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International Tax Policy Forum

Economic Effects of Territorial Taxation

American Enterprise Institute
Wohlstetter Conference Center
1150 Seventeenth Street, N.W.
Washington, D.C. 20036

March 31, 2014

International Tax Policy Forum

About the International Tax Policy Forum

Founded in 1992, the International Tax Policy Forum is an independent group of over 40 major multinational companies with a diverse industry representation. The Forum's mission is to promote research and education on the taxation of cross-border investment. Although the Forum is not a lobbying organization, it has testified before the Congressional tax-writing committees on the effects of various tax proposals on U.S. competitiveness. The ITPF briefs Congressional staff periodically and sponsors annual public conferences on major international tax policy issues.

On the research front, the Forum has commissioned over 20 papers on international tax policy topics such as the effects of the interest allocation rules on the competitiveness of U.S. firms, the compliance costs of taxing foreign source income, and the linkages between foreign direct investment and domestic economic activity (*see* www.ITPF.org).

Members of the Forum meet three times a year in Washington, DC to discuss key international tax policy issues with leading experts in government, academia, and private practice.

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ITPF Mission Statement
The primary purpose of the Forum is to promote research and education on U.S. taxation of income from cross-border investment. To this end, the Forum sponsors research and conferences on international tax issues and meets periodically with academic and government experts. The Forum does not take positions on specific legislative proposals.

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International Tax Policy Forum Conference

Economic Effects of Territorial Taxation

American Enterprise Institute
Monday, March 31, 2014 8:15 a.m. – 1:15 p.m.
Wohlstetter Conference Center, Twelfth Floor, AEI
1150 Seventeenth Street, N.W., Washington, D.C. 20036

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ITPF/AEI Conference
Economic Effects of Territorial Taxation
With a Keynote Address by CEA Chairman Jason Furman
American Enterprise Institute
Wohlstetter Conference Center, Twelfth Floor
1150 Seventeenth Street, N.W., Washington, D.C. 20036

March 31, 2014

As Congress deliberates business tax reform options, the international aspects often prove most complex. All G-8 countries other than the United States have "territorial" tax systems that exempt 95-100 percent of qualified dividends repatriated from foreign subsidiaries. This event, which is cosponsored by the AEI and the International Tax Policy Forum, explores the economic effects of territorial taxation. Based on international experience, including Japan and the UK, panelists will examine the effects of international tax rules on: base erosion and profit shifting; repatriation of foreign profits; and cross-border mergers and acquisitions and headquarters location. The event will conclude with a luncheon address by Jason Furman, Chairman of the White House Council of Economic Advisers.

8:15 am	**Registration**	
8:30 am	**Introductory Remarks**	
	Alex Brill (AEI), John Samuels (GE)	
8:45 am	**Base Erosion and Profit Shifting under Worldwide and Territorial Taxation**	
	Moderator:	Michael Graetz (Columbia)
	Presenters:	Kevin Markle (University of Waterloo)
		Dhammika Dharmapala (University of Illinois)
	Comments:	Alan Viard (AEI)
9:45 am	**Repatriation of Foreign Profits in Japan, Britain, and the United States**	
	Moderator:	Alan Auerbach (UC-Berkeley)
	Presenters:	Sebastien Bradley (Drexel)
		Martin Ruf (University of Tubingen)
		Fritz Foley (Harvard)
	Comments:	Rosanne Altshuler (Rutgers)
11:00 am	**Home Country Tax Effects on Mergers, Inversions, and Headquarters Location**	
	Moderator:	Mihir Desai (Harvard)
	Presenters:	Paul Oosterhuis (Skadden)
		Johannes Voget (University of Mannheim)
		Susan Morse (University of Texas)
	Comments:	James Hines (University of Michigan)
12:15 pm	**Luncheon and Address by Jason Furman**	
	Introduction:	Arthur Brooks (AEI)
	Speaker:	Jason Furman (Chair, Council of Economic Advisers)
1:15 pm	**Adjourn**	

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What Do We Know About Base Erosion and Profit Shifting? A Review of the Empirical Literature

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What Do We Know About Base Erosion and Profit Shifting? A Review of the Empirical Literature

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December 2013

Abstract

The issue of tax-motivated income shifting within multinational firms has attracted increasing global attention in recent years. It is of central importance to many current policy debates, including those related to recent initiatives by the OECD on base erosion and profit shifting (BEPS) and to proposals for US tax reform in a territorial direction. This paper provides a survey of the empirical literature on tax-motivated income-shifting within multinational firms. Its emphasis is on clarifying what is known about the magnitude of BEPS. It begins by outlining a simple conceptual framework that helps to clarify aspects of governments' responses to the BEPS phenomenon and the potential role of the OECD initiative. The paper then discusses different empirical approaches to identifying income-shifting, describes existing data sources, and summarizes the findings of the empirical literature. A major theme that emerges from this survey is that in the more recent empirical literature, which uses new and richer sources of data, the estimated magnitude of BEPS is typically much smaller than that found in earlier studies. The paper seeks to provide a framework within which to conceptualize this magnitude and its implications for policy. It concludes by highlighting the importance of existing legal and economic frictions as constraints on BEPS, and discussing possible ways in which future research might model these frictions more precisely.

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1) Introduction

The arcane world of international taxation, and in particular the taxation of multinational corporations (MNCs), has recently gained an unprecedented level of political salience and public attention.[1] An important aspect of these developments has been the OECD's initiative on "base erosion and profit shifting" (BEPS). Following their meeting in Los Cabos, Mexico in June 2012, the G-20 leaders issued a communiqué declaring that: "We reiterate the need to prevent base erosion and profit shifting and we will follow with attention the ongoing work of the OECD [Organization for Economic Cooperation and Development] in this area."[2] This was followed by a major OECD report in February 2013 (OECD, 2013a) and subsequently by an action plan in July 2013 (OECD, 2013b). The BEPS issue is also highly relevant to current proposals in the United States that envisage combining tax reform in a territorial direction with provisions to limit base erosion.

In analyzing these initiatives and proposals, an important consideration is the magnitude of tax-motivated income shifting by MNCs (i.e. the magnitude of BEPS). This paper provides a survey of the empirical literature on tax-motivated income-shifting within multinational firms. Its emphasis is on describing what is known about the magnitude of BEPS, and on interpreting the implications of these findings. It begins, however, by outlining a simple conceptual framework that helps to clarify aspects of governments' responses to the BEPS phenomenon and the potential role of the OECD initiative.

The paper then discusses the empirical approaches that have been used to identify income-shifting. The emphasis is on the dominant approach within the economics literature on income shifting, which dates back to Hines and Rice (1994), and which we refer to as the "Hines-Rice" approach. However, other approaches within economics and accounting are also surveyed, including methods recently proposed by Dharmapala and Riedel (2013), based on identifying exogenous shocks to the income of parent firms, and by Dyreng and Markle (2013). The paper also describes existing data sources, documenting the shift from aggregate country-

[1] This has been exemplified by, for instance, the hearings held by the Public Accounts Committee of the House of Commons – see e.g. M. Gilleard "Google Hauled Before UK PAC Again, But International Tax Framework Cited as Real Villain" *International Tax* Review, May 21, 2013, available at:
http://www.internationaltaxreview.com/Article/3208706/Google-hauled-before-UK-PAC-again-but-international-tax-framework-cited-as-real-villain.html
[2] See the full text of the G-20 communiqué at:
http://www.telegraph.co.uk/finance/g20-summit/9343250/G20-Summit-communique-full-text.html

level datasets to firm-level microdata that has greatly enhanced the credibility of estimates of BEPS.

The primary aim of the paper is to summarize the findings of the empirical literature, especially with regard to the magnitude of BEPS. A major theme that emerges from this survey is that in the more recent empirical literature, which uses new and richer sources of data, the estimated magnitude of BEPS is typically much smaller than that found in earlier studies. For instance, early studies in the 1990's found estimates that correspond to a tax sensitivity of reported income that is about three times larger than currently accepted estimates. A representative consensus estimate from the literature, based on a meta-regression study by Heckemeyer and Overesch (2013), is a semi-elasticity of reported income with respect to the tax rate differential across countries of 0.8. This entails that a 10 percentage point increase in the tax rate difference between an affiliate and its parent (for instance, because the tax rate in the affiliate's country falls from 35% to 25%) would increase the pretax income reported by the affiliate by 8% (for example, from $100,000 to $108,000).[3]

The paper also surveys the existing evidence (or in some cases the lack thereof) with regard to five specific issues relating to BEPS that have attracted considerable attention in recent policy debates and in academic discourse. The first of these issues is the relative magnitude of profit shifting from parents to foreign affiliates as opposed to profit shifting among foreign affiliates. The second is the role of intellectual property and intangible assets in BEPS, and the related (but more general) question of how income shifting interacts with the location of real economic activity across jurisdictions. The third is the impact on income shifting of the existence of territorial versus worldwide tax systems in the residence country of the parent. The fourth is the issue of whether income shifting has increased in recent years, and the final issue relates to the consequences of income shifting for tax revenue.

Finally, the paper seeks to provide a framework within which to conceptualize the magnitude of BEPS and its implications, in particular whether the estimated magnitude (while clearly smaller than that found in early studies) should be viewed as being "large" or "small" for policy purposes. It contrasts the findings of the empirical literature with a widespread policy discourse which points to descriptive statistics regarding the fraction of net income reported by

[3] The alternative Dharmapala and Riedel (2013) approach provides an estimate that 2% of the (unexpected) income of the parent is shifted to low-tax affiliates, as discussed in Section 4 below.

MNCs in tax havens as indicating *ipso facto* that BEPS is large in magnitude and importance. It suggests how these two parallel discourses might be reconciled, and what types of evidences may be pertinent in achieving greater consensus on these issues.

The paper concludes by emphasizing the importance of existing legal and economic frictions as constraints on BEPS. It suggests that one potential approach to understanding these frictions is for future research to try to better model the costs of tax planning (in particular, the idea that tax planning involves fixed costs) to explain the apparent heterogeneity among firms in their tax planning behavior. Such future research may shed new light on the role of these frictions, and on their implications for the efficiency of the current international tax regime and various proposed reforms.

The paper proceeds as follows. Section 2 introduces a simple conceptual framework to understand the BEPS phenomenon and the recent OECD initiative. Section 3 discusses the various conceptual approaches taken within the empirical literature that seeks to measure BEPS. Section 4 describes the findings of this literature. Section 5 provides an interpretation of the implications of these findings, while Section 6 concludes.

2) A Simple Conceptual Framework for the BEPS Phenomenon and Initiative

The central focus of this paper is on reviewing the empirical findings of the scholarly literature on BEPS and discussing the implications of these findings. Before proceeding to this task, however, it may be helpful to situate this discussion within the context of the recent BEPS initiative. Thus, this section develops a simple conceptual framework that can help understand aspects of the BEPS initiative and the types of circumstances that appear to implicitly underlie the claims that have been made as part of this initiative.

The BEPS initiative raises a number of conceptual issues. The most fundamental of these are the questions of *why* and *for whom* BEPS constitutes a problem. The G-20 communiqué noted above takes as essentially self-evident the "need to prevent BEPS." Yet, national governments (especially of MNC residence countries but also those of source countries) have available a wide variety of legal instruments to reduce or prevent BEPS. If the "need to prevent BEPS" is so pressing, some explanation is required as to why governments have not unilaterally taken more extensive steps in this direction. The OECD's (2013a, b) answer is that BEPS arises primarily because of inconsistencies between the tax laws of different jurisdictions These inconsistencies create (largely unintended) opportunities for firms to reduce tax liabilities. This characterization can be viewed as a variant of the classic "double nontaxation" problem that has long exercised the minds of international tax scholars. This perspective certainly captures a significant element of the BEPS phenomenon, but arguably it underemphasizes the role of governments' incentives in the area of the taxation of multinationals, in favor of stressing the limitations of governments' technical and legal capacities.

With regard to the question of *for whom* BEPS is a problem, the OECD (2013a) of course points to governments and to other taxpayers. It also claims that MNCs themselves may be harmed by BEPS (for instance, if there are reputational costs to tax avoidance). It is worth noting, however, that the impact on other taxpayers of greater tax burdens on MNCs depends in part on the incidence of the corporate tax – i.e. whether workers bear a substantial share of the burden. However, this is the subject of an ongoing debate in the empirical literature (e.g. Arulampalam, Devereux and Maffini, 2012) that is unlikely to be resolved within the timeframe of the BEPS action plan. It is also unclear why MNCs would fail to internalize purely private costs of tax planning, such as reputational losses.

The OECD's (2013b) proposed solutions focus on various forms of multilateral coordination and cooperation. Implicitly, it takes the view that multilateral cooperation can make countries collectively better off. In assessing this perspective, it is helpful to seek to understand more precisely the circumstances in which multilateral cooperation can enhance countries' welfare. Thus, this section presents a relatively simple example that illustrates some circumstances in which this may hold. However, it emphasizes countries' incentives to maximize national welfare, rather than unintentional interactions between different countries' tax laws.

Assume a world with four countries. Two of these - countries A and B - are residence countries for MNCs, and also serve as source countries for MNC operations. One of the counties (country C) is a pure source country, while he fourth is a tax haven (H). However, only the governments of countries A and B, and the MNCs resident in those countries, are assumed to make strategic choices; countries C and H play a passive role. There are two assets located in country A (denoted a1 and a2), and two assets located in country B (denoted b1 and b2). In addition, there are two MNCs – Firm A (resident in country A) and Firm B (resident in country B); residence is assumed to be fixed.

Firm A can generate $50 of (pretax) profits by owning both a1 and b1, while Firm B can generate $50 of (pretax) profits by owning both a2 and b2. Each asset generates zero profit if owned by any other owner. These assumptions reflect the ownership effects on productivity that are heavily emphasized in the general literature on MNCs, and that have been introduced into the literature on international taxation by Desai and Hines (2003). There is a supply of assets in C that (for the same cost of acquisition as each of a1, a2, b1 and b2) generate pretax profits of $45 each; assume these are domestically owned by country C firms as the default scenario. There are no "real" assets located in H, but H can be used (if the relevant tax laws permit) to shift income from any of the other jurisdictions, at a cost of $2 (incurred for each affiliate that shifts income out).

Assume that A, B and C all have a (fixed) corporate tax rate of 20% and have territorial tax systems that exempt active foreign income, while H has a zero tax rate. A natural characterization of national welfare for countries A and B in this framework is that it is the sum of the after-tax profits of the resident MNC and tax revenue from all sources (the government may care about its resident MNC because its ownership is primarily by domestic shareholders, consistent with the familiar "home bias" in equity holdings). For example:

National welfare of country A = After-tax profit of Firm A + Tax revenue of country A

The policy choices available to governments in this example are very simple – residence countries (A and B) can impose controlled foreign corporation (CFC) rules that pertain to their resident MNCs, while source countries (A, B and C) can impose earnings stripping (ES) rules on local affiliates (including parents' domestic operations). The impact of these policies is described below.

First, consider a scenario in which there are no CFC rules or ES rules. An efficient pattern of ownership will prevail, where Firm A owns a1 and b1 and generates $100 of pretax profit, while Firm B owns a2 and b2 and generates $100 of pretax profit. Each affiliate shifts all income out to H (e.g. by injecting equity into its H affiliate, which then lends the money to the A and B affiliates). Firm A's after-tax profit is $96 ($100 minus the $2 cost of profit-shifting at each affiliate), as is Firm B's after-tax profit (see Table 1).

In this scenario, no country has an incentive to unilaterally impose either an ES rule or a CFC rule. To see this for CFC rules, suppose country A introduces a CFC rule unilaterally. This entails that country A taxes interest income earned by Firm A in its H affiliate. Firm A will no longer shift income, so it generates $100 of pretax profit, incurs zero tax planning costs, and pays tax of $10 to A and $10 to B (note that ownership patterns are not distorted because the after-tax returns to assets in different countries are proportional to the pretax returns). Country A's payoff from introducing a CFC rule unilaterally is $90 (the sum of the after-tax profit of Firm A ($80) and the $10 in revenue. Comparing this to the $96 from not doing so (see Table 1), it is clear that countries do not have any incentive to unilaterally introduce CFC rules. Note also that country B's payoff goes up to $106 (the after-tax profit of Firm B is still $96, while country B now receives $10 of revenue from Firm A's affiliate in country B).[4]

Intuitively, the problem is that by unilaterally imposing a CFC rule, country A is in effect transferring revenue to a foreign treasury (thereby reducing national welfare), without any offsetting increase in the revenue it derives from the local affiliates of foreign MNCs. Importantly, the CFC rule does not result in revenue for the residence country, as the firm prefers to forego tax planning and pay tax to the foreign treasury.

Suppose that countries A and B find some mechanism by which to cooperate, and that both countries simultaneously impose CFC rules of the type described above. Then, ownership patterns will be efficient. Firm A will earn $100 of pretax profit, incur zero tax planning costs, and pay $10 tax to each of countries A and B. Firm B will do likewise. Thus:

Country A's payoff = Firm A's after-tax payoff (80) + Revenue (10 + 10) = 100

Country B's payoff = Firm B's after-tax payoff (80) + Revenue (10 + 10) = 100

As shown in Table 1, both countries are better off if they can each commit to introducing a CFC rule.

This conclusion may seem in tension with the longstanding notion that countries seeking to maximize national welfare should encourage their resident MNCs to avoid foreign taxes, as

[4] The reasoning for why unilaterally introducing an ES rule is not in each country's interest is more complex, though intuitively straightforward. Suppose country A were to unilaterally impose an ES rule that is sufficiently strong to preclude all earning stripping (e.g. the denial of deductibility for interest payments to the H affiliate). This affects all affiliates (the owners of a1 and a2) located in country A. If Firm A continues to own a1 and b1, then it will earn $48 after-tax (as before) from b1. However, it will not be able to shift earnings out of a1, and so its after-tax profit = $40 (paying $10 tax to country A, but incurring no tax planning cost). Instead, if it were to buy an asset in country C, it would earn $45 pretax, incur $2 in tax planning costs, and strip all income to H – i.e. its after-tax profit = $43, so this is what it will do. Note that Firm A will then only have a notional presence in its country of residence (A) but we allow this as a possibility. Similarly, Firm B will buy an asset in country C instead of buying asset b1 in country A, earn $45 pretax, incur $2 in tax planning costs, and shift all income to H – i.e. its after-tax profit = $43. Note that this is an inefficient pattern of ownership (from a global perspective), but this is not crucial, as countries are assumed to care about national welfare. Country A's payoff from unilaterally introducing an ES rule is $91 (the after-tax profit of Firm A (48 + 43) plus revenue of zero). Comparing this to a payoff of $96 from not doing so, it is clear that, countries do not have any incentive to unilaterally introduce ES rules.

tax payments to foreign governments reduce national welfare. Indeed, Shaviro (2011) has recently developed a critique of the foreign tax credit in US tax law, partly on the grounds that it disincentivizes US MNCs' avoidance of foreign taxes. However, these views can be reconciled by noting that the key difference here is that multilateral cooperation entails that the CFC rules imposed here generate revenue from the local affiliates of foreign MNCs at the same time that they entail higher tax payments by resident MNCs to foreign governments. Thus, this simple example takes explicit account of the reality that most large economies are *both* residence and source countries. Multilateral adoption of CFC rules transfers money from your own MNCs to foreign treasuries, but also from foreign-owned MNCs to your treasury (in the example, these balance out exactly, with the savings in tax planning costs generating a global surplus from the reform). This can be viewed as an example of Shaviro's (2006) general argument that global welfare norms may sometimes promote national welfare if adopted multilaterally.

Could the "good" outcome in Table 1 be replicated using (source-based) ES rules rather than (residence-based) CFC rules? In this example, this would be possible, but would require that country C is also part of the multilateral agreement. Thus, it would require broader international cooperation. In addition, it is possible that source-based solutions may be more prone to unintended interactions across jurisdictions. In any event, the OECD (2013b) appears to favor a combination of residence-based and source-based solutions. In a recent discussion of the BEPS issue, Fuest *et al*. (2013) point to difficulties with extensions of residence taxation and instead argue for extending source-based taxation to reduce BEPS, in particular through withholding taxes.

This example, of course, is purely illustrative, and a number of important caveats are in order. First, this example is intended not as a description of reality, but as an illustration of a set of circumstances that would explain the BEPS phenomenon and the current BEPS initiative in a coherent way. Whether or not the real world corresponds to the assumptions required to render multilateral cooperation beneficial remains very much an open question. An alternative perspective on BEPS is that it may be optimal for governments to permit BEPS activities as a way of differentially taxing firms that are more and less mobile or tax-sensitive, where this characteristic is unobservable to governments (see Hines (2007) and Dharmapala (2008) for discussions of this possibility, and Hong and Smart (2010) for a formal theoretical model).

Within this perspective, it is less clear than in the example above whether there would be substantial gains from multilateral cooperation.

3) Conceptual Approaches used in the Empirical Literature

The primary approach to the empirical estimation of BEPS in the economic literature is directly derived from the early pioneering research on multinational income-shifting, notably Hines and Rice (1994) and Grubert and Mutti (1991). These important and widely-cited studies established a conceptual framework that continues to be highly influential. However, the early studies were subject to significant limitations in terms of the data that was then available. For instance, Hines and Rice (1994) and Grubert and Mutti (1991) both used aggregate (country-level) data in cross-sectional regression analyses. The available data has improved considerably, enabling the use of a much more extensive set of controls for both observable and unobservable determinants of income reported in different jurisdictions.

The basic premise of Hines and Rice (1994) is that the observed pretax income of an affiliate represents the sum of "true" income and "shifted" income (where the latter can of course be either positive or negative for any particular affiliate). True income is generated by the affiliate using capital and labor inputs. Thus, measures of the capital and labor inputs used by the affiliate (such as fixed tangible assets and employment compensation, respectively) are included in the analysis, to predict the counterfactual "true" level of income. Shifted income is determined by the tax incentive to move income in or out of the affiliate. In the simplest scenario, this would be the tax rate difference between the parent and the affiliate. However, more complex versions take account of the overall pattern of tax rates faced by all the affiliates of the MNC (e.g. Huizinga and Laeven, 2008). Income reported by a low-tax affiliate that cannot be accounted for by the affiliate's own labor and capital inputs is attributed to income-shifting.

This approach (which we will refer to as the "Hines-Rice" approach) can be represented by the following equation:

$$\log \pi_i = \beta_0 + \beta_1 \tau_i + \beta_2 \log K_i + \beta_3 \log L_i + \mathbf{X}_i \gamma + \varepsilon_i \qquad (1)$$

Here, π_i represents the profits of multinational affiliate i. The typical specification in the literature is log-linear – i.e. the natural logarithm of the affiliate's pretax profit is modeled as a linear function of the tax rate differential. Because of this, it is customary in this literature to omit loss-making affiliates (i.e. those with negative income) from the sample.[5] The tax variable τ_i represents the tax incentive to shift profits into or out of affiliate i. Typically, this would be the tax rate difference between the parent and the affiliate, although more complex versions measure the tax rate difference with an appropriately defined average of tax rates faced by all the affiliates of the MNC. The coefficient of interest is β_1, which reflects the extent to which the multinational shifts profits into or out of affiliate i. Affiliate i's capital inputs are represented by K_i (e.g. fixed tangible assets) and its labor inputs by L_i (e.g. employment compensation). $\mathbf{X}_i$ is a vector of additional affiliate-level controls, ε_i is the error term, and β_0 is a constant.

Hines and Rice (1994) estimated a model similar to that in Equation (1). However, their data was aggregated up to the country level (i.e. represented the aggregate profit, capital and labor inputs etc. of all US affiliates in a given country). This data was obtained from the Bureau of Economic Analysis (BEA) of the US Department of Commerce, which collects data on the foreign activities of US firms by means of surveys that these firms are required to complete. The forms that firms are required to complete vary depending on factors such as the year, the size of the parent and affiliate, and the parent's ownership stake. The most extensive data are collected in benchmark years, such as 1982 (used by Hines and Rice (1994)), 1999 and 2004.

Data at the aggregate country and year level are made publicly available by the BEA.[6] Individual firms' responses to the BEA surveys are confidential. Nonetheless, researchers have been able to obtain access to the affiliate-level data under certain conditions. The latter dataset, which captures financial and operating information for both the parent companies and foreign affiliates of U.S. multinationals, has proved important for academic research on various aspects of US multinationals' responses to international taxation (e.g. Desai, Foley and Hines, 2003, 2004, 2006; Dharmapala, Foley and Forbes, 2011).[7] Another confidential dataset that is in many ways analogous to the affiliate-level BEA data is collected by the German central bank (*Deutsche Bundesbank*) on the foreign affiliates of German-based multinational firms, and on the German affiliates of non-German multinational firms. This micro-level dataset on direct

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[5] Note that it is possible to include negative observations using a simple rescaling of the variables (see e.g. Dharmapala and Riedel (2013)). However, incentives for BEPS activity are typically attenuated for loss-making firms due to tax law asymmetries such as limitations on loss offsets.
[6] See the BEA website at www.bea.gov.
[7] Another confidential source of data on US MNCs is from tax returns; these have been used in the literature by researchers with access to this information (e.g. Grubert, 2003, 2012).

investment is referred to as the MiDi (*Mikrodaten Direktinvestitionen*) dataset, and has also been used extensively in recent academic research (e.g. Weichenrieder, 2009; Buettner *et al*, 2012).

The increasing availability of affiliate-level datasets such as these has enabled researchers to move from aggregate country-level analysis to a more micro-level analysis of the behavior of individual multinational affiliates. The primary advantage of such data is the increased ability to control for potential confounding factors in the estimation of the presence and magnitude of BEPS. This trend has been reinforced by the creation and increased availability in recent years of commercial databases of firms that provide unconsolidated (i.e. affiliate-level rather than consolidated worldwide MNC-level) financial and ownership information for multinational affiliates. The most prominent of these databases in international tax research have been the Orbis and Amadeus databases, both produced by the Bureau van Dijk. Orbis is a global database that now provides information on about 100 million individual firms (including multinational affiliates). It has been used, for instance, by Markle (2012). Amadeus is focused on Europe, providing financial and ownership data on 1.6 million European business entities; it has been used, for instance, by Huizinga and Leuven (2008), Dischinger (2010) and Dharmapala and Riedel (2013).[8] In contrast, the primary database of financial statement information on US firms – Compustat – reports consolidated (i.e. worldwide) financial information that pertains to the multinational group in its entirety (although some geographic segment data is also available).

Because these affiliate-level datasets are longitudinal – i.e. report information on the same affiliates over multiple years – they have also enabled researchers to use panel data techniques that provide more credible estimates of BEPS. With panel data, we can modify Equation (1) as follows:

$$\log \pi_{it} = \beta_1 \tau_{it} + \beta_2 \log K_{it} + \beta_3 \log L_{it} + \mathbf{X}_{it}\gamma + \mu_i + \delta_t + \varepsilon_{it} \qquad (2)$$

Here, π_{it} represents the profits of multinational affiliate *i* in year *t*, and the other variables can be reinterpreted in analogous fashion. The new terms μ_i and δ_t represent an affiliate fixed effect (which controls for the unobserved characteristics of affiliate *i* that do not change over time) and

[8] While these affiliate-level datasets are extremely useful for research on international tax issues, they have some drawbacks. For instance, Orbis and Amadeus report ownership information only for the final year of their data. This creates the possibility of misclassification of ownership structures (i.e. of which affiliates belong to which parents in years prior to the final year). Budd, Koenings and Slaughter (2005) argue that under reasonable assumptions, such misclassification would primarily create a bias against finding significant results. Another important point to bear in mind is that these datasets report financial statement information rather than tax return information. This distinction is important, though its significance is somewhat mitigated in countries with a high degree of book-tax conformity.

a year fixed effect (which controls for unobserved common changes in the profitability of all affiliates in a given year), respectively.

Note that that tax incentive variable τ_{it} is now the tax incentive for profit shifting to or from affiliate *i* in year *t*. Changes in the tax differential between affiliate *i* and its parent (or other affiliates in its group more broadly) are typically generated by tax reforms in either affiliate i's country or in the country of the parent or the group's other affiliates. Thus, they are unlikely to be attributable directly to the affiliate's own behavior or choices. However, a remaining concern with the approach in Equation (2) is the possibility that changes in a country's corporate tax rate that change τ_{it} may be correlated with other changes in policy or the economic environment that also independently affect affiliate i's profits. It is feasible to add country-by-year fixed effects to Equation (2) to absorb any unobserved common change in profitability, for instance, to all multinational affiliates located in Estonia in 2008 (although this is rarely implemented in practice). If τ_{it} is measured as the tax rate difference between affiliate *i* and its parent, it is not possible to include country-pair-year fixed effects (which would absorb any unobserved common change in profitability, for instance, to all German-owned affiliates located in Estonia in 2008).[9]

The preceding discussion summarizes the primary approach used in the economic literature on BEPS. There are, in addition, some other approaches that have been implemented. For instance, a quite distinct tradition in the tax accounting literature uses consolidated data from Compustat on the worldwide operations of US firms to analyze BEPS (e.g. Collins, Kemsley and Lang, 1998)). As Compustat does not provide detailed information on each foreign affiliate, the objective is to test whether US-based MNCs shift income from the US to their foreign affiliates (considered as a whole). The basic method is to regress the ratio of foreign pretax income to foreign sales on measures of the foreign tax rate (FTR; interpreted as a measure of the strength of the incentive to shift income abroad). The FTR is weighted by the distribution of the firm's activities across jurisdictions, based on its current mix of operations. The regression controls for the ratio of worldwide income to worldwide sales, and the unit of observation is a (US-based) MNC in a given year. Klassen and Laplante (2012) is an important recent example of this approach, analyzing a panel of US firms with foreign income over 1988-2009.

[9] If the tax incentive variable uses the tax rates uses information on the tax rates faced by all of the group's affiliates, then it may be possible to control for country-pair-year fixed effects, but extensive variation in the tax rates of third countries would be required.

The premise of this approach is that accounting rates of return would be equalized across US and foreign operations in the absence of income shifting; differences in accounting rates of return that are related to FTR are interpreted as being attributable to income shifting. While it has the advantage of being implementable with the widely-available Compustat database and directly addresses important and policy-relevant questions about income shifting out of the US, there are significant empirical challenges that confront this approach. The amount of income shifted and the mix of operations that give rise to the FTR measure are all endogenous choices of the firm. In contrast to the estimation of Equation (2) with unconsolidated affiliate-level data, it is not possible to use changes in local tax rates as a source of arguably exogenous variation. Klassen and Laplante (2012) seek to address these challenges by using an instrumental variables (IV) strategy based on lagged FTR.

A novel development of this approach from the accounting literature is represented by Dyreng and Markle (2013). Their method of estimating income shifting is based on the premise that the allocation of a US-based MNC’s sales between US customers and foreign customers is relatively nonmanipulable, given the fixed location of final consumers. Based on this premise, they argue that it is possible to directly estimate the direction and extent of income shifting by analyzing differences between the location of US MNCs’ sales and the location of their reported earnings. This approach does not require imposing the assumption that accounting rates of return would be equalized across US and foreign operations in the absence of income shifting. However, it relies heavily on the premise that the location of sales is nonmanipulable and that it is not influenced by income-shifting strategies.

Dharmapala and Riedel (2013) also propose a new approach to measuring BEPS that departs in significant respects from the Hines-Rice approach. In the thought experiment underlying the test in Equation (2), the tax rate differential between country *i* and the parent country (or the various other countries in which the MNC operates) changes for exogenous reasons; the coefficient β_1 captures the sensitivity of profits reported by affiliate *i* to this change. An alternative thought experiment that also has the potential to illuminate the magnitude of BEPS is to imagine that a dollar were to exogenously appear, like manna from heaven, in affiliate *i*’s parent. Given some structure of profit shifting that is already in place, it would then follow that some fraction of this dollar would be shifted to affiliates facing a lower tax rate than the parent. If affiliate *i* is low-tax, then it would be expected that some fraction of this dollar would ultimately be reported among affiliate i's profits. This would not apply, however, to affiliates facing a higher tax rate than that of the parent. Thus, high-tax affiliates serve as a control group in this approach, to take account of nontax reasons – such as risk-sharing within the MNC, or the operation of internal capital markets – that increases in the parent's income may be reflected in the reported income of its affiliates.

A challenge facing this approach is to isolate a source of exogenous changes to the income of the parent firm ("income shocks"). Dharmapala and Riedel (2013) adapt an approach developed in a different context by Bertrand, Mehta and Mullainathan (2002), and construct an expected earnings shock variable based on the earnings of firms that operate in the same industry and the same country as the parent firm. This provides a measure of the parents' exogenous income before taxes and before profit shifting activities. Dharmapala and Riedel (2013) use the Amadeus dataset described above. The sample – which consists of over 18,000 observations on approximately 4800 multinational affiliates over the period 1995–2005 – is restricted to affiliates that operate in a different industry and country from their parent firms, so that the earnings shocks experienced by the parents do not directly impact the affiliates.

The basic specification estimated in Dharmapala and Riedel (2013) is:

$$\log \pi_{it} = \beta_1 \log \widehat{\pi_{it}} + \beta_2 (d_{it} * \log \widehat{\pi_{it}}) + \mathbf{X}_{it}\gamma + \mu_i + \delta_t + \varepsilon_{it} \quad (3)$$

Here, $\widehat{\pi_{it}}$ is the "income shock" experienced by affiliate i's parent in year t (computed using the approach outlined above). The indicator variable d_{it}= 1 if affiliate i faces a lower tax rate than its parent, and is 0 otherwise. The coefficient of interest here is β_2, which represents the extent to which an income shock to the parent is reflected in the pretax income of a low-tax affiliate, relative to the extent to which it is reflected in the pretax income of a high-tax affiliate of the same parent. The other variables are as defined previously, with $\mathbf{X}_{it}$ including various controls (including assets and, in some specifications, the tax rate). In essence, the empirical strategy here is to compare the differential impact among low-tax and high-tax affiliates of a common shock to the same parent, controlling for other factors that may affect affiliates' reported profits. This approach also readily allows for the inclusion of country-pair-year fixed effects, which absorb any unobserved common change in profitability, for instance, to all German-owned affiliates located in Estonia in 2008.

4) An Overview of the Findings of the Empirical Literature

4.1) The Magnitude of BEPS

Having described the conceptual foundations of the various approaches used in the empirical literature, we now turn to a summary of the findings, focusing on the magnitude of the estimated extent of BEPS. For this purpose, the coefficient β_1 in Equations (1) and (2) has a particularly straightforward economic interpretation. Recall that specifications of this type regress the log of pretax income (π_{it}) on a measure of the tax incentive for BEPS (τ_{it}). If the analysis were to regress the level rather than the log of pretax income on τ, then the estimated coefficient would be interpreted as the effect of a 1 unit change in τ (typically, a change of 1 percentage point in the tax differential) on pretax income (measured in dollars, euros, or other monetary units). However, as the dependent variable is the log of pretax income, the coefficient β_1 represents what is known as the "semi-elasticity" of pretax income with respect to τ.

The semi-elasticity represents the percentage change in pretax income associated with a 1 percentage point change in τ. For instance, an estimate that β_1 = 0.8 would imply that a 10 percentage point increase in the tax rate differential between affiliate *i* and its parent (for instance, because the tax rate in affiliate *i*'s country falls from 35% to 25% while the tax rate in the parent's country remains unchanged) would increase the pretax income reported by affiliate *i* by 8% (for example, from $100,000 to $108,000). Note that the precise interpretation depends on the definition of τ (which can represent the affiliate's tax differential *vis-à-vis* its parent, or a more complex measure of its tax rate relative to the rates faced by other affiliates within the same multinational group).[10] It is also important to note is that the semi-elasticity varies for different values of τ. Typically, the reported semi-elasticity is evaluated at the sample mean. For instance, if the mean tax rate in the data were 35%, then the semi-elasticity that is reported in the literature and that we discuss below pertains to small changes in τ around the mean value of 35%. The reported semi-elasticity cannot necessarily be extrapolated to changes in τ that are large, or that take as their starting point values of τ that are far from the mean.

[10] When the tax incentive is measured as a tax rate difference (whether between the affiliate and its parent or between the affiliate and all other affiliates), β_1 would be expected to be positive in sign (i.e. a larger tax differential is associated with higher reported income). If the tax incentive were to be measured as the affiliate's local tax rate (as in some studies), β_1 would be expected to be negative in sign (i.e. a lower local tax rate is associated with higher reported income).

A convenient starting point for our description of the findings of the BEPS literature is Huizinga and Laeven (2008). They use cross-sectional firm-level data for 1999 on European firms from the Amadeus database (described in Section 3 above) to estimate a regression analogous to that in Equation (1). They compute a measure of τ that takes account of the tax rates faced by all of the multinational group's affiliates. Using this approach, they estimate both an overall semi-elasticity of BEPS across Europe, and also a set of BEPS estimates for each country (representing the extent of profit shifting out of that country by affiliates located there) in their dataset. The overall estimate of the semi-elasticity is 1.31 (i.e. a 10 percentage point increase in the tax incentive to shift income to affiliate i is associated with a 13.1% increase in the income reported by affiliate i).

An illustrative example of their country-specific BEPS estimates is the following. Austria has a tax rate of 34%, which is close to the mean tax rate in their sample, and the semi-elasticity for income shifting out of Austria is estimated to be 1.07. The lowest-tax country in the sample is Hungary (with a tax rate of 18%). Thus, it can be inferred that approximately 17% of income generated in Austria by multinational groups with Hungarian affiliates is shifted to Hungary (this is obtained by multiplying the tax rate differential between the two countries of 16 percentage points by the semi-elasticity of 1.07 for Austria, and is subject to the caveat that using the semi-elasticity in relation to large tax rate changes or differences may be misleading). This example of the two halves of the erstwhile Habsburg Dual Monarchy serves to illustrate the relatively large effects found by Huizinga and Laeven (2008).

The magnitude of the effect in Huizinga and Laeven (2008) is substantially smaller than those estimated in earlier studies using aggregate country-level data.[11] This suggests that controlling for unobserved country-specific and industry-specific factors that may affect reported pretax income (as Huizinga and Leuven (2008) are able to do) substantially lowers the estimate of BEPS. Moreover, the literature since then has used panel data from Amadeus and elsewhere to estimate regressions similar to Equation (2). These allow researchers to go further and control for unobserved affiliate-specific characteristics that may affect reported pretax income.

[11] For example, Hines and Rice (1994) report a number of different estimates using different approaches. However, a representative estimate using ordinary least squares (OLS) is a semi-elasticity of 2.25 (see Table II, Column 2, p. 163, where the coefficient is reported as negative because the tax variable is the local tax rate rather than a tax differential). Moreover, Heckemeyer and Overesch (2013) report that many other early studies using country-level data found even larger magnitudes.

The estimates of BEPS using panel data and affiliate fixed effects are considerably smaller than those found by Huizinga and Leuven (2008). Dischinger (2010) uses Amadeus data on a panel of European affiliates over the period 1995-2005 to estimate a model that resembles Equation (2). He finds a semi-elasticity of 0.7 – i.e. a 10 percentage point increase in the tax rate differential between an affiliate and its parent is associated with a 7% increase in profits reported by that affiliate. This is an overall estimate; for profit shifting between parents and their lower-tax affiliates, the Amadeus data implies a lower semi-elasticity of about 0.5 (see Dischinger, Knoll and Riedel (2013), as discussed below). Lohse and Riedel (2013) use a more recent panel of Amadeus data (over 1999-2009) and find a semi-elasticity of about 0.4 – i.e. a 10 percentage point increase in the tax rate differential between an affiliate and its parent is associated with a 4% increase in profits reported by that affiliate.

There are a large number of other studies that use various approaches and datasets to obtain estimates of BEPS. Heckemeyer and Overesch (2013) collected 238 estimated semi-elasticities from 25 separate academic studies of profit shifting. They use this meta-dataset to conduct what is known as a "meta-regression." This involves regressing the semi-elasticities on various identifiable characteristics of the dataset (e.g. whether it is cross-sectional or longitudinal) and of the empirical approach (e.g. whether firm fixed effects are included). The meta-regression approach enables them to pinpoint the specific characteristics of different studies that are responsible for the widely varying magnitudes of the estimates. Not surprisingly, in view of our discussion so far, the innovations introduced in the more recent studies (such as the use of panel data and affiliate fixed effects) are strongly associated with smaller estimated magnitudes of BEPS.

Heckemeyer and Overesch (2013) also use the meta-regression approach to identify a "consensus" estimate from this extensive literature. This turns out to be a semi-elasticity of approximately 0.8, when controlling for the various potential sources of bias. As described above, this would imply that a 10 percentage point decrease in the tax rate faced by affiliate *i* (for instance, from 35% to 25%) would increase the pretax income reported by affiliate *i* by 8% (for example, from $100,000 to $108,000). Thus, although the meta-sample assembled by Heckemeyer and Overesch (2013) includes many of the early studies that used aggregate country-level data and found very large effects, the consensus estimate of the literature as a whole is much closer to the smaller effects that have been estimated by recent studies. We will use this 0.8 semi-elasticity for illustrative purposes to summarize the current consensus that emerges from the literature that uses the general approach encapsulated in Equations (1) and (2). However, it should be borne in mind that, as discussed above, the latest estimates using the most current data are considerably smaller than this consensus estimate.

Research using the German MiDi dataset (which includes information on both foreign affiliates of German-based multinational firms and German affiliates of foreign multinationals) has also used a similar approach. Weichenrieder (2009) uses both types of data to analyze profit shifting into and out of Germany, using a panel of affiliates over the period 1996-2003. In particular, he studies the impact of foreign home-country tax rates on the return on assets (ROA) reported by German affiliates of foreign multinationals. An increase in a foreign parent's home country tax rate of 10 percentage points (e.g. from 25% to 35%) entails an increase in the ROA of its German affiliates of about half a percentage point (e.g. from about 5.5%, the approximate mean in the sample, to about 6%). This is a magnitude that is broadly comparable to the consensus estimate discussed above, but is only of borderline statistical significance. There is no statistically significant overall evidence of profit shifting by German multinationals towards their foreign affiliates, although there is some evidence that the extent of profit shifting may be greater for the subset of affiliates that are wholly owned by their German parents.

Buettner *et al*. (2012) use the MiDi data on foreign affiliates of German-based multinationals, in particular a panel of affiliates over the 1996-2004 period, to analyze the effects of tax rates and rules on the use of debt by multinational affiliates. They find a modest impact of tax rates on the use of inter-affiliate debt. A 10 percentage point increase in the local statutory tax rate (e.g. from 25% to 35%) is associated with an 8% increase (around the sample mean) in an affiliate's ratio of internal debt to total capital. The mean debt ratio in this sample is 0.28, so this corresponds to an increase from a debt ratio of 0.28 to one of 0.30. Moreover, the income shifting associated with this change would be even smaller, as the semi-elasticity of the debt ratio would have to be scaled by the interest rate to determine the amount of income shifted *via* the increase in internal debt. The effect found by Buettner *et al*. (2012) is somewhat smaller (though not dramatically so) than that reported by Desai, Foley and Hines (2004): using the confidential firm-level BEA dataset, they find a corresponding semi-elasticity of 10% for the internal debt of affiliates of US multinationals (i.e. a 10 percentage point increase in the local statutory tax rate is associated with a 10% increase in internal debt).

While the underlying effect of taxes on internal debt is small, Buettner *et al*. (2012) find a relatively large impact of thin capitalization rules. These rules deny interest deductibility when the debt ratio (typically, the internal debt ratio) exceeds some specified threshold (for instance, the US threshold is a debt to equity ratio of 1.5 to 1). When thin capitalization rules are introduced or tightened, Buettner *et al*. (2012) find that the tax sensitivity of the internal debt ratio falls by about a half. Thus, thin capitalization rules seem to matter, but the background magnitude of inter-affiliate debt-shifting is quite small. Of course, it should be remembered that debt-shifting is only one potential channel through which BEPS may operate, and this analysis does not account for strategic transfer pricing or the location of intangible assets.

As explained in Section 3 above, the approach of Dharmapala and Riedel (2013), as represented by Equation (3), is quite different from the approaches discussed so far. The essential idea is to construct arguably exogenous income shocks to parent firms in a given year (using the income of other firms in the same country and industry in that year), and to analyze the extent to which this "unexpected" income of the parent is shifted to its low-tax affiliates abroad, relative to the extent to which this "unexpected" income is shifted to its high-tax affiliates abroad. Controlling for a variety of potential confounding factors (including unobserved affiliate and year effects, industry-year effects and country-pair-year effects), the baseline specification suggests that a 10% increase a parent's profits (before taxes and before shifting) is associated with an increase of 0.4% in the profits reported at that parent's low-tax affiliates (relative to the increase in the profits reported at that parent's high-tax affiliates).[12]

The average parent profit in the sample is $220 million, so a 10% increase at the sample mean represents an increase of $22 million (e.g. from $220 million to $242 million) as a result of the arguably exogenous shock. The average profits reported at low-tax affiliates is $7.7 million, so a 0.4% effect entails an increase of $30,000 in the profit reported by a given low-tax affiliate. On average, each parent has 14 low-tax affiliates in the Amadeus dataset. Thus, this estimate implies that of the original $22 million increase in the parent's income, a total of $420,000 is

[12] The focus of the analysis is on profit shifting from parents to low-tax affiliates. However, it is possible to use the same approach to analyze the impact of income shocks to all high-tax affiliates of a multinational group on the income reported by low-tax affiliates. This leads to fairly similar, albeit statistically weaker, results (Dharmapala and Riedel, 2013).

shifted to low-tax affiliates throughout Europe. This represents about 2% of the increase in the parent's income.[13]

The Hines-Rice approach to measuring BEPS (represented by studies implementing Equations (1) and (2)) is primarily designed to answer the question of how an affiliate's reported profits will change in response to a change in the tax rate that it faces. The approach in Dharmapala and Riedel (2013), on the other hand, yields a more direct answer to the question of what fraction of a parent's (or high-tax affiliate's) profit is shifted to low-tax affiliates, a question of great relevance to the current debate on BEPS. In terms of this debate, an estimate that only 2% of parents' income is shifted to low-tax affiliates may seem quite small, and raises the question of how it relates to the estimates derived from the Hines-Rice approach.

