

# **Do Multinationals or Domestic Firms Face Higher Effective Tax Rates?**

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## **ABSTRACT**

To our knowledge, this paper provides the most comprehensive analysis of firm-level corporate income tax expenses to date. We use publicly available financial statement information to estimate firm-level effective tax rates (ETRs) for 10,642 corporations from 85 countries from 1988 to 2007. We find that multinationals and domestic-only companies face similar ETRs. We also find that, on average, ETRs declined by seven percentage points or 20% over the period. German, Japanese, Australian and Canadian decreases were large. American, British, and French declines were more modest. Nonetheless, because ETRs were falling worldwide, the ordinal rank from high-tax countries to low-tax countries changed little. Japanese firms always faced the highest ETRs. ETRs for tax havens and countries from the Middle East and Asia (ignoring Japan) were always lower than those for the U.S. and European countries. These findings should provide some empirical underpinning for ongoing policy debates about the taxation of multinational profits.

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# Do Multinationals or Domestic Firms Face Higher Effective Tax Rates?

## 1. Introduction

This paper estimates country-level effective tax rates (ETRs) using financial statement information from 10,642 corporations domiciled in 85 countries and having subsidiaries in 195 countries from 1988 to 2007.<sup>1</sup> These ETRs enable us to compare within and across countries the taxes faced by multinationals and domestic-only firms and to assess the extent to which the domicile of foreign subsidiaries affects the worldwide tax expense of multinationals. Tests are conducted across years and industries.

The purpose of this study is to illuminate an ongoing worldwide debate about the taxation of international commerce. At the beginning of our investigation period (1988), the taxation of multinationals was an obscure area of the law, understood by few practitioners, rarely mentioned in policy circles, and largely ignored by academe. Today, globalization has made the taxation of international commerce relevant to most businesses, central to policy discussions about jobs, trade, and competitiveness, and an area of interest to scholars in accounting, economics, finance, law, and related fields.

International tax policy changes are being proposed and implemented around the globe. In December, 2008, the UK and Japan decided to revamp their international tax law by shifting from a worldwide tax system to a territorial tax system.<sup>2</sup> In the same month, an advisory panel formed by the Canadian Minister of Finance recommended multinational-friendly changes to its international tax law (see Advisory Panel on Canada's System of International Taxation, 2008).

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<sup>1</sup> By "domicile," we mean 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 U.S., but the location of operational headquarters in the UK.

<sup>2</sup> In overly simplistic terms, countries with territorial systems only tax the domestic income of companies domiciled in their country. In contrast, countries with worldwide systems tax all income (domestic and foreign) of their home companies and provide foreign tax credits to prevent double taxation of foreign profits.

All three countries claimed to be attempting to enhance the competitiveness of their multinationals.

In May, 2009, the Obama Administration took a different course, proposing controversial changes that would strengthen the U.S. worldwide tax system. These proposals follow years of debate over whether longstanding American policy toward the taxation of international business is in the best interest of the country (see United States House of Representatives (2007), Clausing and Avi-Yonah (2007), and The President's Advisory Panel on Federal Tax Reform (2005), among many others).

This paper examines tax information from the financial statements to provide some empirical underpinning for these important policy discussions. Although we recognize that numerous economic, social, and political forces have motivated the need for this documentation, it is beyond the scope of this paper to list the many changes in investment, technology, trade, and labor that have accelerated the development of a global economy and exacerbated the inherent difficulty that any single government faces in attempting to tax companies that service these multinational markets. Furthermore, it also is beyond the scope of this paper to detail how countries have revised their tax laws in recent years to continue to collect revenue while maintaining or increasing their share of the global economy, to list the numerous tax plans devised in response to these legislative changes, to discuss the difficulties of communicating this complex area of tax law in the political arena, or to review the literature of international tax research in accounting, economics, finance and law. Instead, we will mention a few recent events concerning the taxation of multinationals that should suffice for demonstrating the current, unprecedented interest in multinational taxation and the contribution that this study

makes in providing some empirical facts about the extent to which the domicile of a company affects the taxes that it pays.

To start, U.S. President Barack Obama ran on a tax plan that included "...reforming deferral to end the incentive for companies to ship jobs overseas." ([http://www.barackobama.com/pdf/taxes/Factsheet\\_Tax\\_Plan\\_FINAL.pdf](http://www.barackobama.com/pdf/taxes/Factsheet_Tax_Plan_FINAL.pdf)). His election spurred months of heated debate about the possible elimination of the deferral of U.S. taxes on foreign profits until dividend repatriation (Weiner, 2009).<sup>3</sup> On May 4, 2009, when the White House put forth a formal proposal, which calls for deferring some deductions until repatriation and curbing the "check the box" regulations that enable multinationals to structure their foreign operations in a tax-favorable manner, President Obama justified the changes, saying "I want to see our companies remain the most competitive in the world. But the way to make sure that happens is not to reward our companies for moving jobs off our shores or transferring profits to overseas tax havens." Ignoring the merits of the controversial proposed changes, Obama-type policy statements imply that multinationals somehow benefit unfairly from a tax system with perverse incentives.<sup>4</sup>

In contrast, the managers of many U.S. multinationals assert that the U.S. tax system places them at a competitive disadvantage compared with multinationals in other countries.

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<sup>3</sup> A major cost of repealing deferral for some companies would be the deleterious impact on book income. Under current tax law, APB 23 permits firms to classify foreign profits as permanently reinvested, which enables them to report no deferred income taxes for any possible U.S. taxes to be paid at repatriation. Repealing deferral would render this discretion under APB 23 irrelevant. This possibility led Ralph Hellmann, lead lobbyist for the Information Technology Industry Council, to state that the benefit of APB 23 deferral "...hits the bottom line of companies more than any other issue right now. We have to defeat it [repeal of deferral]." (Drucker, 2009).

<sup>4</sup> Consistent with U.S. multinationals' exploiting their ability to report profits in locations with more favorable tax systems than the U.S., the foreign affiliates of American companies reported more of their aggregate net income in the Netherlands (13%), Luxembourg (8%), and Bermuda (8%) than any country in 2006 (<http://www.bea.gov/international/di1usdop.htm>). Other locations with profits that far exceeded assets, sales and employees were Ireland (7%), Switzerland (6%), Singapore (4%), and UK islands in the Caribbean (3%). For comparison, 7% of the aggregate net income of U.S. foreign affiliates was reported to Canada (the U.S. largest trading partner) and the UK, while only 2% was reported in Japan and Germany, which are considered among the most highly-taxed countries.

They point to the relatively high U.S. statutory tax rate as evidence of the competitive disadvantage.<sup>5</sup> They call for reform of the U.S. taxation of multinational profits to reflect current global business conditions, although no consensus exists in the business community about the changes that should be made. Furthermore, consistent with claims that companies domiciled outside the U.S. enjoy more favorable tax conditions (at least for their American operations), the U.S. Government Accountability Office (2008) recently concluded that U.S. companies owned by foreigners pay less U.S. tax than do U.S. companies controlled by Americans.

Meanwhile, during much of 2008, British firms were not just complaining about the tax system, they were abandoning it for domiciles with more favorable tax treatment (*The Economist*, 2008). The Henderson Group, Charter, Shire, WPP, and the United Business Media emigrated to Ireland and the Regus Group to Luxembourg reportedly to escape high taxes on foreign profits for multinationals domiciled in the UK (Werdigier, 2008 and Faith, 2008). Kingfisher, Brit Insurance, RSA Insurance, and Prudential, among others, threatened to leave (Werdigier, 2008, Braithwaite, 2008). In fact, the *Financial Times* (September 21, 2008) quoted an anonymous source saying, “As we understand it, half the FTSE 100 is looking at this [redomiciling outside the UK.]” (Braithwaite, 2008).

One of those exited British firms is Invesco, which moved its domicile to Bermuda (a tax haven) in December 2007. It was explicit about the influence of international tax considerations. Although the S&P 500 company is headquartered in Atlanta, it moved its domicile to Bermuda,

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<sup>5</sup> In the September 26, 2008, U.S. Presidential debate, Republican Presidential candidate Senator John McCain expressed these views about statutory tax rates, stating “Right now, American business pays the second-highest business taxes in the world, 35 percent. Ireland pays 11 percent. Now, if you're a business person, and you can locate any place in the world, then, obviously, if you go to the country where it's 11 percent tax versus 35 percent, you're going to be able to create jobs, increase your business, make more investment, et cetera. I want to cut that business tax. I want to cut it so that businesses will remain in—in the United States of America and create jobs.” His opponent, Senator Barack Obama, countered, “Now, John mentioned the fact that business taxes on paper are high in this country, and he's absolutely right. Here's the problem: There are so many loopholes that have been written into the tax code, oftentimes with support of Senator McCain, that we actually see our businesses pay effectively one of the lowest tax rates in the world.”

rather than the U.S. According to Invesco's Chief Administrative Officer, Colin Meadows, "...we wanted to make sure the transaction in moving our domicile was tax neutral for our shareholders. Moving to the U.S. would not have been a tax neutral situation. When it came down to it, it was a very short list of places that we considered and Bermuda was at the top." (Neil, 2007).<sup>6</sup>

The recent British departures may be receiving undue attention in the same way that a few American inversions (reincorporations in low-tax countries with no operational impact) several years ago became highly controversial (in particular, Stanley Works' aborted move to Bermuda in 2002).<sup>7</sup> The more significant losses (both in number and pounds) may be those newly formed companies that in the past would have established their headquarters in the UK but instead are domiciling (for tax purposes) outside the UK from their inception. Since these "departures" are unobservable, they mainly escape attention, though their impact may be larger and longer-lasting. Furthermore, some companies already domiciled in (perceived to be) tax-disfavored countries, such as the UK and the U.S., claim that they wish that they had never incorporated there and would leave, except for the high tax, political and other costs of exiting.<sup>8</sup>

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<sup>6</sup> Interestingly, Invesco has 5,500 employees in 19 countries, but neither office nor employees in Bermuda. Desai (2008) discusses this increasingly common separation of a multinational's headquarters, tax domicile, and operations, which he terms the decentering of the global firm. In this paper, we may miscode a country's domicile (i.e., tax home) if its domicile differs from the location provided in the company's financial records.

