxes, and in many countries, it is a relatively minor source of government revenue. To the extent countries rely on alternative taxes, they may need less revenue from corporate income taxes, which are the sole tax used to compute ETRs. Alternatively, high income tax countries may levy high taxes across the board. Consistent with a trade-off among revenue sources, we find that the value-added tax rate is negatively correlated with ETRs.²⁸ When we exclude companies domiciled in the United States (the only major country without a value-added tax), the correlation is even more negative. To determine whether the value-added tax affects the inferences drawn above, we include the value-added tax rate in (1) and find a positive and statistically significant coefficient estimate. However, our inferences about relative ETRs across countries are unaltered.

Sixth, the sample excludes all firm-years with losses (i.e., negative NIBT). In this sensitivity test, we add back the 11,416 firm-years with losses and actual ETRs (from the financial statements) that equal zero and estimate (1).²⁹ By definition, adding these loss firm-years lowers the estimated ETRs. We find that the inclusion of loss firm-years has an inconsequential impact on the relative high-tax to low-tax rank across the countries: the Japanese ETR remains the highest at 21 percent, 3 percentage points above

²⁶ This information is obtained from International Tax Summaries prepared by Deloitte, available at http://www.deloitte.com/view/en_GX/global/services/tax/cross-border-tax/international-tax/taxation-and-investment-guides/.

²⁷ We conduct no tests concerning the carryforward of losses because Estonia is the only country that does not permit it.

²⁸ We thank Kevin Hassett for providing us with the value-added tax data.

²⁹ Consistent with the main tests, we exclude observations for which the absolute value of ETR is greater than 70 percent.

the African ETR. The Bermudan ETR is the lowest at 2 percent, 2 percentage points below the Cayman Islands' ETR.

Seventh, the sample includes firm-years with zero ETRs as long as their NIBT was positive. In this robustness check, we drop those 1,372 firm-years with non-positive ETRs as reported in the financial statements. By definition, eliminating these zero ETR firms increases the estimated ETRs. We find that the deletion of non-positive ETRs has an inconsequential impact on the relative high-tax to low-tax rank across the countries: the Japanese ETR is 36 percent, 10 percentage points above that for the United States, the country with the next highest ETR. The Bermudan and Cayman Islands' ETRs are the lowest at 13 percent.

V. RESULTS FROM COMPARING FOREIGN SUBSIDIARIES

A. Does Having a Subsidiary in a Tax Haven Lower a Multinational's ETR?

In this section, we expand the domestic-multinational dichotomy to measure the extent to which the domiciles of foreign subsidiaries affect firms' global ETRs. We begin by turning our attention to tax havens, the most extreme example of a low-tax country. If companies domiciled in tax havens enjoy lower ETRs than companies domiciled in other countries (as the evidence above suggests), then it follows that multinationals with foreign subsidiaries located in tax havens should have substantially lower ETRs than multinationals without subsidiaries in tax havens.

To test this proposition, we modify (1) by adding a categorical variable indicating whether a multinational had a subsidiary in a tax haven, interacting it with the *COUNTRY*MN* variable in (1), and estimating the equation. Using this simple tax haven identifier, we find that multinationals with subsidiaries in tax havens do not have lower ETRs than multinationals without subsidiaries in havens (these results are untabulated). In fact, the current ETR, averaged across all countries is 17 percent for multinationals without subsidiaries in havens and 19 percent for multinationals with subsidiaries in havens. Both figures are 23 percent for American multinationals, and for almost half of the countries/groups (including France, India, Japan, the United Kingdom, and all three listings of tax havens) the spread is within a percentage point.

One reason that having a subsidiary in a haven may not result in a lower ETR is that the companies that establish subsidiaries in tax havens are highly profitable companies that would have had substantially higher ETRs, if they had not had a subsidiary in a tax haven. Therefore, tax havens may lower ETRs, but not by enough to overcome the increase to ETRs arising from higher profitability. Unfortunately, we cannot observe the counter-factual, i.e., comparing multinationals with subsidiaries in havens to those same companies if they had no subsidiaries in havens. Nonetheless, this initial test provides no evidence that the location of the subsidiary affects the worldwide ETR.