With some additional assumptions, it is possible to use the estimates from the Hines-Rice approach to also address the question of the fraction of income that is shifted. In the Amadeus data, the semi-elasticity of income-shifting from the parent to its low-tax affiliates is about 0.5 (see Dischinger, Knoll and Riedel (2013)) – i.e. a 10 percentage point increase in the tax incentive to shift income from the parent to affiliate *i* is associated with a 5% increase in the income reported by affiliate *i*. The average tax rate differential between parents and their low-tax affiliates in the Amadeus data used by Dharmapala and Riedel (2013) is 7.7 percentage points. Multiplying the semi-elasticity by this tax rate differential approximates the fraction of income that is shifted from the parent to its low-tax affiliates. For instance, imagine a simple world in which an MNC has two affiliates, one at home and one in a foreign country, and both affiliates face a 30% tax rate (so there is no tax-motivated profit shifting).Suppose initially that both affiliates report $100 of income. Now suppose that the foreign jurisdiction lowers its tax rate to 22.3%: the 0.5 semi-elasticity implies that income reported in the foreign jurisdiction will rise by a little under 4% (to about $104), and this will also represent the fraction of the parent's income that is shifted.

This example suggests that the Dharmapala and Riedel (2013) approach yields smaller quantitative estimates of BEPS than does the Hines-Rice approach. However, the difference (between 2% of parent profits and under 4% of parent profits being shifted) does not seem

[13] No financial data is available in Amadeus for non-European affiliates. However, assuming that the income-shifting behavior estimated among EU-25 affiliates can be straightforwardly extrapolated to subsidiaries outside Europe, a parent would on average shift profits of $564,000 to affiliates globally, representing 2.6% of the pre-shifting profit shock of $22 million (Dharmapala and Riedel, 2013).

dramatic. One reason for the lower estimates in Dharmapala and Riedel (2013) may be that their dataset is restricted to affiliates that operate in a different industry than the parents (so that the income shocks that affect the parent's industry do not directly affect affiliates). This potentially reduces the scope for the use of strategic transfer pricing between the parent and its affiliates. Indeed, supplemental analysis in Dharmapala and Riedel (2013) suggests that much of the profit-shifting captured by this approach is attributable to the use of debt across affiliates. This does not imply, however, that in reality transfer pricing is unimportant to BEPS; rather, it is more difficult to measure using this particular approach. We discuss further the question of how to interpret these magnitudes in Section 5 below.

Dyreng and Markle (2013), using the approach described in Section 4, provide an estimate of the fraction of US parents' income that is shifted to all foreign affiliates collectively. Their empirical approach involves comparing the foreign sales of US MNCs (assumed to be relatively nonmanipulable) with the income reported at home and abroad. The Compustat data that they use (a panel of US firms with significant foreign income over the period 1997-2011) does not permit affiliate–level analysis, but includes information on foreign and domestic sales, income and tax expense. The baseline estimate of outbound shifting entails that about 10% of US MNCs' domestic income (measured in pretax and pre-shifting terms) is shifted to foreign affiliates. As the authors concede, this may represent an overestimate because direct sales from foreign affiliates of US MNCs to US customers will be captured in the data as domestic sales (Dyreng and Markle, 2013, p. 25). However, these sales will at the same time give rise to foreign income, and thus this empirical method will attribute this pattern (i.e. the combination of domestic sales and foreign income) to income shifting out of the US. In fairness, however, it should be emphasized that the primary purpose of Dyreng and Markle (2013) is not to estimate the magnitude of BEPS *per se*, but to test whether income shifting differs across different subsets of US MNCs, for instance those that are financially constrained versus those that are not.

The empirical literature has also sought to identify the channels through with BEPS occurs. The primary channels are generally thought to be strategic transfer pricing (for instance, charging relatively low prices for goods and services transferred from high-tax to low-tax affiliates) and the strategic use of inter-affiliate debt (for instance, financing the activities of high-tax affiliates using debt issued by low-tax affiliates) – see Dharmapala (2008) for a simple discussion. One approach that has been adopted in the literature to distinguish between these channels is to compare the effect of the tax variable on pretax profit (which includes financial income and payments) with the effect of the tax variable on earnings before interest and taxes (EBIT). The effect on pretax profit represents the combination of strategic transfer pricing and the strategic use of debt, whereas the effect on EBIT isolates the consequences of strategic transfer pricing.

The meta-regression study by Heckemeyer and Overesch (2013) seeks to calculate the fraction of BEPS that is attributable to strategic transfer pricing, using the results of studies that distinguish between pretax profit and EBIT. They argue that the consensus among these studies is that about 70% of the estimated magnitude of BEPS is due to strategic transfer pricing, with the remainder attributable to the strategic use of debt. However, it should be borne in mind that this is based on a smaller sample of studies than the calculation of the consensus magnitude. Many studies do not distinguish between pretax profit and EBIT, while others (by design or construction) only aim to estimate one or the other of these channels. For instance, Buettner *et al*. (2012) focus on debt ratios, while Bartelsmann and Beetsma (2003) and Clausing (2001; 2003) focus on the impact of tax differentials on transfer prices. As previously noted, the approach in Dharmapala and Riedel (2013) may be more suitable for capturing the effect of debt-shifting rather than strategic transfer pricing.

4.2) A Brief Review of Other Issues Related to BEPS

The previous discussion has presented an overview of a number of different approaches to estimating an overall magnitude of BEPS. The aim of Section 5 is to interpret the implications of these estimates and to place them in the context of current policy debates. Before proceeding to this task, however, it is helpful to briefly survey the existing evidence (or in some cases the lack thereof) with regard to five more specific issues relating to BEPS that have attracted considerable attention in recent policy debates and in academic discourse.

4.2.1) Parent-to-Foreign versus Foreign-to-Foreign Shifting

It has been established in the literature using Amadeus data on European firms that the magnitude of BEPS that involves shifting profits from parents is significantly lower than other types profit shifting. In particular, Dischinger, Knoll and Riedel (2013) run a regression similar to Equation (2) where the tax variable is the difference between the affiliate and its parent. To this, they add the variation of considering separately MNCs where the parent has a higher tax rate than the affiliate. They find that the semi-elasticity for income shifting from parents to low-tax affiliates is 0.5 (i.e. a 10 percentage point increase in the tax incentive to shift income from the parent to affiliate *i* is associated with a 5% increase in the income reported by affiliate *i*), whereas the magnitude of shifting from high-tax affiliates to parents is substantially larger.

This asymmetry suggests the existence of disincentives to shift income away from parents. These may be attributable to tax or nontax reasons, or to some combination of the two. For instance, agency costs between the managers of the parent and managers of affiliates may make the former reluctant to shift income to the latter. Alternatively, repatriation taxes that make it costly to return funds to the parent, or CFC rules that render shifting out of the parent pointless, may account for this asymmetry.

In discussions of US MNCs, there generally seems to be a presumption that foreign-to-foreign shifting is more prevalent than shifting out of the US. For instance (although this issue is not the focus of their paper), Desai, Foley and Hines (2003) find a sensitivity among US MNCs to tax rate differences within Europe that is substantially greater than their sensitivity to tax rate differences elsewhere. The 1997 check-the–box regulations are generally thought to have facilitated foreign-to-foreign shifting.[14] However, there appear to be no explicit test with firm-level US data that mirrors the Dischinger, Knoll and Riedel (2013) findings. Indeed, some empirical approaches (e.g. Klassen and Laplante (2012), Dyreng and Markle (2013)) can by design only estimate US to foreign shifting, not foreign-to-foreign shifting.

This is an important issue, as the insight that foreign-to-foreign shifting benefits US national welfare has played a major role in discussions of international tax policy (e.g. Shaviro, 2011). The relative prevalence of foreign-to-foreign and US-to-foreign shifting is important in determining optimal CFC rules under either the current regime or a potential territorial regime. However, direct empirical evidence on this point is limited. Perhaps the most closely related evidence is in Markle (2012), which is discussed in more detail below. He finds that foreign-to-foreign shifting is very similar for MNCs based in territorial and worldwide regimes (including the US), while parent-to-foreign shifting is more prevalent among MNCs domiciled in territorial countries than those domiciled in worldwide countries (including the US).

4.2.2) Real Economic Activity, Intangible Assets, and BEPS

[14] Indeed, Desai and Dharmapala (2009) use the check-the-box regulations as an exogenous source of variation in US MNCs' tax avoidance activities.

As a general matter, the impact of taxes on the location of real economic activity and on income shifting are quite distinct phenomena. For instance, in an influential model of tax competition, Devereux, Lockwood and Redoano (2008) view countries as competing for real activity through their average effective tax rates, and competing for reported profits through their statutory tax rates. However, there may exist specific interactions between them – e.g. transferring intangible property to a foreign low-tax jurisdiction may be easier if some research facilities are also moved to that same jurisdiction. Considering these potential interactions also leads us to a branch of the literature that focuses on the role of intellectual property and intangible assets in income shifting.

The emphasis on intangible assets in this literature owes much to Grubert (2003), who uses a cross-section of corporate tax returns of US firms from 1996, including separate information on CFCs owned by these US firms. This data is linked to Compustat data on these parents to generate a dataset of 1751 CFCs owned by 389 parents. He regresses the ratio of a CFC's pretax earnings scaled by sales on a number of variables, including the local statutory corporate tax rate and measures of the parent's R&D intensity. The main finding relates to the interaction between parent's R&D intensity and the local tax rate, and suggests that the pretax earnings of CFCs with R&D-intensive parents are much more sensitive to local tax rates than are the pretax earnings of other CFCs.

Grubert (2003) conducts additional analysis on the location choices of 728 US MNCs engaged in manufacturing. A probit regression of whether a US MNC locates in each of 60 countries finds that R&D intensive firms are disproportionately attracted to both locations with very low tax rates and those with very high tax rates. The idea here is that opportunities for BEPS not only make low-tax locations attractive, but also reduce the disincentive to invest in high-tax locations (as income can be shifted out of those jurisdictions, at least by R&D intensive firms). Thus, BEPS opportunities shape location choices for real activity. This latter insight has been developed in a number of directions in the literature. One strand highlights the possibility that BEPS opportunities may reduce distortions to the location of real activity and thereby potentially enhance efficiency (see Hong and Smart (2010) for a formal theoretical model, and Dharmapala (2008) for an informal discussion).

More recent literature on the role of intangibles uses Amadeus data on European affiliates. Dischinger and Riedel (2011) use the balance sheet item "intangible fixed assets" from

Amadeus to test whether intangible asset holdings are disproportionately concentrated among affiliates in low-tax jurisdictions, controlling for unobserved affiliate effects that may influence the ownership of intangibles.[15] They find that a decrease in the average tax difference to all other affiliates by 1 percentage point raises the subsidiary's level of intangible assets by 2.2%. This gives some credence to the argument that intangibles tend to be located in low-tax jurisdictions.

Karkinsky and Riedel (2012) link Amadeus data on European affiliates with data on patent applications to the European Patent Office. Their analysis tests whether (within a MNC group) a patent application is more likely to be made by an affiliate facing a lower tax rate (both absolutely and in relation to other group affiliates). The results strongly confirm this hypothesis, and the estimated effect is quite large (especially in relation to the estimates of income-shifting using the same Amadeus dataset that were discussed above). The implied semi-elasticity is -3.5; i.e. evaluated at the sample mean, the baseline result suggests that an increase in the corporate tax rate by 1 percentage point reduces the number of patent applications by 3.5%. The mean number of patent applications is 0.9 per year, so this implies a reduction in the number of patent applications from 0.9 to 0.87 per year. These recent empirical contributions tend to reinforce the widespread idea that intellectual property constitutes a major channel of BEPS.

4.2.3) BEPS under Territorial versus Worldwide Tax Systems

A question of great relevance for current US policy discussions is whether the magnitude of income-shifting among multinational firms with parents based in countries with worldwide tax systems differs from that among multinational firms with parents based in countries with territorial (or participation exemption) tax systems. Markle (2012) uses the Hines-Rice empirical framework (Equation (2)) to address this very policy-relevant question. The analysis uses the commercial database Orbis, compiled by the Bureau van Dijk, which reports unconsolidated financial information and ownership data for a global sample of firms and affiliates. Markle (2012) also constructs bilateral tax measures (based on Huizinga and Laeven (2008)) that take account of both corporate and withholding taxes. The paper uses a panel dataset consisting of Orbis data for the years 2004-2008. The analysis finds that firms with worldwide parents tend to shift less income than firms with territorial parents. However, there are a number of important qualifications to this basic picture. First, there is no significant difference in shifting among firms

[15] Note that Grubert (2003) could not observe the R&D intensity or the ownership of intangibles by affiliates, and proxied for this by the R&D intensity of the (consolidated) MNC.

with similar foreign reinvestment opportunities. Second, there is no difference in foreign-to-foreign shifting, but MNCs based in worldwide countries (including the US) shift less from their parent. This is perhaps due to costs associated with future repatriation from abroad to the parent.

4.2.4) Has BEPS Grown Over Time?

Another important question is whether income shifting has grown over time. There is certainly a perception that the BEPS phenomenon has become more prominent in recent years. If this is true, that may help account for the growing political salience of the issue. On the other hand (though it is perhaps not directly relevant to this question), it is worth remembering that the estimates of the magnitude of BEPS have fallen over time to the current consensus estimate of 0.8 (and lower magnitudes under some approaches). This does not of course imply that the underlying phenomenon has changed in size, but rather that its measurement has possibly become more precise.

Grubert (2012) uses a panel of tax returns for 754 US MNCs over 1996-2004 to analyze changes over time in income shifting. His analysis suggests that the share of US MNCs' income that is reported abroad has grown over this period. In itself, this is not a surprise given growing global activity, but Grubert (2012) argues that foreign income has grown 12 percentage points more than has foreign sales. The analysis hints strongly that this discrepancy is due to income shifting. Klassen and Laplante (2012) also claim that income shifting has grown over time. Holding tax rate differences between U.S. and foreign jurisdictions constant, their empirical estimates imply that their sample of 380 corporations with low average foreign tax rates collectively shifted about $10 billion of additional income out of the United States annually during 2005–2009 relative to the 1998–2002 period. Clausing (2009) also finds that income shifting increased in the latter part of her sample period (1993-2004 relative to 1982-1993).

In contrast, estimates within the Hines-Rice approach have tended to be smaller in magnitude when using more recent time periods. For instance, Lohse and Riedel (2013) find a semi-elasticity of 0.4 (about half the consensus estimate from the literature reported by Heckemeyer and Overesch (2013)) using a panel of firms from Amadeus over 1999-2009. Lohse and Riedel (2013) also formally test whether the extent of BEPS has changed over time by including in their specification an interaction between the tax measure and a linear time trend. They find that the tax-sensitivity of reported income has fallen significantly in magnitude over time. In other words, BEPS has *declined* rather than grown over their 1999-2009 sample period.

While contrary to claims that are frequently made in policy discussions about the growth of BEPS, this finding is entirely consistent with what may be expected based on the spread of transfer pricing regulation and thin capitalization rules around the globe in recent years.

4.2.5) BEPS and Tax Revenue

Finally, the consequences of income shifting for tax revenue have greatly exercised governments around the world. Huizinga and Laeven (2008) use their results (from an Amadeus cross-section for 1999) to derive substantial revenue consequences. According to their calculations (see their Table 8), Germany (the highest-tax country in the sample) lost $1.26 billion in revenue in 1999, while most other sample countries gained revenue. However, as we have seen, the magnitude of estimated income shifting is smaller in subsequent studies, and the revenue consequences would be correspondingly smaller.

Clausing (2009) directly addresses the revenue issue, using a panel of aggregate BEA at the country-year level data over 1982-2004 (this is similar to that in Hines and Rice (1994), but with multiple observations on each country). She estimates that in the last year of the sample (2004), the revenue loss to the US Treasury from income shifting amounted to over one third of corporate tax revenue. This conclusion is based on an analysis of the effect on the profit rate (pretax income scaled by sales) for all US affiliates in a given country in a given year of the effective tax rate differential with the US. This analysis yields a coefficient of 0.5. The sample mean of the profit rate is 15%, so a 10 percentage point increase in the tax differential between a foreign country and the US is associated with an increase in the profit rate of US affiliates in that country from 15% to 20% - i.e. a 33% increase, evaluated at the mean. This implies a semi-elasticity of about 3.3. Thus, the implied revenue effects in Clausing (2009) rest on an estimated magnitude of BEPS that is very large relative to those derived from firm-level studies.

It is entirely understandable that governments would be concerned about the revenue implications of BEPS. However, a number of remarks are in order here that, while they do not fully address these concerns, nonetheless help to place them in context. First, if income shifting is indeed extremely sensitive to tax rates, this would not only imply that income shifting causes large revenue losses, but also that tax rate reductions would generate large amounts of inbound income shifting (and perhaps significant additional revenue). Second, corporate tax revenues are a relatively small component of revenues for the governments of most major economies, and there exist readily available (and surely less mobile) substitutes in the form of personal income tax or VAT revenue. Of course, this does not address the distributional consequences of substituting across different sources of revenue, a question that depends in part on the empirically unresolved issue of corporate tax incidence.

Third, while tax revenue obviously matters to governments and (non-MNC) taxpayers, from a global welfare perspective, the primary concern is not with the distribution of revenue across governments but with the real resources expended in tax planning and compliance. These represent a source of deadweight costs that should be understood primarily as a misallocation of talent (where, for example, someone who could have been another Mozart or could have found a cure for cancer instead toils away producing transfer pricing documentation). Reducing these deadweight costs can generate gains for all countries, as discussed in Section 2. Of course, national governments generally do not have political incentives to care about global welfare. However, the BEPS initiative appears to represent an exercise in multilateral cooperation, and the gains from such cooperation are best analyzed with respect to global welfare.

Finally, notwithstanding BEPS activity, corporate tax revenue in large high-tax economies has generally been robust in recent times (see e.g. Hines, 2007; Dharmapala, 2008; OECD, 2013a, p. 16). Of course, corporate tax revenue fell significantly during the Great Recession, but this decline has obvious and well-attested causes that are unrelated to BEPS. The observation that corporate tax revenue has been relatively stable does not, of course, tell us about the counterfactual – the level of corporate tax revenue in the absence of BEPS activity. However, it is nonetheless difficult to reconcile the stability of revenues with very large revenue effects of income-shifting.

5) Interpreting the Magnitude of BEPS

5.1) Is the Estimated Magnitude of BEPS Large or Small?

We now turn to the interpretation of the magnitude of BEPS that emerges from the various studies discussed in Sections 3 and 4. For concreteness, we will focus on the consensus estimate that emerges from the Hines-Rice approach, with a semi-elasticity of 0.8 (although we will introduce other ways of conceptualizing the magnitude of BEPS where appropriate). Recall that a semi-elasticity of 0.8 implies that a 10 percentage point decrease in the tax rate faced by affiliate *i* (for instance, from 35% to 25%), or equivalently a 10 percentage point increase in the tax differential between the affiliate and other group members, would increase the pretax income reported by affiliate *i* by 8% (for example, from $100,000 to $108,000).

An important question to address is whether this should be viewed as a large effect or a small one. It is certainly smaller than earlier estimates using country-level data, but for policy purposes a more absolute notion of the size and importance of this effect would be helpful. More concretely, imagine a simple world that consists of one high-tax country (with a tax rate of 25%) and a low-tax country (with a tax rate of 15%). If these countries are otherwise identical, and (subject to the caveats expressed earlier) we apply the estimated semi-elasticity to the relatively large (10 percentage point) difference in tax rates, then an affiliate in the low-tax country that would counterfactually have reported $100,000 of income would instead report $108,000. The high-tax country would lose $8000 of domestically reported income and $2000 of tax revenue. Is this effect of tax differences “large” or “small”?

In general public discourse and policy debates, it has become increasingly common to point to the fraction of the income of US (and other) MNCs that is reported in tax havens, to US affiliate profits as a fraction of GDP in tax haven jurisdictions, or to low effective foreign tax rates as in essence self-evidently demonstrating, *ipso facto*, the existence and large magnitude of BEPS. To illustrate descriptive statistics of this type, Table 2 reports the location of various measures associated with US MNCs’ foreign direct investment *via* majority-owned foreign affiliates. This table uses aggregate country-level BEA data for 2011 (the most recent available year), as reported on the BEA website (www.bea.gov). Column 5 of Table 2 shows that 42.6% of the (foreign) net income of US MNCs is reported in tax haven jurisdictions. This calculation uses the classification of havens in Dharmapala and Hines (2009), with some minor modifications to reflect subsequent changes in the political status of some jurisdictions. This large fraction of net income in havens is often cited in support of the claim that BEPS is large in magnitude and that it is an important problem for governments to address.

While the simple descriptive statistics appear compelling to many, the conclusions that are generally drawn from them are in some respects at variance with the conclusions of the empirical literature. As described in Section 4, the general trend in the development of the empirical literature has been for researchers to obtain access over time to more detailed datasets that enable the use of more rigorous empirical techniques, thereby providing more credible estimates of the magnitude of BEPS. Over the course of these developments, accepted estimates have become smaller in magnitude.

It should be noted that the policy discourse described above and the relatively small estimates of the magnitude of BEPS in the academic literature are not necessarily in direct contradiction. The latter relate to the consequences of *marginal* changes (for instance, in tax differentials) rather than to the levels of income reported in different jurisdictions. To illustrate this difference, consider another simple stylized world consisting only of a high-tax country H (with tax rate 25%) and a zero-tax country L. Suppose initially that an H-based MNC reports $90 of income in H and $10 of income in L, as shown in Scenario 1 in Table 3. Suppose that country H reduces its tax rate from 25% to 24% (the type of small "marginal" change that the estimates from the Hines-Rice approach are well-suited to analyze). Then, if we use the consensus estimate of a semi-elasticity of 0.8 from studies using the Hines-Rice approach, income reported in H will increase to $90.7 and income reported in L will fall to $9.3 (as shown in Table 3). Consider instead Scenario 2 (also in Table 3). Here, the initial allocation of income is $60 in H and $40 in L. If we again consider a fall in H's tax rate from 25% to 24%, the allocation of income changes to $60.5 in H and $39.5 in L. The marginal effect is identical across the two scenarios. However, it is clear that policymakers will be likely to be much more concerned about the BEPS phenomenon in Scenario 2 relative to Scenario 1. An analogous pair of scenarios can be constructed to illustrate the magnitude of BEPS that emerges from the alternative Dharmapala and Riedel (2013) approach (see Table 4).[16]

In the policy discourse described above, it would be common to point to the reporting of 40% of the MNC's income in L in Scenario 2 as *ipso facto* constituting BEPS activity. In the empirical literature, the aim is to identify the income shifting effect at the margin (i.e. for small changes in tax rates or in exogenous income), controlling for both observable and unobservable country-specific and affiliate-specific characteristics that may affect reported income, and using the standards for the credibility of evidence that are *de rigueur* in contemporary empirical economics. In contrast, the allocation of 40% of income to country L in Scenario 2 might be termed an "inframarginal" phenomenon. It is difficult to explain using the estimated elasticities –

[16] Suppose that $1 of income is exogenously added to the income of the affiliate based in H. Then, given the result in Dharmapala and Riedel (2013) that 2% of unexpected parent earnings are shifted, it follows in Scenario 1 that the income reported in H will increase to $90.98 while that in L will increase to $10.02. In Scenario 2, the income reported in H will increase to $60.98 while that in L will increase to $40.02.

for example, suppose that the average tax rate among nonhavens is 25% while that among havens is zero. Then, a semi-elasticity of 0.8 would (if it were possible to extrapolate from small changes in the tax rate) imply that 20% of income (rather than 40%) would be shifted to havens.

Does the large fraction of the net income of MNCs reported in havens reflect "inframarginal" income shifting that empirical analysis cannot detect, or does it have some other explanation? Hines (2010) attributes this pattern to the use by MNCs of holding companies located in havens. To illustrate this point, consider a US MNC that invests in France *via* a haven affiliate. It injects $1000 of equity into the latter, which lends the money to the French affiliate. The latter then uses the funds for active investment that generates a return of $100. If this $100 is paid as interest to the haven affiliate (and not subsequently repatriated to the US parent), then the haven affiliate will have $100 of net income (100% of the MNC's foreign income) while the French affiliate will have net income of zero (and 0% of the MNC's foreign income). Hines (2010) argues that value added (which equals sales minus the cost of inputs purchased, and excludes financial payments such as interest income or expense) is a more meaningful measure of the role of havens. Indeed, as shown in Column 6 of Table 2, the share of value added in havens is substantially smaller than the corresponding share of net income. Specifically, the share of value added in havens is 14.5% (this is somewhat larger but quite comparable to the figure reported by Hines (2010) for 2004).

Table 2 reports some evidence supportive of the Hines (2010) argument. The Netherlands does not appear on standard lists of tax havens and does not have a particularly low tax rate, but it is widely believed to be the location of a large number of holding companies owned by MNCs. The Netherlands shares with havens the same pattern of a much higher share of net income than of value added. This suggests that holding companies do indeed account for the large fraction of MNCs' net income reported in havens.

The question that follows from this is whether net (financial) income or value added is a better proxy for taxable income, bearing in mind that the BEPS phenomenon is fundamentally about the shifting of *taxable* income across borders. Even in the very simple example above of a US MNC investing in France *via* a haven affiliate, the answer will depend on a complex set of tax law provisions in France, the haven and the US. For example, ignoring residence country CFC rules, if the $100 interest payment from the French affiliate to the haven affiliate were fully deductible in France, then the haven affiliate's income would be $100 (of interest income) and the French affiliate's income would be zero. This would mirror the distribution of net financial income across the affiliates. On the other hand, if the capital injection from the haven affiliate to the French affiliate were to be structured as equity, then the $100 dividend payment would typically be nondeductible in France, while it would typically be exempt under the haven's tax rules. Thus, taxable income would be zero in the haven and $100 in France, which mirrors the distribution of value added across affiliates. If the capital injection takes the form of debt, but the deductibility of the interest payment in France is limited by thin capitalization rules, earnings stripping rules or other provisions, then the pattern of taxable income would typically fall somewhere in between the distributions of net income and value added.

Thus, the question of whether net financial income or value added provides a better guide to taxable income is complex. Proponents of the *ipso facto* approach have not generally provided evidence that net financial income is a good proxy for taxable income. In principle, this question can be investigated empirically, but would require more information on taxable income and tax payments than is typically available in the datasets that are widely used in the literature. The question is important, however, because if taxable income is reasonably represented by value added, then the fraction reported in havens (about 14% for US MNCs) would be quite consistent with the relatively small estimated magnitude of BEPS.

Even if taxable income is thought to be closely approximated by net financial income, this would in part be a consequence of the use of interest deductions, as in the example introduced above. While the use of debt may be partly tax-motivated, it cannot entirely be viewed as part of the BEPS phenomenon, if BEPS is understood as consisting purely of *cross-border* tax planning. After all, even purely domestic firms in high-tax countries have a stronger tax incentive to use debt than do purely domestic firms in low-tax countries. While the cross-border setting creates new opportunities for the strategic use of debt, the component of interest deductions that is common to both domestic-only firms and MNC affiliates does not seem to fall within the scope of the BEPS phenomenon as it is generally understood (for a discussion of the treatment of MNCs' interest deductions, see Desai and Dharmapala (2013)).

5.2) Some Directions for Future Research

One of the major themes that emerges from this survey is that in the more recent empirical literature, which uses new and richer sources of data, the estimated magnitude of BEPS is typically much smaller than that found in earlier studies. Yet, the newspapers are full of anecdotal evidence suggesting extensive income shifting among major MNCs. Consistent with a modest BEPS magnitude, but in tension with this anecdotal evidence, is the "stylized" fact noted earlier about the relative stability over time of corporate tax revenues in major economies (see e.g. Hines, 2007; Dharmapala, 2008; OECD, 2013a, p. 16).

How might we reconcile these apparently contradictory facts? Based on the relatively small marginal effects, we might posit that MNCs are rather less sensitive to taxes than was once believed. However, this would contradict the anecdotal evidence of extensive tax planning. In view of the latter, we might posit instead that MNCs have already shifted what income they can, and have reached the limits set by thin capitalization rules, transfer pricing regulations and other tax rules. Then, when tax rates change at the margin (or exogenous income is received) there would be limited scope for further shifting. However, this view is contradicted by the generally robust state of corporate tax revenues in high-tax jurisdictions such as the US and the EU.

So, the combination of observations described above is somewhat puzzling. However, one feature of MNCs' tax planning activities that has sometimes been remarked upon in the literature (but only rarely been the direct focus of study) is the considerable heterogeneity in the apparent tax sophistication of MNCs. For example, Desai, Foley and Hines (2006) report that in 1999, only 59% of U.S. firms with significant foreign operations had affiliates in tax haven countries. Dharmapala and Riedel (2013) report that only 58% of the affiliates in their Amadeus sample belong to multinational entities that include at least one affiliate in a non-European tax haven (such as those in the Caribbean). In other words, a surprisingly large fraction of MNCs do not have tax haven affiliates, a characteristic that might be seen as a fairly reliable indicium of tax planning activity.

The evidence on heterogeneity might perhaps be viewed as consistent with the existence of significant fixed costs of tax planning. If this is the case, then larger firms (or those expecting more benefits from planning) will incur the fixed cost. These firms will appear to be highly responsive to tax differentials, and will generate extensive anecdotal evidence of tax planning. Smaller firms will not incur the fixed cost and so will appear to be relatively unresponsive to taxes (and may forego even apparently obvious planning opportunities). There is some existing evidence that is consistent with this fixed costs view. For instance, Mills, Erickson and Maydew (1998) use data from a confidential survey about the tax planning practices of 365 large US firms. Consistent with the existence of fixed costs, tax planning expenditures are decreasing (as a proportion) in firm size. In addition, MNCs tend to invest more than domestic firms. Tax planning expenditures are also found to generate an extremely high rate of return, raising the puzzle of why more is not invested in this activity.

There is an extensive and growing literature across a number of disciplines that analyzes corporate tax avoidance. For instance, Desai and Dharmapala (2006) analyze the impact of corporate governance and executive compensation on tax avoidance activity. However, there is very little literature apart from Mills, Erickson and Maydew (1998) that is directly on the process and structure of corporate tax planning. Future research in this area may shed light on the apparent puzzles highlighted above.

Also highly relevant to these issues of heterogeneity and the structure of tax planning is evidence on whether or not MNCs generally operate at or near the current legal limits on BEPS activities. For instance, an example is provided by the thin capitalization rules studied by Buettner *et al*. (2012). These rules are typically specified in terms of a maximum threshold of internal debt to total capital that an affiliate must remain below in order to be permitted to deduct interest payments. However, if the threshold is exceeded, it is typically only the incremental interest expense that is disallowed. It might thus seem that if a country imposes a 0.6 debt ratio, all multinational affiliates should aim to maintain a 0.6 debt ratio.[17] Evidence on the extent to which firms operate at limits of this type, and on the heterogeneity in their behavior, would also provide valuable insights into the apparent puzzles highlighted above.

The example of thin capitalization rules discussed above raises the more general question of the importance of existing legal and economic frictions as constraints on BEPS. Another fruitful area for future research would be to model these frictions more precisely, and to explore how we might assess their implications for the efficiency of the current international tax regime and for proposed reforms.

6) Conclusion

The unprecedented attention currently being paid to the issue of base erosion and profit shifting creates new opportunities for reform. At the same time, it has become even more

[17] The descriptive statistics in Buettner *et al*. (2012) suggest that for the US, the mean total debt ratio (of internal plus external debt) is about 0.6, which is the limit imposed by the US earnings stripping rule. However, it is not clear that this pattern holds for other countries. This may, at least in part, perhaps be due to German CFC rules that tax low-taxed foreign passive income (such as interest received in a tax haven) at 25% (see Ruf and Weichenrieder (2009)).

important to understand the findings of the empirical literature on BEPS. This paper provides a survey of the empirical literature on tax-motivated income-shifting within multinational firms. Its emphasis is on clarifying what is known about the magnitude of BEPS. It introduces a simple conceptual framework that helps to clarify aspects of governments' responses to the BEPS phenomenon and the potential role of the OECD initiative. The paper then discusses different empirical approaches to the measurement of BEPS. A major theme of this survey is that in the more recent empirical literature, which uses new and richer sources of data, the estimated magnitude of BEPS is typically much smaller than that found in earlier studies. The paper provides a framework within which to conceptualize this magnitude and its implications for policy. It concludes by highlighting the importance of existing legal and economic frictions as constraints on BEPS, and discussing possible ways in which future research might model these frictions more precisely.

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Table 1: Payoffs of Countries A and B

		Country B	
		CFC Rule	No CFC Rule
Country A	CFC Rule	100, 100	90, 106
	No CFC Rule	106, 90	96, 96

Table 2: Location of US MNCs' Direct Investment *via* Majority-Owned Affiliates in 2011

	Total Assets	Net PPE	Cap. Exp.	Sales	Net Income	Value Added	R&D	Empl. Comp.	No. of Empl.
All countries	20699	1202	190	5969	1115	1445	46	536	11,785
% in Havens	32.2	11.1	8.8	21.8	42.6	14.5	10.1	7.3	4.9
% in the Netherlands	8.6	1.6	2.1	3.8	13.4	2.4	3.1	3.2	1.9

Note: Based on author's calculations, using aggregate country-level data for 2011 from the Bureau of Economic Analysis (BEA) obtained from the BEA website at www.bea.gov. "PPE" is plant, property and equipment; "Cap. Exp." is capital expenditures; "R&D" is research and development; "Empl. Comp." is employee compensation; "No. of Empl." is the number of employees. All monetary variables are reported in billions of US dollars, and the number of employees is reported in thousands. Havens are defined using the classification in Dharmapala and Hines (2009). Subsequent to that classification, the Netherlands Antilles was dissolved. The jurisdictions that were formerly part of the erstwhile Netherlands Antilles (Curaçao, Sint Maarten, and what the BEA terms "Netherlands Islands, Caribbean") are classified here in the same way that the Netherlands Antilles was classified in Dharmapala and Hines (2009).

Table 3: The Response of Reported Income to Tax Rates

		Scenario 1		Scenario 2	
		Income reported in H	Income reported in L	Income reported in H	Income reported in L
H tax rate	25%	90	10	60	40
	24%	90.7	9.3	60.5	39.5

Table 4: The Response of Reported Income to Parent's Income Shocks

		Scenario 1		Scenario 2	
		Income reported in H	Income reported in L	Income reported in H	Income reported in L
H Income	100	90	10	60	40
	101	90.98	10.02	60.98	40.02

A Comparison of the Tax-motivated Income Shifting of Multinationals in Territorial and Worldwide Countries

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Abstract

This paper tests for differences in the tax-motivated income shifting behaviors of multinationals subject to different systems of taxing foreign earnings. I find that, on average, multinationals subject to territorial tax regimes shift more income than those subject to worldwide tax regimes. The difference in shifting, however, is driven by a difference in the subset of shifting that involves the parent country; multinationals in the two groups appear to shift equally among their foreign affiliates. In additional tests, I find that, among the subsample of firms that can reinvest foreign profits in foreign growth, there is no difference in the shifting of the two groups.

Key words: income shifting, multinational, worldwide, territorial, exemption, credit, international tax

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I. Introduction

It is well documented that firms shift income across jurisdictions when they have a tax incentive and the ability to do so.[1] What is not yet known is whether the domicile of a multinational affects its propensity to shift income. Because countries tax the foreign earnings of their multinationals differently, the domicile of a multinational might affect its income shifting if the tax laws reduce the incentive or constrain the opportunity to shift. This paper tests for differences in income shifting based on cross-country variation in the taxation of foreign subsidiaries.[2]

Most studies of the effects of home country taxation of foreign earnings divide countries into two categories: territorial and worldwide. Territorial countries are those that generally exempt foreign income from home country tax. Worldwide countries are those that tax foreign income at the home country rate and allow credits for the foreign tax paid on the income.[3] Prior studies have shown that multinationals domiciled in territorial countries behave differently from those domiciled in worldwide countries along several dimensions: location of foreign direct investment (Hines 1996, Clausing and Shaviro 2011, Smart 2010), headquarter relocations (Voget 2011), and subsidiary location choices (Barrios et al. 2010).[4] However, to my knowledge, no one has tested whether companies from territorial and worldwide countries differ

[1] See Devereux and Maffini (2007) for a survey of this literature. More recent studies on the topic include Dischinger (2009), Dischinger and Riedel (2008), Klassen and Laplante (2011), and Dyreng and Lindsey (2009).

[2] There is no universally accepted definition of tax-motivated income shifting in the literature. In this study, I consider shifted income to be taxable income reported in a jurisdiction different from that in which it would be reported absent an action taken by management where a motive for the action taken is to reduce the overall tax burden of the multinational. Income can be shifted in many ways. The most common are through manipulation of the prices of intra-firm trades (transfer prices), location of debt, and location of intangibles. In this study, I do not address how the shifting is accomplished, but rather infer that income has been shifted based on deviation from an expected level of reported income.

[3] In reality, the worldwide/territorial classification is not straightforward. It is most accurately made at the country-pair level since several countries treat the income earned in different countries differently. For example, Canada exempts the income earned in countries with which Canada has a bilateral treaty and taxes income earned in all non-treaty countries. Canada is most commonly classified as a territorial country since most of its trade is with treaty countries, but income earned by Canadian multinationals in approximately 35% of the countries of the world is subject to Canadian tax. Of the 32 (19) territorial (worldwide) parent countries in my sample, 15 (7) tax (exempt) foreign income earned in at least one foreign country. For ease of exposition, I continue to classify parent countries based on their predominant system in the text, but classifications are made at the country-pair level for the empirical tests in the paper.

in their response to tax incentives and opportunities to shift income. This paper conducts such tests.

Understanding whether income shifting is more prevalent in territorial countries should be important to policymakers because the international landscape is changing; both Japan and the UK (representing approximately 9% and 5%, respectively, of global GDP) adopted territorial corporate tax systems in 2009, leaving the U.S. (28% of global GDP) as the sole member of the G8 taxing the worldwide active business income of its corporations.[5, 6] This shifting landscape has rekindled debates in the U.S. about whether it should adopt a territorial system. Conjectures about how such a change would affect income shifting by U.S. multinationals range from "it would become much, much worse" (Jane Gravelle, senior specialist in economic policy at the Congressional Research Service, quoted in Elliott 2010) to "it would not be a bigger problem" (John Samuels of General Electric Corporation, quoted in Taxes 2010).[7] Missing from these debates are empirical comparisons of the behaviors of multinationals subject to different international tax laws. This paper begins to fill that void.

The amount of income shifted by a multinational is assumed to be driven by the expected returns to the shifting and constrained by potential costs (e.g., agency, political, efficiency). As such, the observed income shifting of a multinational is determined by the interplay of its incentives, costs and constraints. Using a framework developed by Hines and Rice (1994) and a tax variable which captures the incentive and opportunity to shift income among all countries in which the multinational operates (Huizinga and Laeven 2008), I directly compare the income

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[4] It should be noted that several other studies (Slemrod 1990; Benassy-Quere et al. 2000; Altshuler and Grubert 2001; Hajkova et al. 2006) find no difference in the sensitivities to tax of the investments of the two groups.
[5] Because my study uses data from 2004-2008, Japan and the UK are worldwide countries in this paper.
[6] In a February, 2010 presentation, David Hartnett, Permanent Secretary for Tax, HM Revenue and Customs, said that three primary factors in the decision for the UK to switch to a territorial system were competitiveness, compliance burden, and anti-avoidance measures (Taxes 2010).
[7] John M. Samuels is Vice President and Senior Counsel, Tax Policy and Planning of General Electric Corporation. He made the remarks quoted in this paper at the Tax Council Policy Institute's 11th Annual Tax Policy & Practice Symposium in February, 2010 (Taxes 2010). I thank Mr. Samuels for sharing his notes with me and for subsequent discussions.

shifting of worldwide and territorial multinationals. To conduct my empirical tests, I use a comprehensive database containing both financial statement data for the years 2004-2008 and ownership data for multinationals domiciled in 34 countries and their subsidiaries domiciled all over the world.

Three main findings emerge from the study. First, multinationals in both groups engage in tax-motivated income shifting and territorial firms, on average, shift more income than worldwide firms. Second, the income shifting among foreign affiliates is no different across the two groups (i.e., they both do it at similar levels). Third, there is no difference in the shifting across the two groups among a subset of firms that are able to profitably reinvest foreign earnings in foreign operations.

The primary contribution of my paper is that it provides direct evidence of an association between income shifting and the taxation of foreign income in the parent's country. To my knowledge, this is the first study to identify and test a specific determinant of tax-motivated income shifting behavior. Prior studies have shown that income is shifted to save tax in different settings and by different means, but no study has documented specific factors that affect the degree of tax-motivated income shifting. My findings contribute needed empirical data to the ongoing debate about international tax policy, the relevance of which is underscored by the recent changes made by Japan and the UK and the increasing isolation of the U.S. in the international tax realm.

My paper also contributes more generally to a growing literature in international tax and financial accounting by including countries from many different regions in the same sample. Much of the existing literature that is grouped under the banner "international" uses samples consisting either of parents domiciled in one country only (predominantly the U.S.) and their foreign affiliates or of European parents and their European subsidiaries. My study is among the first to use more comprehensive data that allow some of the caveats on generalizability of results to begin to be relaxed.

The paper is organized as follows: Section 2 reviews the principles of the tax systems and the relevant prior literature, and develops hypotheses. Section 3 describes the research design. Section 4 describes the data. Section 5 presents the empirical findings. Section 6 describes robustness tests undertaken. Concluding remarks follow.

II. Background and Hypotheses

II.1 Systems of taxing earnings of foreign subsidiaries

Foreign earnings are taxed differently from domestic earnings because all countries adhere to two general principles. First, that the country in which the income is earned has the right to tax it. Second, that each dollar of income should be taxed only once. The territorial system avoids double-taxation by exempting foreign income from home country tax. The worldwide system avoids double-taxation by granting credits for foreign taxes paid which reduce the home country tax liability.

In order to understand how the differences between the two systems may affect income shifting behavior, it is necessary to understand the principles and mechanics of each system. A territorial parent receives dividends paid out of the after-tax earnings of its foreign subsidiary and pays no home country tax on those earnings.[8] The worldwide system is more complicated because it does not treat the income of each foreign subsidiary in isolation. The underlying premise of the worldwide system is that the multinational as a whole (i.e., parent and foreign

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[8] There is a subdivision within the territorial group, with some countries taxing 5% of foreign dividends upon repatriation and some fully exempting all foreign dividends. The countries that choose to tax 5% of the dividends (Belgium, France, Germany, Italy, Netherlands Antilles, and Switzerland) do so as a means to offset any expenses related to the foreign subsidiaries that are incurred and deducted from taxable income in the parent country. Most countries that fully exempt the dividends collect no tax related to the foreign earnings and thus forego any offset of lost revenues, but a small number (e.g., Australia, Hong Kong, and Singapore) impose limits on the deductibility of expenses based on the scale of foreign investment. In countries that tax 5% of foreign dividends, a parent receives dividends paid out of the after-tax earnings of its foreign subsidiaries, includes the non-exempt portion of the dividend in its taxable income, and does not receive a home country credit for the foreign income tax paid. For ease of exposition, I consider only the two extremes (fully exempt (territorial) and fully taxable (worldwide)) in this discussion.

subsidiary) should pay the same amount of tax (the sum of foreign and home country) that would be paid if the income were earned in the home country, regardless of where the income is earned.

Consider two multinational firms, T and W, identical except that T is domiciled in a territorial country, W in a worldwide country. Each has a home country tax rate of τ_P and owns one foreign subsidiary with a 0% tax rate. Both T and W shift \$$S$ of pretax income to their respective subsidiary, the subsidiary pays no tax and returns a \$$S$ dividend to its parent. T's dividend is exempt from home country tax, so T realizes savings from the shifting of \$$S * \tau_P$.[9] W includes \$$S$ in its taxable income, has home country tax payable of \$$S * \tau_P$, which is equivalent to the tax W would have paid if the income was not shifted, and W realizes no return on income shifting.

On the surface, it appears obvious that territorial firms have a greater incentive to shift income. However, this highly stylized example does not include the effects of two important aspects of the worldwide system, deferral and cross-crediting, which can blur the distinctions from the territorial system (Altshuler 2000; de Mooij and Ederveen 2003). Deferral refers to the provision that delays the liability for home country tax on the foreign earnings until they are repatriated as a dividend. Cross-crediting allows W to reduce its tax payable on foreign earnings if its foreign subsidiary in a second foreign country has paid tax at a rate higher than W's. Extending the example, if W had a second subsidiary with tax rate τ_H(where $\tau_H > \tau_P$) that earned \$$I$ in pretax income, that subsidiary would pay \$$I * \tau_H$ of tax, which is \$$I * (\tau_H - \tau_P)$ more than would have been paid at W's tax rate. Cross-crediting allows W to reduce its \$$S * \tau_P$ liability on the income shifted to the zero-tax subsidiary by \$$I * (\tau_H - \tau_P)$, the amount of the excess credit for the tax paid in the high-tax country. If the excess credit is greater than or equal

[9] This example assumes that the tax bases of the two countries are the same (i.e., that \$1 of taxable income shifted out of the parent results in exactly \$1 of additional taxable income being reported by the subsidiary). In reality, differences in tax laws across countries mean that income shifting does not always result in 1:1 differences in taxable income being reported in the two

to $\$S * \tau_P$, W saves $\$S * \tau_P$ (the same amount as the territorial parent, T) by shifting and any excess credit can be carried forward.