<sup>7</sup> See Desai and Hines (2002) and Voget (2008) for detailed discussions of inversions. Capturing the fiery rhetoric in 2002 concerning U.S. inversions, Johnston (2002) reported, "Senior senators from both parties used blunt language today to denounce companies that use Bermuda as a mail drop to reduce their American income taxes by tens of millions of dollars, calling them 'greedy' and 'unpatriotic' tax evaders whose actions could not be tolerated 'in a time of war'."

<sup>8</sup> Their ongoing dissatisfaction is reminiscent of the testimony of Bob Perlman, Vice President of Taxes for Intel Corporation, before the Senate Finance Committee in March, 1999, where he stated, "...if I had known at Intel's founding (over thirty years ago) what I know today about the international tax rules, I would have advised that the parent company be established outside the U.S. This reflects the reality that our Tax Code competitively disadvantages multinationals simply because the parent is a U.S. corporation." (Perlman, 1999). Indicative of the heated nature of this topic, the Senate Finance Committee's ranking Democrat, New York Senator Daniel Patrick Moynihan retorted, "So, you would have left the United States for the tax shelters of the Cayman Islands. Do you think that the Marines are still down there if you need them?...So money matters more to you than country?...I am sure you will reconsider it, but if you do move, well, just keep in check with the American consul. You might never know." (United States Senate Committee on Finance, 1999, p.17.)

Not all developed countries host unhappy multinationals. Dutch multinationals, particularly following enactment of the 2007 Corporate Income Tax Law, reportedly are paying little, if any, tax. Of the twenty largest Dutch companies, allegedly fewer than five are paying any corporate income tax to the Netherlands (Dohmen, 2008). Consistent with favorable treatment of Dutch multinationals, one international tax expert, Timothy McDonald, Vice President of Finance and Accounting for Procter & Gamble, recently identified the Netherlands as having the model system for taxing multinationals (Tuerff, et al., 2008, p.79).

Other countries have recently followed the Dutch lead. In late 2008, both the British and Japanese governments moved to exempt dividends paid from foreign subsidiaries from home country corporate income taxes. The changes shift both countries from a worldwide system of taxation to a territorial system, leaving the U.S. as the only major country with a worldwide system.

In the UK case, the Treasury stated that “The policy objective is to enhance the competitiveness of the UK by providing the widest possible exemption.” Chris Morgan of KPMG called the proposal, “...a decisive shift towards a territorial tax system where the UK only taxes profits made in the UK.” However, Ian Brimicombe, head of tax at AstraZeneca, doubted that the change in the law would bring back the firms that had already exited the UK and noted that companies with intellectual property or finance subsidiaries were still disadvantaged in the UK. (Houlder, 2008). Nonetheless, UK multinationals widely welcomed the exemption of foreign dividends.

Favorable tax treatment for multinationals inevitably leads to concerns that smaller domestic firms are paying a disproportionate share of the taxes. For example, after the HM Revenue and Customs National Audit Office (2007) reported that a third of the UK’s 700 largest

companies paid no tax in the 2005-2006 financial year, Bill Dodwell of Deloitte stated, “That 700 of the largest companies and groups are only paying 54 per cent of corporation tax shows the giant contribution of small companies. It is probably because many are less international and so have different planning opportunities.” (Houlder, 2007). With regards to U.S. companies, Johnston (2008) agrees, stating that “...very few grasp how corporate taxes favor multinationals over domestic firms.”

Now we have come full circle. Perceptions that multinationals are not paying their fair share of taxes because they can avail themselves of tax planning opportunities not available to smaller firms fuel calls for policy changes, such as those recently proposed by the White House. As this smattering of recent events shows, the taxation of multinationals is controversial and politically charged with implications for a country’s ability to compete for tax revenue, capital, investment, and labor.<sup>9</sup> This paper aims to provide facts for the ongoing debate by estimating worldwide taxes using the ETRs for domestic-only firms, multinationals, and foreign subsidiaries around the globe and over many years.

To estimate the corporate income taxes paid by multinationals and domestics around the globe, we regress firm-level ETRs 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, i.e., those operating in the home country only, and multinationals, i.e., those domiciled in the home country but operating in at least one other country. These ETR estimates enable us to compare domestics with multinationals, both within countries and across countries, industries, and years. We then conduct similar regressions adding categorical variables that denote the location of the firm’s

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<sup>9</sup> A recent example of the intensity surrounding the taxation of multinationals is the threat by French President Nicolas Sarkozy to walk out of the April 2009 G20 meeting if the China objected to a listing of non-compliant tax havens.



foreign subsidiaries. These tests enable us to compare the tax expenses attributable to foreign subsidiaries.

We find that multinationals and domestic firms have similar ETRs. Japanese firms always face the highest tax rates. The ETRs for companies in tax havens, the Middle East and Asia (setting aside Japan) are always lower than those for firms domiciled in the U.S. and Europe. We also find a worldwide decline in ETRs. From 1989 to 2006, ETRs, on average, dropped seven percentage points or 20%. German, Japanese, Australian, and Canadian ETRs decreased more than American, British, and French ETRs did. Nevertheless, because the ETRs were falling for all countries, the ordinal rank from high-tax countries to low-tax countries changed little. We also find evidence that the location of a foreign subsidiary may have some effect, though limited, on a multinational's worldwide tax burden.

To our knowledge, this paper provides the most comprehensive analysis of international firm-level corporate income tax burdens to date. Collins and Shackelford (1995) studied parent ETRs for four countries (Canada, Japan, the UK, and the U.S.) and ten years (1982-1991). Their subsequent study, Collins and Shackelford (2003), added Germany and investigated ETRs from 1992-1997; however, with data for only eight Japanese firm-years and 36 German firm-years, they were effectively limited to studying three countries. In both studies, they conclude that the parents of multinationals domiciled in the U.S. and the UK faced similar ETRs, both of which exceeded the parent ETRs in Canada. In neither study did they have information about the location of the company's subsidiaries. Recent advances in computer-readable financial statement datasets enable us to study far more companies (both at the parent and subsidiary level), countries, and years than Collins and Shackelford could study.

Two other studies have compared 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 the 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.

A concurrent study with access to more U.S. companies than our study is Dyreng and Lindsey (2009). They use text-searching software to collect foreign operations information for all U.S.-incorporated firms in the Compustat database between 1995 and 2007 and estimate the average worldwide, federal, and foreign tax rates on U.S. pre-tax income. A limitation of their study is that they do not have access to data for companies domiciled outside the U.S. In contrast, our access to financial statement information for thousands of firms from scores of countries enables us to substantially expand the understanding of corporate tax burdens around the world. While our findings cannot identify the appropriate international tax policy, the ETR estimates in this study should prove useful quantitative information as policymakers, business, and scholars around the globe grapple with the complexities surrounding the taxation of multinational activities.

This paper is organized as follows: Section 2 develops the regression equation used to estimate the ETRs. Section 3 details the sample selection. Sections 4, 5, and 6 present the empirical findings. Closing remarks follow.

## 2. Regression Equation

To compare 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 estimate a modified version of the pooled, cross-sectional regression equation developed in Collins and Shackelford (1995):<sup>10</sup>

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

where:  $ETR_{it}$  = the effective tax rate 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  $t$ , equal to 0 otherwise.

$MN_{it}$  = an indicator variable equal to 1 if firm  $i$  has a foreign subsidiary in year  $t$ , 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 NAICS) in year  $t$ , equal to 0 otherwise.

$YEAR_{it}^m$  = an indicator variable equal to 1 for firm-years for which  $t = m$ , equal to 0 otherwise.

$SIZE_{it}^n$  = the percentile rank of the size of variable  $n$  for firm  $i$  in year  $t$ .  
 $n = \{\text{Assets, Revenue, Owners' Equity}\}$ .

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 effective tax rate for domestic

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<sup>10</sup> 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. 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.<sup>11</sup> 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 domestics) in that country. We test whether this coefficient is significantly different from zero. Positive values are consistent with multinationals in a country facing higher ETRs than their domestic counterparts face. Negative values are consistent with domestics in a country facing higher ETRs than their multinational counterparts face. Throughout the paper, we refer to the sum of the coefficients on the *COUNTRY* and the *COUNTRY \* MN* variables as the *multinational ETR*.<sup>12</sup>

The coefficients on *INDUSTRY* and *YEAR* are used to determine whether ETRs vary across industries and time. Since Rego (2003) finds that ETRs are increasing in the size of the firm, we include three control variables for size (*SIZE*): the percentile ranks of Total Assets, Revenues, and Equity.<sup>13</sup>

The ETRs are collected from each firm's financial statements.<sup>14</sup> The numerator for the ETR computation is the total worldwide income tax expense in the company's publicly available financial statements. In subsequent tests, the numerator is current income tax expense.

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<sup>11</sup> To estimate equation (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 (code 31) is the one left out. We implement a similar procedure on the years, resulting in 2005 being the excluded year. To improve comparability across estimations, we exclude the same industry and year from each regression.

<sup>12</sup> 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.