In subsequent tests, using alternative specifications, we do find evidence that locating a subsidiary in a tax haven reduces the firm's overall ETR. First, however, we move beyond having a subsidiary in a tax haven to consider the locations of all foreign subsidiaries.

B. How Much Does the Location of a Foreign Subsidiary Affect a Multinational's ETR?

In (1), we use the presence of a foreign subsidiary to distinguish multinationals from domestic-only firms. Here, we replace that single categorical variable with categorical variables for all locations of foreign subsidiaries. The coefficients on the foreign subsidiary variables enable us to assess the extent to which the location of a foreign subsidiary affects the ETRs of the worldwide enterprise. The regression equation is:

$$(2) \quad ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{1k} SUB_{it}^k \\ + \sum \beta_{2m} INDUSTRY_{it}^m + \sum \beta_{3n} YEAR_{it}^n + \sum \beta_{4p} SIZE_{it}^p + \varepsilon_{it}$$

where:

SUB_{it}^k = an indicator variable equal to 1 if firm i reports a subsidiary in country k , equal to 0 otherwise.

All other variables are defined as in (1). The estimated regression coefficients on SUB are the estimated impact on ETRs arising from having a subsidiary in a particular foreign country.

We continue to use the same 21 groups as in the previous section for the parents but allow countries to have their own SUB indicator if they host subsidiaries of 450 or more parents. Each firm-year has one country in which its $COUNTRY$ variable is coded one. However, it has n $SUBs$ coded one, where n is the number of different countries in which the parent has at least one subsidiary.³⁰

We use the same sample of 28,343 firm-years (from 2005–2009) with current income tax expense as the numerator for the ETR that was used in Table 2. For these firm-years, there are 80,723 SUB variables with a value of one. Fifty-six subsidiary locations have at least 450 firm-years. The United Kingdom is the most popular location for foreign subsidiaries with 7,608 firm-years.

Table 6 shows the regression coefficient estimates for $COUNTRY$ and SUB . The $COUNTRY$ coefficients from (2) should be the same as the $COUNTRY$ coefficients from (1), except to the extent that identifying the location of a firm's foreign subsidiaries, as opposed to just identifying the existence of a foreign subsidiary provides information. It seems plausible that knowing the subsidiary's domicile would substantially affect inferences because foreign subsidiaries are not randomly distributed across parents. Multinationals from some countries might be more likely to operate in high-tax countries (e.g., French companies are more likely to have a subsidiary in high-tax Germany

³⁰ For example, if a U.S. parent has subsidiaries in Canada, Germany, and Bermuda $COUNTRY_{it}^{US}$, SUB_{it}^{CANADA} , $SUB_{it}^{GERMANY}$, and $SUB_{it}^{BERMUDA}$ would be coded one, while all other $COUNTRY$ and SUB variables would be coded zero.

Table 6
Results with Current Tax Expense, Subsidiary Specification, 2005–2009

Parents	Estimate	Subsidiaries	Estimate	Subsidiaries	Estimate
Australia	19	Argentina	0.55	Luxembourg	-0.52
Bermuda	10	Australia	0.12	Malaysia	-0.92
Canada	16	Austria	-0.66	Mexico	0.72
Cayman Islands	11	Belgium	0.32	Netherlands	0.33
France	21	Bermuda	-0.68	Norway	0.86
Germany	18	Brazil	-0.52	Peru	0.53
India	15	Bulgaria	-1.27	Poland	0.16
Japan	33	Canada	0.59	Portugal	0.37
Malaysia	16	Cayman Islands	-0.08	Romania	0.02
South Africa	19	Chile	1.07	Russia	-0.57
Sweden	12	China	-0.33	Russian Federation	-0.28
Switzerland	15	Colombia	1.44	Singapore	-1.25
Taiwan	15	Croatia	2.59	Slovakia	-1.62
United Kingdom	18	Czech Republic	-0.35	South Africa	2.48
United States	21	Denmark	-0.08	South Korea	-1.59
Africa	22	Estonia	-0.37	Spain	-1.22
Asia	19	Finland	-0.24	Sweden	-0.18
Europe	19	France	1.31	Switzerland	0.84
Latin America	19	Germany	-0.54	Thailand	-0.69
Middle East	13	Greece	-0.54	United Kingdom	1.21
Tax Havens	12	Hong Kong	-0.83	United States	-0.52
		Hungary	0.07	Venezuela	-0.81
		India	-0.43	Africa	2.08
		Ireland	0.35	Asia	0.27
		Italy	0.86	Europe	-1.44
		Japan	0.72	Latin America	1.31
		Latvia	0.26	Middle East	0.74
		Lithuania	0.41	Tax Havens	-1.61
Adjusted R-squared	0.80				
N	28,343				