To complete the comparison to the territorial parent, if T also had a second subsidiary identical to the second subsidiary of W described above, that subsidiary would pay $\$I * \tau_H$ of tax and T would receive no relief for paying tax at a rate higher than its home country rate. As a result, the total tax to be paid on income earned in any given year by a territorial parent will simply be the sum of the tax payable in each of the countries in which it earns taxable income. The total tax to be paid on income earned by a worldwide parent, in contrast, will be the aggregate, after all credits are applied, of the foreign and home country taxes payable on the income. Precise calculation of the worldwide parent's total tax on income earned in a given year is also complicated by the fact that the home country portion may be payable many years after the income is earned.

It is important to note here that the financial reporting standards in worldwide countries parallel the income tax treatment if the earnings are deemed to be indefinitely reinvested in the foreign country. In other words, under APB 23 in U.S. GAAP (and IAS 12 in IFRS, FRS 19 in UK GAAP), the tax expense related to the home country tax on foreign earnings is not recorded until the dividend is paid and the cash tax payment is due. Concurrent theoretical research by Shackelford et al. (2011) and empirical research by Blouin et al. (2011) and Graham et al. (2010) shows that this financial accounting treatment affects the repatriation decisions of U.S. multinationals. These studies infer from their results that the financial accounting treatment of foreign earnings affects the incentives of U.S. multinationals and that this effect is incremental to the incentive effects related to cash taxes paid. These inferences are supported by anecdotal evidence as well. Referring specifically to APB 23, John Samuels stated, "let me assure you, for

countries. I am unable to capture such differences in the available data, so assume no differences in tax bases across countries. For simplicity, the example also ignores withholding tax on the dividend.

better or for worse, these accounting rules drive behavior" (Taxes 2010). In the context of my study, the financial reporting treatment of indefinitely reinvested foreign earnings will provide worldwide firms with incentive to shift income to lower-tax countries and defer repatriation as long as possible. To the extent that they are able to accomplish this, their financial statements will look the same as those of their territorial counterparts.

II.2 The effect of international tax systems on income shifting

Because cross-crediting and deferral can reduce the tax paid by a worldwide multinational on foreign income, it is not a given that the returns to shifting of a territorial parent are greater than those of a similar worldwide parent. Prior studies comparing the behaviors of worldwide and territorial firms have found mixed results. I consider these studies in a framework suggested by Devereux and Maffini (2007) which characterizes the choices of firms wanting to access foreign markets as a four-step decision process: 1. A choice between producing at home and exporting and producing abroad; 2. A choice of where to locate production; 3. A choice of the scale of investment; and 4. A choice of the location of profit. Several previous studies have compared the tax sensitivities of territorial and worldwide firms in the second and third steps. Slemrod (1990), Benassy-Quere et al. (2000), Altshuler and Grubert (2001), and Hajkova et al. (2006) find no difference in the location decisions of worldwide and territorial firms while Hines (1996), Wijeweera et al. (2007), Barrios et al. (2010), Clausing and Shaviro (2011), and Smart (2010) find that territorial firms are more sensitive to tax in their investment location decisions.[10]

In the fourth step (location of profit), several studies have shown that tax considerations have significant influence (Harris et al. 1993, Collins et al.1998, Klassen et al. 1993, among

[10] Other recent studies have made comparisons of worldwide and territorial firms in the context of organizational structure decisions. Voget (2009) finds that worldwide multinationals are more likely to relocate their headquarters in response to tax rate incentives than are territorial multinationals, while Huizinga and Voget (2009) find the parent firm is more likely to be located in the territorial country following the merger of a territorial firm and a worldwide firm.

many others). To my knowledge, however, no previous study has compared the profit location decisions of worldwide and territorial firms and it remains an open question whether they differ in their tax-motivated income shifting.

II.3 Hypotheses

If all else is held constant, a territorial firm will save at least as much cash tax as a worldwide firm by shifting taxable income to a jurisdiction in which it will face a lower tax rate. The deferral provision can result in a convergence of the savings of the two groups when the worldwide firm is able to delay dividend repatriation indefinitely. Cross-crediting can result in a convergence of the savings when the worldwide firm has excess credits because its income earned in low-tax jurisdictions will, in substance, be exempt from home-country tax due to the application of the excess credit. However, since these conditions for convergence are not always present, I predict that territorial firms, on average, shift more income than worldwide firms. This leads to the first hypothesis, stated in the alternative:

> H1: A multinational subject to a territorial tax regime shifts more income among its affiliates for tax reasons than does a similar multinational subject to a worldwide tax regime.

The deferral provision within the worldwide system delays the cash tax liability due on the active foreign earnings until they are repatriated to the parent as a dividend. To the extent that a worldwide multinational is able to reinvest shifted income in the foreign jurisdiction and delay repatriation indefinitely, it moves closer economically to its territorial counterpart. In supporting his opinion that transfer pricing pressures would not increase if the U.S. adopted a territorial system, John Samuels asserted that under the current (worldwide with deferral) system "…a [U.S.] company can always repatriate all or any portion of its foreign earnings at any time it chooses, with the only cost of the repatriation being the same U.S. tax that it would have had to pay had if it had not shifted the income outside of the U.S. in the first place… Simply put, it is economically rational for a company to always shift as much income offshore as possible because it gets the benefit of the time value of money and sometimes the accounting benefit." (Taxes 2010)

However, Mr. Samuels' line of reasoning assumes that cash constraints do not compel the company to undertake repatriations and that the funds can be put to productive use in the foreign country. If either of these conditions is not met and the shifted income will have to be returned to the parent country in the near future, the incentives for a worldwide firm to shift are reduced. Based on this reasoning, I state my second hypothesis:[11]

> H2: The difference in the tax-motivated income shifting of territorial and worldwide firms is decreasing in the ability of the parent to defer repatriation of dividends from foreign subsidiaries.

III Research design

III.1 Tests of Hypotheses 1 and 2

To test Hypotheses 1 and 2, I estimate various modifications of the following regression equation:

$$(1)\ LogPLBT_{it} = \beta_0 + \beta_1 TT_i + \beta_2 C_{it} + \beta_3 TT_i * C_{it} + \beta_4 LogASSETS_{it} + \beta_5 LogCOMP_{it} + \beta_6 LogGDPpc_{it} + \sum Parent\ fe + \sum Year\ fe + \varepsilon_{it}$$

where

$LogPLBT_{it}$	is the natural logarithm of earnings before tax reported on the unconsolidated financial statements of subsidiary *i* in year *t*.
TT_i	is an indicator variable equal to 1 if dividends paid by subsidiary *i* to its parent are either fully- or 95%-exempt from tax in the parent country; 0 otherwise.
C_{it}	is the measure of family-level tax incentive and opportunity derived by Huizinga and Laeven (2008) calculated as follows (see Appendix A for sample calculations):

[11] Ideally, I would test a similar hypothesis about the effect of being in an excess credit position on the income shifting of worldwide firms. Unfortunately, the data available to me do not allow me to calculate a reliable proxy for the foreign tax credit position of a firm and I am unable to conduct such tests. Grubert and Mutti (2001) use confidential tax return data of U.S. multinationals to compare the shifting of excess credit firms to excess limit firms within a worldwide country and find no difference in the shifting of the two groups. This finding mitigates concerns that my inability to separate worldwide firms in excess credit may reduce the validity of my tests.

$$C_i = \frac{1}{(1-\tau_i)} \frac{\sum_{k\neq i}^{n} \frac{B_k}{1-\tau_k}(\tau_i - \tau_k)}{\sum_{k=1}^{n} \frac{B_k}{1-\tau_k}}$$

where

τ_i is the statutory tax rate of subsidiary *i*.

τ_k is the statutory tax rate of subsidiary *k*, where *k* runs from 1 to *n*, where *n* is the number of subsidiaries controlled by the parent.

B_k is the true profits of subsidiary *k*. Revenue is used as a proxy.[12]

$LogASSETS_{it}$ is the natural logarithm of tangible fixed assets reported on the unconsolidated financial statements of subsidiary *i* in year *t*.

$LogCOMP_{it}$ is the natural logarithm of compensation expense reported on the unconsolidated financial statements of subsidiary *i* in year *t*.

$LogGDPpc_{it}$ is the natural logarithm of the per-capita GDP (in millions of U.S. dollars) of the home country of subsidiary *i* in year *t*.

Equation 1 is based on the empirical model developed by Huizinga and Laeven (2008), which begins with the premise that the profit reported by an entity is the sum of the true profit generated and any profit resulting from income shifting.[13] Because true profit is unobservable, it must be estimated. Following Hines and Rice (1994), Huizinga and Laeven (2008) assume a Cobb-Douglas production function and that true profit is equal to output minus the cost of wages. By taking the logarithms of both sides of the equation for true profit and substituting into their equation for reported profit, Huizinga and Laeven (2008) arrive at an estimation model that expresses reported income as a function of labor and capital inputs, a general productivity component, and a measure of tax incentive and opportunity. I modify their model by including an indicator variable and its interaction with the tax variable. The unit of observation is a subsidiary-year, so a significant coefficient on the interaction term, $TT_i * C_{it}$, can be interpreted as evidence that the response to tax incentive and opportunity is different if the ultimate parent of

[12] A more appropriate proxy for true income would be total assets since operating revenue can be shifted. Because operating revenue is available for more subsidiaries, I use it in my reported results and use total assets in sensitivity tests. Inferences are unchanged when total assets is used as the proxy for true income.

[13] To address potential concerns related to scale in Equation 1, I run all main tests using alternative specifications in which I scale all financial statement variables by total assets and by total revenue (i.e., I replace *LogPLBT*, *LogCOMP*, and *LogASSETS* with *PLBT/SCALAR*, *COMP/SCALAR*, and *ASSETS/SCALAR*, respectively). Inferences are unchanged when these specifications are used.

the subsidiary is domiciled in a territorial country than if the ultimate parent is domiciled in a worldwide country.

Consistent with prior studies, I use $LogCOMP$, $LogASSETS$, and $LogGDPpc$ as the proxies for labor input, capital input, and general productivity, respectively. I include parent-firm fixed effects in the model to control for any systematic differences in reported income across multinationals. I also include year fixed effects to control for differences across years.

III.1.1 Possible endogeneity of location decisions

It is possible that the location choices made by territorial multinationals are subject to different influences than those of worldwide multinationals. In the simple case of a firm currently operating in just one foreign country choosing which country to enter next, it is possible that a worldwide firm would consider the opportunities for cross-crediting and deferral that the second country will offer, while a territorial firm would not. To the extent that such systematic differences exist, the assumption in my research design that location choices can be taken as exogenous to the shifting opportunities may not be valid and the results may be biased. As mentioned previously, the extant literature examining differences in location choices of worldwide and territorial firms has produced mixed results, with as many papers finding that the international regime affects the choices as finding that it does not. What these prior papers all agree on is that the tax effects, when present, have a lower-order influence and that location decisions of all multinationals are driven by market-related factors. Given these mixed results, I acknowledge the possible bias in the results and proceed with the assumption that location choice is exogenous to the shifting behavior.

III.2 Tax variable

Equation 1 states that the level of pretax income reported in a country is a function of the capital, labor and productivity inputs and the tax incentive to shift income into or out of the country. As the tax incentive to shift income, I use the measure developed by Huizinga and Laeven (2008), C, which captures the incentive to shift income among all countries in which the global ultimate owner operates, subject to constraints on the shifting.[14] C is derived theoretically under three assumptions: that global after-tax profit of the multinational is maximized, that the cost of shifting is increasing in the ratio of the shifted profit to true profit in the country, and that shifting costs are tax-deductible. The costs of shifting are assumed to be those incurred to modify books and/or real investment and trade patterns in order to substantiate the transfer prices to tax authorities. The assumption that these costs are increasing in the ratio of shifted income to true income is a common one (Hines and Rice 1994) and relies on the simple premise that it is easier to hide $1 in $100 than it is to hide $1 in $10.

There are three components of the total tax on the income of a foreign subsidiary: host country income tax, host country withholding tax, and home country income tax. Host country income tax is paid on all income of the subsidiary as it is earned. Withholding tax is paid when a dividend is paid to the foreign parent and is generally creditable against home country tax payable on the income. Home country tax, if any, is paid when a dividend is received and is potentially avoided if the parent has excess foreign tax credits available.

In order to know which tax rate is relevant for a given entity (and, therefore, should be used as the input to C), I would need to know the domicile of its immediate owner and its dividend repatriation plans. Because I am not able to determine either of these from the available data, I am forced to make assumptions and apply them to all entities in the sample. If I assume that all income was repatriated as a dividend as soon as it was earned, I would include the sum of the host country rate and the withholding rate for territorial firms and the home country rate for worldwide firms. If I assume, at the other extreme, that all repatriations are

[14] Most studies prior to Huizinga and Laeven (2008) used a rate difference between the parent and subsidiary country as the proxy for incentive to shift income, thus ignoring both the opportunities to shift among subsidiary countries and the constraints

deferred indefinitely, the relevant rate for all entities is simply the host country rate (since the net present values of future withholding and home country taxes are assumed to be zero). Both tractability and anecdotal evidence suggest that the second option, an assumption of indefinite deferral, is the appropriate one.[15] As such, the rate that enters the calculation of C for each entity is its statutory income tax rate on corporate income.

Appendix A presents examples of how C is calculated and how it varies with its inputs and from simple rate differences. To convey its basic concepts, I provide a simple example here. Consider two multinationals, M1 and M2, both domiciled in Country X (tax rate 40%) with subsidiaries in Country Y (tax rate 20%) and Country Z (10%).[16] Clearly, the rate incentive for both M1 and M2 is to shift as much income from X and Y into Z. Next, assume that both M1 and M2 have exactly $100 of global true income, and that M1's is allocated 70/20/10 among X/Y/Z while M2's is allocated 10/20/70. With no shifting, M1 will pay $33 in tax ($28 to X + $4 to Y + $1 to Z) and M2 will pay $15 ($4 + $4 + $7), so it may appear that M1 has more incentive to shift income from X to Z than M2 does. However, that is not the assumption made by Huizinga and Laeven (2008). Rather, they assume that M1 and M2 have the same rate incentive because both will save $0.30 in tax for each dollar they can shift from X to Z. However, their opportunities to shift (and, from a different perspective, the costs of shifting) will differ because their allocations of true income differ.

In the simple example given above, it will be more costly for M2 than for M1 to shift $1 out of X (1/10 > 1/70), but it will be more costly for M1 to shift $1 into Z (1/10 > 1/70). The calculation of C_X, however, reflects both the costs of shifting out of X and the costs of shifting

on shifting.

[15] Current estimates of the aggregate indefinitely reinvested foreign earnings of U.S. multinationals are over $1 trillion, an increase of 70% since 2006 (Drucker 2010). In reality, all returns to shifting for worldwide firms come from deferral, so an assumption of immediate repatriation would not be reasonable.

[16] With no constraints on shifting, M1 and M2 would both shift all income out of X and Y into Z. However, laws and enforcement mechanisms as well as costs related to the shifting itself will constrain the shifting.

into whichever country will receive the shifted income. It is the interplay of these costs with the rate differences that determines the magnitude of each C. In this simple example, C_X is equal to 0.09 for M1, while C_X is equal to 0.40 for M2.[17] Both have a positive sign, which reflects the incentive to shift income out of X because it has the highest rate. M1's C_X is lower because it is assumed to be more costly to shift \$1 from high-tax to low-tax when there is only \$10 of true earnings in the low-tax country. From the other angle, M2's C_X is higher because it is assumed to be easier (i.e., less costly) to move \$1 from high-tax to low-tax when there is already \$70 of true earnings there.

Looking at the low-tax countries, M1's C_Z is equal to -0.27 and M2's is equal to -0.07. In this case, M1 has a higher magnitude because it is assumed to be less costly to shift \$1 from high-tax to low-tax when there is \$90 of true earnings in the high-tax countries than when there is \$30. For completeness, M1's C_Y is equal to -0.18 and M2's is equal to 0.05. This demonstrates that, holding rate incentive constant, changes in the allocation of true income can switch a subsidiary from positive (expected to shift out) to negative (expected to receive shifted income).

III.3 Decomposition of the tax variable

The home country of the parent is presumed to be the final destination of all income earned by a multinational since it is the shareholders of the ultimate owner that are entitled to them. The tax measure, C, is calculated for each subsidiary by taking into account what other countries income could be shifted from or to and treats the parent's home country no differently from any other country. Acknowledging that the parent country likely plays a unique role in income shifting, Huizinga and Laeven (2008) propose a decomposition of C into two parts, that related to the parent country and that related to all other foreign countries. These two

[17] $\frac{1}{(1-0.4)}\frac{\frac{20}{1-0.2}(0.4-0.2)+\frac{10}{1-0.1}(0.4-0.1)}{\frac{70}{1-0.4}+\frac{20}{1-0.2}+\frac{10}{1-0.1}} = 0.09\ ;\ \frac{1}{(1-0.4)}\frac{\frac{20}{1-0.2}(0.4-0.2)+\frac{70}{1-0.1}(0.4-0.1)}{\frac{10}{1-0.4}+\frac{20}{1-0.2}+\frac{70}{1-0.1}} = 0.40$

components, which I call C^{parent} and $C^{foreign}$, respectively, replace C in Equation (1) to create Equation (2):

$$(2)\ LogPLBT_{it} = \beta_0 + \beta_1 TT_i + \beta_2 C_{it}^{parent} + \beta_3 C_{it}^{affiliate} + \beta_4 TT_i * C_{it}^{parent} + \beta_5 TT_i * C_{it}^{affiliate}$$
$$+\beta_6 LogASSETS_{it} + \beta_7 LogCOMP_{it} + \beta_8 LogGDPpc_{it} + \sum Parent\ fe + \sum Year\ fe + \varepsilon_{it}$$

where

C_{it}^{parent}	is the measure of tax incentive and opportunity of subsidiary *i* vis-à-vis the parent country.
$C_{it}^{affiliate}$	is the measure of tax incentive and opportunity of subsidiary *i* vis-à-vis the non-parent countries in which the ultimate owner also has subsidiaries.

and all other variables are as defined previously.

When Huizinga and Laeven (2008) include the two components of in their model, they find that the coefficient on C^{parent} is statistically significant while that on $C^{affiliate}$ is not.[18] Estimating Equation (2) on my multi-year sample will allow me to determine if there are systematic differences between the responses of the two groups to the parent- and affiliate-related tax incentives.

III.4 Alternative research design

Because Japan and the UK changed from worldwide to territorial systems in 2009, the possibility may exist to test for differences in the shifting of their multinationals before and after the change in an event study framework. Unfortunately, useful data for such a study are not yet available because both countries continue to iron out the details of their new international tax regimes. As such, it is expected that the behavioral responses of firms will be delayed until there is a stronger sense that the transitions are complete. Other current working papers (Egger et al. 2012, Maffini 2012) in the area have reached the same conclusion.

IV Data

IV.1 Financial statement and ownership data

Financial statement and ownership data are taken from the Orbis database maintained by Bureau van Dijk. The ownership data are static as of the most recent report date, which is 2008 in most cases. The financial statement data are from annual financial statements for the years 2004 – 2008.

Global Ultimate Owners

Orbis identifies a firm as a Global Ultimate Owner (GUO) if it controls at least one subsidiary and is itself not controlled by any other single entity. I begin creating my sample with a list of all GUOs in the database. I then create a list of subsidiaries that are identified as being ultimately controlled by each GUO in the sample.[19] For each subsidiary, I obtain its country of domicile and all needed financial statement variables.[20]

Aggregation

Organizational structure can vary widely among multinationals. For example, one firm may choose to operate through one subsidiary in each country while an otherwise similar firm may choose to use multiple subsidiaries in each country. Or one firm may choose to own all of its subsidiaries directly while a similar firm may have more complex ownership structures. To enable comparisons across all possible structures, I aggregate all subsidiaries controlled by the same GUO at the country level.[21] For ease of exposition, I continue to refer to these aggregated groups as subsidiaries throughout the remainder of the paper. The corporate group to be studied,

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[18] Their sample is limited to European parents and is dominated by territorial parents.

[19] A subsidiary is considered ultimately controlled by the GUO if all links in the ownership chain between it and the GUO have ownership percentages greater than 50%. As such, subsidiaries of all levels are included in the sample. For example, if GUO A owns 100% of B and B owns 75% of C which owns 25% of D, B and C would be counted as ultimately owned by A while D would not.

[20] In Orbis, the country of domicile is based on the primary trading address of the firm. The country of incorporation is also available in the data. In my sample, there are no observations for which the country of primary trading address and country of incorporation are different.

[21] A subsidiary-year is included if it has unconsolidated data for all variables in Equation 1 and it is not in a service, financial, or insurance industry. These industries are excluded on the assumption that the empirical model of true income is not well specified for them. When these industries are included in the sample, inferences remain largely unchanged.

then, consists of a GUO and the portfolio of countries in which it has controlled subsidiaries and income shifting is presumed to be possible among all members of the group.[22]

All financial statement variables are summed by country since they are drawn from unconsolidated statements. Per capita GDP is obtained from the website of the World Bank.

IV.3 Sample

To ensure consistency across specifications, I restrict the main sample to subsidiary-years which have values for all three tax variables (C, C^{parent}, and $C^{affiliate}$). Because only foreign subsidiaries can have a value for C^{parent} and $C^{affiliate}$, this restricts the main sample to foreign subsidiaries. This is consistent with the approach taken by Huizinga and Laeven (2008). Table 1 provides descriptive information about the countries involved in the study. Panel A contains summary information and Panels B and C contain more detailed information about the distribution of observations. The first and second columns of Panel A report the statutory tax rate (which includes sub-national income tax for a representative firm in the country – for example, the U.S. rate of 40% is comprised of the 35% federal rate and the 5% rate of a firm in New York State) for 2004 and 2008, respectively. There was a general downward trend in rates over the sample period, with the most significant decreases coming in Austria (9 percentage points), Bulgaria (10), Germany (7), The Netherlands (9), and Switzerland (8). The U.S. is among a group of 16 countries that had no change in their rate over the 5 years.

The third column (Parents) reports the number of parents (ultimate owners) domiciled in each country that control at least one sample subsidiary and the fourth column (Parent-years) reports the number of observations that those parents contribute to the sample used in the main tests in the paper. The U.S. leads the way with 622 parents contributing 7,808 observations,

[22] In additional untabulated tests, I use the total ownership percentage that the GUO has in the subsidiary rather than relying on the links within Orbis and include only subsidiaries with various minimum ownership percentages. The percentages tested are 100%, 90%, 70% and 60%. Inferences from these tests are not different from those reported.

followed by Germany (228 and 3,359), France (173 and 3,267), and Japan (293 and 3,089). 34 countries contribute to the sample, with 16 of those being represented by more than 10 parents.

The next two columns (Sample subsidiaries and Sample subsidiary-years) report the number of subsidiaries domiciled in each country and the number of subsidiary-years that those subsidiaries contribute to the sample, respectively.[23] The UK leads the way with 1,338 subsidiaries contributing 3,851 observations, followed by France (1,150 and 3,525), Spain (949 and 2,762), Italy (786 and 2,599), and Germany (974 and 2,584).

The final two columns (Common-parent subsidiaries and Common-parent subsidiary-years) report the number of subsidiaries and the number of subsidiary-years, respectively, for which a value for C was calculated (i.e., contributed to the calculation of C for the sample observations). Here, the UK once again leads the way with 3,466 subsidiaries contributing 14,235 observations, followed by France (2,207 and 9,744), the U.S. (3,291 and 8,941), and Germany (2,012 and 7,124).

It is important to understand both the difference and the interplay between the sample subsidiaries and the common-parent subsidiaries. The only reason that the two differ is data availability: for a subsidiary to be a sample subsidiary, it requires data for pretax income, compensation expense, and tangible fixed assets, but to be a common-parent subsidiary, it only requires data for operating revenue. Operating revenue is the most highly-populated variable in the Orbis data. This explains why there are nearly four times as many common-parent subsidiaries as there are sample subsidiaries in the UK. It also explains why there are no sample observations in the U.S. (as well as Canada, Hong Kong, Singapore, and others). The lack of sample observations in the U.S., while not ideal, does not render the results of the tests useless for informing U.S. policy. Far from it, in fact. Because the coverage for the operating revenue

[23] As noted previously, a "subsidiary" refers to the aggregate of all entities in the same country with a common ultimate owner.

variable is so much more complete, 3,291 U.S. subsidiaries contribute to the calculation of C for the sample subsidiaries controlled by common parents. This makes the calculation of C much more accurate for the sample subsidiaries than if only sample subsidiaries were used in the calculation of C; because C is intended to capture the incentive and opportunity of the subsidiary to shift income in or out, having its full opportunity set included in the calculation is clearly superior to the alternative.

IV.1.1 Example of data

Perhaps the best way to understand how the common-parent subsidiaries contribute to the completeness of the sample data is to look at a simple example. PARCO, a global ultimate owner, is domiciled in France. It has 11 subsidiaries distributed across four countries as follows: five in France, three in The Netherlands, two in the U.S., and one in Bermuda. The unconsolidated financial statements of PARCO are also available, meaning there are 12 entities in total. The entities in France and The Netherlands report pretax income, tangible fixed assets, and compensation expense. The two subsidiaries in the U.S. report only operating revenue, and the subsidiary in Bermuda reports no financial statement data. The six (parent plus five subsidiaries) companies in France are aggregated into $\text{PARCO}_{\text{France}}$, the three in The Netherlands are aggregated into $\text{PARCO}_{\text{Netherlands}}$, and the two in the U.S. into PARCO_{US}. The subsidiary in Bermuda is $\text{PARCO}_{\text{Bermuda}}$.

The main tests in the paper include only foreign subsidiaries, meaning PARCO would contribute just 5 observations to the sample ($\text{PARCO}_{\text{Netherlands}}$ in each of the five years). However, the value of C for $\text{PARCO}_{\text{Netherlands}}$ each year will reflect information from 3 of the 4 countries in which PARCO operates; PARCO_{US} is included as a common-parent subsidiary when C is calculated for $\text{PARCO}_{\text{France}}$ and $\text{PARCO}_{\text{Netherlands}}$. $\text{PARCO}_{\text{Bermuda}}$ is not involved in these calculations because it does not report operating revenue, the variable used as the proxy for true income.[24] If the calculation of C were restricted to include sample subsidiaries only, its value for $\text{PARCO}_{\text{Netherlands}}$ would reflect information from only 2 of the 4 countries in its opportunity set.

Panels B and C of Table 1 report the distribution of sample observations and common-parent observations, respectively, across subsidiary countries by parent country. The total number of observations of each, reported in the top left cell of each panel, reinforce the importance of inclusion of the common-parent subsidiaries: there are 31,374 sample observations and 119,976 common-parent observations, a ratio of close to 1:4. Looking first at Panel B, the column on the far right (United States) reports that 1% of the 7,808 observations that have a U.S. parent are in Austria, 7% are in Belgium, 12% are in France, and 16% are in the UK. The corresponding column in Panel C reports that 1% of the 28,424 common-parent observations that have a U.S. parent are in Austria, 4% are in Belgium, 8% are in France, 14% are in the UK, and 12% are in the U.S.

IV.2 Classification of subsidiaries

To determine the effect of foreign dividend taxation on income shifting, I would ideally use a continuous variable equal to the percentage of dividends that are taxed. However, countries have clustered into two groups (territorial and worldwide), denying me the opportunity to use a continuous experimental variable.[25] A subsidiary is classified as territorial if its dividends would be either fully- or 95%-exempt from home country tax if paid directly to its

[24] An alternative version of C which relaxes the assumption that the costs of shifting are proportional to the ratio of shifted income to true income and sets true income to 1 for all subsidiaries is proposed by Huizinga and Laeven (2008) and used in robustness checks. I calculate such a version of C for all sample observations and rerun all the tests in the paper using it. Inferences are consistent with those reported.

[25] The only countries of which I am aware that do not either fully exempt, exempt 95%, or fully tax foreign income are Belarus (which taxes 62.5% of dividends from all countries), Czech Republic (which taxes 62.5% of dividends from most non-European countries and exempts dividends from most European countries), Israel (which taxes 81% of dividends from all countries except Singapore and The Netherlands, dividends from which are exempt), and Pakistan (which taxes 54% of dividends from all countries).

Global Ultimate Owner. A subsidiary is classified as worldwide if its income is fully taxable in the country of the GUO.[26]

Summary statistics for the sample are reported in Table 2. Panel A reports the number of observations, mean, median, maximum, minimum and standard deviation for the regression variables for the full sample divided into two subsamples: territorial and worldwide. Panel B reports the means by country of domicile of the subsidiary. Panel C reports the means by country of domicile of the parent.[27]

Panel A shows that the sample is made up of 17,334 territorial subsidiary-years controlled by 1,312 parents, and 14,040 worldwide subsidiary-years controlled by 1,218 parents. The worldwide subsidiaries are larger, on average, than those in the territorial group, but, while the mean values of each variable are statistically different, the distributions are largely similar. It is expected that the median value of C should be close to zero since it is a weighted average of bilateral tax differences within a corporate group. The range of C in my sample (-0.35 to 0.40) is consistent with that in Huizinga and Laeven (2008) (-0.43 to 0.53).

Panel B of Table 2 reports the means of the variables grouped by subsidiary country. The first column (N) reports the number of observations and confirms that the sample is dominated by European subsidiaries. The second column (# parent countries) reports the number of different countries parents from which have subsidiaries in the given country. For example, the 397 Austrian observations are from subsidiaries which are owned by parents in 18 different countries. The column %Worldwide reports the percentage of subsidiaries in the given country

[26] Under this classification system, a subsidiary in Malaysia that is controlled by a firm in the Netherlands (a territorial country) which is itself controlled by a U.S. (worldwide) GUO would be classified as worldwide even though its dividends, when paid directly to its immediate parent in the Netherlands, would be exempt from tax. This assumption is necessary because corporate structures can vary widely across multinationals. In the sample, 90.1% of the subsidiaries that get aggregated together are controlled directly (i.e., with no third country between the GUO country and the subsidiary country). When tests are run using only these subsidiaries, inferences are unchanged.

[27] Countries are not included in Panel B if they have fewer than 50 observations. All observations are included in Panels A and C and in all regressions unless otherwise noted.

that are owned by GUOs domiciled in worldwide countries. The final seven columns report the means of the regression variables for each country.

Panel C of Table 2 reports the means of the variables grouped by parent country. In this panel, the second column reports the number of parents (i.e., Global Ultimate Owners) domiciled in the given country having subsidiaries in the sample. For example, the first row reports that 21 different Austrian GUOs have a total of 352 subsidiary-years in the sample.

V Results

V.1 Tests of Hypothesis 1

To establish consistency with prior results, I first estimate Equation 1 on the main sample (foreign subsidiaries having values for C, C^{parent}, and $C^{affiliate}$) without the indicator variable (TT) and interaction term ($TT * C$). Table 3, Model 1 presents the results. The coefficient estimates on the labor, capital, and productivity proxies and the tax variable, C (-0.94), are similar to those estimated in other studies using U.S. data only (Blouin et al. 2010) and European data only (Huizinga and Laeven 2008) from different time periods.[28]

Models 2 and 3 in Table 3 present the results of estimating Equation 1 on the territorial and worldwide subsamples, respectively. In Model 2 (territorial subsample), the estimate of the coefficient on C is negative (-1.23) and significant, while in Model 3 (worldwide), it is smaller in magnitude (-0.62), but also highly significant. Since C is calculated such that a negative value indicates a tax incentive to shift income in to the subsidiary, a negative coefficient is interpreted as tax-motivated income shifting. In Model 4, the estimate of the coefficient on $TT * C$ is

[28] To control for the effect of outliers, I use robust regression, which uses an iterative approach to assign weights to each observation. Observations that are assigned a zero weight are not included in the final regression. This results in small variations in the N reported in different models using the same sample.

negative (-0.53) and significant, meaning that territorial subsidiaries shift more income than worldwide subsidiaries, all else equal.[29]

In terms of economic magnitude, the estimate of the coefficient on C of -0.65 in Model 4 indicates that as a worldwide subsidiary's tax incentive goes from 0.1 to 0.2 (i.e., its incentive to shift out becomes greater), the natural log of its pretax income (in thousands of U.S. dollars) will decrease by 0.065. At the mean $LogPLBT$ of 8.22, this translates into a reduction in reported income of \$235,000 (from \$3,714,000 to \$3,479,000), or 6.3%. The estimate of the coefficient of $TT * C$ of -0.53 indicates that as a territorial subsidiary's tax incentive goes from 0.1 to 0.2, the natural log of its pretax income will decrease by 0.118 (-0.065 + -0.053 = -0.118). At the mean $LogPLBT$ for territorial firms of 7.61, this translates to a reduction in pretax income of 11.1% (\$254,000).

Model 5 of Table 3 reports the results when the sample is increased to include all observations that have a value for C (i.e., does not require the observation to have values for the two components). This adds nearly 14,000 more observations, most of which are the domestic components of the corporate family. When this larger sample is used, the coefficient estimate on C increases in magnitude to -0.73 and the estimate of the coefficient on the interaction term decreases to -0.26 and remains highly statistically significant.

On the surface, these results provide a clear answer to the primary question of the study: territorial multinationals shift more income than do worldwide multinationals with the same tax incentives and opportunities. The difference is both statistically and economically significant.

Before proceeding to the tests of Hypothesis 2, I investigate whether the two groups demonstrate different patterns in their shifting by repeating the above tests using Equation (2), which uses the parent- and affiliate-related components of C rather than the aggregate. Results

[29] Recall that TT is an indicator variable equal to 1 if the global ultimate owner of the subsidiary in the observation would be

are presented in Table 4. Model 1 reports that, in the full sample, both components obtain statistically significant negative coefficients, indicating that, on average, multinational firms shift income both among foreign affiliates and between parents and foreign affiliates. The coefficient on $C^{affiliate}$ (-1.12) is slightly larger in magnitude than that on C^{parent} (-0.85). Because C is the sum of $C^{affiliate}$ and C^{parent}, it is not surprising that the components straddle the estimate for C in Model 1 of Table 3 (-0.94).

Model 2 of Table 4 reports the results using the subsample of territorial firms only. As in Model 1, the coefficient estimates on both $C^{affiliate}$ and C^{parent} are negative and significant. In Model 3, which uses the subsample of worldwide firms, both coefficient estimates are negative, but only that on $C^{affiliate}$ is statistically significant (-0.83). The lack of statistical significance on the estimate of the coefficient on C^{parent} indicates that, in the subsample of worldwide parents, more of the shifting occurs among foreign affiliates than between parents and affiliates.

Model 4 again uses the full sample and adds interaction terms to determine if the estimates in Models 2 and 3 are statistically different from one another. The estimate of the coefficient on $TT * C^{affiliate}$ is small (0.02) and insignificant, indicating that there is no difference in the shifting among foreign affiliates between the two groups. Not surprisingly, given the results in Models 2 and 3, the estimate on $TT * C^{parent}$ is large (-1.35) and strongly significant.

The results presented in Table 4 add some nuance to the results of the tests of Hypothesis 1. While it is true that, consistent with the hypothesis, territorial firms shift more income for tax reasons than do worldwide firms, the overall difference appears to be driven by a difference in

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exempt from home country tax on the subsidiary's income if the dividend were paid directly from the subsidiary to the GUO.

the shifting which involves the parent country and there is no evidence of a difference in the shifting among foreign affiliates.

V.4 Tests of Hypothesis 2

My second hypothesis states that the difference in the tax-motivated income shifting of territorial and worldwide firms is decreasing in the ability of the parent to leave the income in the foreign country. This prediction is based on the assumption that worldwide firms have more incentive to shift income when the shifted income can be productively reinvested abroad (and thus defer the home country tax liability) while territorial firms' incentive is unrelated to what happens to the income after it is shifted. Unfortunately, a firm's ability to defer repatriation of foreign dividends is not directly observable in the data and must be approximated. To test Hypothesis 2, I use foreign reinvestment opportunities as the proxy for the ability to defer repatriation of dividends.

V.4.1 Foreign reinvestment opportunities

To estimate the relative foreign reinvestment opportunities for each subsidiary-year, I calculate the asset growth of the foreign subsidiary (where, as in previous tests, all entities within a country are aggregated into one "subsidiary") and the asset growth of the consolidated parent.[30] Assets are defined as total assets less cash. I then take the difference of these two growth rates. A positive difference (foreign – consolidated) indicates that asset growth is higher in the foreign country than for the multinational in aggregate, which should indicate that foreign reinvestment opportunities in that country are higher. For the tabulated tests, I use the contemporaneous asset growth because it preserves the most observations.[31]

[30] As an alternative, I use the asset growth of the parent's domestic holdings in place of the consolidated growth rate and consistent with those reported. Unfortunately, domestic data is unavailable for many companies, resulting in a loss of over 10% of the sample. The lost observations are predominantly worldwide observations, which makes it more difficult to attribute results to reinvestment opportunities without concern that changes in sample composition may also explain them.

[31] In untabulated results, I use lead and lag growth and inferences are consistent.

Using the calculated asset growth, I sort observations within parent countries and years into quintiles. I then code an indicator variable, $GROWTH$, which is set equal to 1 if the relative asset growth is in the top 2 quintiles. To test H2, I then estimate Equation (1) on the high- and low-growth subsamples as well as including $GROWTH$ in Equation (1) and interacting it with the variables of interest. Results are presented in Table 5.

Before moving to the tests of the hypothesis, I first estimate Equation (1) without the growth variable on the new sample. Because calculating growth rates requires two years of data, and because the variables needed to calculate them are less populated than the variables in Equation (1), the sample size is reduced to 21,892. However, the proportion of worldwide and territorial observations remains consistent with that in the main data (12,020 are territorial, 9,872 are worldwide). Model 1 shows that, using this new sample, the estimate of the coefficient on C is -0.71 and that on $TT * C$ is -0.52. Both of these are consistent with the estimates reported in Model 4 of Table 3, mitigating concerns that the change in sample may be driving results.

To test Hypothesis 2, which predicts that worldwide firms will shift as much as territorial firms when they have the ability to defer repatriation, I first split the sample into high- and low-growth observations. Model 2 of Table 5 reports the results of estimating Equation (1) on the high-growth subsample. Consistent with the prediction, the coefficient on $TT * C$ is not statistically different from zero, indicating no difference in shifting between the two groups in this subsample. Model 3 reports that the coefficient on $TT * C$ is negative (-0.56) and significant in the low-growth subsample.

Model 4 reports the results when the full sample is used to estimate the model when it is augmented to include an indicator variable, $GROWTH$, which is equal to 1 for high-growth observations. The coefficient of interest in this model is that on the interaction term, $TT * C * GROWTH$, as it indicates whether there is a statistical difference in the shifting of worldwide and territorial firms when reinvestment opportunities are high. The estimate of the coefficient is not statistically different from zero, consistent with the prediction of H2.

Table 6 reports results analogous to those reported in Table 5, but with the tax variable disaggregated into its affiliate- and parent-related components. Model 2, which uses the high-growth subsample, reports an insignificant coefficient on the interaction $TT * C^{affiliate}$, indicating no difference in the non-parent-related shifting of the two groups. Of course, that coefficient was not significant in the full sample to begin with. The coefficient on $TT * C^{parent}$ is estimated to be negative, but is just marginally significant. Model 4 includes the full sample and introduces the $GROWTH$ indicator variable and interaction terms. The coefficient estimates on both $TT * C^{affiliate} * GROWTH$ and $TT * C^{parent} * GROWTH$ are not statistically significant, indicating that the shifting by the two groups is not different in either dimension when foreign reinvestment opportunities are high.

Taken as a whole, the results of the tests of Hypothesis 2 support the conclusion that worldwide firms with the opportunity and ability to leave shifted earnings abroad indefinitely shift as much income as their territorial counterparts. These tests show that the differences between the average firms in the two groups identified in the main tests are driven by differences in the subsamples of firms facing weaker foreign reinvestment opportunities.

VI Robustness tests

To determine if results are sensitive to choices and assumptions that were made in designing and implementing the empirical tests in the paper, I run a number of robustness checks.

VI.1 Individual countries

As reported in Table 2, Panel C, the territorial subsample is dominated by subsidiaries controlled by parents in France, Germany, and Sweden and the worldwide subsample is dominated by subsidiaries controlled by parents in Japan, UK, and U.S. While the inclusion of parent fixed effects in all of the models mitigates concerns that results are being driven by uncontrolled country-level effects, it remains interesting to know how the empirical results vary across countries when single-country subsamples are used. Table 7 reports the results, with Panel A using the aggregated tax variable and Panel B using the disaggregated components. Each column reports the results when the sample is restricted to those subsidiary-years that have an ultimate owner domiciled in the respective country.

Looking first at Panel A, the first model is a repetition of Model 1 in Table 3 and is included for comparative purposes. The remaining models show that C obtains a negative coefficient estimate in all countries, that the magnitudes vary around the estimate for the full model of -0.94, and that the estimate for Japan is not statistically significant. The results reported in Panel B are more varied. Two of the territorial countries, France and Germany, report insignificant coefficients on $C^{affiliate}$ and large negative coefficients on C^{parent}, two of the worldwide countries, Japan and the U.S., report negative coefficients on $C^{affiliate}$ and insignificant coefficients on C^{parent}, and one territorial country, Sweden, and one worldwide country, the UK, report negative and significant coefficients on both components. These results, while interesting in their own right, do not threaten the validity of the results in the paper since there is variation in the shifting behavior within each of the two groups being compared.

VI.2 Controlled Foreign Corporation Rules

The main variable of interest in the tests described in Table 3 is the interaction of the territorial indicator variable (TT) and the tax variable (C). The fact that TT is a country-level variable is problematic if it is correlated with other factors that could also explain variation in reported income. Most countries impose restrictions on their multinationals intended to limit their ability to avoid tax in abusive ways. The most common such restriction is a controlled foreign corporation (CFC) rule. A CFC rule allows the taxing authority to override the otherwise applicable tax law on an entity-by-entity basis when certain specific conditions are met.[32] In untabulated tests, I examine whether the existence of CFC rules explains the results presented in the paper and find no evidence that it does.

VII Conclusion

The taxation of foreign commerce and the erosion of tax bases through international income shifting are subjects of ongoing and contentious debate in many countries as the increasing globalization of markets makes their consequences for national treasuries, firms and individuals more significant. This paper contributes needed empirical data to those debates by directly comparing the income shifting behaviors of multinationals subject to different systems of taxation of their foreign earnings and finding systematic differences between them.

The general question asked in this paper is: do multinationals domiciled in territorial countries shift more income for tax purposes than do multinationals domiciled in worldwide countries? The answer found in the tests in the paper is “yes and no”. I find that multinationals domiciled in territorial countries, on average, shift more income than do those domiciled in worldwide countries. However, when the shifting is parsed into that which is among foreign affiliates and that which involves the parent country, there is no difference in the shifting of the two groups among affiliates and a large difference in the shifting that involves the parent country. In more detailed tests, I find that the income shifting of worldwide firms that are able to leave the shifted income invested abroad and that of similar territorial firms are not statistically different. Taken as a whole, my findings suggest that a change from a worldwide system to a

[32] For example, France’s law contains a CFC provision stating that income earned in a low-tax foreign country may be ineligible for the 95% exemption if certain conditions are met (e.g., the effective tax rate is less than 2/3 of the French rate). Such determinations are made on an entity-by-entity basis rather than a country-by-country basis. That is, a French parent could have two subsidiaries in Bermuda and one of them could trigger the CFC rule and one of them could not.

territorial one will be accompanied by an increase in income shifting that involves the parent country, but no change in shifting among foreign affiliates, and no increase in either dimension by firms that have consistently reinvested foreign earnings abroad.

As is true of results of any study of income shifting, my results rely on the validity of the empirical model of expected income. To the extent that actual earnings are determined by factors other than capital, labor and productivity inputs, the amount of shifted income is measured with error. Another caveat is that the sample subsidiaries in this study are heavily concentrated in Europe; it is possible that the findings are unique to subsidiaries in that region and not generalizable. This concern is mitigated somewhat by the expansive global coverage of commonly-owned subsidiaries that are able to contribute to the calculation of the tax variable for the sample firms.