<sup>13</sup> We use percentile ranks rather than actual values or logarithms to mitigate concerns about the accuracy of the foreign exchange and unit data. We converted all dollar variables to millions of U.S. dollars using the currency and unit data in the database. However, there appear to be errors in the data for a few countries, e.g., some of the Italian data, which the database claims is expressed in Euros, appear to be expressed in Italian Lira. Also in a few cases, data appear to be expressed in thousands although the database asserts that they are expressed in millions. By using percentile ranks, we limit the impact of these possible errors on our size controls.

<sup>14</sup> Note that the ETRs in this study are not marginal tax rates, as detailed in Scholes, et al., 2009. They ignore implicit taxes, cannot assess who bears the burden of corporate income taxes, and cannot capture incentives to employ new capital (see Fullerton, 1980, and Bradford and Fullerton, 1981, for a discussion of marginal effective tax rates). Neither are they the tax rates related to investment decisions developed in Devereux and Griffith (1998) and Gordon, et al (2003).

Unfortunately, unlike U.S. GAAP, the GAAP in many countries do not require firms to disclose the current income tax expense. Thus, many companies in our study do not report their current income tax expense. Nonetheless, for those companies that report both figures, inferences are the same whether we use total or current income tax expense. Thus, to conduct our primary tests, we use the total income tax expense because it is available for more firms.

The ETR denominator is net income before income taxes (NIBT). Since financial reporting rules vary across countries and thus affect the computation of NIBT, we conduct sensitivity tests using total revenues and an adjusted net income as denominators.<sup>15</sup> Results are qualitatively the same.

### **3. Sample**

We use the Osiris database to collect a sample of firms for this study.<sup>16</sup> To collect information about the parents for all firm-years between 1988 and 2007, we access the data through the Wharton Research Data Services (WRDS) interface.<sup>17</sup> We attempt to mitigate the impact of outliers and errors in the data by deleting all observations for which any one of the following are true: (a) ETR exceeds 70%, (b) ETR is negative, (c) the ratio of total income tax expense to a modification of NIBT (adding back depreciation and research and development

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<sup>15</sup> To test the sensitivity of our findings to the selection of NIBT as the scalar, we use two other profit measures to scale the total income tax expense: adjusted net income (NIBT plus certain key expenses) and revenues. Adjusted net income is intended to add back two key expenses whose accounting rules vary across countries, namely depreciation expense and research and development expense. The second scalar, revenues, eliminates any cross-country variation in expenses.

<sup>16</sup> Although the number of financial statement variables tracked in Osiris is smaller than that tracked in Compustat Global, the Osiris database is superior for this study because it allows us to identify the countries in which firms have subsidiaries.

<sup>17</sup> The data used in this study were last updated February 13, 2008. Because very few December year-end firms would have reported by that time, the number of observations for 2007 is smaller than those for the earlier years.

expense) is negative or exceeds 70%.<sup>18</sup> We also eliminate firm-years with (a) missing values for firm identifier (`os_id_number`), sales (`data13002`), tax expense (`data13035`), and NIBT (`data13034`), (b) nonpositive sales, and (c) negative values for depreciation, and research and development expenses. All missing values for depreciation and research and development expense are set to zero. We also delete all observations where NIBT plus depreciation and research and development expense equals zero.

Information about the subsidiaries of these firms is accessed through an Internet interface with Bureau van Dijk.<sup>19</sup> We obtain information about subsidiaries classified in levels 1 through 10.<sup>20</sup> Thus, if a firm has a domestic subsidiary (level 1), which has a domestic subsidiary (level 2), which has a domestic subsidiary (level 3) and so forth until the domestic subsidiary in level 9 has a foreign subsidiary (level 10), we would treat that firm as a multinational and code that country as having a foreign subsidiary. Foreign subsidiaries buried beneath ten layers of domestic subsidiaries will be miscoded, but we doubt that this data limitation will have any effect on the paper's inferences.<sup>21</sup>

The Osiris subsidiary measure has a serious flaw. Osiris only reports the subsidiary information as of the most recent updating of the information.<sup>22</sup> We are unable to assess the

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<sup>18</sup> Inferences are unchanged when we further control for the effects of outliers by deleting from each specification any observations that are identified as outliers by Cook's D, studentized residuals, or DFFITS.

<sup>19</sup> 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, Datamonitor, Factset, LexisNexis, and Worldbox.

<sup>20</sup> Over two-thirds of the firms reported having zero subsidiaries. We crosschecked this information to public filings of a sample of Canadian and U.S. firms and determined that several of these firms had subsidiaries. Because accurate identification of domestic and multinational firms is central to our study, we discarded the subsidiary information of the 28,427 parent firms that reported having zero subsidiaries. We then code any firm that reports at least one foreign subsidiary as multinational and those that report zero foreign subsidiaries as domestic.

<sup>21</sup> We obtain subsidiary information up to level 10 for parents domiciled everywhere, except Canada, New York, and North Carolina. For unresolved reasons, we were only able to obtain level 1 subsidiary information for firms domiciled in these jurisdictions. Inferences are unchanged when we drop firm-years from these jurisdictions from our sample.

<sup>22</sup> For example, if a company had no subsidiary in Canada before 2007 (the most recent year in the database) and then incorporated a subsidiary in Canada in 2007, we would erroneously treat the company as having had a

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 2002.<sup>23</sup> Our logic is that the foreign subsidiary coding is correct for 2007, has fewer errors in 2006 than in 2005, and has fewer errors in 2005 than in 2004, 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 one regression that uses all of the firm-years and from annual regressions for each year. Conclusions are similar regardless of the sample period.

Our sample selection process yields a main sample of 27,136 firm-years spanning 85 countries, ranging from only one firm-year in seven countries to 7,177 in the U.S. We combine the countries with the fewest observations based on geography and other characteristics, leaving nine large countries: Australia<sup>24</sup> (5% of the sample), Canada (3%), China (3%), France (1%), Germany (1%), India (2%), Japan (24%), the UK (8%) and the U.S.(26%).<sup>25</sup> Because of a similar history of economic development, we form a group with the four Asian Tigers (Hong Kong, Singapore, South Korea, and Taiwan—12% of the sample). We form another group

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Canadian subsidiary for all years in our sample. Likewise, if a company had a subsidiary in Canada for all years before 2007 and then liquidated the Canadian subsidiary in 2006, we would erroneously treat the company as not having had a subsidiary in Canada for any year in our sample.

<sup>23</sup> Another advantage of limiting the analysis to recent years is that it mitigates potential survivorship bias. The Osiris 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 2002, we reduce the deleterious effects of survivorship bias.

<sup>24</sup> We include New Zealand with Australia because New Zealand does not fit in any of the geographic groups described below, does not meet the criteria to be included on its own, and the corporate income tax systems of the two countries are largely similar. In our main sample, we have 1,138 Australia parent firm-years and 96 New Zealand parent firm-years.

<sup>25</sup> The large countries were selected based on the size of their economy and the number of their firm-years. These nine countries were the only ones with gross domestic product in excess of one trillion dollars in 2008 (per the *CIA World Factbook*) and at least 200 firm-years in the sample.

comprised of 17 Tax Havens (3% of the sample).<sup>26</sup> The remaining 57 countries are organized geographically into five groups: Africa (1% of the sample), Asia (2%), Europe (6%), the Middle East (2%) and Latin America (2%).<sup>27</sup> All of the tests are conducted and results are reported using these 16 countries and groups.<sup>28</sup>

For the 16 countries and groups, Table 1 reports the firm-year means of Sales, Assets, Equity, Total Income Tax Expense, and NIBT, dichotomized into 12,778 domestic-only firms and 14,358 multinationals.<sup>29</sup> Not surprisingly, multinational firms average more sales, assets, equity, total tax expense and NIBT than domestics do. The next two columns in Table 1 show the average number of subsidiaries (domestic and foreign) and the average number of subsidiaries located in foreign countries, respectively.

The final four columns of Table 1 present summary measures of alternative tax rate measures (all expressed in percentages). In the first of the four columns (“Agg ETR”), the numerator is the aggregated tax expense for all firms in a group (e.g., all American companies) divided by the aggregated NIBT for those firms. In the full sample, both domestics and multinationals have aggregate ETRs of 31%. The next column presents the means of the total income tax expense divided by net income before taxes. These are the actual ETRs from the

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<sup>26</sup> Note that though they classify Hong Kong and Singapore as tax havens, we do not include them in the tax haven group but rather as members of the Asian Tiger group. However, inferences are unaltered if we include Hong Kong and Singapore in the Tax Havens group and leave South Korea and Taiwan as the only countries in the Asian Tiger group.

<sup>27</sup> No countries are included twice in the groupings. For example, the Asia group only includes Asian countries not included in other places. Thus, it does not include China, India, Japan, and the Asian Tigers because they are reported separately.

<sup>28</sup> In sensitivity tests, we further divide the Europe group into former Warsaw Pact countries and all other countries. Inferences are unchanged. Because we have fewer than 200 firm-years for the Warsaw Pact group in our main sample, we present the results for the aggregated group only.

<sup>29</sup> Osiris asserts that its data are recorded in local currency and provides a variable indicating an appropriate exchange rate for conversion to U.S. dollars and a variable indicating the units in which the data are expressed. However, some unusually large numbers for a few countries, particularly Italy and Mexico, suggest that at least some of the figures are stated in a currency different from the one indicated or in units different from the ones indicated. Since our regression measures are scaled, we doubt that any variation in currency should affect our conclusions. Consistent with that expectation, inferences are unaltered when all Italian and Mexican observations are deleted from the study.



firms' financial statements, not ETRs estimated from regression analysis. The domestics (multinationals) have mean ETRs of 30% (28%). The penultimate column reports the median ETRs. Domestics (multinationals) have median ETRs of 32% (30%). The final column presents the average statutory tax rate for the country-years in the sample.<sup>30</sup> The numbers reported are the weighted average rates, where the weighting was done by number of firm-years. In the full sample, domestics and multinationals faced identical average statutory tax rates of 38%.