Notes: This table presents the results of estimating $ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{1k} SUB_{it}^k + CONTROLS$. The Parents column reports the estimate of β_0 for each country/group. The Subsidiaries column reports the estimate of β_1 for each country/group. $ETR = Current\ tax\ expense/Pretax\ income$. **Bold face** indicates significantly different from zero at the 5% level.

than would Taiwanese companies, which might partially account for the higher ETRs in France.). That said, we find that specifying the location of the foreign subsidiary in the regression results in only one *COUNTRY* coefficients changing more than 3 percentage points from the corresponding *COUNTRY* coefficients in Table 2. The domestic Indian ETR rises from 15 percent to 19 percent.

We now turn our attention to the *SUB* coefficients. We expect cross-country variation in the *SUB* coefficients to the extent that locating a foreign subsidiary in a country affects the multinational's ETR. For example, if a firm can shift profits from a high-tax country to a tax haven, then its ETR should be lower and the *SUB* coefficient for the haven should reflect those tax savings. These *SUB* coefficients are conditional on the location of all other foreign subsidiaries. Thus, they can be interpreted as the incremental impact on ETRs of having a subsidiary in a particular foreign country.

The *SUB* coefficients range from a 1.6 percentage points decrease in ETRs for multinationals with a subsidiary in the Tax Havens to a 2.6 percentage points increase in ETRs for multinationals with a subsidiary in Croatia. (Bold-faced coefficients are significantly different from zero at the 5 percent level.) Besides the Tax Havens, the dozen most negative *SUB* coefficients include tax havens, such as the Singapore (-1.2 percentage points) and Bermuda (-0.7 percentage points) plus a country widely associated with global tax mitigation, Hong Kong, at -0.8 percentage points. These findings are consistent with a foreign subsidiary in at least some tax havens lowering the parent's ETR. However, interestingly, two other countries associated with tax avoidance, the Netherlands and Ireland, have positive coefficients.

Not surprisingly, some of the more positive *SUB* coefficients include countries with relatively high taxes, e.g., France (1.3 percentage points), the United Kingdom (1.2), Italy (0.9), and Japan (0.7). However, once again the results are a bit mixed. When we segregate the sample based on OECD membership, we find no evidence that subsidiaries located in (usually high-tax) OECD countries boost the ETRs of their multinational enterprise more than subsidiaries located in other (often lower taxed) countries.

Contrary to high-tax countries resulting in highly taxed subsidiaries, we find that having a U.S. subsidiary lowers a multinational's ETR by 0.5 percentage points. This finding is consistent with the U.S. Government Accountability Office's (2008) report that U.S.-controlled U.S. companies pay more taxes than foreign-controlled U.S. companies. It provides support for arguments by U.S. companies that they face a competitive disadvantage in the U.S. marketplace, since most non-U.S. multinationals (Japanese multinationals being the notable exception) already face lower ETRs before the added bonus of an ETR reduction when they establish an American subsidiary.

Finally, we measure the correlation between the *COUNTRY* coefficients and the *SUB* coefficients in Table 6 for the 20 countries/groups with both *COUNTRY* and *SUB* coefficients. If countries tax their domestic-only firms similarly to the foreign-controlled subsidiaries domiciled in their country, then the *COUNTRY* coefficients (indicating ETRs for domestic-only firms) should be positively correlated with the *SUB* coefficients (indicating the incremental ETR for multinationals with subsidiaries in that country).