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Table 1 – Panel A – Sample countries

Country	2004 Statutory rate	2008 Statutory rate	Parents	Parent-years	Sample subsidiaries	Sample subsidiary-years	Common-parent subsidiaries	Common-parent subsidiary-years
Territorial								
Austria	34%	25%	21	352	232	397	432	1,133
Belgium	34%	34%	76	932	628	2,163	997	4,508
Canada	36%	31%	23	99			1,479	5,332
Croatia	20%	20%	2	19	105	311	133	512
Czech Republic	28%	21%	1	6	456	1,443	607	2,298
Denmark	30%	25%	91	1,240	365	1,145	708	3,013
Estonia	24%	21%	3	14	127	449	252	1,114
Finland	29%	26%	62	916	375	1,203	656	2,732
France	34%	34%	173	3,267	1,150	3,525	2,207	9,744
Germany	38%	31%	228	3,359	974	2,584	2,012	7,124
Hong Kong	18%	18%	1	4			103	103
Hungary	16%	20%	3	34	208	574	282	1,037
Italy	37%	31%	125	1,106	786	2,599	1,458	6,639
Latvia	15%	15%			5	17	132	533
Lithuania	15%	15%					113	403
Luxembourg	30%	0%	4	94	81	189	179	472
Netherlands	35%	26%	57	700	403	1,064	766	2,482
Norway	28%	28%	38	419	257	801	900	3,859
Singapore	22%	18%	7	33			252	947
Slovak Republic	19%	19%			181	475	260	823
Spain	35%	30%	74	542	949	2,762	1,651	6,111
Sweden	28%	28%	241	3,015	525	1,687	1,438	6,527
Switzerland	24%	16%	58	1,061	2	6	494	1,743
Turkey	25%	20%	1	6			64	163

Country	2004 Statutory rate	2008 Statutory rate	Parents	Parent-years	Sample subsidiaries	Sample subsidiary-years	Common-parent subsidiaries	Common-parent subsidiary-years
Worldwide								
Argentina	35%	35%			2	2	278	744
Brazil	34%	34%	2	8	4	4	539	1,129
Bulgaria	20%	10%			69	197	103	362
China	33%	25%	2	9	1	2	354	1,304
Colombia	35%	33%					125	242
Greece	35%	25%	8	56			295	1,370
India	36%	51%	14	105	17	46	128	420
Ireland	13%	13%	11	67	2	3	625	1,979
Japan	42%	43%	293	3,089	41	106	1,281	4,820
Mexico	33%	28%	2	39			586	1,643
Poland	19%	19%	7	43	609	1,784	1,032	3,812
Portugal	28%	25%	6	29	353	996	511	1,819
Romania	25%	16%					332	1,249
Russia	24%	24%	1	5			350	1,287
South Korea	30%	28%	19	171	213	771	332	1,544
Ukraine	30%	25%			45	143	55	266
United Kingdom	30%	28%	237	2,661	1,338	3,851	3,466	14,235
United States	40%	40%	622	7,808			3,291	8,941

This table reports summary statistics for all countries included in the study. The first two columns report the statutory tax rates (which include sub-national taxes for a representative firm in the country) used for each country in 2004 and 2008, respectively. The Parents column reports the number of unique parents domiciled in the given country that have subsidiaries in the sample. The parent-years column reports the number of observations that the parents in the previous column contribute to the sample. The Sample subsidiaries column reports the number of unique sample subsidiaries. The Sample subsidiary-years column reports the number of sample observations having subsidiaries domiciled in the given country. This column is broken down further in Panel B. The Common-parent subsidiaries column reports the number of unique subsidiaries that contribute to the calculation of *C*, the tax variable. The Common-parent subsidiary-years column reports the number of observations that contribute to the calculation of *C*. This column is broken down further in Panel C.

Panel B – Sample distribution across subsidiary countries

Parent country	N	% All	Austria	Belgium	Denmark	Finland	France	Germany	Italy	Japan	Netherlands	Norway	Spain	Sweden	Switzerland	United Kingdom	United States
Subsidiary country	31,374		352	932	1,240	916	3,267	3,359	1,106	3,089	700	419	542	3,015	1,061	2,661	7,808
AUSTRIA	397	1	-	0	1	1	1	3	1	1	1	1	1	1	2	1	1
BELGIUM	2,163	7	5	-	7	5	12	6	5	6	14	5	4	5	6	8	7
BULGARIA	197	1	4	-	1	0	1	1	1	0	1	-	0	0	0	0	0
CROATIA	311	1	7	0	1	0	1	2	2	0	1	1	1	1	0	1	1
CZECH REPUBLIC	1,443	5	10	6	4	5	5	7	3	3	5	0	6	4	5	5	4
DENMARK	1,145	4	2	2	-	6	3	4	2	1	3	12	-	9	2	4	4
ESTONIA	449	1	0	1	2	13	1	2	-	0	1	2	-	5	0	1	0
FINLAND	1,203	4	2	3	7	-	2	2	3	1	3	7	-	15	3	4	3
FRANCE	3,525	11	8	20	10	6	-	13	21	12	10	10	18	9	13	17	12
GERMANY	2,584	8	7	8	8	5	8	-	10	15	9	7	6	6	10	11	9
HUNGARY	574	2	5	2	1	4	3	3	1	1	3	1	2	1	1	2	1
ITALY	2,599	8	11	8	7	6	11	8	-	7	8	5	14	6	10	10	9
JAPAN	106	0	-	0	-	1	0	0	0	-	0	-	-	0	0	0	1
LUXEMBOURG	189	1	-	3	0	-	1	1	1	0	1	-	-	0	0	1	0
NETHERLANDS	1,064	3	3	4	2	2	3	3	3	5	-	5	1	3	3	4	4
NORWAY	801	3	2	2	7	5	2	2	0	1	2	-	-	9	2	2	2
POLAND	1,784	6	7	9	6	8	6	9	5	3	8	6	5	7	6	5	4
PORTUGAL	996	3	2	3	2	1	5	3	5	2	3	0	25	2	3	3	3
SLOVAKIA	475	2	7	2	1	1	2	3	2	1	1	-	1	1	1	1	1
SOUTH KOREA	771	2	1	1	1	1	3	3	1	7	1	2	-	1	2	2	3
SPAIN	2,762	9	5	8	5	6	11	11	18	9	7	7	-	5	9	10	9
SWEDEN	1,687	5	6	5	16	13	6	4	5	4	6	14	2	-	8	7	5
UKRAINE	143	0	3	0	0	0	1	1	0	0	-	-	-	0	1	0	0
UNITED KINGDOM	3,851	12	6	10	10	7	11	10	11	20	14	14	14	10	12	-	16

This table reports the distribution of observations across subsidiary countries. N reports the number of observations in each subsidiary country. The top row reports the number of observations by parent country. Parent countries with fewer than 300 observations are not included. Each cell reports the percentage of the parent country's observations that are in each subsidiary country. For example, in the full sample, 1% of observations are in Austria and 7% are in Belgium, 5% of the subsidiaries of Austrian parents are in Belgium and 4% of them are in Bulgaria.

"-" indicates that there are zero observations in the cell. "0" indicates that the percentage in that cell is less than 0.5, but greater than 0.

Panel C – Distribution of common-parent subsidiaries across subsidiary countries

Parent country	N	% All	Austria	Belgium	Demark	Finland	France	Germany	Italy	Japan	Netherlands	Norway	Spain	Sweden	Switzerland	United Kingdom	United States
Subsidiary country	119,876		1,046	2,842	4,763	2,850	8,681	9,947	5,240	10,741	4,625	1,680	2,536	9,996	4,033	10,786	28,424
ARGENTINA	802	1	0	0	0	-	1	1	1	0	1	0	2	0	1	0	1
AUSTRIA	1,151	1	6	1	1	1	1	3	1	1	1	0	0	1	2	1	1
BELGIUM	4,569	4	3	23	2	3	7	3	3	2	9	2	2	2	4	3	4
BRAZIL	1,158	1	0	1	0	0	1	1	1	1	1	1	2	0	1	1	1
CANADA	5,437	5	3	2	1	2	3	3	1	4	3	2	1	1	4	5	9
CHINA	1,428	1	2	1	1	0	1	1	1	2	1	0	0	0	2	0	1
CROATIA	532	0	3	0	1	0	1	1	1	0	1	0	0	0	1	0	0
CZECH REPUBLIC	2,323	2	6	2	2	2	2	3	1	1	3	1	2	2	3	2	2
DENMARK	3,050	3	2	2	16	3	2	2	0	1	2	6	-	5	2	2	2
ESTONIA	1,118	1	0	0	2	9	1	1	0	0	1	2	-	4	0	0	0
FINLAND	2,758	2	2	1	4	14	1	1	1	1	2	3	0	9	2	1	2
FRANCE	9,878	8	5	16	6	5	16	9	13	6	8	5	13	5	8	10	8
GERMANY	7,221	6	8	4	4	4	5	16	5	7	7	4	3	3	8	5	5
GREECE	1,400	1	0	1	1	0	2	1	2	0	1	1	2	0	2	1	1
HUNGARY	1,053	1	4	1	1	2	1	1	1	0	2	0	0	1	1	1	1
IRELAND	2,001	2	0	1	1	1	1	1	1	1	2	1	0	0	1	4	2
ITALY	6,710	6	7	4	3	3	7	5	29	3	5	3	9	3	6	4	5
JAPAN	4,867	4	1	1	1	1	1	2	1	28	1	0	0	1	2	1	3
LATVIA	546	0	1	0	2	3	0	1	-	-	1	1	0	1	0	0	0
MEXICO	1,675	1	1	1	0	0	1	1	0	1	1	0	4	0	1	1	3
NETHERLANDS	2,535	2	3	3	1	1	2	2	1	2	5	2	1	1	2	2	3
NORWAY	3,936	3	2	2	11	5	2	2	1	0	3	24	0	13	3	2	2
POLAND	3,863	3	4	5	5	5	4	5	3	2	5	4	3	4	4	2	2
PORTUGAL	1,839	2	1	2	1	1	2	2	2	1	1	0	12	1	2	1	1
ROMANIA	1,268	1	4	1	1	1	2	2	3	1	1	0	0	0	1	1	1
RUSSIAN FEDERATION	1,315	1	2	1	1	6	1	2	0	1	1	1	0	1	2	1	1
SINGAPORE	1,003	1	-	0	1	0	1	1	0	2	1	0	0	0	1	1	1
SLOVAKIA	839	1	4	1	1	0	1	2	1	0	1	0	0	0	1	0	0
SOUTH KOREA	1,554	1	1	1	0	1	1	1	0	3	1	1	0	0	2	1	1
SPAIN	6,184	5	3	4	3	3	7	7	11	4	5	4	27	3	6	4	4
SWEDEN	6,570	5	4	3	15	9	3	2	2	1	3	12	1	28	4	3	3
SWITZERLAND	1,763	1	3	1	1	1	2	3	1	1	1	0	1	1	8	1	1
UNITED KINGDOM	14,702	12	5	7	7	6	8	8	7	11	11	12	6	6	8	28	14
UNITED STATES	9,174	8	3	4	2	2	4	5	4	12	4	4	4	2	5	8	12

This table reports the distribution of common-parent subsidiaries (i.e., the subsidiaries used in computing C for the sample subsidiaries) across subsidiary countries. N reports the number of observations in each subsidiary country. The top row reports the number of observations by parent country. Parent countries are included if they were included in the previous panel. Each cell reports the percentage of the parent country's observations that are in each subsidiary country. For example, in the full sample, 1% of observations are in Argentina and 1% are in Austria. The far right column reports that 9% of the U.S. observations are in Canada, 14% are in the UK and 12% are in the U.S.

"-" indicates that there are zero observations in the cell. "0" indicates that the percentage in that cell is less than 0.5, but greater than 0.

Table 2 – Descriptive statistics

Panel A – Full sample by subsample

	N	Mean	Median	Max	Min	Stdev	
Territorial							
Number of parents	1,312						
C	17,334	-0.03	-0.03	0.55	-0.39	0.09	
C_AFFILIATE	17,334	-0.02	-0.01	0.29	-0.33	0.06	
C_PARENT	17,334	-0.02	0.00	0.54	-0.39	0.06	
Log(Pretax income)	17,334	7.73	7.65	17.34	0.00	2.26	
Log(Compensation)	17,334	8.60	8.49	15.40	0.00	1.93	
Log(Tangible fixed assets)	17,334	7.60	7.68	17.24	0.00	2.87	
Log(Per capita GDP)	17,334	10.24	10.47	11.58	6.47	0.63	
Worldwide							
Number of parents	1,218						
C	14,040	-0.04	-0.04	0.40	-0.40	0.09	*
C_AFFILIATE	14,040	-0.01	0.00	0.40	-0.34	0.07	*
C_PARENT	14,040	-0.03	-0.01	0.20	-0.33	0.06	*
Log(Pretax income)	14,040	8.22	8.17	16.53	0.00	2.21	*
Log(Compensation)	14,040	9.06	9.02	19.04	0.00	1.83	*
Log(Tangible fixed assets)	14,040	7.80	7.91	19.93	0.00	2.83	*
Log(Per capita GDP)	14,040	10.32	10.48	11.68	6.47	0.54	*

Panel A reports summary statistics for the two subsamples of the main sample. Number of parents is the number of global ultimate owners that contribute at least one observation to the main sample. C is the family-level tax incentive and opportunity measure developed by Huizinga and Laeven (2008). C_AFFILIATE is the portion of C which relates to the commonly-owned affiliates in countries other than the parent's home country. C_PARENT is the portion of C which relates to the parent country. Log(Pretax income) is the natural logarithm of profit before income tax expense (in thousands of dollars). Log(Compensation) is the natural logarithm of the compensation expense (in thousands of dollars) of the subsidiary. Log(Tangible fixed assets) is the natural logarithm of the tangible fixed assets (in thousands of dollars) of the subsidiary. Log(Per capita GDP) is the natural logarithm of per capita GDP in the subsidiary's country (in millions of U.S. dollars).

* Indicates means are different at the 5% level.

Panel B – Sample by subsidiary country

Subsidiary country	N	# parent countries	% Worldwide	C	C_AFFILIATE	C_PARENT	Log(Pretax Income)	Log(Compensation)	Log(Tangible Assets)	Log(Per capita GDP)
Austria	397	18	0.44	(0.05)	(0.05)	(0.04)	8.06	9.22	7.99	10.55
Belgium	2,163	22	0.46	0.05	0.01	(0.00)	8.07	9.15	7.61	10.57
Bulgaria	197	17	0.29	(0.16)	(0.12)	(0.08)	7.01	7.03	7.31	8.29
Croatia	311	19	0.30	(0.11)	(0.10)	(0.06)	6.92	7.36	6.84	9.29
Czech Republic	1,443	25	0.39	(0.06)	(0.06)	(0.05)	7.42	8.06	7.68	9.52
Denmark	1,145	20	0.40	(0.02)	(0.03)	(0.02)	7.94	8.98	7.35	10.84
Estonia	449	13	0.12	(0.06)	(0.05)	(0.04)	6.42	6.86	5.97	9.41
Finland	1,203	17	0.31	(0.03)	(0.04)	(0.02)	7.04	8.01	6.07	10.61
France	3,525	31	0.51	0.04	0.01	(0.00)	7.99	9.26	7.68	10.51
Germany	2,584	26	0.59	0.11	0.05	0.02	8.68	9.73	8.56	10.50
Hungary	574	21	0.34	(0.15)	(0.11)	(0.08)	7.24	7.87	7.69	9.34
Italy	2,599	27	0.48	0.09	0.04	0.01	7.87	8.90	7.56	10.39
Japan	106	11	0.63	0.21	0.13	0.04	8.94	8.83	8.95	10.48
Luxembourg	189	14	0.34	(0.14)	(0.11)	(0.08)	7.95	8.46	6.98	11.38
Netherlands	1,064	24	0.53	(0.01)	(0.02)	(0.03)	8.95	9.19	8.37	10.64
Norway	801	16	0.25	(0.02)	(0.03)	(0.02)	8.39	9.09	7.27	11.17
Poland	1,784	27	0.32	(0.13)	(0.09)	(0.07)	7.43	7.61	7.53	9.09
Portugal	996	19	0.35	(0.05)	(0.05)	(0.04)	7.26	7.99	7.16	9.82
Slovak Republic	475	23	0.33	(0.12)	(0.10)	(0.07)	6.93	7.30	7.39	9.43
South Korea	771	15	0.64	(0.04)	(0.04)	(0.05)	8.50	8.49	8.25	9.82
Spain	2,762	27	0.45	0.04	0.01	(0.01)	7.74	8.83	7.65	10.22
Sweden	1,687	21	0.43	(0.03)	(0.03)	(0.02)	7.70	8.52	6.89	10.71
Ukraine	143	17	0.32	(0.03)	(0.04)	(0.04)	7.59	7.44	7.96	7.73
United Kingdom	3,851	32	0.51	(0.03)	(0.02)	(0.04)	8.57	9.53	8.42	10.61

Panel B reports means of variables grouped by subsidiary country. Countries with fewer than 50 observations are not reported. N is the number of observations in which the given country is the subsidiary country. # parent countries reports the number of different parent countries having at least one subsidiary in the country. %Worldwide reports the percentage of subsidiaries in the given country that are controlled by parents in worldwide countries. C is the family-level tax incentive and opportunity measure developed by Huizinga and Laeven (2008). C_AFFILIATE is the portion of C which relates to the commonly-owned affiliates in countries other than the parent's home country. C_PARENT is the portion of C which relates to the parent country Log(Pretax income) is the natural logarithm of profit before income tax expense (in thousands of dollars). Log(Compensation) is the natural logarithm of the compensation expense (in thousands of dollars) of the subsidiary. Log(Tangible fixed assets) is the natural logarithm of the tangible fixed assets (in thousands of dollars) of the subsidiary. Log(Per capita GDP) is the natural logarithm of per capita GDP in the subsidiary's country (in millions of U.S. dollars).

Panel C – Sample by parent country

Parent country	N	# parents	C	C_AFFILIATE	C_PARENT	Log(Pretax Income)	Log(Compensation)	Log(Tangible Assets)	Log(Per capita GDP)
Territorial									
Austria	352	21	0.01	(0.03)	0.00	7.83	8.80	9	9.94
Belgium	932	76	(0.00)	(0.02)	(0.02)	7.41	8.28	8	10.29
Canada	99	23	(0.01)	(0.04)	(0.00)	8.15	8.80	8	10.44
Denmark	1,240	91	0.01	(0.01)	0.01	7.18	8.05	7	10.37
Finland	916	62	0.00	(0.02)	0.01	7.51	8.43	7	10.15
France	3,267	173	(0.00)	(0.02)	(0.03)	8.28	9.09	8	10.21
Germany	3,359	228	(0.01)	(0.02)	(0.06)	8.09	8.79	8	10.13
Hungary	34	3	0.04	0.00	0.01	7.11	8.04	8	9.85
Italy	1,106	125	(0.01)	(0.01)	(0.04)	7.32	8.10	7	10.27
Luxembourg	94	4	0.01	(0.04)	0.06	9.82	10.10	10	10.17
Netherlands	700	57	0.00	(0.03)	0.00	7.85	9.06	8	10.24
Norway	419	38	0.00	(0.01)	0.01	7.75	8.62	7	10.42
Poland	43	7	0.06	(0.01)	0.08	7.11	7.70	7	10.00
Portugal	29	6	0.04	0.00	0.05	7.93	8.29	9	10.24
Singapore	33	7	0.00	(0.01)	0.09	7.07	8.22	6	10.17
South Africa	33	5	0.03	(0.01)	(0.04)	8.21	9.61	9	10.39
Spain	542	74	(0.02)	(0.01)	(0.03)	7.15	7.91	7	10.16
Sweden	3,015	241	0.00	(0.02)	0.01	7.29	8.27	7	10.36
Switzerland	1,061	58	0.01	(0.04)	0.04	7.74	8.85	8	10.28
Worldwide									
Greece	56	8	(0.04)	0.01	(0.02)	7.41	7.84	8	9.63
India	105	14	(0.01)	(0.00)	(0.02)	8.47	9.63	9	10.45
Ireland	67	11	0.01	(0.01)	0.03	8.46	9.11	9	10.33
Japan	3,089	293	(0.02)	(0.01)	(0.09)	7.84	8.69	8	10.33
Mexico	39	2	(0.03)	(0.03)	(0.02)	9.70	9.82	11	10.05
South Korea	171	19	(0.00)	(0.02)	0.02	7.62	8.58	7	10.33
United Kingdom	2,661	237	0.01	(0.02)	0.01	8.21	8.97	8	10.29
United States	7,808	622	0.00	(0.01)	(0.03)	8.39	9.25	8	10.33

Panel C reports means of variables grouped by parent country. N is the number of observations in which the given country is the parent country. # parents reports the number of parents domiciled in the given country that have subsidiaries in the sample. *C* is the family-level tax incentive and opportunity measure developed by Huizinga and Laeven (2008). *C_AFFILIATE* is the portion of C which relates to the commonly-owned affiliates in countries other than the parent's home country. *C_PARENT* is the portion of *C* which relates to the parent country. *Log(Pretax income)* is the natural logarithm of profit before income tax expense (in thousands of dollars). *Log(Compensation)* is the natural logarithm of the compensation expense (in thousands of dollars) of the subsidiary. *Log(Tangible fixed assets)* is the natural logarithm of the tangible fixed assets (in thousands of dollars) of the subsidiary. *Log(Per capita GDP)* is the natural logarithm of per capita GDP in the subsidiary's country (in millions of U.S. dollars).

Table 3 – Main results

	Prediction	(1)	(2)	(3)	(4)	(5)
Sample		*Main (foreign)*	*Main Territorial*	*Main Worldwide*	*Main (foreign)*	*All*
INTERCEPT		0.82***	0.58*	2.04***	0.07	0.82***
		(0.31)	*(0.32)*	*(0.44)*	*(0.39)*	*(0.32)*
TT					0.70***	0.13***
					(0.25)	*(0.19)*
C	-	-0.94***	-1.23***	-0.62***	-0.65***	-0.73***
		(0.08)	*(0.11)*	*(0.12)*	*(0.11)*	*(0.09)*
*TT*C*	-				-0.53***	-0.26***
					(0.14)	*(0.12)*
LOGASSETS	+	0.19***	0.20***	0.18***	0.19***	0.18***
		(0.00)	*(0.01)*	*(0.01)*	*(0.00)*	*(0.00)*
LOGCOMP	+	0.69***	0.67***	0.70***	0.69***	0.69***
		(0.01)	*(0.01)*	*(0.01)*	*(0.01)*	*(0.01)*
LOG_GDP_PERCAP	*?*	-0.07***	-0.04**	-0.10***	-0.07***	-0.07***
		(0.01)	*(0.02)*	*(0.02)*	*(0.01)*	*(0.01)*
Firm and Year fixed effects		*Y*	*Y*	*Y*	*Y*	*Y*
N		31,030	17,149	13,887	31,040	43,851
Adj Rsquare		0.82	0.82	0.81	0.82	0.82

(1) $LogPLBT_{it} = \beta_0 + \beta_1 TT_i + \beta_2 C_{it} + \beta_3 TT_i * C_{it} + \beta_4 LogASSETS_{it}$

$$+\beta_5 LogCOMP_{it} + \beta_6 LogGDPpc_{it} + \sum Parent\ fe + \sum Year\ fe + \varepsilon_{it}$$

This table reports OLS estimates of (1) on the sample described in Table 2. $LogPLBT$ is the natural logarithm of profit before income tax expense (in thousands of dollars). TT is an indicator variable equal to 1 if the subsidiary is owned by a territorial parent; 0 otherwise. C is the family-level tax incentive and opportunity measure developed by Huizinga and Laeven (2008). $LOGASSETS$ is the natural logarithm of tangible fixed assets reported by the subsidiary. $LOGCOMP$ is the natural logarithm of labor compensation reported by the subsidiary. $LOGGDPpc$ is the natural logarithm of per capita GDP in the subsidiary's country (in millions of U.S. dollars). Model (1) pools all types of subsidiaries and excludes the indicator variables and interaction terms from the model. Model (2) uses the subsample of territorial firms (TT=1). Model (3) uses the subsample of worldwide firms (TT=0). Model (4) runs the full Equation (1) on the full sample.

Standard errors are reported in parentheses below the estimate.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4 – Disaggregation of the tax variable

	Prediction	(1)	(2)	(3)	(4)
Sample		***Full***	***Territorial***	***Worldwide***	***Full***
INTERCEPT		0.80***	0.56*	1.98***	0.01
		(0.31)	*(0.32)*	*(0.44)*	*(0.39)*
TT					0.71***
					(0.25)
C_AFFILIATE	-	-0.85***	-0.89***	-0.83***	-0.87***
		(0.11)	*(0.16)*	*(0.15)*	*(0.14)*
*TT*C_AFFILIATE*	?				0.02
					(0.20)
C_PARENT	-	-1.12***	-1.71***	-0.34	-0.33
		(0.15)	*(0.21)*	*(0.23)*	*(0.22)*
*TT*C_PARENT*	?				-1.35***
					(0.30)
LOGASSETS	+	0.19***	0.20***	0.18***	0.19***
		(0.00)	*(0.01)*	*(0.01)*	*(0.00)*
LOGCOMP	+	0.69***	0.67***	0.70***	0.69***
		(0.01)	*(0.01)*	*(0.01)*	*(0.01)*
LOG_GDP_PERCAP	?	-0.07***	-0.04**	-0.09***	-0.06***
		(0.01)	*(0.02)*	*(0.02)*	*(0.01)*
Firm and Year fixed effects		*Y*	*Y*	*Y*	*Y*
N		31,030	17,149	13,883	31,033
Adj Rsquare		0.82	0.82	0.81	0.82

(2) $LogPLBT_{it} = \beta_0 + \beta_1 TT_i + \beta_2 C_{it}^{parent} + \beta_3 C_{it}^{affiliate} + \beta_4 TT_i * C_{it}^{parent} + \beta_5 TT_i * C_{it}^{affiliate}$

$$+\beta_6 LogASSETS_{it} + \beta_7 LogCOMP_{it} + \beta_8 LogGDPpc_{it} + \sum Parent\ fe + \sum Year\ fe + \varepsilon_{it}$$

This table reports OLS estimates of (2) on the sample described in Table 2. $LogPLBT$ is the natural logarithm of profit before income tax expense (in thousands of dollars). TT is an indicator variable equal to 1 if the subsidiary is owned by a territorial parent; 0 otherwise. $C\_AFFILIATE$ is the portion of C which relates to the commonly-owned affiliates in countries other than the parent's home country. C_PARENT is the portion of C which relates to the parent country. $LOGASSETS$ is the natural logarithm of tangible fixed assets reported by the subsidiary. $LOGCOMP$ is the natural logarithm of labor compensation reported by the subsidiary. $LOGGDPpc$ is the natural logarithm of per capita GDP in the subsidiary's country (in millions of U.S. dollars). Model (1) pools all types of subsidiaries and excludes the indicator variables and interaction terms from the model. Model (2) uses the subsample of territorial firms (TT=1). Model (3) uses the subsample of worldwide firms (TT=0). Model (4) runs the full Equation (2) on the full sample.

Standard errors are reported in parentheses below the estimate.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5 – The effect of foreign reinvestment opportunities

	(1)	(2)	(3)	(4)
Sample	*Full*	*High Growth*	*Low Growth*	*Full*
INTERCEPT	-0.98	-0.96***	-2.40***	-1.14*
	(0.63)	*(0.36)*	*(0.44)*	*(0.62)*
TT	0.82***	1.13***	0.55	0.79***
	(0.29)	*(0.27)*	*(0.40)*	*(0.29)*
C	-0.71***	-0.82***	-0.59***	-0.57***
	(0.13)	*(0.22)*	*(0.18)*	*(0.15)*
*TT*C*	-0.52***	-0.17	-0.56**	-0.63***
	(0.16)	*(0.28)*	*(0.22)*	*(0.20)*
GROWTH				0.12***
				(0.02)
*TT*GROWTH*				-0.02
				(0.03)
*C*GROWTH*				-0.29
				(0.20)
*TT*C*GROWTH*				0.22
				(0.27)
LOGASSETS	0.19***	0.20***	0.18***	0.19***
	(0.01)	*(0.01)*	*(0.01)*	*(0.01)*
LOGCOMP	0.68***	0.65***	0.70***	0.68***
	(0.01)	*(0.02)*	*(0.01)*	*(0.01)*
LOG_GDP_PERCAP	-0.04**	-0.00	-0.04**	-0.03*
	(0.01)	*(0.02)*	*(0.02)*	*(0.01)*
Firm and Year fixed effects	*Y*	*Y*	*Y*	*Y*
	21,888	8,534	13,356	21,892
	0.82	0.81	0.82	0.82

$$(1b)\ LogPLBT_{it} = \beta_0 + \beta_1 TT_i + \beta_2 C_{it} + \beta_3 TT_i * C_{it} + \beta_4 GROWTH_{it} + \beta_4 TT_i * GROWTH_{it} + \beta_4 TT_i * C_{it} * GROWTH_{it} + \beta_4 LogASSETS_{it}$$
$$+\beta_5 LogCOMP_{it} + \beta_6 LogGDPpc_{it} + \sum Parent\ fe + \sum Year\ fe + \varepsilon_{it}$$

This table reports OLS estimates of (1b). *LogPLBT* is the natural logarithm of profit before income tax expense (in thousands of dollars). TT is an indicator variable equal to 1 if the subsidiary is owned by a territorial parent; 0 otherwise. C is the family-level tax incentive and opportunity measure developed by Huizinga and Laeven (2008). $LOGASSETS$ is the natural logarithm of tangible fixed assets reported by the subsidiary. $LOGCOMP$ is the natural logarithm of labor compensation reported by the subsidiary. $LOGGDPpc$ is the natural logarithm of per capita GDP in the subsidiary's country (in millions of U.S. dollars). $GROWTH$ Is an indicator variable = 1 if the subsidiary-year is in the top 2 quintiles of asset growth relative to its parent's consolidated asset growth, 0 otherwise.

Standard errors corrected for clustering at the parent level are not reported.
* and ** indicate statistical significance at the 5%, and 1% levels, respectively.

Table 6 – Reinvestment opportunities and the disaggregated tax variable

	(1)	(2)	(3)	(4)
Sample	*Full*	*High Growth*	*Low Growth*	*Full*
INTERCEPT	-1.03*	-1.02***	-2.50***	-1.20*
	(0.62)	*(0.35)*	*(0.44)*	*(0.62)*
TT	0.84***	1.15***	0.57	0.80***
	(0.29)	*(0.27)*	*(0.40)*	*(0.29)*
C_AFFILIATE	-0.92***	-1.08***	-0.82***	-0.77***
	(0.17)	*(0.29)*	*(0.23)*	*(0.21)*
C_PARENT	-0.40	-0.43	-0.23	-0.25
	(0.27)	*(0.49)*	*(0.38)*	*(0.31)*
*TT*C_AFFILIATE*	0.04	0.43	0.10	-0.04
	(0.24)	*(0.41)*	*(0.33)*	*(0.29)*
*TT*C_PARENT*	-1.33***	-1.05*	-1.57***	-1.51***
	(0.36)	*(0.64)*	*(0.50)*	*(0.42)*
GROWTH				0.12***
				(0.02)
*TT*GROWTH*				-0.02
				(0.03)
*C_AFFILIATE*GROWTH*				-0.33
				(0.28)
*C_PARENT*GROWTH*				-0.26
				(0.33)
*TT*C_AFFILIATE*GROWTH*				0.21
				(0.40)
*TT*C_PARENT*GROWTH*				0.26
				(0.43)
LOGASSETS	0.19***	0.20***	0.18***	0.19***
	(0.01)	*(0.01)*	*(0.01)*	*(0.01)*
LOGCOMP	0.68***	0.65***	0.70***	0.68***
	(0.01)	*(0.02)*	*(0.01)*	*(0.01)*
LOG_GDP_PERCAP	-0.03**	-0.00	-0.04*	-0.02
	(0.01)	*(0.02)*	*(0.02)*	*(0.01)*
Firm and Year fixed effects	*Y*	*Y*	*Y*	*Y*
	21,888	8,535	13,352	21,891
	0.82	0.81	0.82	0.82

(2) $LogPLBT_{it} = \beta_0 + \beta_1 TT_i + \beta_2 C_{it}^{parent} + \beta_3 C_{it}^{affiliate} + \beta_4 TT_i * C_{it}^{parent} + \beta_5 TT_i * C_{it}^{affiliate}$

$$+\beta_6 LogASSETS_{it} + \beta_7 LogCOMP_{it} + \beta_8 LogGDPpc_{it} + \sum Parent\ fe + \sum Year\ fe + \varepsilon_{it}$$

This table reports OLS estimates of (2) augmented to split the sample based on foreign reinvestment opportunities. *LogPLBT* is the natural logarithm of profit before income tax expense (in thousands of dollars). TT is an indicator variable equal to 1 if the subsidiary is owned by a territorial parent; 0 otherwise. C is the family-level tax incentive and opportunity measure developed by Huizinga and Laeven (2008). $LOGASSETS$ is the natural logarithm of tangible fixed assets reported by the subsidiary. $LOGCOMP$ is the natural logarithm of labor compensation reported by the subsidiary. $LOGGDPpc$ is the natural logarithm of per capita GDP in the subsidiary's country (in millions of U.S. dollars). $GROWTH$ Is an indicator variable = 1 if the subsidiary-year is in the top 2 quintiles of asset growth relative to its parent's consolidated asset growth, 0 otherwise.

Standard errors corrected for clustering at the parent level are not reported.
* and ** indicate statistical significance at the 5%, and 1% levels, respectively.

Table 7 – Regressions by parent country

Panel A – Aggregated tax variable

	Full sample	FRANCE (T)	GERMANY (T)	JAPAN (W)	SWEDEN (T)	UNITED KINGDOM (W)	UNITED STATES (W)
INTERCEPT	0.82***	-1.66***	2.33***	2.12***	-0.73*	1.29***	1.98***
	(0.31)	*(0.41)*	*(0.38)*	*(0.46)*	*(0.43)*	*(0.47)*	*(0.47)*
C	-0.94***	-1.56***	-0.79***	-0.29	-1.55***	-1.88***	-0.26*
	(0.08)	*(0.26)*	*(0.26)*	*(0.31)*	*(0.26)*	*(0.28)*	*(0.15)*
LOGASSETS	0.19***	0.23***	0.22***	0.16***	0.15***	0.17***	0.18***
	(0.00)	*(0.01)*	*(0.01)*	*(0.01)*	*(0.01)*	*(0.02)*	*(0.01)*
LOGCOMP	0.69***	0.63***	0.62***	0.69***	0.74***	0.77***	0.68***
	(0.01)	*(0.02)*	*(0.02)*	*(0.03)*	*(0.02)*	*(0.03)*	*(0.01)*
LOG_GDP_PERCAP	-0.07***	0.11***	-0.13***	-0.14***	0.02	-0.06	-0.07***
	(0.01)	*(0.04)*	*(0.03)*	*(0.04)*	*(0.04)*	*(0.04)*	*(0.03)*
Firm and Year fixed effects	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
N	31,030	3,238	3,320	3,063	2,975	2,634	7,706
Adj Rsquare	0.82	0.82	0.84	0.74	0.82	0.85	0.81

$$LogPLBT_{it} = \beta_0 + \beta_1 C_{it} + \beta_2 LogASSETS_{it} + \beta_3 LogCOMP_{it} + \beta_4 LogGDPpc_{it} + \sum Parent\ fe + \sum Year\ fe + \varepsilon_{it}$$

Panel B – Disaggregated tax variable

	Full sample	FRANCE (T)	GERMANY (T)	JAPAN (W)	SWEDEN (T)	UNITED KINGDOM (W)	UNITED STATES (W)
INTERCEPT	0.80***	-1.82***	2.33***	2.30***	-0.74*	1.24***	1.94***
	(0.31)	*(0.40)*	*(0.38)*	*(0.47)*	*(0.43)*	*(0.47)*	*(0.47)*
C_AFFILIATE	-0.85***	-0.19	-0.39	-1.26**	-1.22***	-2.36***	-0.41**
	(0.11)	*(0.43)*	*(0.37)*	*(0.51)*	*(0.42)*	*(0.44)*	*(0.17)*
C_PARENT	-1.12***	-3.25***	-1.29***	0.57	-2.06***	-1.14*	0.24
	(0.15)	*(0.54)*	*(0.39)*	*(0.49)*	*(0.60)*	*(0.59)*	*(0.35)*
LOGASSETS	0.19***	0.23***	0.22***	0.16***	0.15***	0.17***	0.19***
	(0.00)	*(0.01)*	*(0.01)*	*(0.01)*	*(0.01)*	*(0.02)*	*(0.01)*
LOGCOMP	0.69***	0.64***	0.62***	0.69***	0.74***	0.77***	0.68***
	(0.01)	*(0.02)*	*(0.02)*	*(0.03)*	*(0.02)*	*(0.03)*	*(0.01)*
LOG_GDP_PERCAP	-0.07***	0.12***	-0.13***	-0.13***	0.02	-0.06	-0.07***
	(0.01)	*(0.04)*	*(0.03)*	*(0.04)*	*(0.04)*	*(0.04)*	*(0.03)*
Firm and Year fixed effects	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
N	31,030	3,238	3,320	3,063	2,974	2,634	7,702
Adj Rsquare	0.82	0.82	0.84	0.74	0.82	0.85	0.81

$$LogPLBT_{it} = \beta_0 + \beta_1 C_{it}^{parent} + \beta_3 C_{it}^{affiliate} + \beta_4 LogASSETS_{it} + \beta_5 LogCOMP_{it} + \beta_6 LogGDPpc_{it} + \sum Parent\ fe + \sum Year\ fe + \varepsilon_{it}$$

The panels in this table report OLS estimates of the respective models on subsamples of the parent county in the respective column. *LogPLBT* is the natural logarithm of profit before income tax expense (in thousands of dollars). TT is an indicator variable equal to 1 if the subsidiary is owned by a territorial parent; 0 otherwise. C is the family-level tax incentive and opportunity measure developed by Huizinga and Laeven (2008). *C_AFFILIATE* is the portion of C which relates to the commonly-owned affiliates in countries other than the parent's home country.

C_PARENT is the portion of C which relates to the parent country. $LOGASSETS$ is the natural logarithm of tangible fixed assets reported by the subsidiary. $LOGCOMP$ is the natural logarithm of labor compensation reported by the subsidiary. $LOGGDPpc$ is the natural logarithm of per capita GDP in the subsidiary's country (in millions of U.S. dollars).

(W) after the country name indicates the country has a worldwide tax system. (T) indicates that the country has a territorial tax system.

Standard errors are reported in parentheses below the estimate.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Appendix A – Calculation of the tax variable, $C_i = \frac{1}{(1-\tau_i)} \frac{\sum_{k \neq i}^{n} \frac{B_k}{1-\tau_k}(\tau_i - \tau_k)}{\sum_{k=1}^{n} \frac{B_k}{1-\tau_k}}$

The following scenarios illustrate the calculation of *C*, its variation with its inputs, and its variation from simple rate differences. The three scenarios are identical except for the distribution of revenue across subsidiaries and assume that the parent is domiciled in the same country as Subsidiary 3 (i.e., has a 20% tax rate). Rate difference is the subsidiary's tax rate minus the parent's tax rate.

Scenario 1

Subsidiary	Tax rate	Revenue	C	Rate difference
1	0%	10	(0.19) *	(0.20)
2	10%	100	(0.12)	(0.10)
3	20%	50	0.01	-
4	30%	80	0.15	0.10
Mean	15%	60	(0.04)	(0.05)

Scenario 2

Subsidiary	Tax rate	Revenue	C	Rate difference
1	0%	10	(0.22)	(0.20)
2	10%	50	(0.15)	(0.10)
3	20%	80	(0.03)	-
4	30%	100	0.11	0.10
Mean	15%	60	(0.07)	(0.05)

Scenario 3

Subsidiary	Tax rate	Revenue	C	Rate difference
1	0%	80	(0.17)	(0.20)
2	10%	10	(0.06)	(0.10)
3	20%	100	0.04	-
4	30%	50	0.19	0.10
Mean	15%	60	0.00	(0.05)

$$* \, C_1 = \frac{1}{(1-0)} \frac{\frac{100}{1-0.1}(0-0.1)+\frac{50}{1-0.2}(0-0.2)+\frac{80}{1-0.3}(0-0.3)}{\frac{10}{1-0}+\frac{100}{1-0.1}+\frac{50}{1-0.2}+\frac{80}{1-0.3}} = -0.19$$

The Effects of Taxes and Financial Constraints on Income Shifting by U.S. Multinationals

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Abstract

Prior research shows that many U.S. multinational corporations shift income across international borders in response to tax incentives and that many U.S. multinationals have built up large foreign cash balances that cannot be returned to the U.S. without incurring substantial incremental tax liabilities. Trapped cash creates frictions in internal capital markets, increasing the demand for external financing. The cost of external financing, however, is increasing in financial constraints, leading to the prediction that constrained firms will forgo the tax benefits of income shifting in order to avoid the higher costs of borrowing. Consistent with this prediction, we find that income shifting from the U.S. to foreign countries is decreasing in financial constraints while income shifting from foreign countries to the U.S. is unaffected by financial constraints. We estimate that firms in our sample with tax haven operations shifted an average of $28 million out of the U.S. for tax purposes each year and that financially constrained firms shifted between 5 and 15% less out than did unconstrained firms.

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1. Introduction

In this study, we test whether financial constraints affect income shifting undertaken by U.S. multinational corporations. Many firms have incentives to shift income so that it is recognized in relatively low-tax jurisdictions. To reap the tax benefits of income shifting to low-tax foreign countries, firms must leave the earnings abroad, potentially trapping them in foreign jurisdictions (Foley et al. 2007). Research suggests that trapped earnings create frictions in internal capital markets, increasing demand for external financing (Altshuler and Grubert, 2003). Therefore, if a firm is financially constrained, such that external financing is prohibitively expensive, the returns to income shifting will be reduced by the need to repatriate earnings. Whether, and to what extent, financial constraints affect income shifting is the empirical question we ask in this paper.

In order to test this question, we develop a new measure of cross-jurisdictional income shifting which we use to estimate the percentage of domestic income that is shifted out of the U.S. and the percentage of foreign income that is shifted into the U.S. We derive income shifting out of the U.S. (outbound shifting) from the variation in reported foreign earnings that is explained by domestic sales, after controlling for the variation in foreign sales. We derive income shifting into the U.S. (inbound shifting) from the variation in reported domestic earnings that is explained by foreign sales, after controlling for the variation in domestic sales. After validating the measure by showing that the shifting is sensitive to tax incentives, we test whether outbound shifting is reduced by financial constraints. We use publicly available data and require fewer restrictive assumptions than other measures of cross-jurisdictional income shifting used in prior literature.

Implicit in any estimate of income shifting is an assumption about where the income should be reported absent any shifting. Our baseline, which is directly estimable with available data, is that pre-shifted income is reported in the same jurisdiction as the revenue from which it derives.[1] Any income that is reported in a jurisdiction different from the one in which the sale is made to the external customer is considered shifted. Because there are many reasons that firms might shift income away from this baseline, some of which have nothing to do with tax incentives (e.g., compliance with transfer pricing regulations, alignment of managerial incentives), we refer to the shifting captured by our method as *gross* income shifting. We then use cross-sectional variation in gross income shifting to empirically estimate the marginal effects of financial constraints and tax incentives on income shifting.

Our study builds on recent academic and anecdotal evidence that suggests U.S. multinational corporations are shifting billions of dollars of income from the U.S. to foreign jurisdictions and (at least temporarily) out of the reach of the U.S. tax system. For example, recent articles in the popular business press have asserted that General Electric Corporation paid no U.S. tax in 2010, despite having $14 billion in U.S. profits (Kocieniewski 2011), that Forest Laboratories Inc. cut its U.S. tax bill by more than a third by transferring profits on U.S. sales out of the U.S. (Drucker 2010), and that Cisco Systems Inc. reduced its U.S. tax bill by $7 billion between 2005 and 2011 by shifting income to a subsidiary located in the Swiss Alps (Drucker 2011).[2] Furthermore, some academic literature tells a similar story. Klassen and Laplante (2012b) estimate that a sample of 380 U.S. multinationals corporations collectively shifted $10

[1] This is different from a system of formulary apportionment with sales as the only factor. Under such a system, the return on sales is forced to be the same in all jurisdictions. Our measure allows the return on sales to vary across jurisdictions.

[2] We acknowledge that there is not universal agreement on the accuracy of the numbers in the articles that we cite. We include the citations only to support the existence of the issue. None of the articles alleges illegal conduct by the companies named.

billion more of income out of the U.S. each year in the period 2005-2009 than they did in the period 1998-2002.

We show that, on average, U.S. multinationals shift income both into and out of the U.S. for tax purposes and that outbound shifting is reduced by financial constraints. We estimate that the average firm shifts 7.4% of its domestic income out of the U.S. and 24% of its foreign income into the U.S. for tax reasons. This translates into $28 million ($6 million) of income being shifted out of the U.S. by the mean (median) firm-year in our sample. Finally, we estimate that financially constrained firms shift 5-15% less of their domestic income out of the U.S. than their unconstrained counterparts. Indeed, in some models financially constrained firms do not shift any of their domestic income out of the U.S.

We note that the estimates of inbound income shifting are relatively high when compared to the estimates of outbound income shifting. This result, which is potentially surprising given the fact that the U.S. has one of the highest statutory corporate tax rates in the world, is consistent with institutional details related to transfer pricing rules, the treatment of foreign sales made through unincorporated branch operations, and the fact that a large proportion of product development costs of U.S. multinationals are incurred in the U.S. It is also consistent with prior research documenting inbound shifting by firms with effective foreign tax rates higher than the U.S. statutory tax rate (Collins et al. 1998; Klassen and Laplante 2012a). In supplemental tests, we provide evidence that inbound income shifting estimated using our measure varies across firms in predictable ways, thus providing more support for its validity.

Our study makes a number of contributions to existing research. First, we show that income shifting is affected by firms' financial constraints. Frictions in internal capital markets can be exacerbated by tax-motivated income shifting because financially constrained firms may not have ready access to debt markets that might otherwise relieve the frictions. As a result, financially constrained firms shift less income across jurisdictions and forgo the associated tax savings. These findings contribute to research on income shifting, internal finance, and financial constraints found in economics, finance, and accounting.