In general, the four tax rate columns paint a similar picture. Countries with high statutory tax rates tend to have high ETR, whether they are measured in the aggregate or at the firm level. One notable exception is multinationals domiciled in tax havens. They face the lowest statutory rates in the study. However, their ETRs are much higher, albeit less than those in most other countries. This discrepancy between statutory and effective tax rates is consistent with multinationals in tax havens having extensive foreign operations in high-tax countries. Even though they face low taxes on their domestic income, they must pay higher taxes abroad.

#### **4. Results from Comparing Domestic-only Firms with Multinationals**

##### *4.1. Actual vs. Estimated ETRs*

Table 2, Panel A presents the domestic-only ETRs, which are the *COUNTRY* coefficients from estimating equation (1). Panel B presents the multinational ETRs, which are the sum of the *COUNTRY* and the *COUNTRY\*MN* coefficients.

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<sup>30</sup> We use the combined corporate statutory tax rate calculated for the 30 OECD countries and available at [www.oecd.org](http://www.oecd.org) (Table II.1). For the non-OECD countries in our sample, we use the maximum rate in data kindly provided by Kevin Hassett.

The first column in Table 2 reports the actual ETRs from the financial statements. The second column reports the ETRs from estimating equation (1).<sup>31</sup> There is little difference between the two columns.<sup>32</sup> 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.

#### *4.2. Comparing the tax burdens of domestic-only firms across countries*

The ETRs in Table 2, Panel A enable us to compare the tax burdens of domestic-only firms across countries. The estimated regression coefficients for the domestic-only ETRs (in the second column) range from 10% (Middle East) to 39% (Japan) with mean (median) [standard deviation] of 24% (24%) [6%]. The Tax Havens (17%) are the only other group with a domestic ETR under 20%. Japan (39%) is the only country with a domestic ETR above 27%. Throughout the study this pattern reappears—the Middle East and usually the Tax Havens will have the lowest ETRs, and Japan's ETR will far exceed any other country's ETR.

The domestic ETR for the U.S. is 26%, which is above the worldwide average, the same as those for the UK and France, and a percentage point less than those for Germany and Europe

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<sup>31</sup> To illustrate, for Canadian companies, Panel A shows that the mean actual ETR from the financial statements for domestic-only firms is 22%, while the estimated ETR for domestics is 23%. Panel B shows that the multinational actual ETR from the financial statement is 26% and the estimated multinational ETR is 24%.

<sup>32</sup> The actual domestic ETRs in Panel A average 0.4 percentage points more than the domestic estimated ETRs. The largest spread in absolute value is 3.1 percentage points for Japan. More importantly, for purposes of comparing countries, the rank order of the two ETRs columns is nearly identical with a Pearson coefficient of 99%. With the multinationals in Panel B, the actual ETRs average 2.1 percentage points more than the estimated multinational ETRs. The largest spread in absolute value is 3.9 percentage points for Africa. The Pearson correlation coefficient is 99%.

(i.e., the remaining European countries, which are grouped together). This order will hold throughout the study, i.e., the U.S. domestic ETR will be above average, similar to those of the UK and European countries, but well below that of Japan. Furthermore, ignoring Japan's high rates, the Asian ETRs will be less than the American and European ETRs. In fact, all of the domestic ETRs for France, Germany, the UK, the U.S., and Europe will exceed those for China, India, the Asian Tigers, and Asia (i.e., the remaining Asian countries) for most of the tests in the paper.

#### *4.3. Comparing the tax burdens of multinationals across countries*

The ETRs in Table 2, Panel B enable us to compare the tax burdens of multinationals across countries. The mean (median) [standard deviation] of the multinational ETRs in the second column are 22% (23%) [6%]. As with the domestic ETRs, the Middle East (11%) and Japan (36%) have the most extreme ETRs. The Tax Havens (15%), China (17%), Asian Tigers (17%), and India (18%) also are under 20%. Germany (30%) has the second highest multinational ETR. The U.S. multinational ETR follows at 27%. Once again, the U.S. finds itself with an above-average ETR and bracketed by its European trading partners with the next highest ETRs coming from the UK (26%), France (25%) and Europe (24%). As with the domestic ETRs, the multinational ETRs for France, Germany, the UK, the U.S., and the remaining European countries exceed those for China, India, the Asian Tigers, and the remaining Asian countries (excluding Japan). We infer that the general rankings from high-tax countries to low-tax countries are qualitatively the same for domestics and multinationals.

The difference between the percentages in Panel B and those in Panel A (which is the coefficient on  $COUNTRY*MN$ ) is the amount by which the multinational ETRs exceed the

domestic ETRs. The mean (median) [standard deviation] for the difference is -1% (-2%) [2%]. This indicates that the multinationals average slightly lower ETRs than their domestic-only counterparts face.

Interestingly, four of the five groups whose domestics face statistically significant (at the 0.05 level) higher ETRs compared with their multinational counterparts are Asian (India (5%), China (4%), Asian Tigers (3%) and Japan (3%)).<sup>33</sup> The other one is Europe (3%). The U.S. is the only country whose multinational ETR is significantly greater than its domestic ETR. However, the difference is only 1%, leading us to conclude that American domestics and multinationals face similar ETRs.

#### *4.4. Comparisons using the Current Income Tax Expense*

The numerator in our computation of ETR, the total income tax expense, is the tax expense on current profits, regardless of whether those taxes were paid in the past, are paid in the current year, or will be paid in the future. The current income tax expense includes only that portion of the total income tax expense related to taxes that will be paid in the current year. Thus, current income tax expense should be a better numerator than total income tax expense for our measure of ETRs.<sup>34</sup>

Unfortunately, Osiris does not collect the current income tax expense. However, Compustat Global does collect it. Thus, to test the sensitivity of our inferences to the use of the total income tax expense, we merge the Osiris and Compustat Global databases to create a

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<sup>33</sup> A possible explanation for the lower ETR of Indian multinationals as compared to Indian domestic-only firms is that India has granted extended tax holidays to software firms over our sample period. 19% of the Indian firm-years in our sample are in the Computer Programming industry (NAICS 5415). All other industries, except Biotech Manufacturing (NAICS 3254) at 12%, represent less than 5% of the sample. We thank Mihir Desai for bringing this information to our attention. We look forward to future research that details similarly rich industry-level differences that explain some of the differences in the domestic and multinational ETRs of other countries.

<sup>34</sup> See Hanlon (2003) for a detailed discussion of both the total and current income tax expenses and problems associated with using either of them to approximate actual taxes paid.

matched sample of 9,185 firm-years from 2003-2007 for whom data are available in both databases.<sup>35</sup> We then estimate equation (1) using the matched sample and the current income tax expense. The regression coefficient estimates for *COUNTRY* and *COUNTRY\*MN* will enable us to compare domestic and multinational ETRs across countries and within countries and thus assess whether the inferences, reached using the total income tax expense, hold when we use the current income tax expense.<sup>36</sup>

The third column in Table 2 shows the estimated ETRs using the current income tax expense and the matched sample. A limitation of the smaller, matched sample is that we have insufficient observations for some countries, e.g., we have only one domestic African firm-year that reports a current income tax expense. Thus, we do not report an estimated domestic ETR for Africa or any other domestic or multinational cell with fewer than 20 observations. This eliminates domestic and multinational estimated ETRs for Canada and domestic estimated ETRs for France, India, the Tax Havens, Africa and the Middle East, leaving nine (15) domestic (multinational) ETRs.

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<sup>35</sup> The matched sample is smaller for several reasons. First, Compustat Global may track different companies from those tracked by Osiris. Second, the only firm identifier common to the two databases is the firm name. Slight variations in the name (e.g., Inc. versus Incorporated) may result in matches being overlooked. Last, an inordinate number of European firms erroneously show zero current tax expense in 2005 and 2006. Compustat Global has acknowledged this error but has not corrected it. Consequently, we drop all firm-years from the problematic countries from our sample. Compustat Global has another shortcoming for purposes of this study. In particular, it has no foreign subsidiary information. The only item in the Compustat Global database that indicates any foreign activity is foreign tax expense. Unfortunately, accounting rules vary across countries in the reporting of foreign income tax expense, rendering cross-country comparisons based on foreign tax expense problematic. In addition, no foreign income tax expense will be reported by companies that owe no foreign tax, even if they have extensive foreign activities. To illustrate this shortcoming, 678 (30%) of the 2,276 firm-years in our matched sample in 2006 (the year in which we have the most confidence in our procedure for identifying multinationals using Osiris data) are classified differently (and we believe erroneously) when we rely on the presence of foreign income tax expense in Compustat Global to identify multinationals.

<sup>36</sup> To establish comparability between the two samples, we first estimate equation (1) with the smaller, matched sample, but continuing to use the total income tax expense in the numerator of the ETR measure. We find that the inferences drawn from this regression are similar to the ones drawn from the full sample using total income tax expense. This provides confidence that any difference between the findings using total income tax expense in the numerator and those using current income tax expense in the numerator does not arise from sample differences.