Consistent with this expectation, we find a positive correlation between the *COUNTRY* and *SUB* coefficients of 37 percent, which is significant at the 0.05 level using a one-tailed test. We interpret these findings as evidence that countries that tax their domestic-only firms heavily also tax their foreign subsidiaries heavily and vice versa. We infer from this array of tests that some evidence exists that the domicile of the subsidiary affects the overall firm ETR; however, the evidence is far from overwhelming. Although we find no ETR difference between multinationals with subsidiaries in tax havens and those without, some *SUB* coefficients are consistent with low-tax countries lowering overall ETRs and high-tax countries increasing them. Yet, there are notable exceptions to this pattern, e.g., Ireland, the Netherlands, and the United States. Nevertheless, we find that countries that tax parents heavily tend to tax foreign subsidiaries heavily and vice versa. All in all, the evidence is mixed about the extent to which the domicile of the foreign subsidiary affects the multinational's overall ETR.

1. Parent-Subsidiary Interactions

One possible reason for the mixed findings in the prior section is that we restrict the *SUB* coefficient to be the same, regardless of the domicile of the parent. For example, establishing a subsidiary in Ireland may substantially lower an American firm's ETR while having little effect on the ETR of a multinational domiciled in the United Kingdom. If so, by forcing the same *SUB* coefficient on Ireland for all countries, we may be masking its differential impact across countries. Thus, in this section, we alter the research design to allow for the possibility that foreign subsidiaries affect the ETRs of their parents differently depending on the domicile of the parent.

To conduct this extension, we modify (2) by replacing the *SUB* variables with interactions between the *COUNTRY* and *SUB* variables. We then compare the coefficients on the interactions to assess the extent to which subsidiaries affect parents differently, depending on whether the parent is in a high-tax or low-tax country.

$$(3) \quad ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{1l} COUNTRY_{it}^j * SUB_{it}^k \\ + \sum \beta_{3m} INDUSTRY_{it}^m + \sum \beta_{4n} YEAR_{it}^n + \sum \beta_{5p} SIZE_{it}^p + \varepsilon_{it}.$$

Table 7 presents the estimated interaction coefficients (no coefficients are shown unless there are at least 50 observations in a cell) for major parent locations and select subsidiary countries. (Bold-faced coefficients are significantly different from zero at the 5 percent level.) The dependent variable is always current ETR, except for the last column, which reports results for the United States only, using the cash ETR as the dependent variable (no other country has enough cash ETR observations to warrant tabulation).³¹

³¹ Each number in Table 7 represents the ETR impact from a particular parent-subsidiary country mix. For example, on the first line, -8.9 means that a French parent has an 8.9 percentage points lower current ETR, on average, if it has a subsidiary in Argentina.

Table 7
Results with Current Tax Expense, Subsidiary Specification, Parent-Subsidiary Interactions, 2005–2009