Second, we develop a direct measure of income shifting; the inputs to our model are primitives rather than proxies. We do not make inferences about shifting by comparing rates of return on sales or rates of productivity across jurisdictions, as in prior research. Instead, we directly estimate the fraction of pre-shifted domestic earnings that was shifted to reported foreign earnings, and the fraction of pre-shifted foreign earnings that was shifted to reported domestic earnings. We then show how tax incentives affect the cross-sectional estimates of both outbound and inbound income shifting. Academic researchers and government regulators can use the evidence we provide to inform public policy questions surrounding the taxation of multinational corporations.

Finally, we provide estimates of the amount of income that was shifted out of the U.S. during our sample period and of the U.S. tax that was deferred as a result of the shifting. In addition, we provide separate estimates of the amount of income shifted by financially constrained firms and non-financially constrained firms.

The remainder of the paper is organized as follows. In the next section we develop the relevant background information on multinational income shifting used throughout the study. In Section 3 we develop our hypotheses in the context of prior literature. In Section 4 we develop our new measure of income shifting and describe the research design. In Section 5 we describe the data used in the empirical tests. In Section 6 we analyze the results of our empirical tests. We make concluding remarks in Section 7.

2. Income Shifting

2.1. What is income shifting?

In this study, income shifting refers to anything which causes income to be reported in a jurisdiction different from the one in which the sale underlying the income was made. Income is defined as revenue minus expenses, and the baseline in our estimates is that the revenue and the expenses which are incurred to earn it are matched and reported in the same geographic location. It is important to note that this baseline is distinct from one in which all income is reported in full compliance with separate accounting and an unbiased application of the arm's length transfer pricing principle; because expenses incurred in one jurisdiction often generate revenue in a different jurisdiction, some shifting of income across borders is expected relative to our baseline.[3] As such, we refer to deviations from our baseline as *gross* income shifting. Just how much income gets shifted, and whether the shifting is sensitive to tax incentives or financial constraints are empirical questions.

We focus on income shifting into and out of the U.S. by U.S. multinational corporations. We do not study shifting that may occur among the foreign subsidiaries of U.S. corporations and we do not study shifting to or from the U.S. by foreign-controlled firms. Finally, we note that the income shifting we observe could fall at any point on the legal spectrum, from fully-compliant with all financial laws and regulations, to willfully fraudulent.

[3] We note that prior research also does not use a baseline equivalent to separate accounting with arm's length transfer pricing. For example, Klassen and Laplante (2012b) define income shifting as "a plan or structure that causes relatively more income to be earned in lower tax-rate jurisdictions than would otherwise be expected based on the company's worldwide asset allocation". Christian and Schultz (2005) define income shifting as "the recognition of income as being earned in a country other than its true source".

2.2. Inbound and outbound shifting

The factors that drive reported income away from the baseline used in this study may not be symmetrical for inbound and outbound shifting. Compliance with arm's length transfer pricing standards often creates the need to decouple the location of income from the location of revenues that generated the income. Product development, manufacturing, administration, and other general expenses, which generate revenues in foreign countries, are often incurred in the U.S. For example, consider a firm that develops a new product in the U.S. that is built and sold by its subsidiary in France to French customers. The arm's length standard dictates that the French subsidiary pay a royalty to the U.S. parent for the right to build and sell the product to customers in France. The royalty payment creates earnings in the U.S. even though all revenues related to the product are in France. This creates an association between foreign sales and domestic income that we capture as gross inbound shifting (even if the royalty rate is set in compliance with the arm's length standard) because the location of the revenue is different than the location of some of the income (some foreign income is shifted to the U.S., where the costs of original development were incurred). A similar scenario could play out in reverse, creating gross outbound shifting. However, because our sample consists of U.S. firms, we expect there will be relatively more expenses in the U.S. that generate foreign revenues than vice versa. This fact is likely to create asymmetrically large amounts of gross inbound income shifting (relative to gross outbound shifting) that are driven by compliance with transfer pricing regulations.

Tax incentives are also likely to have an effect on inbound and outbound income shifting. Broadly speaking, U.S. firms have an incentive to shift income to jurisdictions where the tax rate is relatively low. During our sample period, the average statutory tax rate of countries in the OECD was lower than the U.S. statutory tax rate, and there are many so-called tax haven countries with statutory tax rates at or near zero. Firms with operations in these countries have an incentive to shift income out of the United States where returns to shifting come largely from the ability to defer repatriation of income shifted to low-tax foreign jurisdictions. However, some firms may have operations in countries where the tax rate is higher than the U.S. statutory tax rate, creating an incentive to shift income into the United States. The returns to inbound shifting are realized when income that would otherwise be taxed at a rate higher than the U.S. rate is shifted into the U.S. This incentive, in turn, may be muted by the ability to cross-credit, whereby a firm can credit the foreign tax paid in excess of the U.S. rate against U.S. tax owing on income repatriated from low-tax subsidiaries.

2.3. How is tax-motivated income shifting accomplished?

Firms can shift income in at least three ways. First, firms set the prices of goods or services transferred between controlled entities located in different jurisdictions. Most countries require transfer prices between related parties to be set using the arm’s length principle (i.e., as if the transfer were between unrelated parties). As noted above, even if all transactions take place at an arm’s length price, we will capture the transfer payments as gross income shifting because the income is reported in a jurisdiction other than where the sale takes place. However, incentives may drive firms beyond a neutral application of the arm’s length transfer pricing principle, thereby allowing them to shift marginal income to the location most favorable to achieving their objectives.

Second, firms can shift profits using intra-company debt. Once again, a neutral allocation of intra-company debt might be integral to the effective functioning of internal capital markets, and could result in gross income shifting. But, just as was the case with transfer pricing, firms can opportunistically arrange their finances such that income is disproportionately recognized in jurisdictions favorable to the company's objectives. For example, a subsidiary located in a low-tax country lends to a related subsidiary in a high-tax country. The subsidiary in the high-tax country can then make tax-deductible interest payments to the subsidiary in the low-tax country, where the interest income is earned at the low-tax rate.

Third, firms can shift income using cost-sharing agreements. A cost-sharing agreement is a contract between related parties specifying how they will share the costs of developing intangible assets. Costs are contractually allocated based on the location of earnings expected to be generated by the new asset. For example, if a parent firm in a high-tax country spends $10 million developing a new asset that is expected to increase its earnings by $8 million and is also expected to increase the earnings of a subsidiary in a low-tax country by $4 million, the subsidiary will reimburse the parent for one-third (4/12) of the costs of development. Although the parent in our example would pay tax on the $3.3 million reimbursement for the development costs, it would not receive any future royalty payments from the low-tax subsidiary when the low-tax subsidiary earns revenues using the asset. The low-tax subsidiary, meanwhile, can keep all future profits that it generates, including those it may earn from selling into the parent's market. Firms, therefore, have incentives to manipulate the estimated profits to be earned by their various controlled entities so that income will be disproportionately recognized in the low-tax jurisdiction.

Regardless of the mechanism used to shift income, a firm cannot unilaterally change the location of its customers. We exploit this fact, and take the amount of domestic sales made to third-party customers inside the U.S. and the amount of foreign sales made to third-party customers outside the U.S. as exogenous. What the firm chooses, through its transfer pricing practices, the location of its debt, and the structuring of its cost-sharing agreements, is the amount of income that will be reported (and taxed) as domestic and the amount that will be reported (and taxed) as foreign. Because (in our study) the choice of where to locate income is binary (foreign or domestic) and the total amount of consolidated income is unaffected by income shifting, any decrease in domestic income must result in a dollar-for-dollar increase in foreign earnings, and vice versa.

3. Related Research and Hypothesis Development

3.1. Prior research

A number of studies in economics (Harris et al. 1991, Hines and Rice 1994, Huizinga and Laeven 2008) and accounting (Klassen et al. 1993, Collins et al. 1998, Klassen and Laplante 2012a and 2012b) have examined tax-motivated income shifting across international borders by multinational corporations. Most of these studies estimate income shifting using variations on one of two approaches, introduced by Hines and Rice (1994) and Collins et al. (1998), respectively. Hines and Rice (1994) assume that unobservable unshifted income in a jurisdiction is a function of the jurisdiction's labor, capital, and productivity inputs to a Cobb-Douglas production function; to the extent that reported income varies with a tax incentive variable, incremental to the standard Cobb-Douglas inputs (labor, capital, and productivity), income shifting is inferred. One weakness of this measure is that labor, capital, and productivity in a country could systematically vary with tax incentives in that country, and so the separation of the economic factors from the tax factors becomes problematic. In addition, the method allows for analysis at the jurisdiction level, but is not easily adapted to the firm level.

Collins et al. (1998) take a different approach and assume that the accounting pre-tax rate of return on foreign sales should be a function of the return on domestic sales in the absence of income shifting. In their model, if the return on sales in foreign jurisdictions is a function of tax incentives, after controlling for the worldwide return on sales, then income shifting is inferred.[4] One weakness of this approach, similar to that of the Hines and Rice (1994) approach, is that rates of return on sales could be systematically related to tax incentives, so a higher rate of return on sales in foreign countries may have more to do with the economics of foreign markets and less to do with cross-jurisdictional income shifting. Another weakness of this approach is that it classifies each firm-year as either a net in-shifter or a net out-shifter based on the firm-year foreign effective tax rate. If firms actually shift income both in and out, this approach allows them to contribute only in the direction that dominates.[5]

A third approach, developed by De Simone and Stomberg (2012), introduces a measure of "income mobility" which is designed to capture a firm's ability to tax-efficiently structure global operations. Their measure combines membership in a high-tech or pharmaceutical industry, R&D and advertising expenditures, proportion of foreign sales, and gross profit percentage. The De Simone and Stomberg (2012) approach is distinct in that it measures the likelihood that a firm will have the ability to shift income, while other studies, including ours, attempt to measure income shifting that has actually been undertaken.

Although a number of studies have used these techniques to measure income shifting, relatively little is known about the variation in the degree of income shifting across firms beyond the fact that the level of shifting is related to tax incentives. What has been examined is the tax avoidance behavior of firms associated with one or more indirect proxies for income shifting and

[4] Another approach, introduced by Christian and Schultz (2005), is similar to that of Collins et al. (1998) but assumes that the marginal after-tax rate of return on assets should be the same in all jurisdictions. This approach requires access to tax return data and has not been used in other studies of which we are aware.
[5] Collins et al. (1998) find evidence that U.S. multinationals operating in high-tax countries shift income into the U.S.; they do not find evidence that those operating in low-tax countries shift income out of the U.S. Klassen and LaPlante (2012b) refine the research design of Collins et al. (1998) by aggregating data over 5 years and find evidence of shifting by both groups.

various firm characteristics. For example, Dyreng and Lindsey (2009) and Markle and Shackelford (2012) find that tax haven operations reduce firms' effective tax rates. Furthermore, Desai et al. (2006) find that firms with a greater degree of multinationality, more extensive intrafirm trade, and more intense research and development activities have more operations in tax haven countries. Presumably, tax havens reduce tax rates because firms use them in income shifting strategies. However, the existing evidence supporting this conjecture is indirect.

Klassen and Laplante (2012a) and Markle (2012) attempt to identify factors that affect the degree of income shifting. Both studies find that firms with better foreign reinvestment opportunities shift more income. As is the case with all empirical studies, these studies are bound by the limitations of the empirical proxies they use for income shifting (the Collins et al. (1998) proxy, and the Hines and Rice (1994) proxy, respectively).

3.2. Hypothesis 1: the effect of tax incentives

Building on this body of research, we first test a hypothesis that has been examined previously: the effect of tax incentives on income shifting. As noted above, firms with operations in countries with tax rates lower than the U.S. rate have incentives to shift income out of the U.S. to those countries. Conversely, firms with operations in high-tax foreign countries have incentives to shift income into the U.S. Stated formally:

Hypothesis 1: U.S. multinational corporations shift income in response to tax incentives.

Although this hypothesis has been examined in prior research, testing it here is valuable for at least two reasons. First, the test can be seen as a validation check of our new measure of income shifting. Based on prior research, we expect to find that firms shift income in response to tax incentives. Using our measure, we expect that shifting in response to tax incentives will be incremental to the shifting that is driven by innate factors. Second, establishing that firms shift income in response to tax incentives is an important component of the theory that links income shifting and financial constraints.

3.3. Hypothesis 2: the effect of financial constraints

Our second hypothesis moves beyond those examined in prior research. U.S. multinationals are subject to a worldwide tax regime in which every dollar of income earned throughout the world is eventually subject to taxation in the U.S. In a simple worldwide tax system, there should be no returns to shifting income out of the U.S. because any income taxed by the foreign country at a lower rate would also be taxed by the U.S., with the end result of every dollar of income being taxed at a minimum of the U.S. rate. However, the U.S. system allows firms to defer the payment of the U.S. portion of tax until the foreign income is repatriated to the U.S. in the form of a dividend. Foley et al. (2007) show that this deferral provision helps to explain the large amount of cash held by U.S. multinational corporations by showing that the cash is "trapped" in foreign countries by the U.S. tax liability that will come due when the cash is repatriated.[6]

Other research suggests that trapped cash creates frictions in the firm's internal capital market, increasing the demand for external financing (Altshuler and Grubert, 2003). However, if firms face high borrowing costs, they may prefer to shift less and pay the incremental taxes rather than to shift the income and incur borrowing costs. That is, firms facing financial constraints will shift less income than their less financially constrained peers because it is more expensive for financially constrained firms to have cash trapped in foreign jurisdictions.

[6] Anecdotal evidence for this is also provided by the concerted lobbying efforts of large U.S. multinationals asking the government for a tax "holiday" which would permit the cash to be brought back and taxed at a significantly-reduced rate.

Following this line of reasoning, we predict that financially constrained firms will shift less income out of the U.S. than other firms.

Hypothesis 2: Financially constrained U.S. multinational corporations shift less income out of the U.S. than financially non-constrained firms.

The predicted effect of financial constraints on inbound income shifting is not likely to be the same as that on outbound income shifting. If a firm has tax incentives to engage in inbound income shifting, it will do so, regardless of its financial constraints. If the firm has tax incentives to leave the earnings abroad, but needs the cash at home because of financial constraints, it has two choices. First, it could pay tax to the foreign country and then issue a dividend to the parent, paying tax to the U.S. on the difference between the foreign country tax rate and the U.S. tax rate. Second, it could engage in inbound income shifting, in which case it would pay the U.S. tax rate. In either case, the firm incurs the same tax burden. Hence, it is unlikely that financial constraints interact with the tax incentives to engage in inbound income shifting.

4. Research Design

To test our hypotheses, we develop an approach that is distinct from those used in prior research. First, consider the following simple identities:

$$PIFO^* = SALEFO^* - EXPFO^*, \tag{1a}$$

$$PIDOM^* = SALEDOM^* - EXPDOM^*, \tag{1b}$$

where $PIFO^*$ ($PIDOM^*$) is unobservable pre-shifted foreign (domestic) pretax earnings, $SALEFO^*$ ($SALEDOM^*$) is foreign (domestic) sales to third parties, and $EXPFO^*$ ($EXPDOM^*$) is expenses incurred to generate foreign (domestic) sales to third parties.[7] Note that $EXPFO^*$ and $EXPDOM^*$

[7] In all equations, * on a variable name indicates pre-shifted.

are aggregated based on where the sales to which they relate are made, not based on where the expenses are actually incurred. Eq. (1a) and (1b) can be rewritten as:

$$PIFO^{*} = \rho_f SALEFO^{*}, \tag{2a}$$

$$PIDOM^{*} = \rho_d SALEDOM^{*}, \tag{2b}$$

where ρ_f is the return on sales for pre-shifted foreign income and ρ_d is the return on sales for pre-shifted domestic income.

The purpose of our study is to estimate how much pre-shifted income is shifted across international borders (i.e., what portion of $PIFO^{*}$ ($PIDOM^{*}$) ends up being reported as domestic (foreign) income). To examine this question, we modify Eq. (2a) and (2b) as follows:

$$PIFO = (1 - \gamma)\rho_f SALEFO^{*} + \theta\rho_d SALEDOM^{*}, \tag{3a}$$

$$PIDOM = \gamma\rho_f SALEFO^{*} + (1 - \theta)\rho_d SALEDOM^{*}, \tag{3b}$$

where $PIFO$ and $PIDOM$ are reported (post-shifted) foreign and domestic pretax earnings, respectively; γ is the fraction of pre-shifted foreign pretax earnings that is shifted to reported domestic pretax earnings; θ is the fraction of pre-shifted domestic pretax earnings that is shifted to reported foreign pretax earnings. The intuition behind Equation (3a) is that reported pretax foreign earnings will be the sum of pretax foreign earnings not shifted and pretax domestic earnings shifted.

Eq. (3a) and (3b) are empirically estimable. U.S. accounting standards require firms (when practicable) to disclose "revenues from external customers (1) attributed to the enterprise's country of domicile and (2) attributed to all foreign countries in total from which the enterprise derives revenues."[8] In spite of this relatively clear guidance, the overall theme in the standard is that firms should use the "management approach" in preparing segment disclosures. Under this approach, management reports segment performance consistent with how the firm is organized for making operating decisions and assessing performance. We sampled numerous 10K filings to see how firms describe their geographic sales disclosures and found that many explicitly state that geographic revenues are based on the location of third-party customers. For example, Apple Inc. reports, "Net sales for geographic segments are generally based on the location of customers." Illinois Tool Works, Inc. reports, "Operating revenues by geographic region are based on the customers' location." Google, Inc. reports that "domestic and international revenues [are] determined based on the billing addresses of our advertisers." Although not all firms we sampled used such simple language, we found no firms that disclosed revenue allocation policies which conflicted with our assertion that geographic segment reporting of revenues is based on the location of the third-party customer.

In contrast to foreign and domestic sales reported in geographic segment disclosures, foreign and domestic pretax earnings, required by the SEC to be disclosed in the income tax footnote, are not reported based on the location of customers generating the earnings. Instead, the pretax earnings numbers are based on the domicile of the legal entity in which the earnings are reported (i.e., post-shifting).[9] This important difference between the income numbers and the revenue numbers allows us to estimate Eq. (3a) and (3b). To estimate the model, we transform

[8] Statement of Financial Accounting Standards No. 131, June 1997.
[9] See SEC Reg. S-X, Rule 4-08(h).

the variables to changes and add an intercept and an error term.[10] That is, we estimate

$$\Delta PIFO = \alpha_0 + \alpha_1 \Delta SALEFO^* + \alpha_2 \Delta SALEDOM^* + \epsilon, \tag{4a}$$

$$\Delta PIDOM = \beta_0 + \beta_1 \Delta SALEFO^* + \beta_2 \Delta SALEDOM^* + u.^{11} \tag{4b}$$

All variables are as defined previously and Δ indicates a first difference.

An obvious problem with the interpretation of the coefficients in Eq. (4a) and (4b) is that they capture both the fraction of shifted income and the rate of return on sales (e.g., $\alpha_2 = \theta\rho_d$ and $\beta_1 = \gamma\rho_f$), and we want to estimate the shifting parameters (θ and γ). By dividing the estimated coefficient $\hat{\alpha}_2$ ($\hat{\beta}_1$) by the estimated coefficient $\hat{\beta}_2$ ($\hat{\alpha}_1$) we remove the rates of return on sales (i.e., ρ_d and ρ_f) and derive the following:

$$\hat{\theta} = \frac{\hat{\alpha}_2}{(\hat{\alpha}_2 + \hat{\beta}_2)}, \tag{5a}$$

which is the estimated fraction of pre-shifted domestic income that is reported in foreign pretax income, and,

$$\hat{\gamma} = \frac{\hat{\beta}_1}{(\hat{\beta}_1 + \hat{\alpha}_1)}, \tag{5b}$$

which is the estimated fraction of pre-shifted foreign income that is reported in domestic pretax income.

By dividing the two coefficient estimates as shown above, we isolate a direct estimate of the fraction of pre-shifted income that is ultimately reported in a jurisdiction other than where it

[10] Using a changes form reduces concerns related to correlated omitted variables and non-stationarity. The cost is that we are forced to assume that the return on sales parameters (ρ_d and ρ_f) are constant from t-1 to t when estimating the changes model.

[11] Because Eq. (4a) and (4b) contain exactly the same independent variables, OLS regressions are equivalent to seemingly unrelated regressions. We use seemingly unrelated regressions to test the coefficients across equations in the empirical tests.

was earned. The shifting parameters are not contaminated by the return on sales parameters because those parameters are canceled out in the division, eliminating one issue that has been problematic in prior efforts to estimate cross-jurisdictional income shifting.

4.1. Separating out tax-motivated income shifting

Donohoe et al. (2012) issue a note of caution to researchers trying to use the segment disclosures and the income tax footnote to uncover income shifting. They observe that there are non-tax reasons that a dollar of income and its related sales could be reported in different jurisdictions. The simplest example is an exporter. If a U.S. firm builds a product in the U.S. and sells it directly to a foreign customer, the sales are classified as foreign and the income is reported as domestic. Similarly, if a U.S. firm has a foreign subsidiary that sells directly to U.S. customers, those sales are domestic and the income is foreign.[12]

Consistent with this, our estimates of $\hat{\theta}$ and $\hat{\gamma}$ (the outbound and inbound shifting parameters) capture the gross income shifting relative to the baseline of customer location, not just tax-motivated income shifting. In order to isolate the tax-motivated portion of income shifting, we identify firm-years that have more incentive to shift income for tax purposes, code indicator variables, and then estimate fully interacted models with the indicator variables. To identify firm-years with more incentive to shift income out of the U.S. to low-tax countries, we use an indicator variable, *HAVEN FIRM*, which is equal to 1 if the firm has at least one subsidiary in a tax haven, and 0 otherwise. To identify firm-years with more incentive to shift income into the U.S. from high-tax countries, we use an indicator variable, *HIGH FTAX FIRM*,

[12] As highlighted by Donohoe et al. (2012), Microsoft Corporation, in responding to a comment letter from the SEC in 2011 asking for an explanation of why its foreign income was 62% of its total income while its foreign sales were 42% of its total sales, offered two explanations: domestic sales includes sales to U.S. customers by foreign subsidiaries, and operating expenses vary by geography.

which is equal to 1 if the firm has a high proportion of its subsidiaries in countries with statutory tax rates higher than the U.S. rate. Similarly, to test the effect of financial constraints on outbound shifting, we code indicator variables developed in prior literature and estimate fully interacted models.

The tests of our first hypothesis, then, are whether the inbound and outbound shifting parameters are larger for firms with tax incentives to shift income into and out of the U.S., respectively. The test of our second hypothesis is whether the outbound shifting parameter is smaller for financially constrained firms.

4.2. Comparison to previous approaches

Any empirical estimation of income shifting requires an assumption about where the income should be reported absent any shifting; the amount shifted is then the difference between the amount reported (which is observable) and the estimate of what it would have been with no shifting. The Hines and Rice (1994) model assumes that income is generated by a log-linear function of labor, capital, and productivity that is the same across all jurisdictions. The Collins et al. (1998) model assumes that allocation of income across jurisdictions should be consistent with the allocation of assets, and uses revenue as the proxy for assets. This approach does not allow rates of return to differ across groups of firms with different tax incentives. Our model imposes a less restrictive functional form on the income-generating process, allows the rate of return on sales to vary across jurisdictions and for each subsample of interest, and uses primitives rather than proxies as inputs. We simply calculate the associations between domestic sales and foreign income and foreign sales and domestic income and then remove the rates of return to arrive at our estimates of gross income shifting.

Our approach also differs from those of previous studies in how we identify tax incentive. The Hines and Rice (1994) approach uses an estimate of the average effective tax rate or the statutory tax rate of the foreign country to determine whether it should be a net recipient or sender of shifted income. The Collins et al. (1998) approach uses the foreign effective tax rate of the firm (the ratio of foreign tax expense to foreign pretax income); if that rate is lower (higher) than the U.S. statutory rate, the firm is assumed to have a tax motivation to shift income out of (into) the U.S. A potential problem with this approach is that the rate that is being used to identify incentive to shift is calculated using post-shifting numbers. This could be problematic if the shifting affects the overall foreign rate. In contrast to this, we use the firm's opportunity set (i.e., the characteristics of the countries in which it has subsidiaries to shift to or from) to identify its incentive to shift income for tax purposes.

Finally, another important difference between our approach and that of Collins et al. (1998) is that ours yields an estimate of both the inbound and outbound shifting of the average firm-year while theirs classifies each firm-year as a net in-shifter or a net out-shifter and infers that income shifting has occurred from an association with a proxy for tax incentive. Consider a U.S. multinational that operates in the U.S. (35% tax rate), Japan (42%), and Bermuda (0%). The Collins et al. (1998) approach would divide the total (post-shifting) foreign tax expense by the total (post-shifting) foreign pretax income and if that quotient was greater than 35%, it would predict that firm's foreign return on sales would be lower than expected due to net inbound shifting. In reality, it is possible that the firm shifted some of its Japanese income to the U.S. and shifted some of its U.S. income to Bermuda. Our approach enables us to estimate both pieces.

5. Data and Sample Selection

The financial statement data used in our study are obtained from Compustat. The breakdown of sales between foreign and domestic is obtained from the segment data within Compustat. The breakdown of pretax earnings between foreign and domestic is also obtained from Compustat, and corresponds to data disclosed in firms' financial statement footnotes related to income tax expense. The data for coding the tax haven variable ($HAVEN\ FIRM$) and the high-tax country variable (*HIGH FTAX FIRM*) are obtained from Exhibit 21 of each firm's 10K using the method described in Dyreng and Lindsey (2009). Statutory tax rate data are obtained from multiple sources, but predominantly come from Comtax and Mintz and Weichenrieder (2009). S&P bond ratings are obtained from Compustat.

5.1. Sample

Our sample is comprised of U.S.-incorporated multinational firms having foreign and domestic sales and foreign and domestic pretax income available in the Compustat files between the years 1998 and 2011. We delete observations where the sum of foreign and domestic sales is not within 1% of total sales or the sum of foreign and domestic pretax income is not within 1% of total pretax income. We also delete observations where the firm uses an intracompany eliminations account for its geographic segments. Furthermore, we delete observations with very small values of foreign or domestic sales (less than $1 million of either value). We begin our sample after 1997 because two significant changes occurred in that year: the rules for segment disclosures (FAS 131) changed and new international tax reporting requirements (the so-called "check-the-box" rules) were introduced that year. The sample ends in 2011 because that was the most recent year of available data on Compustat when we began the study. We require firms to have non-missing values of total assets, and at least two consecutive years of non-missing values of pretax foreign income and pre-tax domestic income. We eliminate flow-through entities (partnerships, LLCs, trusts, etc.) because they are not subject to entity level taxation, financial institutions (SIC codes between 6000 and 6999) because their revenue is substantially different from industrial firms, and utilities (SIC codes between 4900 and 4999) because they are subject to substantially different regulatory environments than industrial firms.[13]

Not all pretax earnings are generated by sales to third-party customers as depicted in Eq. (1a) and (1b). Non-operating gains and losses can also affect pre-tax earnings. For example, firms may have interest revenues from invested financial instruments that create pretax income, or they may record gains or losses on the disposition of assets, etc. Because foreign and domestic pretax incomes before non-operating gains and losses are not available, we delete observations from our sample that have relatively large interest revenues or special items (either item in excess of 10% of sales).

Finally, our estimates of income shifting hinge on our ability to execute the algebra that divides the return on sales parameters out of the estimated regression coefficients. This includes an assumption that the return on sales parameters are constant in the portfolio of firms we use to estimate the regressions. To mitigate the severity of this assumption, we delete influential observations in the following regression:

$$\Delta PI = \rho_0 + \rho_f \Delta PIFO + \rho_d \Delta PIDOM + e. \tag{6}$$[14,15]

[13] We have re-examined the results with financial institutions included in the dataset and results are similar.
[14] Eq. (6) can be derived by adding Eq. (3a) and (3b). Note that when adding these equations, the shifting parameters are eliminated. As an aside, this shows an alternative estimation technique, which is to estimate Eq. (6) for each sub-group of observations, then estimate Eq. (4a) or Eq. (4b) for the same subgroup. One can then divide the coefficient estimates in Eq. (4a) or (4b) by the appropriate return on sales parameters estimated in Eq. (6) to isolate the shifting parameters. The two techniques are algebraically equivalent, and also yield identical econometric results.
[15] We estimate Eq. (6) using the MM method of iteratively reweighted least squares (i.e. robust regression), and delete observations flagged as outliers. See Leone et al. (2012) for details on robust regression.

These sample selection criteria leave us with 9,164 observations corresponding to 2,000 distinct firms. A summary of the sample selection criteria is presented in Table 1.

Table 2 presents summary statistics for the sample just described. In Panel A we show the univariate summary statistics. The first two rows show the change in foreign pretax income scaled by lagged assets ($\Delta PIFO$) and the change in domestic pretax income scaled by lagged assets ($\Delta PIDOM$), which are the two dependent variables used to estimate Eq. (4a) and (4b). On average, firms in our sample have year-over-year increases in foreign pretax income (domestic pretax income) of about 0.6% (0.8%) of assets. The next two rows show the change in foreign sales scaled by lagged assets ($\Delta SALEFO$) and the change in domestic sales scaled by lagged assets ($\Delta SALEDOM$). Sales in both foreign and domestic locations are increasing by about 4% of assets at the mean (3% of assets at the median). The remaining variables in the table are all indicator variables. About 65% of our firm-years report at least one subsidiary in a tax haven country (*HAVEN FIRM*), and a third of our sample firm-years have a high proportion of subsidiaries in high tax countries (*HIGH FTAX FIRM*).[16] *CONSTRAINED* (*DIVIDENDS*) is equal to one if the firm is in the lowest dividend-paying tercile, which essentially results in a variable that captures firms with no dividends. The mean is not equal to 33% because all firms with no dividends get assigned to the lowest tercile. The *CONSTRAINED* (*JUNK RATING*) variable is equal to one for about 40% of firms that have a non-investment grade rating (among firms that have non-missing ratings). Finally, *CONSTRAINED* (*SA INDEX*) is equal to one for the most constrained tercile of firms, before outlier deletion. The *SA INDEX* is computed following Hadlock and Pierce (2010), and is a nonlinear function of firm age and firm size.

[16] The number of firm-years for which we could code *HIGH FTAX FIRM* is lower for two reasons. First, for firm-years listing no foreign countries, we code *HAVEN FIRM* as 0, but are unable to code *HIGH FTAX FIRM*. Second, we do not have a full time series of statutory tax rates for every country in the world.

Panel B shows the Spearman (below the diagonal) and Pearson (above the diagonal) correlations among the variables used in the tests of our two hypotheses. The change in foreign income is positively correlated with the change in domestic income, indicating that foreign and domestic incomes are not independent. We also see that the change in domestic sales is correlated with the change in foreign income, and that the change in foreign sales is correlated with the change in domestic income. These two correlations suggest that income shifting across jurisdictions is a possibility, though the multivariate tests specified by Eq. (4a) and (4b) are needed for confirmation. We also note that the three proxies for financial constraints are positively correlated, with spearman correlation values ranging between 25% and 41%.

6. Results

In this section, we discuss the results of the tests of our hypotheses. In subsection 6.1 we discuss the results of our tests of Hypothesis 1. In subsection 6.2, we discuss the results of our tests of Hypothesis 2. In subsection 6.3, we provide estimates of the dollars shifted and the taxes deferred.

6.1. Tests of Hypothesis 1 – Tax incentives and income shifting

Tables 3 and 4 report the results of the tests of Hypothesis 1. Table 3 reports the test on outbound shifting, Table 4 reports the test on inbound shifting. The tables report both the results of the regressions and the calculated shifting parameters. The regression results are reported in two main columns, each with two sub-columns reporting results with the two dependent variables, $\Delta PIFO$ and $\Delta PIDOM$. As explained above, it is necessary to estimate the model with each of the dependent variables in order to be able to calculate the shifting parameters reported in the lower part of the table.

Looking first at Table 3 (outbound shifting), Model 1 estimates Equations (4a) and (4b) on the full sample of firm-years. In the first sub-column ($\Delta PIFO$), the positive and significant estimate (0.012) of the coefficient on $\Delta SALEDOM$ indicates a positive association between domestic sales and reported (post-shifting) foreign income. In order to determine what portion of that association is related to shifting, we use the estimate of the coefficient on $\Delta SALEDOM$ from the second sub-column (when $\Delta PIDOM$ is the dependent variable). As described in Equation (5a), dividing the first coefficient estimate (0.012) by the sum of the two estimates (0.012 + 0.144) removes the non-shifting-related return on sales from the estimate, yielding the estimate of shifting from domestic to foreign of 0.074 (p-value <0.001).[17] The estimate suggests that, on average, U.S. multinationals shift 7.4% of pre-shifted pretax domestic income out of the U.S. This captures the gross outbound shifting of the average firm-year.

Model 2 adds the indicator variable for tax haven use and its interactions with foreign and domestic sales in order to test whether firms with a tax incentive to shift income out of the U.S. engage in more outbound income shifting. As noted earlier, this hypothesis serves to some extent as a validation test of our measure of income shifting. It is unlikely that firms have significant foreign operations located in tax havens solely to sell their products to customers located in those locations since many haven countries have very small populations. Instead, a likely first-order driver of the decision to establish operations in a haven is reducing tax-based frictions as funds flow throughout the company.

The regression results in Model 2 report that the marginal associations between foreign earnings and domestic sales are stronger for firms with tax haven operations than for firms

[17] The parameter estimates have been rounded to three decimal places. Computing the shifting value on the rounded numbers yields 0.077, slightly more than the actual shifting parameter reported in the table of 0.074.

without ($\Delta PIFO$ sub-column), though not statistically significant using a two-tailed test. However, the same pattern does not hold for the relation between domestic earnings and both domestic sales and foreign sales ($\Delta PIDOM$ sub-column). The statistical test of *Hypothesis 1* is the comparison of the shifting parameters of the two groups (haven users (0.112, p-value <0.001) and non-haven users (0.039, p-value > 0.10) reported at the bottom of the table. The difference of 0.073 (p-value < 0.001) shows that firms with tax haven operations shift more than three times as much pre-shifted income out of the U.S. as firms without tax haven operations, consistent with our hypothesis.

Turning next to inbound shifting, Table 4 estimates the same regressions, but with the tax haven indicator replaced by an indicator variable for firm-years with a high proportion of foreign operations in high-tax countries (*HIGH FTAX FIRM*). As noted in Section 5, the sample size is reduced by the number of firm-years for which we cannot calculate *HIGH FTAX FIRM*. We first re-estimate Model 1 on the subsample of firm-years for which *HIGH FTAX FIRM* could be calculated and note that estimates are consistent with those reported in Table 3. As in Table 3, the direct test of *Hypothesis 1* is whether the shifting parameters of the two groups are different. The difference in the shifting parameters of 0.247 (p-value < 0.001) is consistent with expectations and suggests that firms with a tax incentive to shift income in to the U.S. engage in twice as much inbound income shifting as firms with no such incentive.

We note the large estimate of γ, which captures the gross inbound shifting from foreign operations to domestic operations. The estimate suggests that 34.7% of pre-shifted pretax foreign earnings is shifted into the U.S. Although this estimate seems large at first glance, we offer several explanations for why this empirical fact arises in our data. First, costs are commonly incurred in multiple jurisdictions, requiring intra-firm transfers (e.g., purchase of intermediate goods, royalties) in order to calculate entity-level incomes. All such transfers will be captured as shifted income relative to our baseline. Because our sample consists exclusively of U.S.-based multinationals, it is not surprising that a significant portion of the costs incurred to generate foreign income are incurred in the U.S.

Second, some firms make foreign sales through foreign branch operations (as opposed to separately organized legal subsidiaries) wherein earnings immediately flow to the parent corporation. Though the use of such branches is believed to be relatively rare among non-financial firms, our model will classify all earnings generated through branch operations as having been shifted from foreign to domestic jurisdictions. The same would hold true for firms that export goods directly to foreign customers. If goods are exported to third-party customers in foreign jurisdictions, and geographic segment revenues are reported as foreign while all related income is reported as domestic, our model will classify those earnings as having been shifted from foreign to domestic jurisdictions.

Third, for part of our sample period, the average firm in the sample had a domestic effective tax rate that was lower than its foreign effective tax rate. In Figure 1, we plot the mean current foreign effective tax rate and the mean current federal effective tax rate. The figure shows that for the late 1990s and early 2000s, firms' domestic effective tax rates were lower than their foreign effective tax rates. Although it is not clear whether the domestic effective tax rate is the correct benchmark for assessing taxes on earnings repatriated from foreign jurisdictions, it is possible that some firms have a tax incentive to shift income to the United States.

Fourth, the nuances of transfer pricing regulations in the U.S. require that firms establish a method for determining if the transfer price is reasonable. The most common method for determining whether a transfer price is legitimate is the comparable profits method, under which the profit margin is compared to some benchmark to determine its reasonability. To make such a comparison, the tested entity (almost always the foreign subsidiary) must show a profit margin that is comparable to those of similar firms that do not have incentives to shift income. The effect of these regulations is that foreign subsidiaries are often assigned a maximum rate of return, and the residual profits beyond that rate of return are transferred to the parent firm in order to remain compliant with the transfer pricing rules (Sullivan, 2006). Thus, firms with more volatile rates of return will have more residual profits that get assigned to the parent company. Our model will capture these profit transfers as inbound income shifting. In untabulated tests, we split our sample into terciles based on the standard deviation of the firm's worldwide return on sales in the prior five years and compare the inbound shifting parameters of the groups. Consistent with our theory that the transfer of residual earnings will be captured as inbound shifting, we find that firms with the least volatile return on sales have inbound shifting parameters close to zero, and firms with the most volatile return on sales have high inbound shifting parameters.

An obvious question is whether similar factors may affect our estimates of outbound shifting. Most of the items that affect the inbound estimate are likely unidirectional because we only include U.S.-incorporated multinationals in our sample. As a result, the issues of branch operations and exports can have no effect on estimates of outbound shifting. And because the foreign subsidiary is almost always the tested party in transfer pricing agreements, the residual adjustments will be made to achieve a target foreign profit margin and not a target domestic profit margin. As a result, there is no reason to expect the statistical relationship that exists between foreign sales and domestic earnings because of transfer pricing adjustments to exist between domestic sales and foreign earnings.

The factor that most likely inflates our estimates of outbound shifting is when foreign subsidiaries of U.S. multinationals sell directly to U.S. customers. Such transactions will create an association between domestic sales and foreign income that our method will capture as income shifting. However, this will only confound our estimates if such selling arrangements are used disproportionately by firms in our various subsamples.[18]

6.1.1. Alternative Test of Hypothesis 1 – allow return on sales to vary

Estimating Eq. (4a) and (4b) in a pooled panel as we do in Tables 3 and 4 imposes the assumption that the return on sales parameters are the same for each examined group (e.g., firms with tax havens and firms without tax havens in Model 2), though the return on sales parameters are allowed to vary across foreign and domestic jurisdictions. To test the sensitivity of our results to this fairly restrictive assumption, we estimate Eq. (6) for each industry and year. This gives us industry-year specific estimates of ρ_d and ρ_f. We then multiply each firm-year observation of *SALEDOM** and *SALEFO** by its corresponding industry-year estimate of ρ_d and ρ_f, respectively, to obtain estimates of *PIDOM** and *PIFO** (pre-shifted domestic pretax earnings and pre-shifted foreign pretax earnings, respectively). Using these calculated variables, we estimate the following system of equations:

$$\Delta PIFO = a_0 + a_1 \Delta \widehat{PIFO}^* + a_2 \Delta \widehat{PIDOM}^* + \epsilon, \tag{7a}$$

$$\Delta PIDOM = b_0 + b_1 \Delta \widehat{PIFO}^* + b_2 \Delta \widehat{PIDOM}^* + u. \tag{7b}$$

Because the independent variables already incorporate the return on sales parameters, the coefficient estimates, reported in Table 5, yield direct estimates of the shifting parameters, θ and γ.

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[18] It is possible that firms arrange to have foreign subsidiaries sell directly to the domestic market as part of their outbound shifting strategy.

Model 1 in Table 5 shows that $\hat{a}_2$, which is an estimate of shifting from domestic to foreign (θ), is 0.11, and statistically significant (p-value < 0.001). The estimate of $\hat{b}_1$ is 0.44 and statistically significant (p-value <= 0.001). These estimates are similar to the estimates in Table 3 (0.074 for θ) and Table 4 (0.377 for γ), suggesting the assumption of a constant ρ_d and ρ_f was not overly restrictive.

Models 2 and 3 show the results when splitting the sample by firms that report tax haven operations, and by firms that have a relatively high proportion of their foreign operations in high-tax countries, respectively. Similar to results in Tables 3 and 4, we find that firms with tax haven operations shift relatively more pre-shifted domestic income to foreign income (incremental shifting of 4.5%, p-value =0.0278), and firms with relatively more high-tax operations shift more pre-shifted foreign income to domestic income (incremental shifting of 30.8%, p-value <0.001).

We note that the incremental shifting parameters using this method are slightly different than those reported in Tables 3 and 4, though the conclusions are similar. One explanation for the difference is that this method does not allow the return on sales parameters to vary across firms that have and don't have tax incentives to shift out or in, but instead allows the return on sales to vary by industry and year. Whatever the explanation, the results provide some assurance that the estimates of the shifting parameters are not overly sensitive to different assumptions related to the return on sales parameters.

Having established that results are similar across methods, and noting that the results correspond to indirect tests of tax-motivated income shifting in previous research, we next move on to tests of Hypothesis 2, which has not been examined in the literature to date.

6.2. Tests of Hypothesis 2 – Financial constraints and outbound shifting

Hypothesis 2 predicts that firms facing financial constraints will shift less income out of the U.S. than their less financially constrained peers because it is more expensive for financially constrained firms to have cash trapped in foreign jurisdictions. The results of our tests of this hypothesis are reported in Table 6. Since the measurement of financial constraints has been a contentious topic in the literature for many years and many different proxies have been introduced, each of the three models in the table present results using a different proxy.

The first proxy for $CONSTRAINED$ is $JUNK\ RATING$. This indicator equals one when the firm's debt is rated below BBB by Standard & Poor's. This specification has the fewest observations because we exclude all firm-years that do not have debt ratings in Compustat. As for the tests of the previous hypothesis, the test of *Hypothesis 2* is the comparison of the inbound shifting parameters of the two groups presented at the bottom of the table. The difference of -0.151 (p-value = 0.034) in the domestic-to-foreign shifting parameters indicates that financially constrained firms shift 15.1 percentage points less income out of the U.S. than non-constrained firms, as predicted. It should also be noted that the estimate of the shifting parameter for the financially constrained firms (reported in the "YES" column) is not statistically different from zero, indicating that financially constrained firms do not shift income out of the U.S.

We rely on the work of Hadlock and Pierce (2010) in selecting our second proxy for financial constraints. Hadlock and Pierce (2010) carefully examine a number of proposed proxies for financial constraints, and conclude that a non-linear index based on the size and age of the firm is the best proxy for financial constraints. The results using this proxy are different from those using bond ratings in that the shifting parameter for the constrained firms (0.064) is larger in magnitude and statistically significant. However, the difference in the shifting parameters of the two groups (-0.055, p-value = 0.049) continues to suggest that financially constrained firms shift less income out of the U.S. to foreign countries than non-constrained firms.

Third, a number of studies (e.g., Hadlock and Pierce, 2010; Campello et al., 2010) argue that firms that do not pay dividends are financially constrained. The intuition is that they lack available cash with which to pay dividends. Alternatively, one could imagine a scenario where a firm feels constrained by an implicit obligation to pay a dividend even when cash is tight to avoid reducing the payout ratio. Though these theories predict opposite results with regard to income shifting, we follow the majority of prior research and classify firms with no dividends as constrained. Results suggest that non-constrained firms shift 5.9% more pre-shifted domestic income to foreign jurisdictions than non-constrained firms, though the result is not statistically significant at traditional levels (p-value = 0.112).

With regard to the tests relating income shifting and financial constraints, we note that the correlations shown in Table 2 among the three financial constraints proxies are not particularly high (30% between $SA\ INDEX$ and $DIVIDENDS$, 25% between $JUNK\ RATING$ and $SA\ INDEX$ and 41% between $JUNK\ RATING$ and $DIVIDENDS$). Given that we cannot be sure which of the three is best capturing financial constraints, it is reassuring that the results of the tests using all three yield similar conclusions with regard to *Hypothesis 2*.

6.3. Estimates of amounts shifted and tax deferred

Our parameter estimates allow us to calculate dollar estimates of the amount of outbound and inbound income shifting. We first examine the outbound shifting by firms with tax haven operations that is incremental to the amount of outbound shifting observed in firms without tax haven operations. In Model 2 of Table 3 we found that firms with tax haven operations shift

7.3% more of their pre-shifted income to foreign jurisdictions. This parameter implies that the mean (median) firm with tax haven operations shifts about $28 million ($6 million) in pre-shifted domestic income to foreign jurisdictions per year (above what would be expected absent tax incentives).[19] Aggregated over all firm-years with tax haven operations, we estimate a total of $169,948 million in incremental outbound shifting in our sample period. An upper bound estimate of tax deferral would be to assume that firms would have paid 35% tax rate on these earnings, but instead paid nothing. This would result in deferral of $59,482 million in tax.[20] During this same time period, these firms paid an aggregate of $453,990 million in federal taxes. Thus, the estimated tax deferral is about 13.1% of federal taxes paid.