We find that our high-tax to low-tax rankings are largely indifferent to whether the ETR numerator is total or current income tax expense.<sup>37</sup> Japan's current domestic (multinational) ETR remains substantially higher than any other country's ETR at 38% (35%). The group with the next highest ETR is Europe (Germany) at 32% (30%). With no domestic estimates for the Middle East or Tax Havens, the Asian Tigers and Latin America share the lowest domestic ETR at 17%. China has the lowest multinational ETR (14%). Ignoring Japan, all of the Asian ETRs continue to be less than the American and European ETRs.

In summary, the ETRs and the relative rank of the countries are largely unaffected by whether the numerator in the ETR calculation is total income tax expense or current income tax expense. Thus, for the remainder of this paper, we will use the sample with total income tax expense as the numerator because it triples the sample that uses the current income tax expense.

#### *4.5. Comparisons using all Firm-Years from 1988-2007*

As discussed above, we exclude pre-2003 firm-years because the Osiris foreign subsidiary information, which we use to identify multinationals, is only coded for the most recent Osiris update. Since we do not know when a firm formed its first foreign subsidiary, using all firm-years undoubtedly results in miscoding some domestic-only firm-years as multinational firm-years.

To find out if this miscoding of firm-years before 2003 affects the high-tax to low-tax ranking among the countries in our study, we estimate equation (1) including all firm-years for which we have data. This adds 41,737 firm-years to our sample. The last column in Table 2 shows the resulting estimated ETRs.

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<sup>37</sup> Consistent with deferred tax liabilities generally exceeding deferred tax assets, the coefficient estimates for the ETRs computed with total income tax expense in the numerator exceed the coefficient estimates for the ETRs computed with current income tax expense in the numerator in 20 of the 25 cases in the third column of Table 2.

Despite this substantial increase in observations and the inevitable miscoding of multinationals introduced by adding the earlier firm-years and the potential survivorship bias noted above, the inferences are largely unaltered. The rank order of the countries remains qualitatively unaltered: the Japanese domestic (multinational) ETR is 38% (37%), nine (five) percentage points greater than that for France (Germany), the country with next highest ETR. The domestic (multinational) Middle Eastern ETR is the lowest at 11% (12%), seven (two) percentage points below those of China and Latin America (Tax Havens). Once again, the U.S. and European countries generally have higher ETRs than Asian countries. All of the domestic and multinational ETRs for France, Germany, the UK, the U.S., and Europe exceed those for China, India, the Asian Tigers, and Asia. In short, the high-tax to low-tax rankings are substantially the same from 1988 to 2007 as they are from 2003 to 2007.

#### *4.6. Year-by-year comparisons from 1988 to 2007*

The previous section establishes that the estimates of equation (1) are substantially the same whether the sample is drawn from recent years (2003-2007) or from the entire investigation period (1988-2007). In this section we report annual estimated ETRs, using the complete sample of firm-years to estimate equation (1) for each year. These estimated regression coefficients enable us to analyze the changes in ETRs over time for each country.

Table 3 reports the annual estimated domestic and multinational ETRs. Percentages are only presented if there are at least 20 observations, but all available firm-years were included in the regressions.

We find that the high-tax to low-tax rank across countries has changed little over the two decades. The order in 1988 (the first year) is similar to the rank in 2006 (the final year with data

for all groups). In 1988, the Japanese multinational ETR was the highest at 49% (15 percentage points ahead of any other country); in 2006, they were the highest at 36% (nine percentage points higher than those from any other country). In fact, although their rates declined significantly over time, in every year Japanese domestic and multinational ETRs were higher than those in any country (note that we report no estimates for Japanese domestics before 1993 because in these earlier years we do not have at least 20 Japanese domestic observations in a single year).<sup>38</sup>

In 1988, the Tax Havens enjoyed the lowest multinational ETR. Since then, they have averaged three percentage points above the minimum ETR. The Middle East has had the lowest domestic (multinational) ETRs since 2000 (1999). From 1997 to 2000, India enjoyed the lowest multinational ETRs.

The U.S. and European countries always had higher ETRs than the Asian countries, with the notable exception of Japan. In 1998 (the first year with data for all Asian countries), the multinational ETRs of France, Germany, the UK, the U.S., and Europe averaged 29%. The multinational ETRs of China, India, Asian Tigers, and Asia averaged 15%. In 2006, those same Western countries bested their same Eastern counterparts 25% to 18%.

Over the two decades, German multinational ETRs fell more than any other country's multinational ETRs. In 1989 they approached Japanese levels in 1989 at 47%. By 2006 they had tumbled to 27% (although still five percentage points above average). Two other countries with large declines were Japanese multinationals from 49% in 1988 to 36% in 2006 and Australian multinationals from 34% in 1988 to 23% in 2006. U.S. ETR declines were modest:

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<sup>38</sup> 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.



domestic (multinational) ETRs dropped by only two (two) percentage points.<sup>39</sup> For the ten groups for which we have data from 1989 to 2006 (British and American domestics and multinationals and Australian, French, German, Japanese, Tax Haven and European multinationals), the average decline over the period was 7 percentage points or 20% of their 1989 ETRs.

Interestingly, the ETR declines had a precipitous drop from 1992 to 1994. During those two years, German multinational ETRs fell 14 percentage points. Australian multinational ETRs tumbled 11 percentage points. Japanese multinational ETRs dropped 6 percentage points. The decrease was permanent. ETRs for those three groups never rebounded to their 1992 levels. From 2002 to 2003, the ETRs for Canadian domestics dropped from 31% to 22% and multinationals from 27% to 21%. Neither Canadian group has seen its ETR return to its earlier level.

The only country that showed a substantial increase in ETRs is India, where multinational ETRs jumped from 8% in 2000 to 20% in 2002 and have remained at roughly that level. The Europe multinational ETRs remained steady over time. They were 22% in 1989, even lower than the Tax Havens' multinational ETR, but because of the dramatic declines in other countries' ETRs, they were slightly above average by 1999. All other groups had lower ETRs in 2006 than in 1988.

#### *4.7. Comparisons Across Industries*

To assess whether ETRs vary across industries, we estimate equation (1) using industry groupings. We form the industries using two-digit NAICS codes and the 2003-2007 sample with

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<sup>39</sup> These findings are consistent with those of the 2008 study by the OECD discussed in Hodge (2008) which documented that 2008 was the seventeenth consecutive year in which the average statutory corporate tax rate in non-U.S. OECD countries fell while the U.S. rate remained unchanged.

total income tax expense in the numerator. We group two-digit codes to ensure that each reported industry has at least 900 firm-years. All observations are included in the regressions, but only cells with twenty or more observations are reported. Manufacturers comprise 49% of the firm-years.

Table 4 shows the resulting ETR estimates. The rank order of the countries is consistent across industries. For every industry in which they have enough observations, Japanese ETRs remain higher and Middle Eastern ETRs lower than those from any other country. The U.S. and European countries continue to have higher ETRs than Asian ETRs (once again, ignoring Japan).

Within-country comparisons reveal substantial variation in most countries/groups, with an average range (standard deviation) in ETRs of 14 (five) percentage points. The Retail Trade industry has the highest ETRs. Combining domestic and multinational estimates, the Retail Trade ETRs are highest for 13 of the 17 countries/groups that reported Retail Trade ETRs. The U.S. Retail Trade ETR is 34% (35%) for domestics (multinationals), six percentage points higher than those of the next industry, Manufacturing (Real Estate).

The Information and Professional industries have the lowest multinational ETRs. Six (four) of the ten (eleven) countries/groups that report a multinational ETR in the Information (Professional) industry report their lowest ETR in that industry. The domestic ETRs exhibit no similar pattern. The U.S. Financial (Information) industry has the lowest domestic (multinational) ETR of 15% (17%), four (two) percentage points less than the Information (Professional) industry ETR.

#### *4.8. 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.

One, 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 (see discussions 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 equation (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 expenses as a percentage of total assets are above the median. Consistent with high intangible firms having lower ETRs, we find that the coefficient on the categorical variable is -2.6% and highly significant.

Two, as mentioned above, many countries have shifted from a worldwide tax system to a territorial tax system. Furthermore, Japan and the U.K. are in the process of moving to a territorial system, leaving the U.S. as the sole remaining major worldwide country. Some have conjectured that a territorial system in the U.S. would collect less revenue than the current worldwide system. To test the impact of a worldwide system on ETRs, we estimate equation (1), after adding a categorical variable equal to one if the parent country has a worldwide tax system, and zero otherwise. We find that the worldwide coefficient is insignificant.

Three, 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 those do in classical systems, such as the U.S., where corporate taxes do not offset shareholder taxes. We test this possibility by modifying equation (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 6% and significant at the 1% level, consistent with imputation countries facing higher ETRs.

Four, to assess the impact of cross-country differences in book and tax accounting on our estimates of cross-country ETRs, we use Atwood, Drake and Myers' (2009) book-tax conformity measure (*BTC*) for 33 countries from 1993 to 2005. Consistent with book-tax conformity mattering, we find a positive correlation between *BTC* and the absolute value of the difference between a firm's maximum statutory tax rate and its ETR. However, when we modify equation (1) to include the *BTC* measure, we find that the coefficient on the *BTC* measure is insignificant. This failure to detect a relation between a measure of book-tax conformity and the level of ETRs provides some comfort that the inferences drawn from this study are not solely an artifact of cross-country differences in financial reporting.

Five, another cross-country difference is whether tax losses can be carried back to offset the prior year's taxable income.<sup>40</sup> 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 -2.5% and significant at the 0.01 level, which is consistent with lower ETRs in countries that permit firms to carry back their losses.<sup>41</sup>

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<sup>40</sup> This information is obtained from International Tax Summaries prepared by Deloitte and available through its website.

<sup>41</sup> We conduct no tests concerning the carryforward of losses because Estonia is the only country that does not permit them.