Subsidiaries	Parents: France	Germany	Japan	Sweden	Switzerland	Taiwan	UK	Europe	US	US Cash
Argentina	-8.9		-1.1				2.8	6.0	-0.3	0.0
Australia		-1.1	-0.8				0.5		0.9	1.1
Austria	-0.6	-2.5	0.6	4.3	-0.3		-0.8	1.7	-0.7	0.7
Belgium	-4.8	-5.3	0.4	-3.8	1.3		2.0	1.0	0.8	1.4
Brazil	1.7	1.4	-2.0		-2.0		1.7	3.8	-0.5	-0.5
Canada	0.8	-3.5	-2.6		-0.9		-0.2	-0.5	1.8	1.4
Chile	11.7		-0.3				7.3	-1.5	0.3	2.3
China			1.3			-0.4			-1.8	-1.6
Czech Republic	-1.9	5.2	0.8		-6.5		-3.5	-0.6	-0.1	0.4
Denmark	3.6	-1.1	3.5	1.5			-2.2	-1.0	-0.7	-1.4
Finland	-7.6	1.5	0.1	5.2			0.7	0.4	-0.3	0.5
France		-1.9	1.8	4.0	4.8		1.0	-0.2	1.0	1.1
Germany	-6.7		0.0	1.0	-4.3		2.7	-1.1	-0.7	-2.0
Greece	-8.8	3.5					-10.3		-2.6	-0.4
Hungary	-2.7	-4.0	4.4					1.9	-2.4	0.8
Ireland	6.1	0.5	-1.0				0.8	-1.5	-0.5	-1.6
Italy	5.8	2.0	0.6	1.2	1.2		2.8	-0.7	1.5	1.7
Japan	6.8	-1.2			-0.8	-2.6	2.4	-5.9	0.4	0.2
Luxembourg	-3.1	2.5	-2.3				-3.4	0.5	-0.8	-1.1
Mexico	-2.2	1.3	-0.5		0.0		-0.4	2.8	0.9	1.4
Netherlands	-0.3	3.9	-1.1	-7.3	-1.7	0.3	3.8	-1.2	-0.1	-0.5
Norway	2.7	-6.8	-1.4	1.0			6.0	-0.4	0.5	0.3
Poland	10.7	1.5	-0.6	-1.5	8.2		-3.6	-0.7	2.1	2.7
Portugal	-2.3	3.8	0.2				-3.1	-0.4	1.1	-0.9
Romania	-2.9	3.9	2.1					-0.8	1.9	-0.3

Table 7 (continued)
Results with Current Tax Expense, Subsidiary Specification, Parent-Subsidiary Interactions, 2005–2009

Subsidiaries	Parents:	France	Germany	Japan	Sweden	Switzerland	Taiwan	UK	Europe	US	US Cash
Russian Federation		3.6	-5.3	-0.5				-0.1	1.2	-1.6	-1.6
Singapore		16.3		-1.9				1.6		-1.4	-2.0
Slovakia		0.0	-11.1	-1.7					-0.6	-2.9	
South Korea		-15.8	4.7	1.0						-2.4	-2.4
Spain		-4.6	4.4	-1.1	5.8	2.3		-1.5	0.4	-1.6	-2.2
Sweden		-2.0	7.5	0.9	-4.0	-0.5		-1.6	-3.2	0.8	-0.6
Switzerland		-10.9	-1.2	-1.5	-0.4	-8.6		-0.9	2.9	0.6	0.1
United Kingdom		1.1	1.4	0.5	-0.4	-8.6	-1.3		2.4	2.3	0.5
United States		-0.8	3.8	-0.8	3.2	3.7	-1.5	-1.9	0.1		
Africa		-11.9						2.9		4.5	3.9
Europe		17.4	4.0							-1.7	-1.4
Tax Havens							-2.1		-3.5	-2.2	-0.2

Notes: This table presents the results of estimating $ETR_{it} = \sum \beta_0 COUNTRY_{it} + \sum \beta_1 COUNTRY_{it} * SUB_{it}^k + CONTROLS_{it}$ on a subsample of the sample described in Table 1 for which we have the necessary subsidiary information. Each cell reports the estimate of β_1 for the interaction of the given parent and subsidiary variables. For example, the estimate of for β_1 the interaction term $COUNTRY_{USA} * SUB_{ARGENTINA}$ is -0.3. All interaction terms were included in the estimation, but estimates are only reported for cells with 50 or more observations. Subsidiary countries are only reported if they report estimates in at least 4 of the 10 Parent columns. $ETR = Current\ tax\ expense/Pretax\ income$ for all columns except the last. The last column reports the results of a separate regression with $ETR = Cash\ taxes\ paid/Pretax\ income$. **Bold face** indicates significantly different from zero at the 5% level.