Next, we examine the inbound shifting by firms with relatively more operations in high-tax foreign countries. Using similar arithmetic, we estimate that the mean firm-year with high-tax foreign operations shifted $43 million into the U.S. each firm-year incremental to what would be expected if the firm had operations in fewer high-tax foreign countries. In aggregate over the sample period, these firms shifted about $111,716 million into the U.S. Again, using an upper-bound estimate, if these earnings are taxed at 35%, the total federal tax on these earnings would be $39,101 million.

Putting these estimates in context relative to other estimates of income shifting is not straightforward since methods and samples differ substantially. Klassen and Laplante (2012b) estimate that the mean firm (all firms combined) in their subsample of 380 firms with a tax incentive to shift income out of the U.S. shifted $26 million ($10,000 million) more per year in

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[19] The mean firm-year with tax haven operations has $2,775 million in domestic sales. Using 14% as the value of ρ_d(implied by the regression coefficients), we calculate $28 million as $2,775*0.14*0.073, where 0.073 is the incremental outbound income shifting reported in Table 3.

[20] This can be seen as an upper bound on the estimate of the amount of tax deferred since not all income shifted out of the U.S. would be shifted to no-tax foreign countries.

2005-2009 than it (they) did in 1998-2002. The most direct comparison we can make between these estimates and ours is at the mean firm-year level: we estimate that the mean firm-year in our sample period (1998-2011) shifted $28 million out of the U.S for tax reasons. This appears to be consistent with their estimate of $26 million. However, their $26 million is an estimate of shifting that is incremental to what was being shifted in the earlier period, while ours is an average amount over the entire sample period. Thus, it is likely that our estimates are lower than the Klassen and Laplante (2012b) estimates.

Another estimate of shifting that is often cited is that of Clausing (2009). Using country-level data on the activities of U.S. multinationals, she estimates that, in 2002, $87 billion of domestic income was shifted out of the U.S. in response to tax incentives. This estimate is more than five times larger than our estimate of $11.3 billion per year ($170 billion/15 years). However, when one considers that we are using an average of 610 firms per year and Clausing (2009) is, in principle, capturing the shifting of every U.S. entity that is required to report to the Bureau of Economic Analysis, the estimates may not be as inconsistent as they first appear.[21] That said, we view our estimates less as validation checks or critiques of those in prior literature and more as additional data points to aid in the estimation of an unobservable number.

Finally, we estimate the magnitude of the effect of financial constraints on outbound income shifting. In Table 6 we used three different proxies for financial constraints and found that financially constrained firms shift somewhere between 5.5% and 15.1% less of their pre-shifted domestic income to foreign jurisdictions. Using the lower-bound estimate, this translates to a mean (median) estimate of the amount not shifted due to financial constraints of about $3 million ($1 million) per firm-year.

[21] 610 = 9,164 firm-years/15 years (see Table 1).

7. Conclusion

In this study, we show that firms facing financial constraints shift less income out of the U.S. into foreign jurisdictions than do their unconstrained peers. We develop a new technique to measure income shifting that is more direct and requires less restrictive assumptions than the methods in the extant literature. We validate the measure by showing that, when it is used to estimate income shifting, firms with tax haven operations shift more income out of the U.S., and that firms with more high-tax foreign operations shift more income in to the U.S.

We also introduce a new definition of income shifting – anything that results in income being reported in a different jurisdiction than the revenue to which it relates – that is directly measurable using available data. Not surprisingly, given the breadth of our definition of shifting, we find that a substantial portion of pre-shifted foreign income is shifted into the U.S. We assert several explanations for this finding: transfer payments to compensate for development costs incurred in the U.S.; the existence of foreign branch operations in which sales are made to foreign third parties but income flows directly to the parent company in the U.S.; check-the-box rules, which create flow-through entities for tax purposes; the relationship between foreign and domestic tax rates (the average domestic ETR was lower than the average foreign ETR for several years in our sample); and the volatility of rates of return.

Finally, we estimate that the firms in our sample shifted an aggregate of $170 billion of domestic income out of the U.S. between 1998 and 2011, allowing them to defer as much as $59 billion in U.S. tax, or 13% of their tax bill. Our lower-bound estimate of the aggregate amount of shifting forgone due to financial constraints is $9 billion. We believe our findings will be of interest to researchers and policymakers alike and that our study will provide a platform for future research to examine income shifting and its related issues more directly.

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Table 1 – Sample Selection.

Criteria	Firms	Firm-years
Multinational firms with data beginning in 1998 with foreign and domestic sales summing to within 1% of total sales, foreign and domestic pretax income summing to within 1% of total pretax income, and both foreign and domestic income of at least $1 million.	2,609	12,729
Drop regulated firms (SIC 4900-4999, SIC 6000-6999)	2,508	12,369
Drop firms incorporated in foreign countries	2,242	11,338
Drop firms organized as flow-through entities	2,206	11,170
Drop firms missing a CIK number to link to SEC filings for tax haven data	2,179	11,095
Drop firms with exact zero value of *PIFO* or *PIDOM*, or negative values of *SALEFO*, or *SALEDOM*, and firms with missing lagged assets.	2,138	10,695
Drop firms with Special Items greater than 10% of Sales, and Interest Income greater than 10% of Sales, and firms with total assets in the current or previous year less than $1 million.	2,065	9,783
Drop influential observations in a regression of ΔPI on $\Delta SALEFO$ and $\Delta SALEDOM$.	2,000	9,164

Financial statement data are obtained from Compustat. Domestic and foreign sales are obtained from data that corresponds to geographic segment disclosures, while domestic and foreign pretax income are obtained from data that corresponds to the income tax footnote. Data for coding the tax haven variable are obtained from Exhibit 21 of the firm’s 10K filed with the SEC.

Table 2 – Summary statistics, 1998 – 2011.

Panel A: Univariate summary statistics.

NAME	N	MEAN	STD	P25	P50	P75
ΔPIFO	9,164	0.006	0.031	-0.005	0.003	0.015
ΔPIDOM	9,164	0.008	0.060	-0.018	0.006	0.033
ΔSALEFO	9,164	0.045	0.108	0.000	0.029	0.077
ΔSALEDOM	9,164	0.039	0.144	-0.016	0.027	0.090
HAVEN FIRM	9,164	0.652	0.476	0.000	1.000	1.000
HIGH FTAX FIRM	7,679	0.337	0.473	0.000	0.000	1.000
CONSTRAINED (DIVIDENDS)	7,261	0.525	0.499	0.000	1.000	1.000
CONSTRAINED (JUNK RATING)	3,552	0.450	0.498	0.000	0.000	1.000
CONSTRAINED (SA INDEX)	9,013	0.314	0.464	0.000	0.000	1.000

Panel B: Pearson (spearman) correlations above (below) the diagonal.

	1	2	3	4	5	6	7	8	9
1 *ΔPIFO*		0.03*	0.36*	0.14*	0.04*	-0.01	0.06*	-0.03*	0.01
2 *ΔPIDOM*	0.12*		0.19*	0.37*	0.01	0.03*	0.11*	0.05*	0.04*
3 *ΔSALEFO*	0.38*	0.20*		0.25*	0.06*	-0.01	0.08*	-0.03	0.02
4 *ΔSALEDOM*	0.19*	0.36*	0.32*		-0.02	-0.02	0.09*	-0.00	0.04*
5 *HAVEN FIRM*	0.07*	-0.00	0.08*	-0.03*		-0.10*	-0.06*	-0.09*	-0.28*
6 *HIGH FTAX FIRM*	-0.02	0.02*	0.01	-0.02*	-0.10*		0.10*	0.12*	0.16*
7 *CONSTRAINED (DIVIDENDS)*	0.04*	0.11*	0.07*	0.10*	-0.06*	0.10*		0.41*	0.30*
8 *CONSTRAINED (JUNK RATING)*	-0.06*	0.04*	-0.05*	-0.00	-0.09*	0.12*	0.41*		0.25*
9 *CONSTRAINED (SA INDEX)*	-0.02	0.04*	0.01	0.05*	-0.28*	0.16*	0.30*	0.25*	

This table reports descriptive statistics and correlations for the sample used in the cross-sectional tests. N reports the number of firm-years in the sample period 1998-2011. $\Delta PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*. $HAVEN\ FIRM$ is an indicator variable = 1 if firm *i* reports having significant operations in at least one tax haven country in year *t*; 0 otherwise. $HIGH\ FTAX\ FIRM$ is an indicator variable = 1 if firm *i* is in the upper tercile of the distribution of percentage of subs in countries with statutory tax rates higher than the US statutory tax rate to total subs in year *t*; 0 otherwise. $CONSTRAINED\ (JUNK\ RATING)$ is an indicator variable = 1 if firm *i* has below investment grade S&P bond rating in year *t*; 0 otherwise. $CONSTRAINED\ (SA\ INDEX)$ is an indicator variable = 1 if firm *i* has an *SA INDEX* value in the upper third of the sample in year *t*; 0 otherwise. *SA INDEX* is a measure of financial constraints based on firm size and firm age, developed by Hadlock and Pierce (2010). $CONSTRAINED\ (DIVIDENDS)$ is an indicator variable = 1 if firm *i* does not pay dividends in year *t*.

* indicates statistical significance at the 5% level.

Table 3 – Outbound Shifting Parameters

Regression results

Independent Variables	Model 1 $\Delta PIFO$	Model 1 $\Delta PIDOM$	Model 2 $\Delta PIFO$	Model 2 $\Delta PIDOM$
INTERCEPT	0.001	-0.001	0.000	-0.003
	(1.20)	(-0.25)	(0.08)	(-1.01)
ΔSALEFO	0.099***	0.060***	0.105***	0.078***
	(10.02)	(5.30)	(8.70)	(4.58)
ΔSALEDOM	0.012**	0.144***	0.007	0.166***
	(2.99)	(14.56)	(1.28)	(14.12)
HAVEN FIRM			0.001*	0.003**
			(1.82)	(2.87)
*HAVEN FIRM * ΔSALEFO*			-0.011	-0.024
			(-0.80)	(-1.21)
HAVEN FIRM ΔSALEDOM*			0.009	-0.041***
			(1.73)	(-3.27)
N	9,164	9,164	9,164	9,164
ADJRSQ	0.129	0.149	0.130	0.152

Outbound shifting parameters

	ALL	*HAVEN FIRM* *YES*	*HAVEN FIRM* *NO*	*HAVEN FIRM* *DIFF*
Gross shifting	0.074***			
	(3.03)			
Tax-motivated shifting		0.112***	0.039	0.073***
		(4.45)	(1.25)	(2.64)

This table reports results of OLS regressions of the models described in each column. The variable at the top of the column is the dependent variable in the model. $\Delta PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*. $HAVEN\ FIRM$ is an indicator variable = 1 if firm *i* reports having significant operations in at least one tax haven country in year *t*; 0 otherwise.

Shifting parameters are calculated as explained in Section 4 of the paper. For example, the *Gross shifting* parameter under Model 1 is calculated as $\frac{0.012}{(0.012+0.144)} = 0.077$ (difference from the 0.074 reported due to rounding).

T-statistics based on standard errors clustered by firm and year are reported in parentheses below the estimate.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4 – Inbound Shifting Parameters

Regression results

	Model 1		Model 2	
Independent Variables	***ΔPIFO***	***ΔPIDOM***	***ΔPIFO***	***ΔPIDOM***
INTERCEPT	0.001	0.000	0.001	-0.000
	(1.19)	(0.04)	(1.24)	(-0.07)
ΔSALEFO	0.099***	0.052***	0.097***	0.031**
	(8.87)	(4.53)	(8.65)	(2.60)
ΔSALEDOM	0.013***	0.133***	0.012**	0.129***
	(3.18)	(12.74)	(2.28)	(12.53)
HIGH FTAX FIRM			-0.001	0.001
			(-0.69)	(0.50)
*HIGH FTAX FIRM * ΔSALEFO*			0.003	0.065***
			(0.34)	(4.30)
*HIGH FTAX FIRM * ΔSALEDOM*			0.001	0.017
			(0.14)	(1.39)
N	7,679	7,679	7,679	7,679
ADJRSQ	0.125	0.128	0.124	0.133

Inbound shifting parameters

	ALL	*HIGH FTAX FIRM*		
		YES	*NO*	*DIFF*
Gross shifting	0.347***			
	(6.77)			
Tax-motivated shifting		0.487***	0.240***	0.247***
		(10.38)	(3.51)	(3.90)

This table reports results of OLS regressions of the models described in each column. The variable at the top of the column is the dependent variable in the model. $\Delta PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*. $HIGH\ FTAX\ FIRM$ is an indicator variable = 1 if firm *i* is in the upper tercile of the distribution of percentage of subs in countries with statutory tax rates higher than the US statutory tax rate to total subs in year *t*; 0 otherwise.

Shifting parameters are calculated as explained in Section 4 of the paper. For example, the *Gross shifting* parameter under Model 1 is calculated as $\frac{0.052}{(0.052+0.099)} = 0.347$.

T-statistics based on standard errors clustered by firm and year are reported in parentheses below the estimate.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5 – Alternative calculation of shifting parameters using industry-year specific estimates of return on sales parameters.

	Model 1		Model 2		Model 3	
Independent Variables	*ΔPIFO*	*ΔPIDOM*	*ΔPIFO*	*ΔPIDOM*	*ΔPIFO*	*ΔPIDOM*
$INTERCEPT$	0.002**	-0.001	0.001	-0.002	0.002**	-0.001
	(2.36)	(-0.36)	(1.44)	(-0.92)	(2.30)	(-0.24)
$\Delta\widehat{PIFO}^{*}$	0.468***	0.440***	0.430***	0.537***	0.480***	0.294***
	(14.49)	(8.41)	(8.57)	(7.31)	(12.11)	(5.62)
$\Delta\widehat{PIDOM}^{*}$	0.114***	0.855***	0.091***	0.957***	0.122***	0.788***
	(6.65)	(23.11)	(3.79)	(26.22)	(4.74)	(16.71)
$HAVEN\ FIRM$			0.001	0.003**		
			(1.06)	(2.62)		
$HAVEN\ FIRM * \Delta\widehat{PIFO}^{*}$			0.056	-0.144		
			(0.83)	(-1.65)		
$HAVEN\ FIRM * \Delta\widehat{PIDOM}^{*}$			0.045**	-0.195***		
			(2.07)	(-3.74)		
$HIGH\ FTAX\ FIRM$					-0.001	0.001
					(-1.16)	(0.45)
$HIGH\ FTAX\ FIRM * \Delta\widehat{PIFO}^{*}$					0.006	0.308***
					(0.19)	(5.71)
$HIGH\ FTAX\ FIRM * \Delta\widehat{PIDOM}^{*}$					0.002	0.040
					(0.03)	(0.74)
N	9,164	9,164	9,164	9,164	7,679	7,679
ADJRSQ	0.135	0.192	0.136	0.194	0.135	0.169

This table reports results of OLS regressions of the models described in each column. The variable at the top of the column is the dependent variable in the model. $\Delta PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta\widehat{PIFO}^{*}$ is an estimate of pre-shifted foreign earnings calculated by multiplying $\Delta SALEFO$ by $\hat{\rho}_f$. $\Delta\widehat{PIDOM}^{*}$ is an estimate of pre-shifted domestic earnings calculated by multiplying $\Delta SALEDOM$ by $\hat{\rho}_d$. $\Delta SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t*. $\Delta SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*. $\hat{\rho}_f$ and $\hat{\rho}_d$ are estimated for each industry and year using the following regression: $\Delta PI = \rho_0 + \rho_f \Delta PIFO + \rho_d \Delta PIDOM + e$. ΔPI is worldwide pretax income, scaled by total assets in year *t-1*. $HAVEN\ FIRM$ is an indicator variable = 1 if firm *i* reports having significant operations in at least one tax haven country in year *t*; 0 otherwise. $HIGH\ FTAX\ FIRM$ is an indicator variable = 1 if firm *i* is in the upper tercile of the distribution of percentage of subs in countries with statutory tax rates higher than the US statutory tax rate to total subs in year *t*; 0 otherwise.

T-statistics based on standard errors clustered by firm and year are reported in parentheses below the estimate.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6 – Regressions evaluating the influence of financial constraints on cross-sectional estimates of income shifting.

Regression results

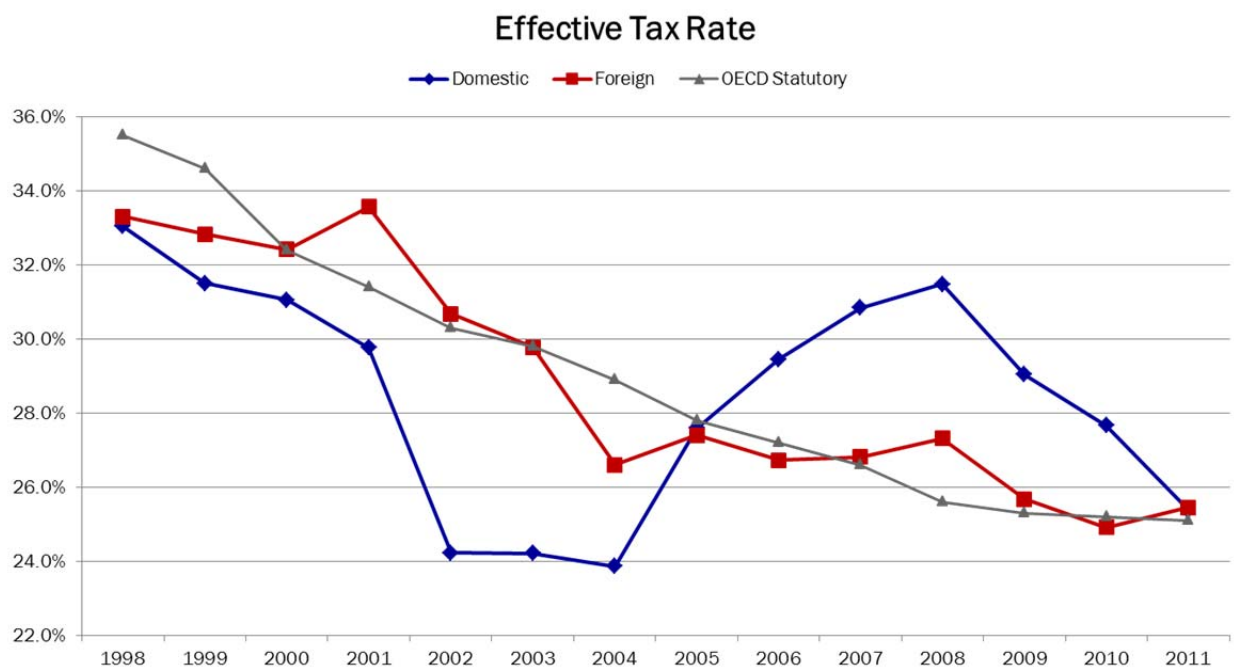
	JUNK RATING			*SA INDEX*			*DIVIDENDS*		
Independent Variables	***ΔPIFO***	***ΔPIDOM***		***ΔPIFO***	***ΔPIDOM***		***ΔPIFO***	***ΔPIDOM***	
INTERCEPT	0.001	-0.002		0.001	-0.000		0.001	0.001	
	(1.45)	(-0.81)		(1.33)	(-0.22)		(1.56)	(0.35)	
ΔSALEFO	0.086***	0.044***		0.093***	0.047***		0.092***	0.031***	
	(4.95)	(3.60)		(8.29)	(5.21)		(7.68)	(3.40)	
ΔSALEDOM	0.023***	0.093***		0.016***	0.115***		0.013**	0.122***	
	(3.61)	(7.40)		(4.52)	(12.94)		(2.50)	(11.94)	
CONSTRAINED	-0.001	0.004**		-0.001	-0.001		0.001	0.003**	
	(-1.03)	(2.73)		(-0.65)	(-0.81)		(1.19)	(2.80)	
*CONSTRAINED * ΔSALEFO*	0.017	-0.027		0.015	0.014		0.016	0.022	
	(1.05)	(-1.49)		(1.18)	(0.96)		(1.52)	(1.52)	
*CONSTRAINED * ΔSALEDOM*	-0.018**	0.011		-0.004	0.050***		-0.008	0.011	
	(-2.21)	(0.78)		(-0.83)	(3.57)		(-1.30)	(0.89)	
N	3,552	3,552		9,013	9,013		7,261	7,261	
ADJRSQ	0.151	0.115		0.145	0.176		0.159	0.175	
Shifting parameters	*Constrained*			*Constrained*			*Constrained*		
	YES	*NO*	*DIFF*	*YES*	*NO*	*DIFF*	*YES*	*NO*	*DIFF*
Outbound	0.046	0.197***	-0.151**	0.064**	0.119***	-0.055**	0.037	0.096**	-0.059
	(0.96)	(3.22)	(-1.97)	(2.16)	(4.26)	(-1.78)	(0.96)	(2.28)	(-1.27)
Inbound	0.141	0.339***	-0.198	0.361***	0.336***	0.025	0.331***	0.256***	0.075
	(1.19)	(4.25)	(-1.50)	(5.11)	(7.03)	(0.29)	(5.07)	(3.64)	(0.74)

This table reports results of OLS regressions of the models described in each column on the full sample. The variable at the top of the column is the dependent variable in the model. $\Delta PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*. $CONSTRAINED\ (JUNK\ RATING)$ is an indicator variable = 1 if firm *i* has below investment grade S&P bond rating in year *t*; 0 otherwise. $CONSTRAINED\ (SA\ INDEX)$ is an indicator variable = 1 if firm *i* has an *SA INDEX* value in the upper third of the sample in year *t*; 0 otherwise. *SA INDEX* is a measure of financial constraints based on firm size and firm age, developed by Hadlock and Pierce (2010). $CONSTRAINED\ (DIVIDENDS)$ is an indicator variable = 1 if firm *i* does not pay dividends in year *t*.

Shifting parameters are calculated as explained in Section 4 of the paper. For example, the *Outbound* parameter under $JUNK\ RATING$, YES is calculated as $\frac{0.023-0.018}{(0.023-0.018+0.093+0.011)} = 0.046$.

T-statistics based on standard errors clustered by firm and year are reported in parentheses below the estimate.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Figure 1 – Current effective tax rates of profitable sample firms across time



Domestic ETR is the mean of (domestic tax expense/domestic pretax income). Foreign ETR is the mean of (foreign tax expense/foreign pretax income). The OECD Statutory rate is the average top corporate statutory tax rate in the OECD.

Investor Valuations of Japan's Adoption of a Territorial Tax Regime: Quantifying the Direct and Competitive Effects of International Tax Reform*

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Abstract

Globalization of firm operations has brought the issue of multinational taxation to the forefront of tax reform debates worldwide, with countries paying increasingly close attention to developments in international taxation. Using an event study methodology that emphasizes specific firm attributes while netting out worldwide financial market conditions, we examine investors' reactions in both Japanese and U.S. stock markets to nine events leading up to the enactment of the 2009 Japanese dividend exemption in order to measure the perceived gains in short- and long-term after-tax profitability resulting from this reform. We thus aim to provide a comprehensive evaluation of the full range of direct tax savings effects and indirect effects associated with changes in firm competitiveness and international tax competition. Lower foreign effective tax rates are associated with net gains of up to 2.22 percent of market capitalization among Japanese multinationals. Overall, however, investors appeared to capitalize much larger gains for Japanese domestic firms (4.98 percent) than for multinationals (1.92 percent), while more tax aggressive Japanese firms' stock valuations performed relatively worse. Reactions in the U.S. market exhibit the reverse pattern, with relatively larger gains accruing to more sophisticated multinationals in a manner unrelated to presumptive tax savings.

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1 Introduction

As firms' operations have expanded their global reach, corporate taxation has become inextricably tied to the taxation of multinational firms' foreign earnings. Correspondingly, discussions over corporate tax reform have been dominated by consideration of international tax issues, tax avoidance, and tax competition, with much debate focusing specifically on the choice over worldwide (residence-based) versus territorial (source-based) taxation. In this environment, corporate tax reform in one country is likely to have immediate implications beyond the boundaries of the home country by affecting firm competitiveness and the prospects for reform elsewhere in the world. Despite an extensive body of normative literature in this area,[1] however, little is known as to the practical importance of any such tax competition effects on foreign corporations, nor much even as to the magnitude of any domestic effects from significant changes in the tax treatment of domestically-incorporated multinational firms.

The purpose of this paper is to quantify these domestic and foreign effects empirically in the context of one of the most important recent instances of international tax reform: namely, Japan's 2009 adoption of a territorial tax regime exempting Japanese corporations' foreign earnings from domestic taxation.[2] Broadly speaking, such changes in tax regime ought to influence domestic as well as foreign corporations' spatial and intertemporal investment and repatriation decisions through their direct effects on the tax cost of dividend repatriation over the short- and longer-term (and thus, the after-tax return of

[1] For a description of optimal international tax systems, including the implications of international taxation for capital export and import neutrality, see Musgrave (1969), Desai and Hines (2003), or Devereux (2008).

[2] The U.K.'s implementation of a very similar reform—likewise in 2009—represents the other prominent example of major international tax reform of the last five years. All together, ten OECD countries have adopted territorial tax systems since 2000 (Dittmer, 2012), namely: Iceland (2003), the Czech Republic, Norway, and Slovakia (2004), Estonia and Turkey (2005), Poland (2007), Japan, New Zealand, and the United Kingdom (2009). This leaves only seven remaining OECD countries with worldwide tax systems in place: Chile, Greece, Ireland, Israel, Korea, Mexico, and the U.S. Brys et al. (2011) provide a brief introduction to recent such international tax reforms, the net effect of which has been that the U.S.'s share of real GDP among OECD countries with worldwide tax systems increased from 56.4 to 78.2 percent between 2005 and 2010.

foreign direct investment and reported earnings), as well as by affecting firms' ability to compete effectively with home and foreign competitors and by indirectly influencing the outlook for reform elsewhere around the globe through tax competition. Consistent with the most direct of these anticipated incentives, Egger et al. (2012) and Hasegawa and Kiyota (2013) document the existence of an immediate dividend repatriation reaction among U.K. and Japanese multinationals to the corresponding reforms in each of these countries, respectively. This reaction is simultaneously met by a reduction in foreign reinvestment by U.K.-owned foreign subsidiaries (Egger et al., 2012).

Longer-term dynamic effects may be even more important than these domestic short-term consequences of dividend exemption, however, with resulting consequences for firms' short-term and long-term after-tax profitability. In the absence of financial market frictions, forward-looking investors ought to have immediately incorporated the combination of all direct and indirect short- and long-term effects into their valuation of firm share prices as soon as new information related to Japan's adoption of the permanent dividend exemption became known. Our approach is thus to apply an event study methodology to evaluate changes in corporate stock market valuations around multiple event dates related to Japan's transition from a worldwide to territorial tax system for the largest 25 percent (by market capitalization) of publicly-listed Japanese, U.S., and German domestic and multinational corporations (MNCs), exploiting information with regards to foreign subsidiary location and other key firm characteristics to obtain precise estimates of the net present value tax savings and tax avoidance opportunities afforded by the adoption of a territorial tax regime, while simultaneously disentangling changes in firm valuation due to direct tax savings effects from those due to effects on firm competitiveness and tax competition.[3]

Alongside the U.K.'s similar 2009 reform, Japan's adoption of a territorial tax system

[3]For additional applications of event study methods to quantifying the perceived benefits of tax avoidance, see Desai and Dharmapala (2007), Hanlon and Slemrod (2009), or Bradley (2013). Sakurada and Nakanishi (2011) also examine investor reactions to news of the Japanese dividend exemption, albeit for only a single event date and a small selected sample of large Japanese MNCs.

has been carefully watched in the U.S. as a potential harbinger of consequences for the U.S. if it were to follow suit, with particular attention being paid to the effect of the reform on multinational tax avoidance and investment activity.[4] Understanding the full scope of the dynamic effects of major international tax reform hence remains extremely timely and moreover justifies our special focus on U.S. MNCs as those firms most likely to be indirectly affected by the Japanese dividend exemption through tax competition. By contrast, we should not expect the Japanese tax reform to have a significant impact on firms already subject to territorial taxation except through changes in relative firm competitiveness, since such firms would already be shielded from taxation of foreign-source income. We consequently include a sample of German firms alongside the Japanese and U.S. firms in our analysis to serve as a benchmark against which to measure investor valuations of current and future tax savings both in Japan and the U.S.[5] Controlling for global financial market developments in this manner is especially critical given the coincident timing of events leading up to the Japanese reform and the financial crisis.

Examining nine potential event dates related to the initial proposal, discussion, and eventual adoption of the dividend exemption, we find several of these events across a variety of empirical specifications and event study methodologies to be associated with significant (and significantly different across markets) cumulative abnormal stock returns (CARs), the most pronounced of investor reactions reflecting the initial announcement on May 9, 2008 by the Ministry of Economics, Trade, and Industry (METI) of its intent to seriously consider the adoption of a territorial tax regime and culminating in the final

[4]Debate over adoption of a territorial tax system has been a regular fixture of tax policy discussions in the U.S. Historically more widely endorsed among Republican policymakers, territorial taxation appears to have gained some degree of support among both political parties in recent years. As recently as December 2010, for example, adoption of a territorial regime figured prominently among the set of proposals laid forth by President Obama's bipartisan National Commission on Fiscal Responsibility and Reform (i.e. the Simpson-Bowles Commission). The issue likewise figures prominently in House Ways and Means Committee Chairman Dave Camp's (R-Michigan) tax reform proposal of 2014 and was favored by Mitt Romney throughout his 2012 presidential campaign.

[5]Germany's territorial tax regime was first adopted in 1920, the details of which have changed over time. Current law (in place since 2001) features a 95% dividend exemption similar to the system adopted in Japan in 2009, albeit with a lower corporate tax rate (i.e. 30.2% since 2008 versus 40.69% in Japan during this time period).

passage of the dividend exemption legislation through the Japanese Parliament on March 27, 2009.

Predictably, event date abnormal returns cumulated over all nine events support the view that Japanese MNCs facing lower effective tax rates on their foreign operations would stand to benefit disproportionately from the reform, such that at its peak, following a series of government proposals released in close succession in November and December 2008, tax savings to Japanese corporations were valued at 2.22 percent of market capitalization (net of their counterfactual German market effects). Overall, however, the largest beneficiaries of the reform among Japanese firms in fact appear to have been *domestic* firms, with net gains in firm valuation through the last event date of 4.98 percent relative to their German counterparts, or nearly 3 percentage points more than among multinationals. Meanwhile, Japanese multinationals with at least one subsidiary located in a tax haven jurisdiction[6] or multinationals operating in more intangible-intensive industries tended to fare worse than those MNCs construed as less capable at minimizing their global tax obligations through strategic income reallocation. Hence, the most tax aggressive Japanese firms prior to the reform may have been viewed by investors as benefiting relatively less from the dividend exemption given their tax-minimizing strategies already in place, whereas less sophisticated firms that might have been previously deterred from establishing foreign operations under a worldwide tax regime might suddenly find it profitable to do so.

Conversely, among U.S. firms responding to developments associated with the Japanese reform, the largest relative gains in market capitalization appear to have accrued to MNCs *with* tax haven subsidiaries, but in manner unrelated to either presumptive tax savings or intangible intensity. We interpret the resulting difference as primarily reflecting more sophisticated U.S. MNCs' ability to continue to compete effectively in foreign markets against their Japanese competitors once subject to territorial taxation. At the same time,

[6]Tax havens are defined following Hines (2010) and Gravelle (2013)

to the extent that uncertainty regarding the details and probability of implementation of the Japanese dividend exemption persisted through its final enactment date, and thus could be viewed as nearly equally informative with respect to the prospects of U.S. international tax reform, it may also be the case that differences in investor perceptions in the U.S. and Japanese markets reflected differences between Japanese and U.S. anti-avoidance measures (actual and hypothetical) and associated incentives for complexity of ownership structures.

The remainder of the paper is organized as follows: Part 2 describes the details of the Japanese tax reform, including our choice of event dates leading up to its implementation, and characterizes its corresponding implications for Japanese and U.S. MNCs; Part 3 explains the event study methodology and associated econometric complications; Part 4 summarizes the sources and principal characteristics of the merged parent- and subsidiary-level data and describes the construction of various measures of foreign activity, effective tax rates, and intangible intensity; Part 5 presents the primary results of our analysis, and Part 6 concludes.

2 Japan's Dividend Exemption System

2.1 Tax Reform

Until the end of March 2009, Japan employed a worldwide tax system that taxed foreign source income upon repatriation, allowing tax credits for corporate income taxes paid by Japanese-owned subsidiaries in foreign jurisdictions and other related taxes paid to foreign governments, including withholding taxes on dividend, royalty, and interest payments between foreign subsidiaries and their Japanese parents. Beginning in early 2008, the Japanese government became increasingly concerned that this system of worldwide taxation was inducing firms to retain excessive amounts of earnings in foreign countries to avoid Japanese taxation, with the resulting consequence that this might distort the decisions of Japanese corporations on the timing of profit repatriations while simultaneously reducing domestic R&D investment that could be financed out of foreign-source income. Japanese MNCs with subsidiaries located in low-tax countries arguably had especially strong incentives to do so because their foreign incomes were taxed at high rates (as high as 40 percent) upon such repatriation and the additional tax payment was proportional to the differential between Japan's corporate tax rate and the corporate tax rates facing foreign subsidiaries.[7]

To stimulate dividend repatriations from Japanese-owned foreign affiliates and facilitate domestic investment funded by repatriated foreign-source income, Japan adopted a dividend exemption system beginning April 1, 2009 (coincident with the start of the fiscal year) whereby dividends remitted by foreign affiliates to their Japanese parent firms would be exempt from domestic taxation. Thus, with the introduction of the dividend exemption system (hereinafter referred to as the 2009 tax reform), Japan's corporate tax system switched to a territorial tax system that exempts certain types of foreign income from home taxation.

Concretely, the new exemption system enacted under the 2009 tax reform permits Japanese resident corporations to deduct from taxable income 95 percent of dividends received from foreign affiliates in accounting years commencing on or after April 1, 2009. The remaining 5 percent of dividends are regarded as expenses incurred by parent firms for earning the dividends and are added to the calculation of their taxable incomes in Japan.[8] In order to qualify for dividend exemption, a parent firm must have held at least 25 percent of the shares of its affiliate for at least six months as of the dividend declaration date. While dividend exemption would reduce corporate tax liabilities on

[7]In 2009, the corporate income tax rate of Japan was the highest among the OECD member countries.

[8]The expenses corresponding to the five percent of the repatriated dividends are assumed to be deducted from the taxable incomes of parent firms when they invest in their subsidiaries, and thus, would not be exempted upon repatriation under the new exemption system. An important change under the reform is that the foreign tax credit no longer applies to the 5% taxable foreign dividends. For this reason, the tax reform may worsen the taxation os some firms that were previously able to offset these taxes with excess tax credits from other sources.

repatriated dividends in Japan, foreign tax credits no longer apply to withholding taxes on repatriated dividends imposed by host countries.

At this point it is worth noting some important aspects of the pre-2009 Japanese worldwide tax system, especially those that affect our computation of the tax savings implied from the territorial reform.[9] Before 2009, the Japanese foreign tax credit system utilized an "overall limitation" rather than a foreign tax credit limitation on each item of income (e.g. dividends, royalty, or interest income) or country. This allowed taxpayers to engage in "cross-crediting" or "mixing/blending" by applying excess credits generated in a high tax country against excess limitations generated in a low tax country, and was a way to escape taxation of income from a low-tax country received in Japan. Controlled foreign corporation (CFC) regulations and other anti-avoidance rules were slightly modified under the 2009 reform to make the treatment of foreign dividends paid by CFCs consistent with the dividend exemption provisions..[10] Under the new CFC rules, the pre-tax income of CFCs is added to the taxable income of their parent firms and is immediately taxed by the Japanese government.

The new system is still quite distant from pure source-based taxation. Importantly, as the term "dividend" exemption suggests, it only exempts foreign income in the form of paid dividends and does not apply to other types of foreign source income, including royalties, interest payments, income earned by foreign branches, and capital gains. Foreign taxes imposed on these types of income continue to be creditable under the direct

[9] For more details about the reform, see among others PriceWaterHouseCoopers; Deloitte. See also http://japantax.org/?p=590.

[10] CFCs in Japan are called 'Specified Foreign Companies' (SFSs) formed in certain low taxed foreign territories specified by the Minister of Finance. The tax treatment of SFSs in Japan is described by the Tax Haven Counter Measure Laws ("THCML"), which is comparable to U.S.'s Subpart F and U.K. CFC rules. By definition, a company is treated as a SFS if 50% or more of the total number of issued shares or 50% or more of the voting shares of the company is held by corporations resident in Japan, and faces an effective tax rate of 25% or less. The CFC rules apply on an entity basis. A company that would otherwise be treated as a SFS is exempted from the application of the CGC rules if the companies satisfy several conditions to prove that it owns a fixed plant or office and engages in real business activities. Also, excess foreign tax credits from income subject to either foreign corporate taxation or foreign withholding taxation of dividends, royalty or rents, could be used to offset residual Japanese taxes from any of these sources. For example, excess foreign tax credits from non-SFS income could be used to offset SFS income for purposes of calculating the overall limitation.

foreign tax credit system in Japan.

2.2 Event Dates

As with most policy reforms, adoption of the Japanese dividend exemption arose over the course of many months out of a series of policy discussions, debates, proposals, and pronouncements. Key developments in that process hence constitute the set of event dates upon which our analysis of stock market reactions focuses. While the possibility of switching from a worldwide tax system to some type of territorial tax system had been discussed by policymakers and industry executives earlier in time, the process leading to enactment of the dividend exemption system started to gather serious momentum when the head of the Ministry of Economy, Trade and Industry (METI), Akira Amari, announced in an interview immediately following a May 9, 2008 Cabinet meeting that he had instructed his ministry to examine the possibility of switching from a foreign tax credit system to a foreign income exemption system. Japan's leading business newspaper, Nihon Keizai Shimbun, then reported on May 10, 2008 that the METI had started to examine the introduction of dividend exemption as part of a set of tax reforms planned for fiscal year 2009.

On June 27, 2008, "Basic Policies for Economic and Fiscal Reform 2008" was approved in another Cabinet meeting. This document proposed a tax reform to stimulate profit repatriation by Japanese MNCs so as to prevent an excessive amount of Japanese corporate profits from being retained in foreign countries and to curb the outflow of Japanese employment and R&D investment opportunities.

On August 22, 2008, the subcommittee on international taxation at the METI released their interim report, "Repatriations of Foreign Profits by Japanese Enterprises: Toward the Introduction of a Dividend Exemption Regime." This report described the main characteristics of the proposed dividend exemption in greater detail than either of the preceding two events on May 9 and June 27. The report thus highlighted four key elements of the dividend exemption that finally became law on April 1, 2009: (1) the dividend exemption system would permit Japanese resident corporations to deduct from taxable income a constant rate of dividends received from foreign affiliates, (2) in order to qualify for dividend exemption, a parent firm would have to have held at least 25 percent of the shares of its affiliate for at least six months, (3) exemption would apply only to foreign income in the form of paid dividends but not to other types of foreign source income, including royalties, interest payments, and income earned by foreign branches, and (4), foreign tax credits would no longer apply to withholding taxes on repatriated dividends imposed by host countries. Although the subcommittee also expressed concern about the tax avoidance behavior of multinationals through income shifting facilitated by the adoption of a territorial tax regime, the report concluded that the new system would achieve revenue neutrality and instead emphasized positive aspects of the dividend exemption system, including the elimination of distortions related to the timing of profit repatriations, the stimulation of dividend remittances and domestic facility and R&D investment funded out of foreign-source income, and simplification of the international tax system.

Prior to the official release of the August 22 interim report, the Nihon Keizai Shimbun reported on August 17 that the subcommittee had established a plan to introduce the dividend exemption system under the 2009 tax reform and provided a summary of the details of the interim report (without mentioning that the METI would release these details five days later). Hence, the content of the METI report should not have surprised investors when it was officially released on August 22, and we therefore use August 18, 2008 (i.e. the first business day after the Nihon Keizai Shimbun article appeared in the press) as the relevant event date for our analysis.

Following the release of the METI's interim report, the Cabinet, Ministry of Finance, and Liberal Democratic Party (the ruling party in the House of Representatives) each released separate tax reform plans containing the adoption of a territorial tax regime. On

October 1, 2008, Prime Minister Taro Aso mentioned that he supported the implementation of a dividend exemption system at the full House of Representatives. On November 28, 2008, the Government Tax Commission released "Policy Recommendation for Tax Revisions for Fiscal Year 2009," which proposed the introduction of dividend exemption, while on December 12, 2008, the Liberal Democratic Party released "The Large Package of Tax Revisions for Fiscal Year 2009," which likewise included the introduction of dividend exemption. This package added more detailed information on dividend exemption to the proposal by the METI, including the heretofore-unspecified proportion of dividends eligible for tax exemption (95 percent) and the treatment of foreign subsidiaries subject to the controlled foreign corporation (CFC) legislation.[11] One week later, on December 19, 2008, the Ministry of Finance released their endorsed version of "The Large Package of Tax Revisions for Fiscal Year 2009," followed on January 23, 2009 by the Cabinet's approval of "The Outline of Tax Revisions for Fiscal Year 2009." Each of these last three tax reform proposals contained almost exactly the same provisions regarding dividend exemption, such that from an investor's perspective, the real substance of the latter two events would have largely been in terms of the prominence of the endorsements. The legislative bill including the dividend exemption provisions was also submitted by the Cabinet to the Diet on January 23, 2009 and finally passed into law on March 27, 2009 before coming into effect on April 1, 2009.[12]

As Table 1 summarizes, we use each of the nine dates described above as events in our analysis of investor responses. While all of the selected events should have enhanced

[11] Under the Japanese worldwide tax system, a foreign subsidiary located in a jurisdiction where the effective tax rate was 25% or less was subject to the CFC rule and its earnings were taxed immediately upon accrual unless exemptions applied.

[12] There were also transitional measures of the new exemption regime in relation to the CFC legislation. The transitional rules provided that dividends paid by foreign subsidiaries subject to the CFC rules be eligible for dividend exemption if these dividends are paid out of profits in accounting years commencing on or after April 1, 2009. The Ministry of Finance published on January 22 the instructions for these transitional rules, explaining that the date of right allotment of dividends (the dividend declaration date) must belong to accounting years commencing on or after April 1, 2009. Nonetheless, this provision seemed to confuse shareholders and tax accountants as to when dividends paid by CFC subsidiaries would first qualify for exemption.

the likelihood of enactment of the dividend exemption system, it is possible—even probable—that investors would have shown stronger reactions to certain events than others given the variation in the amount of new information revealed with each new report, proposal, etc.. In this light, we expect the Japanese government's first public announcement, on May 9, 2008, of its intent to seriously consider the adoption of a territorial tax regime, to constitute an especially important surprise for stock market investors. Second, the detailed plan to move to a territorial tax regime that was disclosed for the first time in the METI's August 22, 2008 interim report along with a description of that report in the Nihon Keizai Shimbun's August 17$^{\text{th}}$ article should have substantially reduced investor uncertainty about the provisions of the tax reform, and thus might likewise have induced a strong stock market response. Third, we note that the Liberal Democratic Party kept a simple majority in the Lower House but lacked a majority in the Upper House from 2007 to 2009. Therefore, there may have remained some uncertainty with respect to the likelihood of the passage of the dividend exemption legislation in parliament right up until its signature on March 27, 2009,[13] at which point all remaining uncertainty would have been completely eliminated, thereby prompting a further possible pronounced investor reaction.

3 Event Study Methodology

In order to evaluate the magnitude of the expected change in firm after-tax profitability in response to the release of potentially-unanticipated news pertaining to the Japanese tax reform as a function of MNC characteristics, we adopt a variant of the standard market model event study approach popularized by Ball and Brown (1968) and Fama et al. (1969) using a dummy variable procedure first proposed by Gibbons (1980) to allow for single-step estimation of cumulative abnormal returns and associated firm characteristic

[13]Because of this situation of Japan's Diet (the "twisted" Diet), the passage of the bill for the tax reform of 2008 was delayed until April 30, 2008, for example.

interactions.[14]

Under the standard market model approach, ordinary risk-adjusted stock returns r_{it} for firm i in period t are modeled as

$$r_{it} = \alpha_i + \beta_i R_t + \epsilon_{it} \tag{1}$$

where R represents the average risk-free return on an appropriately-chosen market portfolio. Event-induced abnormal stock returns (AR) over event period E are then calculated as the out-of-sample prediction errors obtained by applying the parameters $\widehat{\alpha}_i$ and $\widehat{\beta}_i$ estimated from Equation (1) over a pre-event historical estimation period of length $T, t = -T, -T+1, ... -1$ to contemporaneous stock prices and market returns, such that:

$$\begin{aligned} \widehat{AR}_{it}^{E} &= r_{it} - \widehat{r}_{it} \\ &= r_{it} - (\widehat{\alpha}_i + \widehat{\beta}_i R_t), \forall t = T_0^E, ... T_1^E \end{aligned} \tag{2}$$

In order to allow for pre-event information leakage or gradual post-event information dissemination, the duration of the event window, $T_1^E - T_0^E$, is typically greater than a single period, with the resulting statistic of interest being the cumulative abnormal return (CAR):

$$\widehat{CAR}_{it}^{E} = \sum_{s=T_0^E}^{t} \widehat{AR}_{is}^{E} \tag{3}$$

Several adjustments have been proposed for the calculation of the corresponding standard errors and test statistics to account for potential intertemporal autocorrelation, event-induced return volatility, and cross-sectional correlation of abnormal returns inherent to a study of investor reactions involving clustered events (i.e. affecting multiple

[14]See MacKinlay (1997), Binder (1998), or Corrado (2011) for reviews of differing event study methodologies and associated statistical issues.

firms simultaneously). In the results that follow, we begin by presenting broad evidence of abnormal stock returns around key event dates that are largely robust to the application of several parametric and non-parametric test statistic corrections designed to address some or all of these econometric concerns, including the Patell (1976) test, the Boehmer, Musumeci, and Poulsen (1991), or BMP, test, the Corrado and Zivney (1992) non-parametric rank test, plus cross-sectionally-adjusted versions of each of these tests developed by Kolari and Pynnönen (2010). Nevertheless, even the most sophisticated of econometric corrections for ARs and CARs obtained under the standard market model are inappropriate for evaluating the source of these abnormal returns in relation to firm characteristics.