Six, 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.<sup>42</sup> However, when we exclude companies domiciled in the U.S. (the only major country without a value-added tax), the correlation becomes positive, consistent with countries that have high corporate income taxes also having high value-added taxes. To determine whether the value-added tax affects the inferences drawn above, we include the value-added tax rate in equation (1). Inferences are unaltered.

Seven, we include the maximum statutory corporate income tax rate in equation (1). As would be expected, we find a positive coefficient on the statutory rate. However, the relative ranks of the sixteen countries/groups' multinationals, remain largely unchanged with Japan (Middle East) retaining the top (bottom) rank. This implies that the ETRs are driven by differences in both tax rates and tax bases.

Eight, the sample excludes all firm-years with losses (i.e., negative NIBT). In this sensitivity test, we add back the 3,297 firm-years with losses and actual ETRs (from the financial statements) that equal zero and estimate equation (1). By definition, adding these loss firm-years lowers the estimated ETRs. We find that the inclusion of loss firm-years has inconsequential impact on the relative high-tax to low-tax rank across the countries: Japanese domestic (multinational) ETRs remain the highest by far at 31% (26%), ten (five) percentage points above the German ETRs. The domestic (multinational) Middle Eastern ETRs are the lowest at 5% (4%), five (three) percentage points below the Tax Havens. All of the multinational ETRs for

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<sup>42</sup> We thank Kevin Hassett for providing us with the valued-add tax data.

France, Germany, the UK, the U.S., and Europe exceed those for China, India, and the Asian Tigers.

Nine, the sample includes firm-years with zero ETRs as long as their NIBT was positive. In this robustness check, we drop those 1,058 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 inconsequential impact on the relative high-tax to low-tax rank across the countries: Japanese domestic (multinational) ETRs are 40% (38%), twelve (six) percentage points above those for Germany, the country with the next highest ETR. The domestic (multinational) Middle Eastern ETRs are the lowest at 12% (13%), eight (four) percentage points ahead of the Tax Havens. Once again, the U.S. and European countries generally have higher ETRs than Asian countries. All of the domestic and multinational ETRs for France, Germany, the UK, the U.S., and Europe exceed those for China, India, the Asian Tigers, and Asia.

All in all, we conclude from this series of additional tests that the earlier inferences about ETRs hold. The remainder of the paper expands the domestic-multinational dichotomy to consider whether the domiciles of foreign subsidiaries affect ETRs.

## **5. Results from Comparing Foreign Subsidiaries**

### *5.1. Cross-country comparisons*

In Equation (1), we use the presence of a foreign subsidiary to distinguish multinationals from domestic-only firms. In this section, 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 tax burdens of its parent. The regression equation is:

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

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 the same as in equation (1). The estimated regression coefficient on  $SUB$  is the estimated impact on ETRs arising from having a subsidiary in that foreign country.

We continue to use the same 16 groups as in the previous section. Each group serves as a  $COUNTRY$  variable and a  $SUB$  variable. Each firm-year has one country in which its  $COUNTRY$  variable is coded one. However, it has  $n$   $SUB$ s coded one, where  $n$  is the number of different countries in which the parent has at least one subsidiary.<sup>43</sup>

We begin with the original sample of 27,136 firm-years (from 2003-2007) with total income tax expense as the numerator for the ETR. We lose 167 firm-years whose companies indicated that they had a foreign subsidiary (which was adequate for coding it as a multinational in estimating equation (1)), but did not specify the location of the foreign subsidiary, rendering it unusable for estimating equation (2). For these remaining 26,969 firm-years, there are 57,966  $SUB$  variables with a value of one. All 16 subsidiary locations have at least 1,200 firm-years. Europe is the most popular location for foreign subsidiaries with 6,335 firm-years.

Table 5 shows the regression coefficient estimates for  $COUNTRY$  in Panel A and  $SUB$  in Panel B. The  $COUNTRY$  coefficients from equation (2) should be the same as the  $COUNTRY$

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<sup>43</sup> For example, if a U.S. parent has subsidiaries in Canada, Germany, and Bermuda,  $COUNTRY^{US}$ ,  $SUB^{CANADA}$ ,  $SUB^{GERMANY}$ , and  $SUB^{TAX HAVENS}$  would be coded one, while all other  $COUNTRY$  and  $SUB$  variables would be coded zero.

coefficients from equation (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 affect inferences because foreign subsidiaries are not randomly distributed across parents. Multinationals from some countries might be more likely to have profitable foreign investments or operate in high-tax countries (e.g., French companies are more likely to have a subsidiary in high-tax Germany than are Indian companies, which might account for some of the higher ETRs in France.). That said, we find little evidence that the location of the foreign subsidiary matters. Only two *COUNTRY* coefficients are more than two percentage points different from the corresponding *COUNTRY* coefficients in Table 2. The domestic German ETR decreases from 30% to 27%, while the domestic Indian ETR increases from 20% to 23%.

We now turn our attention to Panel B and 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 Tax Haven *SUB* coefficient should reflect those tax savings. To our surprise, we find little evidence of cross-country variation in *SUB* coefficients. The *SUB* coefficients range from a 1.3 percentage points decrease in ETRs (Asia) to a 1.2 percentage points increase in ETRs (Australia). The Tax Haven *SUB* coefficient implies that a firm with at least one subsidiary in a haven country enjoys a 0.5 percentage point lower ETR, negative but hardly a substantial amount.

## *5.2. Parent-subsidiary interactions*

The lack of results in the previous section may stem from the fact that foreign subsidiaries affect the ETRs of their parents differently depending on the domicile of the parent.



For example, Australian subsidiaries may lower the high-tax ETRs of Japan parents but increase the low-tax ETRs of Asian Tiger parents. In the prior section, the two effects of Australian subsidiaries would have offset each other, potentially understating the impact of Australian subsidiaries on parent ETRs in both Japan and the Asian Tigers.

In this section, we alter the research design in an attempt to detect any possible parent-subsidiary interactive effects. Specifically, we modify equation (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.

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

Table 6, Panel A presents the estimated interaction coefficients (no coefficients are shown unless there are at least 100 observations in a cell). We would expect that subsidiaries in low-tax countries would lower the ETRs of their parents more than subsidiaries in high-tax countries do. Consistent with this expectations, we find that, across all parents, the subsidiaries from low-tax countries (China, India, Asian Tigers, Tax Havens, Asian and the Middle East) have 30 negative interaction coefficients (indicating a reduction in the parents' ETRs) and only nine positive interaction coefficients (indicating an increase in the parents' ETRs). For example, subsidiaries in Tax Havens reduce ETRs in 7 of the 8 countries with coefficients. Conversely, subsidiaries located in high-tax countries (France, Germany, Japan, the UK, the U.S., and Europe) have 23 negative interaction coefficients and 26 positive interaction coefficients.

The interactive coefficient estimates also allow us to compare domestics in a country with multinationals operating in that country, shedding light on reports, such as the U.S.

Government Accountability Office's (2008) finding that U.S.-controlled U.S. companies pay more taxes than foreign-controlled U.S. companies. Consistent with the U.S. Government Accountability Office's (2008) report, we find that U.S. domestics have a higher ETR (26%) than multinationals from every country, except Japan.<sup>44</sup> We also find that domestics in China, India, and the Asian Tigers face lower ETRs than multinationals from all Western countries.

We find a modest -0.1% coefficient on the Tax Haven subsidiaries of U.S. parents, which is less than Dyreng and Lindsey's (2009) 1.5% estimate, computed using different data and methodology. Nonetheless, both estimates imply that the impact of tax havens on U.S. parents' ETRs is not as substantial as might be implied by some political claims that vast sums of tax revenue are being lost through havens.

One explanation for both studies' surprisingly low tax haven estimates is that foreign subsidiaries cluster and thus coefficients cannot be interpreted independently. For examples, if tax havens are always paired with subsidiaries in high-tax locations (e.g., Irish subsidiaries always co-exist with high-tax European subsidiaries), then clustering effects among subsidiaries may understate the importance of tax havens because the tax haven coefficients are capturing some of the high-tax countries' impact on ETRs.

Thorough investigation of the potential effects of clustering on the ETR estimates in this study is beyond the scope of this paper. However, as exploratory work, we augment equation (3) with three-way interaction terms. Because of a limited number of observations, we include only three-way interactions that have as the parent country one of the five groups with the most firm-years (Japan, the UK, the U.S., Asian Tigers, and Europe).

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<sup>44</sup> To compute the multinational rate, take the domestic ETR and adjust it for the effect of a U.S. subsidiary. For example, the table shows that the Australian domestic ETR is 24% and the Australian parent-U.S. subsidiary is 1.9%. Thus, Australian companies with U.S. subsidiaries have an average ETR of 22.1%, compared with an average U.S. domestic ETR of 26%.

$$\begin{aligned}
ETR_{it} = & \sum \beta_{0_j} COUNTRY_{it}^j + \sum \beta_{1_l} COUNTRY_{it}^j * SUB_{it}^k + \sum \beta_{2_l} COUNTRY_{it}^j * SUB_{it}^k * SUB_{it}^q \\
& + \sum \beta_{3_m} INDUSTRY_{it}^m + \sum \beta_{4_n} YEAR_{it}^n + \sum \beta_{5_p} SIZE_{it}^p + \varepsilon_{it}
\end{aligned} \tag{4}$$

Panel B of Table 6 reports the estimates of  $\beta_1$  (the coefficient on the two-way interactions) for each of the five countries/groups from estimating equation (4) on the full sample. Our hope is that controlling for three-way interactions will result in more precise two-way interactions. Comparing the estimates in Panel B to those in Panel A, we find that the sign of the two-way interaction coefficients remain the same in 45 of the 54 coefficients. However, some of the coefficients change enough to suggest that controlling for three-way interactions affects the inferences drawn on the two-way interactions. For example, the coefficient on Tax Haven subsidiaries of U.S. parents (-0.1% in Panel A) decreases to -0.7% in Panel B, providing stronger evidence that tax havens reduce the ETRs of U.S. multinationals even though the amount remains small.