There are far too many *COUNTRY * SUM* coefficients in Table 7 to cover them in any detail here. Thus, for brevity, we comment only on U.S. inbound and outbound activities and leave the many other statistics in this table for the reader to peruse. Beginning with inbound investment, Table 6 shows that a subsidiary in the U.S. lowers a multinational's current ETR by 0.5 percentage points, on average. Table 7 expands the analysis to show that having a subsidiary in the United States affects a multinational differently, depending on its domicile, suggesting that the *SUB* coefficient constraint in (2) materially affects inferences. We find that the marginal effect of an American subsidiary on current ETRs ranges from a decrease of 1.9 percentage points for a European parent to an increase of 3.8 percentage points for a German parent.

For outbound investment from the United States, we turn to the last column in the table, which shows the marginal effect on cash taxes paid for an American multinational having operations in various countries. We find weak evidence that investments in developed, (generally) high-tax countries increase U.S. companies' cash ETRs. Locating a subsidiary in a listed OECD country increases the American multinational's cash ETR by 0.2 percentage point, while a subsidiary in a non-OECD country drives down the U.S. multinational's ETR by 0.5 percentage point. The difference is significant at the 10 percent level.

However, locating a subsidiary in a tax haven (Ireland, Luxembourg, Singapore, or the Tax Havens) lowers U.S. multinationals' cash ETRs by -1.2 percentage points, on average.³² This is significantly less than the 0.05 percentage point increase for the non-haven countries (at the 0.05 level). Moreover, if tax havens are typically paired with subsidiaries in high-tax locations (e.g., if Bermudan subsidiaries always co-exist with higher-taxed British subsidiaries), then clustering effects among subsidiaries may understate the importance of tax havens because the tax haven coefficients may be capturing some of their companion high-tax countries' impact on ETRs (Dyreg et al., 2011). In brief, we infer from the analysis of foreign subsidiaries that firms with subsidiaries in less heavily taxed countries enjoy lower global ETRs. However, the evidence is not overwhelming.

VI. CLOSING REMARKS

This paper computes effective taxes using cash taxes paid and current and total income tax expense data for thousands of companies around the world. Our estimates may provide useful and needed quantitative information as policymakers, business, and scholars around the globe grapple with the complexities surrounding the taxation of multinational activities.

Our principal findings include the following observations. The location of the parent of a multinational company has a major effect on its worldwide tax liability;

³² Even though they are computed with different data and methodology, this study's 1.2 percentage point cash ETR reduction for these four tax havens is similar to Dyreg and Lindsey's (2009) 1.5 percentage point estimate for tax haven activity by U.S. multinationals.

however, the locations of its foreign subsidiaries have much less impact, which is not particularly surprising since the bulk of its activities likely occur in the home country. Japanese multinationals consistently face the highest ETRs. American multinationals face among the next highest ETRs. Multinationals domiciled in tax havens enjoy the lowest ETRs. Multinationals and domestic-only firms face similar ETRs. ETRs declined worldwide over the last two decades; however, the ordinal rank from high-tax countries to low-tax countries remained remarkably constant. ETRs vary considerably across industries.

Further work is warranted to understand how the high-tax to low-tax rank of countries has remained so steady over two decades of radical worldwide changes in tax policy, financial reporting, economic development, law, politics, technology, and many other areas. Although tax rates have fallen dramatically over the last 20 years, high-tax countries remain relatively high-tax, and low-tax countries remain relatively low tax. Perhaps globalization permits countries to change their tax systems but forces a herding effect because tax changes in one country reverberate around the globe (see Griffith and Klemm (2004) for a discussion of tax competition among OECD countries). If so, policies that do not conform to international norms, such as the United States and its worldwide tax system, may be difficult to sustain.

As with any empirical study, simplifying assumptions are necessary. We close by repeating a few of the key caveats in this paper. First, although the data are superior to any in the past, they are incomplete. We have accounting information, not actual tax returns. We only know the location of foreign subsidiaries in the most recent year of the data. The data may not capture all foreign subsidiaries. Furthermore, our analysis assumes that the decision to locate a subsidiary in a foreign country is made without consideration of the portfolio of current subsidiary locations or possible ones in the future. Finally, although we have the most extensive database to date, some countries have a limited number of domiciled companies. Therefore, readers should interpret the data for small countries with some caution.

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