A better suited methodology for estimating possible such relationships in a single step instead consists of estimating Equation (1) with the inclusion of a sequence of event dummy variables D_s for each date s in the event window following the procedure outlined in Salinger (1992) and Binder (1998):

$$r_{it} = \alpha_i + \beta_i \tilde{\mathbf{R}}_{\mathbf{t}} + \sum_{s=T_0^E}^{T_1^E} \gamma_s D_s + \tilde{\delta}_{\mathbf{s}} \tilde{\mathbf{X}}_{\mathbf{i}} \cdot D_s + \epsilon_{it} \tag{4}$$

$$\forall i = 1, ...N;\ \forall t = -T, -T+1, ... -1; T_0^E, ...T_1^E$$

Firm-specific average returns α_i and market co-movement β_i over the historical estimation period carry over from the standard model, while $\tilde{\mathbf{X}}_{\mathbf{i}}$ represents a vector of time-invariant pre-reform firm characteristics which are allowed to affect stock market valuations through their interaction with the event date indicators. With D_s set to 1 on date s and 0 otherwise, date s abnormal returns are estimated directly as $AR_{is} = \gamma_s + \tilde{\delta}_{\mathbf{s}} \tilde{\mathbf{X}}_{\mathbf{i}}$. Taken one step further, CARs can be readily recovered as shown in Salinger (1992) by redefining the event dummies such that D_s equals 1 on date s, *-1 on date* $s+1$, and 0 otherwise.[15] This approach—which most closely resembles the procedure followed by

[15] To see this, consider the simplest case with a 2-period event window ($T_1 - T_0 = 2$). Equation (4)

Auerbach and Hassett (2005) to evaluate the impact of the U.S. dividend tax cut of 2003 —represents the core econometric technique employed in our analysis and has the important virtue of facilitating the estimation of average CARs in a single step, including their interactions with key firm characteristics. Furthermore, CAR standard errors estimated in this manner are robust to intertemporal autocorrelation across event window stock returns, thereby eliminating one of the primary econometric concerns associated with most event studies.[16]

Given the nature of the question under consideration—wherein events in the Japanese market are believed to have potential repercussions in the U.S. market and where markets are moreover globally-integrated—$\tilde{\mathbf{R}}$ includes separate measures of Japanese as well as U.S. and German market returns. Consistent with a majority of event studies focused on these countries, we use the daily return on the Frankfurt Stock Exchange (CDAX), the overall daily value-weighted market return on all NYSE, NASDAQ, and AMEX stocks, and the daily return on the TSE Tokyo Stock Price Index (TOPIX) to capture market movements in Germany, the U.S., and Japan, respectively (Corrado and Truong, 2008). Due to differences in market trading hours for the TSE and the U.S. and Frankfurt exchanges, we allow U.S. and German market returns on date t to influence calendar

may thus be rewritten (suppressing the idiosyncratic error term for brevity) as $r_{it} = \alpha_i + \beta_i \tilde{\mathbf{R}}_\mathbf{t} + AR_{i1} \cdot W_1 + AR_{i2} \cdot W_2$, with $W_s = 1$ on date s and 0 otherwise. By definition of cumulative abnormal returns, $CAR_1 = AR_1$ and $AR_s = CAR_s - CAR_{s-1}$ for all subsequent dates in the event window, such that this last expression can be transformed into a function of CARs only:

$$\begin{aligned} r_{it} &= \alpha_i + \beta_i \tilde{\mathbf{R}}_\mathbf{t} + CAR_{i1} \cdot W_1 + (CAR_{i2} - CAR_{i1}) \cdot W_2 \\ &= \alpha_i + \beta_i \tilde{\mathbf{R}}_\mathbf{t} + CAR_{i1} \cdot (W_1 - W_2) + CAR_{i2} \cdot W_2. \end{aligned}$$

Specifying $D_1 \equiv W_1 - W_2$ and $D_2 \equiv W_2$ completes the desired transformation.

[16] Smith et al. (1986) estimate Equation (4) as a system of equations in order to address potential cross-sectional correlation among firm ARs. Lack of contemporaneous (daily) variation in firm characteristics precludes our ability to employ such a technique, which would moreover be constrained by limits on the number of cross-equation restrictions that may be imposed in order to recover average CARs for a large sample of publicly-traded firms. The most popular approach to addressing cross-sectional correlation in the event study literature—estimation of aggregate portfolios of stock returns (Kolari and Pynnönen, 2010)—assumes away the possibility of heterogenous policy effects and is consequently equally uninteresting for our purposes. Our panel estimation approach can instead by viewed as a hybrid of these techniques, whereby conditioning on firm characteristics may be viewed as yielding a set of flexibly-defined portfolios and should as such largely mitigate—if not eliminate—concerns associated with cross-sectional correlation.

date $t+1$ stock prices listed on the TSE.[17] Conversely, the fact that U.S. and German markets open after the close of the Japanese markets recommends using date t market data to identify the impact of events surrounding the Japanese dividend exemption on valuations of U.S. and German shares. Stock market holidays in either the Japanese, U.S., or German markets are recorded as zero-return dates from the perspective of each of the other countries.

4 Data

4.1 Stock Returns

Stock market capitalization data on Japanese, U.S., and German publicly-listed companies are drawn from the Thomson Reuters Datastream database and cover all stocks listed on the Tokyo Stock Exchange (TSE), New York Stock Exchange (NYSE), Nasdaq, American Stock Exchange (AMEX), and the Frankfurt Stock Exchange. Listings which did not exist over the entire period 2007-2009 are dropped, as are listings for which market capitalization information remained unchanged for more than 20 consecutive trading days, thereby yielding an initial set of 2795 Japanese listings, 2975 U.S. listings, and 585 German listings. Risk-free daily stock returns are computed as the percent change in gross market capitalization from the prior trading day,[18] net of the risk-free rate for U.S. stocks, as provided by Kenneth French and interpolated for the Japanese and German

[17] Historically, an additional econometric concern in event studies has been the issue of non-synchronous trading, whereby the timing of realized market returns and individual stock returns differ. Scholes and Williams (1977) show, for example, that this can yield biased and inconsistent estimates of the degree of co-movement with the market, with the direction of the bias depending on the relative frequency of trading. An extension of this is unavoidable in the present context. Brown and Warner (1985) present evidence that this does not preclude valid inference in the case of the basic market model.

[18] Unlike CRSP—which only provides information on U.S. stocks—Datastream regrettably does not provide information on ex-dividend returns. Returns based on changes in market capitalization may therefore be influenced by dividend payouts. For this reason (among others) outlying stock market returns and corresponding abnormal return estimates derived from the standard market model are winsorized to the 1st and 99th percentile values from their respective daily distributions. Preliminary results suggest only modest sensitivity to the choice of cutoff or outright exclusion of outlying return observations.

markets on U.S. market holidays.

4.2 Financial statements

These stock return data are subsequently merged by SEDOL identification number with financial statement data from Bureau van Dijk's Orbis database for all publicly-listed Japanese and U.S. global ultimate owners (i.e. MNC parents) and all of their majority-owned foreign subsidiaries. In addition to financial items on balance sheet and profit-and-loss statements, the data contain information on industrial classification, country of location, and the list of main foreign countries where a company operates. Burean van Dijk's ownership database, which is linked to Orbis by default for the latest fiscal year (2012 or 2013, depending on firms), is then used to identify global and direct ultimate owners (UO) of corporate affiliates worldwide, including their identification number, country of location, and percentages of shareholder ownership.[19] Restricting global ultimate owners to being located in Japan, the U.S., or Germany and linking all subsidiaries to these parents based on UO identification numbers and location over the period 2005-2009, we are able to identify 3,588 publicly-listed Japanese corporations, 11,035 publicly-listed U.S. corporations, and 999 German corporations matched to 15,158 Japanese, 72,852 U.S., and 16,855 German foreign subsidiaries, respectively.

Using tax and losses accounts (income statements) and balance sheet accounts, we construct several financial variables of interest at the parent level, including effective tax rates, repatriation tax savings from the dividend exemption, a measure of deferred tax assets intensity, and proxies for liquidity constraints.[20]. We also use information on fiscal-

[19]By default, Orbis defines an ultimate owner of a subsidiary by tracing the ownership path of shareholders with a minimum 50 percent ownership stake and searching for the shareholder with the highest ownership percentage that has no further shareholders with more than 50 percent ownership. To identify as many foreign subsidiaries as possible, we also use information from foreign subsidiaries owned with a minimum 25 percent ownership percentage, to little effect. In practice, a majority of foreign subsidiaries of Japanese, U.S., and german MNCs are wholly-owned.

[20]See Appendix for more details. We experimented with several measures of effective tax rates including average ex-ante effective tax rates (AETR) calculated as the ratio of the sum of tax payments of each MNC's subsidiaries and the sum of pretax income of the same subsidiaries over the three years

year end (FYE) to check when Japanese firms' financial reports should be first impacted by Japan's international reform.[21]. We also construct a dummy for MNC status.[22] In the next two subsections, we describe additional links between these firm-level data and other databases based on country- and industry-level data in order to construct further measures of exposure to tax haven systems, territorial or residential tax systems, and intangible intensity. Table 2 lists the set of key variables used in our analyses and provides a brief description of their calculation, while additional details regarding the calculation of these variables can be found in Appendix A, and summary statistics are presented in Table 3.

preceding the first event year (2005-07), and minimum effective tax rates (METR) calculated based on information on marginal corporate and withholding tax rates for all countries where subsidiaries are located. On the one hand, the AETR more precisely measures variation of tax savings potential across MNCs. However our database may not cover several subsidiaries that pay large amounts of taxes and may be subject to classical mis-reporting of small firms' financials (Orbis only provides details about a firm's subsidiaries if it owns at least 25 percent of its shares). On the other hand, the METR is likely to be more accurate because it is based on statutory corporate tax law that we separately collected based on several sources for each country where a subsidiary is located. Its drawback is that it varies much less across firms since many MNCs are located in similar countries. Our results based on either measure do not significantly change our conclusions, so we decided to present results based on AETRs (results with METRs are available on demand).

[21] 67 percent of Japanese MNC parents in our initial sample have a fiscal year ending on March 31. Given the timing of the effective date of the reform, companies with fiscal years ending on March 31 should have benefited the soonest from the dividend exemption.

[22] MNCs in our analysis are identified on the basis of the existence of at least a single matched foreign subsidiary in our sample. All remaining firms are first categorized as domestic-only firms, with measures of foreign activity coded as zeros (where appropriate). This latter determination of what constitutes domestic-only firms is far from perfect given that many types of firms in many countries are not required to file annual financial statements and thus do not appear in our list of subsidiaries. In addition, Orbis does not allow linking of parents and subsidiaries with less than 25 percent ownership. After a causal scrutiny of the list of "domestic-only" firms in our sample we found that many firms were in fact MNCs. However, for computational reasons, our regressions are based on the sample of top quartile domestic firms and MNCs in Japan, Germany, and the United States. As shown in Table 3, this sample represents close to 1,250 firms in total. Therefore we carefully go through the list of firms and compare financial information obtained from Orbis with information from other sources including Compustat, Datastream, and online companies' annual reports. Such scrutiny enables us to identify any firm that is misclassified as domestic by Orbis. We remove any misclassified firm from our sample of top firms and replace it with the next top firm in our larger database. Table A.1 provides a quick characterization of the relative proportions of "domestic" and multinational firms in our initial database and our top quartile sample.

4.3 Intangible assets

As a theoretical matter, the nature of the relationship between long-term tax savings flowing from the Japanese dividend exemption and the pre-reform availability of tax minimizing strategies is theoretically ambiguous. Intuitively, MNCs that were able to skillfully navigate international tax rules in order to achieve low effective foreign tax rates and high after-tax rates of return under a worldwide system might see relatively little additional benefit from a reduction in taxes on foreign-source income. On the other hand, greater ability to reduce foreign tax obligations through strategic income reallocation might render a dividend exemption system even more valuable by increasing the reward from shifting profits toward low-tax foreign jurisdictions. While most MNCs located in both low and high-tax countries are able to use various legal tax minimizing strategies, these strategies are often more accessible to intangible intensive firms, such as firms in the chemical, pharmaceutical, or software industries, because of the nature of the underlying assets involved in production (Gravelle, 2013). In particular, transactions involving intangible assets present special problems for the application and enforcement of transfer pricing rules due to the non-existence of comparable goods. Therefore, the uniqueness of intangible assets makes it difficult to assess appropriate arm's-length transaction prices.[23] For instance, Altshuler and Grubert (2003) find that about half of of the difference in profitability from high- and low-tax countries was due to transfers of intellectual property, and may relate to artificial income shifting.[24] Intangible intensive firms are also more likely to creatively use cross-crediting rules between income sources (e.g., dividends or royalty income) and countries (e.g., high- and low-tax countries).[25] One im-

[23]If a Japanese patent is licensed to an affiliate in a low-tax country, income shifting can occur if the royalty or other payment is lower than the true value of the license.

[24]Gravelle and Marples (2011) study the effect of the temporary tax cut on foreign earnings enacted in the U.S. in 2004, and find that about one half of repatriated earnings for that year were in the pharmaceutical, medical, software and computer electronics industries, and were repatriated from low-tax countries and tax havens.

[25]See section 2. Before 2009, Japanese foreign tax credit rules allowed MNCs to use excess foreign taxes paid in one jurisdiction or one type of income for FTC or not) to offset Japanese corporate taxes that would be due on other income, a practice called "cross-crediting." Cross-crediting has been frequently

portant type of income that is considered foreign-source income and can be shielded from taxes in high-tax countries is royalty income from active businesses, because royalties are generally deductible from income.[26]

In order to capture the differential availability of such tax minimization strategies and resulting gains from tax reform, we define measures of intangible intensity, INT_INT, at the 2-digit industry level for firms located in Japan, the United States, and Germany. A detailed description of the construction of various measures of intangible intensity is presented in Appendix C. In short, we utilize information on total investment and stocks of intangible assets calculated by the Japanese Research Institute of the Economy, Trade, and Industry (RIETI), and combine these with data on physical assets, measured over the three-year period 2006-2008 leading up to the reform. We use similar data for the U.S and Germany also based on industry-level comprehensive measures of intangible assets.[27] This permits us to calculate a measure of intangible intensity based on intangible and physical asset stocks for 19 two-digit industries, excluding finance and real estate which we omit from our analysis because of their distinct tax treatment and special sensitivity to market events over the 2008-2009 period. Although we experiment with various measures of intangible intensity based on subsidiary- or parent-level industry classification, we ultimately employ only the latter in our preferred analyses.[28]

used by MNCs as a way to escape taxation of income from a low-tax country that is received in Japan. Cross-crediting is allowed between eligible and ineligible income, as well as between countries. For instance, controlled foreign corporation (CFC) income, defined in Japan as income received from a low-tax country (25% corporate tax rate or less), could be credited against non-CFC income for tax credit calculations purposes. Also, excess foreign tax credits from income subject to either foreign corporate taxation or foreign withholding taxation of dividends, royalty or rents, could be used to offset residual Japanese taxes from any of these sources.

[26]This is also true for R&D current expenses, although R&D activities also benefit from additional tax incentives, the most common of which are tax credits. See Chen and Dauchy (2013a) for a detailed list of tax subsidies for R&D in 34 OECD countries over time, and a summary index of the tax benefit by industry and country.

[27]For the U.S. we use a detailed database on intangible assets comparable to that collected by the RIETI. However, for Germany, we do not have access to a broad measure of intangible assets at the industry level, so we use information limited to reported intangibles, obtained from KLEMS. See Appendix C for details.

[28]We make this choice for various reasons. First, our industry measures of intangible assets are based on Japanese (respectively, U.S. and Germany) investment and therefore may not apply to those countries in which subsidiaries operate. Second, the measure based on subsidiaries requires the use of a weighted

4.4 Tax rates and tax systems

4.4.1 U.S., German, and Japanese tax rates

A further natural theoretical implication of the adoption of a territorial tax regime is that MNCs should benefit in proportion to their tax savings on repatriated earnings. Potential tax savings per dollar of earnings remitted following the reform, TS, are defined as the difference between pre-reform domestic and foreign effective tax rates (ETRs) measured at the level of the parent firm, with foreign tax rates defined in a wide variety of ways. We thus experiment with the use of various weighted and unweighted average ETRs calculated over the three-year pre-reform period 2006-2008 to smooth over firm tax and income realizations as well tax rates based on marginal statutory rates (including combined corporate and withholding tax rates on dividends, royalty, and interest payments by ownership percentages) to further avoid concerns associated with reform-induced rate endogeneity. Ultimately, we only report results involving potential tax savings calculated in a single manner, with parent-specific average foreign ETRs calculated as the ratio of total foreign average taxes paid over total foreign taxable income across all MNC subsidiaries. Results involving alternative foreign tax rate and tax savings measures are used to validate the primary findings and are available from the authors upon request. Additional details about the construction of all tax rate measures are provided in Appendices A and D.

Due to computational limitations associated with single-step estimation of firm-specific market co-movement parameters, we select for inclusion in our analysis only the top quartile of publicly-listed domestic and multinational firms in Japan, Germany, and the U.S. as determined by their January 4, 2008 market capitalization (MC) rank. The sample consists of 91 German firms (42 domestic and 49 multinational), 577 U.S. firms (180

average of each subsidiaries' intangible intensity to arrive at single parent-level figure, with weights based on financial statement data on total assets or retained earnings, and these data are frequently missing at the subsidiary level. We also experiment with measures of intangible-intensity based on stocks rather than investment flows, which are available on demand. The results based on other measures of intangible intensity do not generally change our conclusions.

domestic and 397 multinational), and 579 Japanese firms (361 domestic, and 218 multinational). Table 3 provides the summary statistics of the key variables used in our empirical specifications for each country of nationality and multinational status. Notably, most (88 percent) of German and U.S. owns at least one subsidiary in tax havens ($I\_Haven = 1$) whereas fewer than 60 percent of Japanese firms hold tax haven subsidiaries. Because of the high domestic effective tax rates in Japan, averaging 39.3 percent, Japanese multinational firms on average have larger potential tax savings per dollar of earnings from the reform. The mean of the tax saving measure (TS) for Japanese firms is 0.217, which is greater than those for U.S. and German firms (0.186 and 0.144, respectively).

5 Results

5.1 Market Model Returns

Before turning to the detailed analysis of the impact of particular firm characteristics on investor valuations of the Japanese dividend exemption, Tables 4 and 5 present general evidence of investor reactions to each of the tax reform-related events as a function of parent firms' multinational status and nationality. Average abnormal returns (AAR; Table 4) are calculated as mean cross-sectional prediction errors derived from estimation of the standard market model including market portfolio returns drawn from the Japanese, U.S., and German exchanges over the the last 250 trading days ending 20 days before the first May 9, 2008 event. Average CARs (ACAR; Table 5) are computed as the corresponding running sums thereof within three-day event windows centered around each event date. Tests of statistical significance follow Kolari and Pynnönen (2010) and include corrections for intertemporal correlation (2), intertemporal correlation and event-induced returns volatility (3), plus additional adjustments for cross-sectional correlation (4)-(5). Non-parametric rank test results following Corrado and Zivney (1992) are given in (6)-(7) for event date AARs only, with the latter column incorporating the proposed

Kolari and Pynnönen (2010) adjustment. Unadjusted test statistic results are given in (1) for comparison.

An immediate implication of the results in Tables 4 and 5 is that the choice of test statistic matters a great deal for drawing conclusions as to the significance of different event date AARs and ACARs. In particular, accounting for cross-sectional correlation tends to yield larger estimated standard errors and correspondingly smaller test statistics[29] Focusing on the most conservative of the parametric standard error corrections proposed in Kolari and Pynnönen (2010) or the Corrado and Zivney (1992) non-parametric rank test (columns 5 through 7), a majority of significant abnormal returns within the five-day event windows shown in Table 4 occur within plus or minus one day of the market event. We use this as the basis for narrowing our attention to three-day event windows in Table 5 and in all subsequent analyses.

As evidenced by the pattern of statistically significant AARs and ACARs shown in Tables 4 and 5, several events do not appear to have induced significant investor reactions in the Japanese market. This includes the events of June 27 and August 18, 2008 and January 23, 2009 which evidently were not construed as providing important new information regarding the prospects for Japanese tax reform, at least within basic firm groupings. In addition, the timing of the October 1, 2008 event was such that the significant negative abnormal returns experienced simultaneously among domestic and multinational firms in Japan, Germany, and the U.S. likely reflect the global impact of the financial crisis rather than a consequence of Prime Minister Aso Taro's statement in support of dividend exemption.[30]

[29]According to Corrado and Truong (2008), further reason for caution in interpreting estimated ARs and CARs arises in contexts where security returns are distributed non-normally. The BMP T-test (3), for example, is found to reject the true null too often when applied to market model returns from the AMEX, Nasdaq, and Asia-Pacific stock exchanges (Corrado, 2011).

[30]The U.S. stock market experienced its worst single-day performance since the crash of 1987 on September 29, 2008 as investors responded to uncertainty over passage of the United States' Troubled Assets Relief Program (TARP) and a series of important bank bailouts and takeovers including Fortis (Benelux), Hypo Real Estate (Germany), Bradford & Bingley (U.K.), and Wachovia Corporation (U.S.). TARP was subsequently adopted on October 3 as part of the Emergency Economic Stability Act of 2008 (Bajaj and Grynbaum, 2008).

Among the remaining event dates, differences in abnormal returns across markets provide tentative evidence of event-induced reactions, recalling that by design, German returns are meant to account primarily for global financial market conditions and be unaffected by the Japanese reform except through perceived effects on firm competitiveness, while U.S. returns ought to additionally incorporate anticipated effects due to tax competition as well. Beginning with the first event, Japanese domestic-only firms are shown to have experienced significant positive AARs one day before the METI's May 9, 2008 announcement in a manner not seen in the other markets (Table 4)[31]. Cumulated over the corresponding three-day event window, Japanese domestic firms' stock market capitalization rose by an average of 1.74 percent (Table 5). Among MNCs, in contrast, the pattern of results between U.S. and Japanese firms is largely reversed, with Japanese multinationals' share prices exhibiting no statistically-discernible impact from the METI announcement and U.S. MNCs exhibiting three-day ACARs of 0.68 percent against an insignificant or negative baseline effect in the German market.

Though less robust to the use of the adjusted BMP test statistic, abnormal returns surrounding the November 28, 2008 government's tax commission proposal and March 27, 2009 final enactment of the Japanese dividend exemption appear to reinforce these general effects, wherein Japanese domestic firms experienced substantially larger (less negative) day-three ACARs than their U.S. and German counterparts while ACARs among MNCs were more nearly uniform across markets. This seemingly-counterintuitive result may reflect a perception that domestic firms would have the greatest scope for expanding overseas and competing internationally thanks to the elimination of taxes on repatriated earnings, whereas those firms which already had established overseas operations and associated tax mitigation strategies prior to the reform might see little change in after-tax profits. Only the December 19, 2008 proposal by the Ministry of Finance

[31]Investors hence appear to have learned of the METI's planned announcement the day before it was officially released—precisely the reason for allowing for pre-event information leakage in the construction of the event windows.

yields a reversal of this pattern with a -2.11 percent three-day ACAR among domestic Japanese firms—the worst three-day ACAR for Japanese firms across any of the nine events, multinational or domestic. This raises the possibility that the sequence of proposals released in close succession starting on November 28 and ending on December 19, 2008 may have culminated in disappointment relative to initial expectations among investors in domestic Japanese corporations as details of the proposed reform became more concrete. We return to these considerations below with the introduction of additional firm characteristics to explore the role of tax sophistication.

Notably, the importance of several of the later events suggests that there existed a considerable degree of investor uncertainty with respect to the likelihood of territorial adoption right up until the time that the law passed parliament. Upon elimination of this uncertainty, domestic Japanese firm valuations rose a further 1.35 percent based on three-day ACARs. Japanese MNCs likewise experienced large single-day AARs on the March 27 event date of 0.86 percent (over ¥1350 billion in aggregate market capitalization), but these gains were largely clawed back the following trading day while domestic firms conversely experienced further large positive AARs.

5.2 Modulating Effects of Firm Characteristics

As previously emphasized, the foregoing market model AAR and ACAR estimates fail to exploit variation in firm characteristics, and as such, cannot be used to isolate in a statistically-valid manner those channels by which firms were expected to benefit from adoption of a territorial tax regime. Hence, these first general results may over- or understate underlying response patterns which are more precisely tied to the implications of dividend exemption. Table 6 takes the preceding analysis a step further by applying the dummy variable approach described in Section 3 to simultaneously estimate day one through three ACARs for all firms, allowing for differential impacts by nationality, multinational status, and international tax aggressiveness through the interaction of event date dummies, categorical country indicators ($I\left[ctry \in \{DE, US, JP\}\right]$), and binary indicators of international presence ($I\left[MNC \in \{0,1\}\right]$) and ownership of at least one tax haven subsidiary (I_Haven). Suppressing firm fixed effects (including firm-specific stock market betas) and day one and two interaction effect estimates for brevity, Table 6 reveals a very similar pattern of investor responses in the Japanese, U.S. and German markets as seen in Table 5, with May 9 and November 28, 2008 and March 27, 2009 once again yielding the largest positive ACARs for Japanese and U.S. firms across the nine events.[32] Consistent with the preceding results, Japanese MNCs are again shown to exhibit generally weaker changes in market valuation than their domestic-only counterparts, as estimated by the contribution to day-three ACARs coming through the MNC and tax haven interaction terms (i.e. $I[MNC = 1]$ and $I[MNC = 1] \times I\_Haven$ combined into $\frac{\partial r}{\partial D3}|MNC = 1$).

Furthermore, among Japanese firms with international operations, those with subsidiaries located in a tax haven jurisdiction (approximately 59 percent of MNCs in our sample) tended to experience the weakest abnormal returns around a majority of events. MNCs with tax haven subsidiaries thus experienced an imprecisely-estimated near-zero change in market capitalization following the May 9 METI announcement, while presumably less tax-aggressive MNCs (i.e. without tax haven subsidiaries) were rewarded by investors with a 0.51 percent increase in market capitalization, and domestic-only firms were seen to benefit most of all with a 1.98 percent ACAR. Relative to their German counterparts, these gains represent a statistically-significant increase of 1.23 and 2.65 percentage points among Japanese domestic firms and "non-haven" MNCs, respectively. Domestic Japanese firms similarly saw their market valuations rise significantly following the March 27 signing into law of the dividend exemption, while Japanese MNC valua-

[32]Comparison of day-three ACARs in Table 6 for domestic-only firms (e.g. $I[ctry = DE]$) or multinational firms (e.g. $\frac{\partial r}{\partial D3}|MNC = 1, ctry = DE$) with the corresponding day-three ACARs in Table 5 confirm the equivalence of the standard market model approach and single-step dummy variable approach where only basic group indicators are involved. Minor differences are attributable to average returns for the omitted firm from the single-step analysis plus imprecision in approximating overall multinational ACARs as average marginal effects from the subsamples of MNCs with and without at least one tax haven subsidiary.

tions appeared again unaffected on the whole, significantly below the ACAR for German MNCs for the same period. In fact, only the November 28 government tax commission proposal is associated with economically and statistically significant positive ACARs accruing to Japanese MNCs with more elaborate ownership structures featuring tax haven subsidiaries.

Among the sample of U.S. firms, the 11 percent of all MNCs *without* a single tax haven subsidiary tended instead to experience the *lowest* day-three ACARs, as around the May 9, October 1, December 12, and December 19, 2008 events while those with more sophisticated tax-motivated ownership arrangements experienced significantly more positive changes in market capitalization than either the domestic-only firms or those MNCs without tax haven subsidiaries on May 9, December 12, 2008 and March 27, 2009. Although these differential effects are not all precisely estimated, an illustration of this pattern can be seen in investor reactions surrounding the May 9 event, wherein insignificant negative returns among less sophisticated MNCs and a moderate 0.45 percent average increase in market capitalization for domestic-only firms are dominated by larger gains for U.S. MNCs with tax haven operations, the net effect of the METI announcement for this latter group implying a 0.68 percent increase in average firm valuation.

This pattern of results largely extends the implications from the preceding unconditional analysis of market model abnormal returns: namely, that investor valuations of the Japanese tax reform appear to have been decreasing in the degree of firms' international exposure and tax sophistication among Japanese firms while tending to rather favor tax sophistication among U.S. multinationals. This may reflect differences in the anticipated sources of tangible benefits from dividend exemption in Japan and presumptive benefits in the U.S., with the latter necessarily working primarily through tax competition and unspecified anti-avoidance provisions. To the extent that pre-reform differences in the prevalence of tax haven subsidiaries among U.S. versus Japanese MNCs subject to worldwide taxation reflected differences in benefits to international tax planning and the restrictiveness of anti-tax avoidance regimes, amplification of these differences under territorial taxation could very well yield the observed pattern.

Naturally, MNC status and ownership of tax haven subsidiaries remain relatively coarse measures of international exposure and tax aggressiveness. Consequently, we next turn to consideration of a select few additional measures of foreign activity in four further specifications aimed to more narrowly identify the sources of potential benefits from dividend exemption. In all of these more detailed specifications, day one through three ACARs for all firms are interacted with the same variables as those in Table 6 with the exception of the dummy for ownership of a subsidiary located in a tax haven. Instead, all further specifications include interactions between day-one through three event date dummies, categorical country indicators, and binary indicators of international presence, plus the rate of anticipated tax savings (TS) resulting from elimination of the Japanese tax on repatriated foreign earnings computed as the difference between pre-reform historical effective tax rates on domestic and foreign earnings.

The purpose of controlling for anticipated tax savings is to further evaluate the potential benefits from dividend exemption for existing MNCs. As shown in Table 7, contrary to the generally weak or negative impact of the reform on investors' valuations of Japanese MNCs, all but the last event reveal positive reactions to MNC's tax saving potential, the largest and most precisely-estimated of these falling around the June 27, 2008 and January 23, 2009 events. Interestingly, this positive effect of Japanese MNCs' potential tax savings persists even around October 1, 2008, while U.S. and German MNCs' valuations were experiencing significant declines due to developments related to the global financial crisis. This result strongly suggests that the several events between the May 9, 2008 METI announcement and the March 27, 2009 final passage into law clarified the details of the dividend reform proposal in Japan in ways that investors interpreted as benefiting MNCs with large potential tax savings relatively more. Meanwhile, the fact that MNCs with a tax haven presence did not benefit from a similar effect suggests that those major events were viewed as conferring the largest benefits on MNCs that were both subject to relatively larger current taxation and large tax savings potential. This also contrasts with results for U.S. MNCs, for which larger potential tax savings did not noticeably impact investor valuations whereas a tax haven presence—as shown in Table 6—did. More aggressive tax minimization strategies among U.S. MNCs might thus have been expected to continue to produce disproportionate savings if the U.S. were to enact similar international tax legislation, or, in the absence of such a reform, might provide the best protection from Japanese competitors no longer subject to taxation of foreign-source income.

Narrowing further our identification of potential sources of gains in after-tax profitability from dividend exemption, we further interact all variables used in Table 7 with a proxy for deferred tax liability intensity (DTL), measured as the ratio of balance sheet deferred tax liabilities to total current liabilities. Unreported data on deferred taxes necessitates a roughly 25 percent reduction in our estimation sample. Overall, the results presented in Table 8 seem to confirm the positive impact of the tax reform on Japanese MNCs with larger tax savings potential. The impact of the interaction between DTL and TS on day-three ACARs is positive for Japanese MNCs around most events, although generally not significant. This said, while the previous results showed investors attributing larger potential benefits to Japanese MNCs as a function of the tax savings rate on all current and future dividend repatriations, TS, the potential savings attributable directly to firms' accumulated deferred tax liabilities (captured by $\frac{\partial r}{\partial DTL}|MNC = 1, ctry = JP$) does not impact day-three ACARs significantly differently from zero on any event date besides December 12, 2008. Results from Table 7 involving U.S. MNCs are likewise largely confirmed with the introduction of DTL, showing that U.S. MNCs' potential tax savings had little effect on day-three ACARs, especially insofar as the significant marginal effects of DTL on U.S. MNC ACARs observed around multiple dates were met by nearly equivalent effects for domestic-only firms.[33]

Focusing on future tax avoidance and potential tax savings on shifted earnings, we also interact all variables from the basic tax savings specification with a measure of intangible intensity based on intangible asset investment intensity (INT_INT) defined at the NAICS 2-digit industry level. Despite a fairly inconsistent pattern of estimated impacts of intangible intensity on Japanese firm valuations, Table 9 reveals that if anything, greater income shifting ability as measured by intangible intensity was perceived by investors as being disproportionately valuable to domestic firms rather than MNCs. Comparing the overall impact of INT_INT for Japanese and German firms (e.g. $\frac{\partial r}{\partial INT\_INT}|MNC \in \{0,1\}, ctry \in \{JP, DE\}$) in order to strip out financial market developments unrelated to the Japanese reform, the estimated marginal effects are generally larger for Japanese domestic firms than for German domestic firms, even if these effects are not uniformly significant. Exceptions to this general pattern arise around the first and last events. Conversely, among MNCs, intangible intensity more commonly appears to have been associated with reduced ACARs among Japanese firms relative to their German counterparts. Moreover, the interaction between TS and INT_INT does not yield any consistent pattern of effects for Japanese MNCs, suggesting that the negative effect of the reform on intangible intensive Japanese MNCs occurred regardless of their tax savings potential.

We interpret this result as reflecting the fact that as investors learned that anti-avoidance rules would not significantly change compared to previous law, they may have anticipated domestic firms to benefit disproportionately from their newfound incentives and opportunities for international expansion and income reallocation. This can be seen for instance on November 28, 2008, when the government released the first version of its policy recommendations for tax revisions for the next fiscal year, introducing more detailed provisions of the dividend exemption. As shown in column (5), a 10 percent-

[33] Unlike TS, a virtue of this additional proxy for potential tax savings is that DTL intensity is well-defined for both domestic and multinational firms.

age point increase in intangible intensity relative to the average firm was associated with a 0.34 percent increase in market capitalization for Japanese domestic firms (i.e., $\frac{\partial r}{\partial INT\_INT} - \frac{\partial r}{\partial D3}|MNC = 0, ctry = JP)$. Contrary to conventional wisdom, it appears that for Japanese MNCs, investors did not associate reliance on intangibles with increased tax avoidance opportunities and incentives following adoption of Japan's dividend exemption. Nevertheless, this result is once again consistent with tax aggressiveness or sophistication being negatively correlated with anticipated gains in Japanese firm profitability following the reform.

Table 9 reveals similarly-inconsistent effects of intangible intensity on U.S. firm valuations across event dates for both domestic and multinational firms, with patterns therein appearing to be more likely driven by industry-specific impacts of the financial crisis. Hence, investor valuations of the Japanese reform did not appear to be substantially informed by U.S. firms' degree of intangible intensity.

5.3 Cumulated Event Date Returns

In order to distill results from all nine market events, accounting for swings in investor valuations as new information caused investors to revise prior expectations, we conclude with the accumulation of event-date AAR effects by artificially treating the sequence of event dates as though these were drawn from a single contiguous event period. The initial tax haven and tax savings specifications from Tables 6 and 7 are thus reproduced in Tables 10 and 11, respectively, with the distinction that the results in each column reflect the sum of event-date AARs from all preceding events. As shown in both tables, the net effect of all events leading up to final adoption of the Japanese dividend exemption (Column 9) was to increase Japanese domestic firms' market capitalization by an average of 1.51 percent and decrease MNC capitalization by 1.36 percent, corresponding to aggregate gains and losses of ¥353 billion ($3.6 billion) and ¥2138 billion ($21.6 billion) among our top-quartile firm samples, respectively.

This seemingly-modest and even negative result changes markedly under the assumption that Japanese stock returns would have mirrored returns in the German market across all nine events if not for developments related to the Japanese tax reform, such that differences in returns across markets are entirely due to direct short- and long-term tax savings accruing to Japanese MNCs and indirect improvements in Japanese firm competitiveness. By this metric, abnormal returns among Japanese domestic-only and multinational firms through March 27, 2009 imply gains of 4.98 and 1.92 percent, respectively, relative to the German counterfactual. Given the primarily U.S. origins of the financial crisis, the already strong assumption that German market returns serve as a valid counterfactual for global financial market conditions becomes even more tenuous for evaluating impacts on U.S. firm valuations.[34] Nevertheless, it appears that the general pattern of investor reactions by MNC status to news of the Japanese reform were if anything amplified among U.S. firms, with progressively larger (less negative) ACARs accruing to both domestic and multinational firms over the course of the entire sequence of events.

An important distinction between the effect on Japanese versus U.S. firms arises through the impact of tax haven subsidiary ownership and presumptive tax savings. As Table 10 helps to further clarify, it is again apparent that whereas investors attributed relatively larger gains from developments leading up to Japan's adoption of territorial taxation to U.S. MNCs with tax haven operations, having these types of more tax-sophisticated structures was viewed, if anything, as weakening the relative gains to Japanese MNCs. At a certain level, this result is unsurprising: those Japanese firms which had already structured their foreign operations to minimize their international tax obligations prior to reform likely stood to gain the least from elimination of taxes due upon repatriation, whereas among U.S. firms, being more tax aggressive might help

[34] Assuming similar improvements in Japanese firms' international competitiveness vis-à-vis both U.S. and German MNCs, the presumption that German market returns serve as a valid counterfactual further implies that differences between U.S. and German returns would be entirely due to anticipated gains from tax competition-induced U.S. tax reform.

such firms preserve their competitive position in the face of potentially-strengthened Japanese competitors. On the other hand, this tends to run counter to the idea that more tax-sophisticated firms might be more inclined to increase their tax avoidance under a territorial regime.

By focusing exclusively on AARs cumulated across event dates rather than over wider three-day event windows for each event separately, Table 11 brings added nuance to the observed effects of the tax savings rate. In particular, despite a long sequence of negative event date AARs for the average Japanese MNC, multinationals with higher anticipated tax savings experienced relatively larger returns, or equivalently, more moderate declines in market capitalization overall. The positive contribution to Japanese MNC ACARs from tax savings on current and future repatriated earnings reached a peak following the sequence of proposals issued in short succession by the Government Tax Commission, the Liberal Democratic Party, and the Ministry of Finance. A Japanese multinational facing an average effective tax rate on its foreign operations 10 percentage points below that of the average firm would thus have seen a 0.70 percent improvement in stock market valuation through December 19, 2008 relative to the average MNC. In contrast, U.S. and German MNCs facing larger presumptive repatriation tax savings (lower foreign effective tax rates) tended to see relatively larger reductions in market capitalization. Though less precisely estimated, a similar 10 percentage point increase in U.S. and German MNCs' presumptive tax savings rate would have reduced those firms' market capitalization by roughly 0.3 percent by the time the Japanese dividend exemption was signed into law. Translated into an aggregate effect, the difference between Japanese MNCs' baseline December 19, 2008 ACAR of -3.10 percent and the overall average marginal effect factoring in the offsetting positive tax savings effect of -1.59 percent implies a combined tax savings effect of 1.51 percent, or ¥2362 billion ($26.4 billion).

6 Conclusion

Tax competition has become a major concern among OECD countries, especially as many countries have sought to provide even stronger incentives for international businesses to invest at home since the financial crisis. Moreover, recent experience in countries that tax corporations on a worldwide basis has proven that, if anything, the share of unrepatriated income has increased over time, in part due to the increasingly intangible nature of worldwide business income, and increased global coverage of MNC operations. The amount of undistributed foreign subsidiary earnings for first-tier subsidiaries of Japanese MNCs was thus estimated to be as much as ¥17 trillion at the end of fiscal year 2006,[35] and the repatriations that followed the 2005 U.S. repatriation tax holiday has been essentially concentrated in intangible intensive industries (Redmiles (2008), Gravelle and Marples (2011)). For theses reasons, many countries have passed reforms to simplify or reduce the taxation of international income. Among thirty four OECD members, currently twenty six countries have adopted the foreign income exemption method for eliminating double taxation. This paper estimates the impact on market stock valuation of such fundamental tax reform, when Japan switched in 2009 from worldwide taxation of foreign business income to near full exemption of repatriated earnings. The significance of this research, however, has much broader implications for other worldwide taxation countries, such as the U.S., where territorial taxation has been repeatedly proposed as an option for tax reform, or for the U.K. and New Zealand, both of which passed similar territorial reforms after the financial crisis, and which may learn from our findings.

Our results show that investors in the Japanese market were subject to considerable uncertainty until the eventual signing into law of the territorial tax reform, on March 27, 2009. We find that, among our nine event dates, the announcement of the tax reform had the most pronounced significant and positive impacts on Japanese stock market

[35]Source: PriceWaterHouseCoopers' 2008 *Japan Tax Update*. If second-tier subsidiaries were included, the amount of undistributed earnings is estimated to be significantly higher. In turn, this increased the government's desire to reform the system.

valuations on two dates: May 9, 2008, when the METI first announced its commitment to seriously examine ways to implement the exemption system, and March 27, 2009, when the bill passed into law. Interestingly, while we expect that the territorial reform should provide more tax savings to Japanese multinational corporations than to domestic firms, we find that on most event days, domestic firms experienced a positive reaction of their stock market valuations, while MNCs' valuations decreased on most event days. A way to summarize the total impact on of the dividend exemption reform on market valuations is to estimate the total net effect of the nine important events from the first METI meeting to the final adoption of the Japanese dividend exemption. Based on this measure, the net effect was to increase stock market capitalization of Japan domestic firms by 1.5 percent, but decrease market capitalization of Japanese MNCs by 1.36 percent. This seemingly counter-intuitive result suggests that investors may have perceived the reform as an increased opportunity, or incentive, for domestic firms to expand internationally. This in fact may not be incompatible with the objective of the tax reform to encourage more repatriations of foreign earnings as a way to increase investment in local businesses, including domestic R&D.

However, this relatively modest and even negative result may also encompass world-wide economic conditions, as most of the market events occurred just before and well into the global financial crisis. Using German firms' stock market valuations as a control for global market conditions, we argue that Japanese stock returns would have mirrored returns in the German market across all nine events if not for developments related to the Japanese tax reform, such that differences in returns across markets are entirely due to direct short- and long-term tax savings accruing to Japanese MNCs and indirect improvements in Japanese firms' relative competitiveness. By this metric, the cumulated effect of the nine events through March 27, 2009 imply net gains of 4.98 percent for Japanese domestic firms, and 1.92 percent for MNCs relative to their German counterparts.

To better evaluate the impact of the Japanese dividend exemption on stock market valuations, we extend our analysis using the largest publicly-available source of financial statement and ownership data for multinationals and their subsidiaries worldwide, which allows—among other things—identification of whether MNCs' foreign subsidiaries are located in one or more tax havens. With this in hand, we confirm that the impact of the reform on Japanese MNCs' valuations—controlling for German (global) market valuations—was significantly smaller than for domestic firms. Moreover, Japanese MNCs with at least one subsidiary located in a tax haven tended to experience the weakest abnormal returns around a majority of events, such that firms with access to more sophisticated tax minimization strategies experienced near-zero or even negative changes in market capitalization following both the May 9 METI announcement and the March 27 final enactment relative to their German counterparts. Japanese domestic-only firms, meanwhile, were seen to benefit relatively most with a 0.1 percentage point greater event date AAR on May 9 followed by increasingly larger differences with each successive event leading up to the final March 27, 2009 event.

This suggests that investors may have perceived that MNCs that were relatively more aggressive in their tax minimization strategies prior to reform would benefit disproportionately *less* from the long-term tax savings and incentives for tax avoidance afforded under a dividend exemption system. In fact, this may also reveal that the benefits of the tax reform likely depend on other tax system details that our data do not allow us to observe directly, such as changes in the ability of MNCs to use cross-crediting for foreign tax credit purposes, or the strictness of anti-avoidance rules. Analysts have for instance pointed out that the tax reform might increase tax liabilities of certain firms that would no longer be able to use foreign tax credits to reduce foreign taxes on other sources of income, such as royalty and interest income, which are not covered by the reform, are still taxable upon repatriation, and are no longer creditable against qualified exempt dividend income. Furthermore, in contrast to the U.S. treatment of "deemed" repatriations under I.R.C. §956, the absence of restrictions on Japanese parent corporations' ability to borrow from foreign subsidiaries without triggering domestic taxation either *before* or after the reform suggests that even moderately-sophisticated Japanese MNCs might have easily avoided taxes on foreign-source income under Japan's worldwide regime, thereby making the reform largely irrelevant for tax avoidance purposes.[36] Altogether, these features of the Japanese tax system and Japanese corporations' general tax morale may also explain our finding that more intangible-intensive MNCs experienced near-zero or negative returns (relative to ACARs among German firms) around most events in our sample.