Ideally, additional interactions (i.e., four-way, five-way, and so forth) would be included in the regression model. However, insufficient observations limit the extent of such interactions. We look forward to future work that attempts to grapple with the clustering of foreign subsidiaries and their impact on ETRs.

## 6. Closing Remarks

To our knowledge, this paper provides the most comprehensive analysis of international firm-level corporate income tax expenses to date. Its findings should aid the development of tax policy by quantifying the effective tax rates faced by multinational corporations around the globe. The ETRs provide an empirical foundation for the heated debates about the taxes paid by

multinationals and domestics around the world and should help to balance rhetoric with documented empirical facts.

Our primary findings are:

- Multinationals and domestic-only firms face similar ETRs;
- Japan consistently has much higher ETRs than any other country;
- The U.S. has above-average ETRs;
- Tax havens, and Middle Eastern, and Asian countries (excepting Japan) have below-average ETRs.
- ETRs fell worldwide over the last two decades;
- The average decline in ETRs was about seven percentage points or 20%.
- German, Japanese, Australian and Canadian ETRs fell more than American, British, and French ETRs.
- The ordinal rank from high-tax countries to low-tax countries remained remarkably constant because all countries reduced their tax burdens.

On this last point, further work is warranted to understand how the tax order 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 high-tax and low-tax countries remain 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 (2005) for a discussion of tax competition among OECD countries). If this is the case, then proposed major international tax changes that would run

contrary to current tax policy (e.g., adopting a formula apportionment system in the European Union or eliminating deferral in the U.S.) may be impossible without worldwide coordination.

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**Table 1 - Sample**

		n	Sales	Assets	Equity	Total tax	NIBT	# Subs	# Foreign subs	Agg ETR	Mean ETR	Median ETR	Mean Stat rate
Full sample	Domestic	12,778	612	847	305	17	56	13	-	31	30	32	38
	Multinational	14,358	3,513	4,290	1,563	115	371	68	30	31	28	30	38
AUSTRALIA	Domestic	494	132	307	129	7	27	13	-	27	24	29	30
	Multinational	740	971	1,185	546	33	144	49	21	23	25	29	30
CANADA	Domestic	376	423	547	274	11	52	7	-	20	22	23	36
	Multinational	426	1,340	2,616	963	67	218	31	11	31	26	29	36
CHINA	Domestic	534	176	289	112	3	14	11	-	21	21	19	30
	Multinational	184	762	1,132	392	17	96	20	6	18	18	17	30
FRANCE	Domestic	44	62	290	157	3	32	14	-	8	25	31	35
	Multinational	333	8,340	10,275	3,204	276	815	241	119	34	28	30	35
GERMANY	Domestic	74	79	199	72	3	11	71	-	29	26	28	39
	Multinational	293	8,757	12,990	3,270	200	628	151	71	32	33	35	39
INDIA	Domestic	80	193	243	80	4	15	2	-	27	24	27	35
	Multinational	375	508	637	303	15	78	6	5	19	20	19	35
JAPAN	Domestic	3,929	642	715	262	14	35	7	-	40	42	43	40
	Multinational	2,497	3,875	4,534	1,642	96	252	42	13	38	39	40	40
UNITED KINGDOM	Domestic	749	419	730	279	16	61	41	-	27	26	29	30
	Multinational	1,314	3,340	3,580	1,295	135	426	99	25	32	28	29	30
UNITED STATES	Domestic	2,836	1,166	1,799	582	36	111	25	-	33	28	36	39
	Multinational	4,341	4,965	6,136	2,333	185	597	81	38	31	30	33	39
ASIAN TIGERS	Domestic	2,241	330	414	177	7	33	4	-	21	20	21	25
	Multinational	972	2,236	2,411	918	34	190	19	7	18	18	17	25
TAX HAVENS	Domestic	41	138	341	167	4	19	10	-	18	20	21	23
	Multinational	807	1,785	1,991	888	43	199	70	59	21	17	16	6
AFRICA	Domestic	128	665	753	379	40	128	5	-	31	27	29	30
	Multinational	178	1,807	1,438	550	57	202	44	20	28	27	29	30
ASIA	Domestic	451	146	254	119	6	24	2	-	24	22	22	28
	Multinational	167	356	656	206	9	39	19	7	27	22	22	28
EUROPE	Domestic	296	276	583	206	15	52	19	-	28	27	28	28
	Multinational	1,264	2,719	3,416	1,169	100	313	88	46	32	26	28	30
LATIN AMERICA	Domestic	323	1,029	1,296	513	46	161	7	-	28	26	27	29
	Multinational	167	1,912	2,492	974	59	259	18	4	23	26	26	29
MIDDLE EAST	Domestic	110	222	463	232	4	48	4	-	9	9	4	24
	Multinational	258	358	740	334	8	58	18	12	14	11	5	30

This table presents the means of variables in the Osiris dataset for years 2003-2007. All dollar figures are in millions of U.S. dollars.

**Table 2**  
Summary of results

	(1)	(2)	(3)	(4)
	2003-2007 Positive NIBT Nonnegative ETR	2003-2007 Positive NIBT Nonnegative ETR	2003-2007 Positive NIBT Nonnegative ETR ETR= Current tax/NIBT	1988 - 2007 Positive NIBT Nonnegative ETR
AdjR2		0.86	0.88	0.87
N		27,136	9,185	68,873
	Mean	Estimate	Estimate	Estimate
<b>Panel A - Domestic</b>				
AUSTRALIA	24	24	21	23
CANADA	22	23		25
CHINA	21	21	20	18
FRANCE	25	26		29
GERMANY	26	27	25	27
INDIA	24	23		21
JAPAN	42	39	38	38
UNITED KINGDOM	26	26	24	23
UNITED STATES	28	26	28	24
ASIAN TIGERS	20	20	17	19
TAX HAVENS	17	17		19
AFRICA	27	25		21
ASIA	22	22	22	22
EUROPE	27	27	32	25
LATIN AMERICA	26	24	17	18
MIDDLE EAST	8	10		11
<b>Panel B - Multinational</b>				
AUSTRALIA	25	23	23	23
CANADA	26	24		25
CHINA	18	17*	14*	15*
FRANCE	28	25	23	23*
GERMANY	33	30	30	32*
INDIA	20	18*	19*	15*
JAPAN	39	36*	35*	37*
UNITED KINGDOM	28	26	25	24
UNITED STATES	30	27*	27*	26*
ASIAN TIGERS	18	17*	15	15*
TAX HAVENS	17	15	15	14*
AFRICA	26	23	23	19*
ASIA	23	22	19	20*
EUROPE	26	24*	24*	22*
LATIN AMERICA	25	22	23*	17
MIDDLE EAST	11	11	15	12

Column (1) reports the mean ETR for each country/group in the Osiris 2003-2007 sample, as shown in Table 1.

Columns (2) – (4) present the results of estimating  $ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{1j} (COUNTRY_{it}^j * MN_{it}) + CONTROLS$  on samples described in the column headings. Panel A reports the estimate of  $\beta_0$  for each country/group. Panel B reports 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 20 or more observations. \* indicates that  $\beta_1$  is statistically significant at the 5% level.

**Table 3** Yearly estimates

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
AdjR2	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86	0.85	0.86	0.85	0.86
N	1,175	1,288	1,409	1,493	1,694	1,918	2,359	2,679	2,993	3,255	3,463	4,101	4,536	4,394	4,980	5,734	6,567	6,991	7,085	759
<b>Panel A - Domestic</b>																				
AUSTRALIA												23	26	25	22	20	21	24	23	23
CANADA											33	32	30	29	31	22	22	20	19	
CHINA											20	17	16	18	21	20	20	21	21	
FRANCE																				
GERMANY																		25	23	
INDIA																		19		
JAPAN						48	43	42	42	44	44	40	42	40	41	38	36	38	39	39
UNITED KINGDOM	30	32	30	28	29	26	26	25	24	24	23	24	24	25	26	25	23	25	26	21
UNITED STATES	28	27	27	26	27	25	25	25	25	26	27	26	26	25	26	24	24	25	26	24
ASIAN TIGERS						32	26	26	24	21	22	21	21	21	21	18	18	19	18	
TAX HAVENS																				
AFRICA													18	18	24	24	23	25	24	
ASIA							30	30	28	30	25	13	23	26	25	21	22	20	22	
EUROPE											28	30	28	26	26	29	25	26	25	
LATIN AMERICA					16	17	14	13	9	13	15	15	21	23	23	25	22	23	24	
MIDDLE EAST													13	11	8	8	11	7	9	
<b>Panel B - Multinational</b>																				
AUSTRALIA	34	32	31	27	33	26	26	25	24	24	26	25	25	25	23	21	22	22	23	20
CANADA					28	31	24	26	29	31	31	32	29	29	27	21	22	22	24	
CHINA											11	15	14	13	18	16	16	17	17	
FRANCE	27	29	26	25	26	22	22	23	23	28	29	28	26	27	26	24	23	23	25	
GERMANY		47	46	42	44	36	30	33	33	34	38	37	34	31	32	32	27	29	27	
INDIA										9	8	10	8	16	20	18	17	17	18	
JAPAN	49	50	47	45	49	45	43	41	41	42	44	39	37	38	38	34	33	33	36	39
UNITED KINGDOM	28	29	28	27	28	24	25	24	25	25	25	24	27	27	29	26	24	25	25	23
UNITED STATES	29	30	30	28	29	27	27	27	28	29	29	29	30	28	27	24	25	25	27	24
ASIAN TIGERS						22	17	19	17	16	19	17	17	15	16	13	14	15	17	
TAX HAVENS	21	24	20	19	20	14	14	14	15	16	16	17	15	16	16	14	14	13	15	
AFRICA											23	14	20	21	20	19	21	23	22	
ASIA							24	22	22	22	21	14	19	20	23	23	20	21	20	
EUROPE	23	22	25	21	22	19	21	21	23	24	24	23	26	25	25	22	22	22	23	
LATIN AMERICA					18	18	19	14	14	12	13	16	18	18	22	22	19	20	23	
MIDDLE EAST												17	15	15	14	11	9	9	11	

Results of estimating  $ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{1j} (COUNTRY_{it}^j * MN_{it}) + CONTROLS$  for each year in the sample described in Column (6) of Table 2. Panel A reports the estimate of  $\beta_0$  for each country/group. Panel B reports the estimate of  $(\beta_0 + \beta_1)$  for each country/group. Estimates are reported for country-years with 20 or more observations.

**Table 4** Industries

	Full sample	Construction (23)	Financials (52)	Information (51)	Manufacturing (31, 32, 33)	Mining (21)	Other (22, 56, 61, 62, 71, 72, 81, 92, 99)	Professional (54)	Real Estate (53)	Retail Trade (44, 45)	Transportation (48, 49)
AdjR2	0.86	0.86	0.65	0.81	0.86	0.80	0.89	0.86	0.85	0.94	0.88
N	27,136	964	1,181	1,499	13,265	988	4,252	1,743	945	1,376	923
<b>Panel A - Domestic</b>											
AUSTRALIA	24	23	27	14	25	17	24	19	23	27	22
CANADA	23		13	19	24	17	23				
CHINA	21				20		23		28	22	
FRANCE	26										
GERMANY	27										
INDIA	23				20						
JAPAN	39	36	36	35	38		41	36	40	44	39
UNITED KINGDOM	26	21	26	21	25		26	24	26	27	25
UNITED STATES	26	25	15	19	28	22	30	21	24	34	24
ASIAN TIGERS	20	16		14	19		21	15	12	28	16
TAX HAVENS	17										
AFRICA	25				28		24				
ASIA	22	23			19		22	20	24		
EUROPE	27				27		28	23	23		
LATIN AMERICA	24				25		27			21	24
MIDDLE EAST	10		9		9		9				
<b>Panel B - Multinational</b>											
AUSTRALIA	23	19	24	17	24	13	27	22	15*	32*	22
CANADA	24		13	17	24	17	23	19			
CHINA	17*				14*		19		28	31	
FRANCE	25				24		32	20			
GERMANY	30			24	31		28	17*			
INDIA	18*			14	21		13*	6*			
JAPAN	36*	31*	37	30*	35*		38*	31*	35*	44	35*
UNITED KINGDOM	26	19	31	18	25	23*	25	21	27	30	20
UNITED STATES	27*	24	25*	17	26*	23	30	19	29*	35	28*
ASIAN TIGERS	17*	18		6	16*		19	16	16	24	11
TAX HAVENS	15		12	9	15*		12		21	21	
AFRICA	23				23*		24			31	
ASIA	22	28			22		19	15	23		
EUROPE	24*	21	19	16*	24*	16	25	20	20	27*	21
LATIN AMERICA	22				22		26			23	2*
MIDDLE EAST	11		10		10		6		11		

Results of estimating  $ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{1j} (COUNTRY_{it}^j * MN_{it}) + CONTROLS$  for each industry (two-digit NAICS numbers included in each group are included in parentheses) in the sample described in Column (2) of Table 2. Panel A reports the estimate of  $\beta_0$  for each country/group. Panel B reports the estimate of  $(\beta_0 + \beta_1)$  for each country/group. Estimates are reported for country-industries with 20 or more observations.

\* indicates that  $\beta_1$  is statistically significant at the 5% level.

**Table 5**  
Results of Parent/Subsidiary Specification

AdjR2	0.86
N	26,969
<b>Panel A - Parents</b>	
AUSTRALIA	24
CANADA	24
CHINA	20
FRANCE	26
GERMANY	30
INDIA	20
JAPAN	38
UNITED KINGDOM	26
UNITED STATES	27
ASIAN TIGERS	19
TAX HAVENS	17
AFRICA	24
ASIA	22
EUROPE	25
LATIN AMERICA	24
MIDDLE EAST	11
<b>Panel B - Subsidiaries</b>	
AUSTRALIA	1.2
CANADA	0.5
CHINA	(0.6)
FRANCE	0.8
GERMANY	(0.6)
INDIA	0.4
JAPAN	(0.6)
UNITED KINGDOM	(0.0)
UNITED STATES	(1.1)
ASIAN TIGERS	(0.6)
TAX HAVENS	(0.5)
AFRICA	0.8
ASIA	(1.3)
EUROPE	0.4
LATIN AMERICA	(0.3)
MIDDLE EAST	(0.3)

This table presents the results of estimating  $ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{1k} SUB_{it}^k + CONTROLS$  on a subsample of the sample described in Table 1 for which we have necessary subsidiary information. Panel A reports the estimate of  $\beta_0$  for each country/group. Panel B reports the estimate of  $\beta_1$  for each country/group.

**Table 6** Interactions

Parents	Subsidiaries																	
	MAIN	AUSTRALIA	CANADA	CHINA	FRANCE	GERMANY	INDIA	JAPAN	UNITED KINGDOM	UNITED STATES	ASIAN TIGERS	TAX HAVENS	AFRICA	ASIA	EUROPE	LATIN AMERICA	MIDDLE EAST	
<b>Panel A</b>																		
AUSTRALIA	24		0.2	0.8		0.1			0.6	(1.9)	1.2	(2.3)		(1.7)	0.4	(0.2)		
CANADA	23								1.8	1.7								
CHINA	21										(2.9)							
FRANCE	26	5.3	3.0	2.7		0.8		(2.2)	(1.6)	(6.9)	(1.6)	(2.4)	(0.7)	(7.7)	3.9	3.1		
GERMANY	29				2.4				(2.6)	(3.1)		(0.1)			3.3			
INDIA	22								(1.2)	(6.0)					1.8			
JAPAN	39	(1.9)	(0.9)	0.1	2.1	(2.8)	(0.4)		0.1	(1.3)	(1.3)	1.4		(1.4)	(0.4)	(2.0)		
UNITED KINGDOM	26	2.4	(1.6)	(0.2)	1.2	0.3	3.1	(0.2)		(1.5)	(0.2)	(1.0)	0.7	(0.5)	0.9	(1.9)	(3.0)	
UNITED STATES	26	0.9	1.0	(1.6)	(0.0)	(0.6)	(0.5)	(2.5)	0.9		1.3	(0.1)	1.1	(1.6)	0.9	0.4	(0.7)	
ASIAN TIGERS	19			(1.2)		(1.0)		(1.5)	(2.7)	1.4		(3.6)		(0.7)	(3.0)	(1.4)		
TAX HAVENS	15	(2.2)	(2.3)	(0.0)	4.9	2.7		0.9	(0.6)	(0.8)	(0.9)		1.3	1.3	3.0	(0.4)		
EUROPE	25	(0.0)	(0.6)	(0.2)	(1.5)	1.1	(2.3)	0.9	0.9	0.9	(0.8)	(1.2)	(0.9)	(0.3)		0.3	2.8	
<b>Panel B</b>																		
JAPAN	39	(3.8)	(9.7)	1.2	3.8	(5.6)			(1.4)	(1.5)	(2.7)	6.7		(2.6)	1.7	(9.2)		
UNITED KINGDOM	26	7.6	(1.0)	(3.9)	(1.6)	(4.7)				(1.5)	(4.3)	(0.2)	5.2		3.5	(5.9)		
UNITED STATES	26	2.9	1.4	(4.3)	(1.7)	2.0	1.1	(3.1)	1.6		1.7	(0.7)	8.7	(0.1)	2.9	1.8	1.3	
ASIAN TIGERS	19			(3.9)					(2.4)	0.7					(3.7)	(5.0)		
EUROPE	26	(1.3)	(3.2)	1.1	(4.3)	1.4			1.5	0.5	(8.6)	(4.6)		29.3		3.4		

Panel A presents the results of estimating  $ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{2n} COUNTRY_{it}^j * SUB_{it}^k + CONTROLS$  on a subsample of the sample described in Table 1 for which we have necessary subsidiary information. Each cell reports the estimate of  $\beta_2$  for the interaction of the given parent and subsidiary variables. For example, the estimate of  $\beta_2$  for the interaction term  $COUNTRY_{it}^{AUSTRALIA} * SUB_{it}^{CANADA}$  is 0.2. All interaction terms were included in the estimation, but estimates are only reported for cells with 100 or more observations.

Panel B presents the results of estimating  $ETR_{it} = \sum \beta_{0j} COUNTRY_{it}^j + \sum \beta_{2n} COUNTRY_{it}^j * SUB_{it}^k + \sum \beta_{3n} COUNTRY_{it}^j * SUB_{it}^k * SUB_{it}^m + CONTROLS$  on the same sample as in Panel A. Only three-way interaction terms with one of the five countries listed in Panel B as the parent were included. Each cell reports the estimate of  $\beta_2$  for the interaction of the given parent and subsidiary variables. All interaction terms were included in the estimation, but estimates are only reported for cells with 200 or more observations.