This said, as predicted, we also find that our constructed direct measure of potential tax savings is positively correlated with the size of abnormal returns of Japanese MNCs around all but one event date, even after netting out abnormal returns in the German market. Market valuations of Japanese MNCs with large tax savings reached a peak following the sequence of proposals that clarified the detailed provisions of the dividend exemption system with regards, for instance, to cross-crediting rules and tax haven treatment. Based on accumulated event date AARs through December 19, 2008, a 10 percentage point increase in Japanese MNCs' average tax savings rate would have thus led to an increase in market valuation of 0.70 percent, with the sum of all such tax savings effects (net of counterfactual German returns) adding up to a 2.22 percent increase in market capitalization for Japanese MNCs from anticipated tax savings.

These findings provide important information for other countries that may be encouraged to adopt similar reforms in the future as a result of tax competition. Considering the U.S. specifically, we find that among MNCs, the pattern of results between U.S. and Japanese firms is largely reversed, with Japanese multinationals' share prices exhibiting no statistically-discernible impact from the METI announcement and U.S. MNCs exhibiting three-day ACARs of 0.68 percent against an insignificant or negative baseline

[36]Anecdotally, Japanese corporations are said to be far less aggressive in their approach to avoiding domestic tax obligations than U.S. firms, however, and it is not even thought that Japanese MNCs took advantage of their ability to circumvent repatriation taxes (and increase income shifting out of Japan) by borrowing from foreign subsidiaries in this manner prior to the reform.

effect in the German market. Similar patterns prevail around subsequent event dates. This exercise reveals that U.S. MNCs generally experienced significantly larger market valuations than Japanese MNCs. Accumulated event date AARs of U.S. MNCs over all events leading to the final March 27, 2009 passage into law were hence 1.55 percentage points larger than for Japanese MNCs. If German market valuations represent a good gauge for non-reform-related global stock market events, this result implies that investors reacted to the Japanese reform by rewarding U.S. MNCs with a 3.47 percent *relative* increase in market valuation as a consequence of the effects of tax competition and increased probability of reform in the U.S.

In contrast with Japanese firms—and perhaps reflecting pre-reform differences in the prevalence of complex MNC ownership structures and tax aggressiveness—we also find that U.S. MNCs with a tax haven presence are more likely to benefit from the Japanese reform than other U.S. MNCs, with AARs cumulated through the final event date among U.S. MNCs with at least one tax haven subsidiary implying a 2.25 percent increase in market capitalization relative to their arguably less sophisticated U.S. MNC counterparts. Controlling for abnormal stock returns among German MNCs with tax haven operations, tax-aggressive U.S. MNCs thereby experienced a 4.5 percent increase in market valuation, or 1.95 percentage points more than among comparable Japanese firms. These disproportionate gains are not due to larger potential tax savings among firms with tax haven subsidiaries, however, as our direct measure of potential tax savings did not appear to influence investor valuations of U.S. MNCs in a significant manner. Likewise, income reallocation ability does not appear to be responsible for this result either, as U.S. MNCs in more intangible-intensive industries tended to exhibit smaller, rather than larger abnormal returns. Consequently, it may be that the primary channel by which investors capitalized news of the Japanese reform into U.S. market valuations was in terms of firm competitiveness, whereby more tax aggressive U.S. MNCs may have stood to lose the least in the face of potentially strengthened Japanese competition.

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Table 1: Timeline of Prominent Events Related to Japan's Dividend Exemption

May 9, 2008	The Minister of Economy, Trade and Industry, Akira Amari, instructed the METI to examine a tax reform to implement a foreign income exemption system.
June 27, 2008	The Cabinet approved "Basic Policies for Economic and Fiscal Reform 2008," which proposed a tax reform that stimulate profit repatriation by Japanese multinational corporations.
August 18, 2008	METI released the interim report, "Repatriations of Foreign Profits by Japanese Enterprises: Toward the Introduction of a Dividend Exemption Regime" on August 22. The Nihon Keizai Shimbum's article on August 17 provided a summary of the report.
October 1, 2008	Prime Minister Taro Aso mentioned that he supported the introduction of a dividend exemption system at the full House of Representatives.
November 28, 2008	The Government Tax Commission released "Policy Recommendation for Tax Revisions for Fiscal Year 2009," which proposes the introduction of dividend exemption.
December 12, 2008	The Liberal Democratic Party released "The Large Package of Tax Revisions for Fiscal Year 2009," which includes the introduction of dividend exemption.
December 19, 2008	The Ministry of Finance released "The Large Package of Tax Revisions for Fiscal Year 2009," which includes the introduction of dividend exemption.
January 23, 2009	The Cabinet approved "The Outline of Tax Revisions for Fiscal Year 2009," which includes dividend exemption provisions.
March 27, 2009	The legislative bill including the dividend exemption provisions was passed into law.

Table 2: Description of Key Regression Variables

Variable name	Description, measures, and level of observation
$I[ctry = k]$	Country dummies, $k \in JP, US, DE$. Firm level.
I_MNC	Multinational status defined as 1if MNC, or 0otherwise. Firm level. See appendix A.
I_Haven	Dummy for presence in tax haven, defined as 1 if parent owns at least one subsidiary in a tax haven. Firm level. See appendix D.
TS	Tax savings potential, defined as domestic average effective tax rate (AETR) *less* Foreign AETR, where AETR is measured as the pre-reform historical ETR (2005-07) on domestic and foreign earnings. Foreign AETR is measured as the ratio of the sum of all subsidiaries' tax liabilities *divided by* the sum of all subsidiaries' pre-tax earnings. Firm level. See appendix.
DTL	Deferred tax liability (DTL) intensity, defined from balance sheet items as DTL *divided by* total current liability. Firm level. See appendix.
INT_INT	Intangible intensity. Industry level (two-digit NAICS codes).
LQ[a]	Proxy for liquidity constraints, defined as the sum of income statements items (domestic net income + depreciation) *divided by* Net Properly, Plant & Equipment, beginning period (balance sheet). Firm level. See appendix.

[a] A more standard approach in the finance literature is to define liquidity constraints as *cash flow intensity* (CF/K) where CF is defined as the sum of earnings before extraordinary items and depreciation, divided by the beginning-of-period net property, plant and equipment (which proxies for capital stock K). See for instance Kaplan and Zingales (1997); Fazzari and Peterson (1993); Almeida and Campello (2007); Moyen (2004). This approach was not available to us because few firms in Orbis accurately report earnings before extraordinary items.

Table 3: Summary Statistics for Japanese, U.S., and German Firms

	Domestic		Multinational	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Germany				
(42 domestic firms, 49 MNCs)				
$AETR\_dom$	0.199	0.143	0.304	0.236
$METR\_min\_sub$			0.04	0.087
$AETR\_for$			0.208	0.174
TS			0.144	0.215
INT_INT	0.135	0.095	0.159	0.083
DTL	0.161	0.158	0.150	0.047
LQ	0.340	0.403	0.104	0.168
I_Haven			0.878	0.331
MC	1236.532	2157.644	21236.45	35718.4
U.S.				
(180 domestic firms, 397 MNCs)				
$AETR\_dom$	0.233	0.187	0.308	0.175
$METR\_min\_sub$			0.065	0.106
$AETR\_for$			0.168	0.200
TS			0.186	0.191
INT_INT	0.259	0.201	0.466	0.190
DTL	0.766	0.369	0.760	0.359
LQ	0.047	0.138	0.029	0.096
I_Haven			0.884	0.320
MC	3638.053	5014.358	24264.12	47814.34
Japan				
(361 domestic firms, 218 MNCs)				
$AETR\_dom$	0.423	0.193	0.393	0.117
$METR\_min\_sub$			0.128	0.135
$AETR\_for$			0.206	0.203
TS			0.217	0.175
INT_INT	0.337	0.166	0.378	0.123
DTL	0.060	0.092	0.063	0.028
LQ	0.099	0.205	0.007	0.071
I_Haven			0.587	0.493
MC	911.798	2248.536	13032.52	19530.69

$AETR\_dom$: Average domestic effective tax rate, $METR\_min\_sub$: Minimum foreign subsidiary statutory tax rate, $AETR\_for$: Average foreign effective tax rate, TS: Tax savings potential in percent, $AETR\_dom$-$AETR\_for$, INT_INT: Intangible intensity at the industry level in percent, DTL: Deferred tax liability intensity in percent, LQ: Proxy for liquidity constraints in percent, I_Haven: Dummy variable for the presence of foreign subsidiaries in tax havens, MC: Market capitalization as of January 4, 2008 in million U.S. dollars.

Table 4: Abnormal Returns by Nationality and MNC Status

		Domestic-Only								**Multinational**							
Country	*Event Date*	*AAR*	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	t_C (6)	t_C^{Adj} (7)	*AAR*	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	t_C (6)	t_C^{Adj} (7)
DE	7-May-2008	-0.991	**	***	***	**	*	.	.	-0.433	-	-	*	-	-	.	.
DE	8-May-2008	0.235	-	-	-	-	-	.	.	-0.385	-	-	-	-	-	.	.
DE	9-May-2008	0.305	-	-	-	-	-	-	-	-0.656	*	**	***	-	-	-	-
DE	12-May-2008	0.195	-	-	-	-	-	.	.	0.369	-	-	**	-	-	.	.
DE	13-May-2008	-0.175	-	*	-	-	-	.	.	0.404	-	-	-	-	-	.	.
US	7-May-2008	0.168	-	-	-	-	-	.	.	0.08	-	-	-	-	-	.	.
US	8-May-2008	-0.127	-	-	-	-	-	.	.	0.268	***	***	***	-	-	.	.
US	9-May-2008	0.384	**	***	***	-	-	-	-	0.209	**	*	*	-	-	-	-
US	12-May-2008	0.189	-	**	**	-	-	.	.	0.201	**	***	***	-	-	.	.
US	13-May-2008	0.326	**	**	***	-	-	.	.	0.339	***	***	***	-	-	.	.
JP	7-May-2008	0.345	**	*	-	-	-	.	.	-0.292	**	**	**	-	-	.	.
JP	8-May-2008	1.461	***	***	***	***	***	.	.	0.249	*	-	*	-	-	.	.
JP	9-May-2008	0.366	**	***	***	-	-	-	-	-0.107	-	-	-	-	-	-	-
JP	12-May-2008	-0.083	-	-	-	-	-	.	.	-0.01	-	-	-	-	-	.	.
JP	13-May-2008	-0.496	***	***	***	-	-	.	.	-0.172	-	-	-	-	-	.	.
DE	25-Jun-2008	-0.527	-	*	**	-	-	.	.	-0.678	*	**	*	-	-	.	.
DE	26-Jun-2008	-0.007	-	-	-	-	-	.	.	-1.141	***	***	***	-	-	.	.
DE	27-Jun-2008	-1.874	***	***	***	***	***	**	-	-2.75	***	***	***	***	**	**	*
DE	30-Jun-2008	-1.261	***	***	***	-	-	.	.	-0.811	**	**	**	-	-	.	.
DE	1-Jul-2008	-0.653	*	**	-	-	-	.	.	-1.012	***	***	***	-	-	.	.
US	25-Jun-2008	0.181	-	**	*	-	-	.	.	0.03	-	-	-	-	-	.	.
US	26-Jun-2008	0.243	-	**	**	-	-	.	.	-0.192	*	***	***	-	-	.	.
US	27-Jun-2008	-0.11	-	**	**	-	-	-	*	-0.116	-	**	*	-	-	-	-
US	30-Jun-2008	0.13	-	***	***	-	-	.	.	-0.1	-	-	-	-	-	.	.
US	1-Jul-2008	-0.138	-	-	-	-	-	.	.	-0.428	***	***	***	*	-	.	.
JP	25-Jun-2008	0.086	-	***	**	-	-	.	.	0.069	-	-	-	-	-	.	.
JP	26-Jun-2008	-0.043	-	-	-	-	-	.	.	-0.332	**	**	***	-	-	.	.
JP	27-Jun-2008	-0.057	-	-	-	-	-	-	-	0.067	-	-	-	-	-	-	-
JP	30-Jun-2008	0.343	**	***	***	-	-	.	.	-0.008	-	-	-	-	-	.	.
JP	1-Jul-2008	0.059	-	*	*	-	-	.	.	0.145	-	-	-	-	-	.	.

Continued on next page

		Domestic-Only								Multinational							
Country	*Event Date*	*AAR*	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	t_C (6)	t_C^{Adj} (7)	*AAR*	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	t_C (6)	t_C^{Adj} (7)
DE	14-Aug-2008	0.388	-	-	-	-	-	.	.	0.477	-	-	-	-	-	.	.
DE	15-Aug-2008	-0.639	-	***	***	-	-	.	.	-0.487	-	-	-	-	-	.	.
DE	18-Aug-2008	-0.973	**	***	**	-	-	-	-	-0.833	**	***	***	-	-	-	*
DE	19-Aug-2008	0.454	-	-	***	-	-	.	.	-0.005	-	-	-	-	-	.	.
DE	20-Aug-2008	-0.233	-	-	-	-	-	.	.	1.124	***	***	***	-	-	.	.
US	14-Aug-2008	0.038	-	-	-	-	-	.	.	0.037	-	-	-	-	-	.	.
US	15-Aug-2008	-0.622	***	***	***	-	-	.	.	-0.252	**	-	-	-	-	.	.
US	18-Aug-2008	0.292	*	***	***	-	-	-	-	-0.123	-	-	-	-	-	-	-
US	19-Aug-2008	-0.103	-	-	-	-	-	.	.	-0.034	-	-	-	-	-	.	.
US	20-Aug-2008	-0.121	-	*	-	-	-	.	.	-0.123	-	***	**	-	-	.	.
JP	14-Aug-2008	-1.116	***	***	***	*	-	.	.	0.2	-	-	-	-	-	.	.
JP	15-Aug-2008	-0.077	-	-	-	-	-	.	.	-0.02	-	-	-	-	-	.	.
JP	18-Aug-2008	-0.175	-	-	-	-	-	-	-	-0.085	-	-	-	-	-	-	-
JP	19-Aug-2008	-0.08	-	-	-	-	-	.	.	0.003	-	-	-	-	-	.	.
JP	20-Aug-2008	0.572	***	***	***	-	-	.	.	0.144	-	-	-	-	-	.	.
DE	29-Sep-2008	-3.218	***	***	***	***	**	.	.	-3.916	***	***	***	***	**	.	.
DE	30-Sep-2008	-1.852	***	***	***	***	**	.	.	1.417	***	***	**	-	-	.	.
DE	1-Oct-2008	-0.023	-	-	-	-	-	-	-	-1.263	***	***	***	-	-	-	-
DE	2-Oct-2008	-1.462	***	***	***	***	**	.	.	-2.366	***	***	***	***	*	.	.
DE	3-Oct-2008	-0.262	-	-	-	-	-	.	.	-0.422	-	-	-	-	-	.	.
US	29-Sep-2008	1.29	***	***	***	***	-	.	.	0.291	***	***	***	**	-	.	.
US	30-Sep-2008	-1.548	***	***	***	***	*	.	.	-0.64	***	***	***	***	*	.	.
US	1-Oct-2008	-0.496	***	***	*	-	-	-	-	-1.151	***	***	***	***	***	***	-
US	2-Oct-2008	-0.774	***	***	*	-	-	.	.	-1.518	***	***	***	***	***	.	.
US	3-Oct-2008	-1.488	***	***	***	***	*	.	.	-0.513	***	***	***	**	-	.	.
JP	29-Sep-2008	0.515	***	***	***	-	-	.	.	-0.275	**	-	-	-	-	.	.
JP	30-Sep-2008	0.201	-	***	*	-	-	.	.	0.19	-	-	-	-	-	.	.
JP	1-Oct-2008	-0.682	***	***	**	-	-	-	-	-0.663	***	***	***	**	-	-	-
JP	2-Oct-2008	-0.805	***	***	***	-	-	.	.	-0.767	***	***	***	**	-	.	.
JP	3-Oct-2008	-0.904	***	***	***	-	-	.	.	-0.987	***	***	***	***	**	.	.

Continued on next page

		Domestic-Only								Multinational							
Country	*Event Date*	*AAR*	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	t_C (6)	t_C^{Adj} (7)	*AAR*	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	t_C (6)	t_C^{Adj} (7)
DE	26-Nov-2008	0.131	-	-	-	-	-	.	.	1.506	***	***	***	*	-	.	.
DE	27-Nov-2008	-0.624	-	*	-	-	-	.	.	1.353	***	***	**	-	-	.	.
DE	28-Nov-2008	-1.383	***	***	***	**	*	*	-	-1.888	***	***	***	**	*	*	-
DE	1-Dec-2008	0.361	-	-	-	-	-	.	.	1.27	***	***	**	-	-	.	.
DE	2-Dec-2008	-1.987	***	***	**	*	-	.	.	-2.093	***	***	***	**	-	.	.
US	25-Nov-2008	1.188	***	***	***	**	-	.	.	-0.041	-	-	-	-	-	.	.
US	26-Nov-2008	1.078	***	***	-	-	-	.	.	1.826	***	***	***	***	**	.	.
US	28-Nov-2008	-0.222	-	-	-	-	-	-	-	-0.11	-	-	-	-	-	-	-
US	1-Dec-2008	-3.411	***	***	***	***	**	.	.	-0.74	***	***	***	***	*	.	.
US	2-Dec-2008	1.642	***	***	***	***	-	.	.	0.303	***	***	-	-	-	.	.
JP	26-Nov-2008	0.171	-	-	-	-	-	.	.	0.061	-	-	-	-	-	.	.
JP	27-Nov-2008	-0.5	***	***	***	-	-	.	.	0.337	**	*	-	-	-	.	.
JP	28-Nov-2008	0.798	***	***	***	-	-	-	-	0.947	***	***	***	***	-	*	-
JP	1-Dec-2008	-0.744	***	***	***	*	-	.	.	-0.561	***	***	***	**	*	.	.
JP	2-Dec-2008	-0.081	-	-	-	-	-	.	.	-1.5	***	***	***	***	***	.	.
DE	10-Dec-2008	0.53	-	-	-	-	-	.	.	1.378	***	***	**	-	-	.	.
DE	11-Dec-2008	1.821	***	***	***	***	*	.	.	1.243	***	***	***	-	-	.	.
DE	12-Dec-2008	0.466	-	*	-	-	-	-	-	1.911	***	***	***	**	-	*	-
DE	15-Dec-2008	0.953	**	*	-	-	-	.	.	1.466	***	***	***	*	-	.	.
DE	16-Dec-2008	-0.828	**	-	-	-	-	.	.	-1.351	***	***	***	-	-	.	.
US	10-Dec-2008	2.559	***	***	***	***	**	.	.	1.228	***	***	***	***	***	.	.
US	11-Dec-2008	-2.922	***	***	***	***	*	.	.	-0.879	***	***	***	***	-	.	.
US	12-Dec-2008	2.268	***	***	***	***	-	-	-	0.81	***	***	***	***	-	*	-
US	15-Dec-2008	-0.825	***	***	***	*	-	.	.	-0.554	***	***	**	-	-	.	.
US	16-Dec-2008	1.859	***	***	***	***	-	.	.	0.539	***	***	***	***	-	.	.
JP	10-Dec-2008	-1.056	***	***	***	**	-	.	.	0.911	***	***	***	***	*	.	.
JP	11-Dec-2008	-0.096	-	-	-	-	-	.	.	-0.099	-	-	-	-	-	.	.
JP	12-Dec-2008	1.106	***	***	***	**	-	*	-	-1.417	***	***	***	***	***	***	-
JP	15-Dec-2008	-0.295	*	***	*	-	-	.	.	0.834	***	***	***	***	**	.	.
JP	16-Dec-2008	0.493	***	***	***	-	-	.	.	-0.113	-	*	-	-	-	.	.

Continued on next page

		Domestic-Only								Multinational							
Country	*Event Date*	*AAR*	t	t_P	t_B	t_P^{Adj}	t_B^{Adj}	t_C	t_C^{Adj}	*AAR*	t	t_P	t_B	t_P^{Adj}	t_B^{Adj}	t_C	t_C^{Adj}
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		(1)	(2)	(3)	(4)	(5)	(6)	(7)
DE	17-Dec-2008	0.593	-	***	*	*	-	.	.	1.968	***	***	***	**	-	.	.
DE	18-Dec-2008	0.743	*	-	-	-	-	.	.	0.432	-	*	-	-	-	.	.
DE	19-Dec-2008	-0.582	-	***	**	**	-	-	*	0.566	-	-	-	-	-	-	-
DE	22-Dec-2008	3.629	***	***	***	***	*	.	.	2.608	***	***	***	***	-	.	.
DE	23-Dec-2008	3.29	***	***	***	***	**	.	.	2.741	***	***	***	***	-	.	.
US	17-Dec-2008	1.235	***	***	***	**	-	.	.	0.932	***	***	***	***	*	.	.
US	18-Dec-2008	-1.025	***	***	***	*	-	.	.	-0.84	***	***	***	***	-	.	.
US	19-Dec-2008	0.929	***	***	**	**	-	-	-	0.55	***	***	***	*	-	-	-
US	22-Dec-2008	-0.712	***	***	*	-	-	.	.	-0.953	***	***	***	***	*	.	.
US	23-Dec-2008	-0.789	***	***	***	*	-	.	.	-0.117	-	**	*	-	-	.	.
JP	17-Dec-2008	-0.776	***	***	***	-	-	.	.	-1.005	***	***	***	***	**	.	.
JP	18-Dec-2008	-0.455	***	***	***	-	-	.	.	-0.452	***	***	***	**	-	.	.
JP	19-Dec-2008	-1.09	***	***	***	**	**	*	-	-0.254	*	**	-	-	-	-	-
JP	22-Dec-2008	-0.565	***	***	***	-	-	.	.	0.156	-	-	-	-	-	.	.
JP	24-Dec-2008	0.283	*	***	*	-	-	.	.	0.056	-	-	-	-	-	.	.
DE	21-Jan-2009	-0.61	-	-	-	-	-	.	.	-0.018	-	-	-	-	-	.	.
DE	22-Jan-2009	0.228	-	*	-	-	-	.	.	0.614	*	-	-	-	-	.	.
DE	23-Jan-2009	0.384	-	-	-	-	-	-	-	-0.456	-	**	-	-	-	-	-
DE	26-Jan-2009	0.336	-	***	*	-	-	.	.	-1.333	***	***	**	-	-	.	.
DE	27-Jan-2009	0.029	-	-	-	-	-	.	.	0.854	**	**	*	-	-	.	.
US	21-Jan-2009	1.096	***	***	***	**	-	.	.	0.081	-	-	-	-	-	.	.
US	22-Jan-2009	-0.779	***	***	***	-	-	.	.	-0.327	***	**	-	-	-	.	.
US	23-Jan-2009	0.715	***	***	**	-	-	-	-	0.483	***	-	-	-	-	-	-
US	26-Jan-2009	1.399	***	***	***	***	**	.	.	-0.127	-	-	-	-	-	.	.
US	27-Jan-2009	-0.21	-	-	-	-	-	.	.	-0.049	-	-	-	-	-	.	.
JP	21-Jan-2009	0.187	-	**	**	-	-	.	.	-0.614	***	***	***	**	*	.	.
JP	22-Jan-2009	0.077	-	-	-	-	-	.	.	0.156	-	-	-	-	-	.	.
JP	23-Jan-2009	0.537	***	***	***	-	-	-	-	-0.517	***	***	***	**	*	-	-
JP	26-Jan-2009	0.004	-	***	***	-	-	.	.	-0.232	*	-	-	-	-	.	.
JP	27-Jan-2009	-1.249	***	***	***	**	*	.	.	-0.196	-	-	-	-	-	.	.

Continued on next page

		Domestic-Only								Multinational							
Country	*Event Date*	*AAR*	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	t_C (6)	t_C^{Adj} (7)	*AAR*	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	t_C (6)	t_C^{Adj} (7)
DE	25-Mar-2009	0.201	-	-	-	-	-	.	.	-0.52	-	**	-	-	-	.	.
DE	26-Mar-2009	0.134	-	-	-	-	-	.	.	-0.437	-	-	-	-	-	.	.
DE	27-Mar-2009	0.189	-	-	-	-	-	-	-	2.103	***	***	***	**	-	-	-
DE	30-Mar-2009	0.431	-	-	-	-	-	.	.	0.005	-	-	-	-	-	.	.
DE	31-Mar-2009	0.222	-	-	-	-	-	.	.	0.653	*	**	-	-	-	.	.
US	25-Mar-2009	0.065	-	-	-	-	-	.	.	-0.402	***	***	**	-	-	.	.
US	26-Mar-2009	0.635	***	***	***	-	-	.	.	0.991	***	***	***	***	***	.	.
US	27-Mar-2009	-1.81	***	***	***	***	***	***	*	-0.351	***	***	**	-	-	-	-
US	30-Mar-2009	-0.406	**	***	-	-	-	.	.	-0.48	***	***	***	**	-	.	.
US	31-Mar-2009	1.319	***	***	***	***	-	.	.	-0.39	***	***	***	-	-	.	.
JP	25-Mar-2009	0.483	***	***	***	-	-	.	.	-0.408	***	**	-	-	-	.	.
JP	26-Mar-2009	-0.389	**	***	***	-	-	.	.	0.058	-	-	-	-	-	.	.
JP	27-Mar-2009	0.636	***	***	***	-	-	-	-	0.862	***	***	***	***	**	**	-
JP	30-Mar-2009	1.099	***	***	***	**	-	.	.	-0.688	***	***	***	***	**	.	.
JP	31-Mar-2009	-0.113	-	-	-	-	-	.	.	0.232	*	-	-	-	-	.	.

Significance levels are designated as *** p<0.01, ** p<0.05, and * p<0.1. Test statistics for cells marked "-" are not statistically significant at conventional levels while those marked "." were not computed. Average abnormal returns (AAR) are calculated as the daily average of firm-specific ARs obtained from estimation of the standard market model based on Japanese (JP), U.S. (US), and German (DE) market returns with $T = 250$ pre-event trading days leading up to 20 days before the May 9, 2008 event. Parametric test statistics are calculated without adjustment (1), following Patell (1976) to correct for serial autocorrelation (2), following Boehmer et al. (1991) to correct for serial autocorrelation and event-induced variance inflation (3), and following Kolari and Pynnönen (2010) to incorporate additional adjustments for event date cross-sectional correlation (4 and 5). (6) is based on Corrado and Zivney's (1992) non-parametric rank test, with Kolari and Pynnönen's (2010) comparable cross-sectional correction imposed in (7).

Table 5: Cumulative Abnormal Returns by Nationality and MNC Status

		Domestic-Only						**Multinational**					
Country	*Event Date*	*ACAR*	t	t_P	t_B	t_P^{Adj}	t_B^{Adj}	*ACAR*	t	t_P	t_B	t_P^{Adj}	t_B^{Adj}
			(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)
DE	8-May-2008	0.235	-	-	-	-	-	-0.385	-	*	-	-	-
DE	9-May-2008	0.539	-	*	-	-	-	-1.041	*	***	***	**	-
DE	12-May-2008	0.734	-	**	-	-	-	-0.672	-	***	-	-	-
US	8-May-2008	-0.127	-	-	-	-	-	0.268	-	***	***	**	-
US	9-May-2008	0.256	-	***	*	-	-	0.477	***	***	***	***	-
US	12-May-2008	0.445	-	***	***	**	-	0.678	***	***	***	***	**
JP	8-May-2008	1.461	***	***	***	***	***	0.249	-	***	*	-	-
JP	9-May-2008	1.826	***	***	***	***	***	0.143	-	-	-	-	-
JP	12-May-2008	1.743	***	***	***	***	**	0.133	-	-	-	-	-
DE	26-Jun-2008	-0.007	-	-	-	-	-	-1.141	*	***	***	**	-
DE	27-Jun-2008	-1.881	***	***	***	***	*	-3.89	***	***	***	***	**
DE	30-Jun-2008	-3.142	***	***	***	***	**	-4.701	***	***	***	***	**
US	26-Jun-2008	0.243	-	***	**	-	-	-0.192	-	***	***	**	-
US	27-Jun-2008	0.133	-	-	-	-	-	-0.309	*	***	***	***	-
US	30-Jun-2008	0.263	-	***	*	*	-	-0.409	**	***	*	***	-
JP	26-Jun-2008	-0.043	-	-	-	-	-	-0.332	-	***	***	**	-
JP	27-Jun-2008	-0.1	-	***	-	-	-	-0.264	-	***	-	-	-
JP	30-Jun-2008	0.243	-	***	***	***	-	-0.273	-	***	-	-	-
DE	15-Aug-2008	-0.639	-	***	***	**	-	-0.487	-	**	-	-	-
DE	18-Aug-2008	-1.613	**	***	***	***	*	-1.32	**	***	***	**	-
DE	19-Aug-2008	-1.159	*	***	***	***	-	-1.326	**	***	***	***	-
US	15-Aug-2008	-0.622	**	***	***	**	-	-0.252	-	**	-	-	-
US	18-Aug-2008	-0.33	-	-	-	-	-	-0.376	**	***	-	-	-
US	19-Aug-2008	-0.432	-	-	-	-	-	-0.409	**	***	*	**	-
JP	15-Aug-2008	-0.077	-	-	-	-	-	-0.02	-	-	-	-	-
JP	18-Aug-2008	-0.251	-	**	-	-	-	-0.105	-	-	-	-	-
JP	19-Aug-2008	-0.331	-	-	-	-	-	-0.102	-	-	-	-	-

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		Domestic-Only						Multinational					
Country	*Event Date*	$ACAR$	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	$ACAR$	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)
DE	30-Sep-2008	-1.852	**	***	***	***	**	1.417	**	***	**	**	-
DE	1-Oct-2008	-1.874	***	***	***	***	-	0.154	-	-	-	-	-
DE	2-Oct-2008	-3.336	***	***	***	***	**	-2.213	***	***	***	***	-
US	30-Sep-2008	-1.548	***	***	***	***	*	-0.64	***	***	***	***	*
US	1-Oct-2008	-2.044	***	***	***	***	*	-1.791	***	***	***	***	***
US	2-Oct-2008	-2.818	***	***	***	***	*	-3.308	***	***	***	***	***
JP	30-Sep-2008	0.201	-	***	*	-	-	0.19	-	**	-	-	-
JP	1-Oct-2008	-0.481	*	-	-	-	-	-0.473	**	***	**	***	-
JP	2-Oct-2008	-1.286	***	***	**	**	-	-1.24	***	***	***	***	*
DE	27-Nov-2008	-0.624	-	***	-	*	-	1.353	**	***	**	**	-
DE	28-Nov-2008	-2.007	***	***	***	***	*	-0.535	-	***	-	-	-
DE	1-Dec-2008	-1.646	**	***	***	***	-	0.735	-	-	-	-	-
US	26-Nov-2008	1.078	***	***	-	*	-	1.826	***	***	***	***	**
US	28-Nov-2008	0.856	***	***	-	-	-	1.717	***	***	***	***	**
US	1-Dec-2008	-2.555	***	***	***	***	-	0.976	***	***	**	***	-
JP	27-Nov-2008	-0.5	*	***	***	*	-	0.337	-	***	-	-	-
JP	28-Nov-2008	0.298	-	-	-	-	-	1.284	***	***	***	***	-
JP	1-Dec-2008	-0.446	*	***	***	***	-	0.723	***	***	-	**	-
DE	11-Dec-2008	1.821	***	***	***	***	*	1.243	**	***	***	**	-
DE	12-Dec-2008	2.287	***	***	***	***	-	3.154	***	***	***	***	-
DE	15-Dec-2008	3.24	***	***	***	***	-	4.621	***	***	***	***	**
US	11-Dec-2008	-2.922	***	***	***	***	*	-0.879	***	***	***	***	-
US	12-Dec-2008	-0.654	**	***	-	**	-	-0.069	-	-	-	-	-
US	15-Dec-2008	-1.479	***	***	***	***	-	-0.623	***	***	-	***	-
JP	11-Dec-2008	-0.096	-	-	-	-	-	-0.099	-	-	-	-	-
JP	12-Dec-2008	1.009	***	***	***	***	-	-1.515	***	***	***	***	***
JP	15-Dec-2008	0.714	***	***	***	***	-	-0.681	***	***	***	***	-

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		Domestic-Only						Multinational					
Country	*Event Date*	$ACAR$	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)	$ACAR$	t (1)	t_P (2)	t_B (3)	t_P^{Adj} (4)	t_B^{Adj} (5)
DE	18-Dec-2008	0.743	-	***	-	-	-	0.432	-	***	-	-	-
DE	19-Dec-2008	0.16	-	***	-	**	-	0.998	-	***	-	-	-
DE	22-Dec-2008	3.79	***	***	*	***	-	3.606	***	***	***	***	-
US	18-Dec-2008	-1.025	***	***	***	***	-	-0.84	***	***	***	***	-
US	19-Dec-2008	-0.096	-	-	-	-	-	-0.29	*	***	-	-	-
US	22-Dec-2008	-0.808	***	***	-	-	-	-1.243	***	***	***	***	-
JP	18-Dec-2008	-0.455	*	***	***	-	-	-0.452	**	***	***	***	-
JP	19-Dec-2008	-1.545	***	***	***	***	*	-0.706	***	***	***	***	-
JP	22-Dec-2008	-2.111	***	***	***	***	*	-0.55	**	***	*	***	-
DE	22-Jan-2009	0.228	-	***	-	-	-	0.614	-	***	-	-	-
DE	23-Jan-2009	0.611	-	***	-	**	-	0.158	-	-	-	-	-
DE	26-Jan-2009	0.948	-	***	**	***	-	-1.175	*	***	*	***	-
US	22-Jan-2009	-0.779	***	***	***	***	-	-0.327	*	***	-	-	-
US	23-Jan-2009	-0.064	-	**	-	-	-	0.156	-	**	-	-	-
US	26-Jan-2009	1.335	***	***	***	***	-	0.029	-	***	-	-	-
JP	22-Jan-2009	0.077	-	**	-	-	-	0.156	-	*	-	-	-
JP	23-Jan-2009	0.614	**	***	***	***	-	-0.361	-	***	*	***	-
JP	26-Jan-2009	0.619	**	***	***	***	-	-0.593	***	***	*	***	-
DE	26-Mar-2009	0.134	-	-	-	-	-	-0.437	-	***	-	-	-
DE	27-Mar-2009	0.323	-	***	-	-	-	1.666	***	***	*	***	-
DE	30-Mar-2009	0.754	-	**	-	-	-	1.671	***	***	-	**	-
US	26-Mar-2009	0.635	**	***	***	**	-	0.991	***	***	***	***	***
US	27-Mar-2009	-1.176	***	***	***	***	-	0.639	***	***	***	***	-
US	30-Mar-2009	-1.582	***	***	***	***	-	0.159	-	***	-	**	-
JP	26-Mar-2009	-0.389	-	***	***	**	-	0.058	-	-	-	-	-
JP	27-Mar-2009	0.247	-	-	-	-	-	0.92	***	***	***	***	*
JP	30-Mar-2009	1.346	***	***	***	***	-	0.232	-	*	-	-	-

Significance levels are designated as *** p<0.01, ** p<0.05, and * p<0.1. Test statistics for cells marked "-" are not statistically significant at conventional levels while those marked "." were not computed. Average abnormal returns (AAR) are calculated as the daily average of firm-specific ARs obtained from estimation of the standard market model based on Japanese (JP), U.S. (US), and German (DE) market returns with $T = 250$ pre-event trading days leading up to 20 days before the May 9, 2008 event. Parametric test statistics are calculated without adjustment (1), following Patell (1976) to correct for serial autocorrelation (2), following Boehmer et al. (1991) to correct for serial autocorrelation and event-induced variance inflation (3), and following Kolari and Pynnönen (2010) to incorporate additional adjustments for event date cross-sectional correlation (4 and 5). (6) is based on Corrado and Zivney's (1992) non-parametric rank test, with Kolari and Pynnönen's (2010) comparable cross-sectional correction imposed in (7).

Table 6: Day-Three ACAR Effects by Nationality, MNC Status, and Tax Haven Presence

	Event Date								
	5/9/08	6/27/08	8/18/08	10/1/08	11/28/08[a]	12/12/08	12/19/08	1/23/09	3/27/09
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I[ctry = DE] \times I[MNC = 0]$	0.754	-3.151***	-1.151*	-3.343***	-1.632*	3.271***	3.802***	0.938	0.756
	(0.616)	(0.692)	(0.605)	(0.835)	(0.906)	(1.174)	(1.275)	(0.861)	(0.853)
$I[ctry = DE] \times I[MNC = 1]$	-3.368**	-4.657**	-2.212*	2.386	1.148	4.268	6.566***	0.001	2.334*
	(1.449)	(2.363)	(1.296)	(1.648)	(0.983)	(2.975)	(1.109)	(1.841)	(1.320)
$I[ctry = DE] \times I[MNC = 1] \times I\_Haven$	3.051**	0.031	1.012	-5.254***	-0.453	0.414	-3.223**	-1.473	-0.757
	(1.498)	(2.431)	(1.398)	(1.820)	(1.266)	(3.077)	(1.503)	(2.054)	(1.593)
$I[ctry = US] \times I[MNC = 0]$	0.445*	0.260	-0.424	-2.815***	3.201***	-1.447***	-0.765	1.320***	-1.594***
	(0.230)	(0.310)	(0.260)	(0.417)	(0.422)	(0.429)	(0.572)	(0.366)	(0.387)
$I[ctry = US] \times I[MNC = 1]$	-0.222	0.661	0.424	-4.240***	1.371**	-2.072***	-1.818**	1.664***	-0.188
	(0.439)	(0.603)	(0.368)	(0.689)	(0.568)	(0.577)	(0.858)	(0.548)	(0.806)
$I[ctry = US] \times I[MNC = 1] \times I\_Haven$	1.022**	-1.191*	-0.942**	1.106	-0.870	1.638**	0.662	-1.848***	0.401
	(0.460)	(0.635)	(0.403)	(0.759)	(0.601)	(0.636)	(0.898)	(0.605)	(0.850)
$I[ctry = JP] \times I[MNC = 0]$	1.982***	0.309	-0.388*	-0.637**	-0.425	-0.073	-2.216***	0.194	1.373***
	(0.224)	(0.202)	(0.228)	(0.301)	(0.268)	(0.314)	(0.284)	(0.293)	(0.313)
$I[ctry = JP] \times I[MNC = 1]$	0.512**	-0.178	-0.002	-0.632	-0.503	-0.668	-0.545	-0.075	-0.289
	(0.239)	(0.372)	(0.274)	(0.501)	(0.528)	(0.499)	(0.460)	(0.400)	(0.275)
$I[ctry = JP] \times I[MNC = 1] \times I\_Haven$	-0.485	-0.126	-0.281	-0.563	1.884***	-0.367	-0.184	-0.985*	0.587
	(0.393)	(0.444)	(0.333)	(0.628)	(0.718)	(0.648)	(0.631)	(0.521)	(0.387)
Average Marginal Effects									
$\frac{\partial r}{\partial D3} \mid MNC = 1, ctry = DE$	-0.690*	-4.630***	-1.324***	-2.225***	0.750	4.631***	3.737***	-1.292	1.669**
	(0.378)	(0.579)	(0.488)	(0.708)	(0.710)	(0.779)	(0.901)	(0.830)	(0.799)
$\frac{\partial r}{\partial D3} \mid MNC = 1, ctry = US$	0.682***	-0.393**	-0.408***	-3.262***	0.602***	-0.623**	-1.232***	0.030	0.167
	(0.133)	(0.191)	(0.151)	(0.292)	(0.185)	(0.246)	(0.254)	(0.236)	(0.257)
$\frac{\partial r}{\partial D3} \mid MNC = 1, ctry = JP$	0.227	-0.252	-0.167	-0.963***	0.604*	-0.883***	-0.653**	-0.653**	0.056
	(0.208)	(0.209)	(0.158)	(0.303)	(0.360)	(0.319)	(0.317)	(0.256)	(0.196)
Observations	314,244	314,244	314,244	314,244	314,244	314,244	314,244	314,244	314,244

Significance levels are designated as *** p<0.01, ** p<0.05, and * p<0.1, with standard errors clustered by firm. All panel regressions include firm-specific intercepts and German (DE), U.S. (US), and Japanese (JP) market co-movement slope parameters (not shown), plus a full set of day one through three event window interaction terms, $D1$-$D3$, as defined in Section 3. Only day-three interaction effects are shown. $I[MNC]$ and I_Haven represent binary indicators of multinational and tax haven activity, respectively.

[a] Day-three CAR effects are unavailable for the U.S. for the November 28, 2008 event on account of November 27 being a U.S. holiday. Day-two CARs are reported instead.

Table 7: Day-Three ACAR Effects by Nationality, MNC Status, and Tax Savings

	5/9/08		6/27/08		8/18/08		10/1/08		11/28/08[a]	
	(1)		*(2)*		*(3)*		*(4)*		*(5)*	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
$I[ctry = DE] \times I[MNC = 0]$	0.754	(0.616)	-3.151***	(0.692)	-1.151*	(0.605)	-3.343***	(0.835)	-1.632*	(0.906)
$I[ctry = DE] \times I[MNC = 1]$	-0.478	(0.507)	-5.065***	(0.737)	-1.612**	(0.631)	-1.708**	(0.869)	0.587	(0.908)
$I[ctry = DE] \times I[MNC = 1] \times TS$	-1.468	(1.181)	3.015	(2.300)	1.997	(2.664)	-3.584	(3.307)	1.131	(3.044)
$I[ctry = US] \times I[MNC = 0]$	0.445*	(0.230)	0.260	(0.310)	-0.424	(0.260)	-2.815***	(0.417)	3.201***	(0.422)
$I[ctry = US] \times I[MNC = 1]$	0.652***	(0.172)	-0.505**	(0.256)	-0.316	(0.197)	-2.999***	(0.396)	0.844***	(0.286)
$I[ctry = US] \times I[MNC = 1] \times TS$	0.158	(0.645)	0.605	(0.975)	-0.496	(0.742)	-1.416	(1.503)	-1.308	(0.868)
$I[ctry = JP] \times I[MNC = 0]$	1.982***	(0.224)	0.309	(0.202)	-0.388*	(0.228)	-0.637**	(0.301)	-0.425	(0.268)
$I[ctry = JP] \times I[MNC = 1]$	0.110	(0.325)	-1.146***	(0.320)	-0.449*	(0.271)	-1.775***	(0.459)	0.125	(0.578)
$I[ctry = JP] \times I[MNC = 1] \times TS$	0.537	(1.017)	4.112***	(1.222)	1.299	(0.957)	3.733**	(1.661)	2.201	(2.126)
Average Marginal Effects										
$\partial r/D3 \mid MNC = 1, ctry = DE$	-0.690*	(0.402)	-0.394	(0.362)	-1.324***	(0.486)	-2.225***	(0.743)	0.750	(0.710)
$\partial r/\partial D3 \mid MNC = 1, ctry = US$	0.682***	(0.134)	0.271***	(0.092)	-0.408***	(0.152)	-3.262***	(0.292)	0.602***	(0.186)
$\partial r/\partial D3 \mid MNC = 1, ctry = JP$	0.227	(0.208)	0.342***	(0.117)	-0.167	(0.158)	-0.963***	(0.301)	0.604*	(0.364)
Observations	314,244		314,244		314,244		314,244		314,244	
R Squared	0.283		0.284		0.283		0.292		0.308	

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Significance levels are designated as *** p<0.01, ** p<0.05, and * p<0.1, with standard errors clustered by firm. All panel regressions include firm-specific intercepts and German (DE), U.S. (US), and Japanese (JP) market co-movement slope parameters (not shown), plus a full set of day one through three event window interaction terms, $D1$-$D3$, as defined in Section 3. Only day-three interaction effects are shown. $I[MNC]$ and I_Haven represent binary indicators of multinational and tax haven activity, respectively.

[a] Day-three CAR effects are unavailable for the U.S. for the November 28, 2008 event on account of November 27 being a U.S. holiday. Day-two CARs are reported instead.

Table 7: Day-Three ACAR Effects by Nationality, MNC Status, and Tax Savings

	12/12/08		12/19/08		1/23/09		3/27/09	
	(6)		*(7)*		*(8)*		*(9)*	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
$I[ctry = DE] \times I[MNC = 0]$	3.271***	(1.174)	3.802***	(1.275)	0.938	(0.861)	0.756	(0.853)
$I[ctry = DE] \times I[MNC = 1]$	4.504***	(1.027)	3.825***	(1.080)	-1.099	(0.924)	1.964*	(1.058)
$I[ctry = DE] \times I[MNC = 1] \times TS$	0.878	(2.682)	-0.607	(3.844)	-1.337	(4.011)	-2.043	(3.011)
$I[ctry = US] \times I[MNC = 0]$	-0.625*	(0.365)	-0.765	(0.572)	1.320***	(0.366)	-1.594***	(0.387)
$I[ctry = US] \times I[MNC = 1]$	-0.066	(0.295)	-1.240***	(0.341)	-0.369	(0.322)	-0.209	(0.379)
$I[ctry = US] \times I[MNC = 1] \times TS$	-0.026	(1.028)	0.042	(1.249)	2.154*	(1.140)	2.026	(1.276)
$I[ctry = JP] \times I[MNC = 0]$	-0.073	(0.314)	-2.216***	(0.284)	0.194	(0.293)	1.373***	(0.313)
$I[ctry = JP] \times I[MNC = 1]$	-1.274***	(0.487)	-0.980**	(0.486)	-1.208***	(0.396)	0.255	(0.307)
$I[ctry = JP] \times I[MNC = 1] \times TS$	1.798	(1.602)	1.507	(1.864)	2.553*	(1.438)	-0.915	(1.056)
Average Marginal Effects								
$\partial r/D3 \mid MNC = 1, ctry = DE$	4.631***	(0.778)	3.737***	(0.914)	-1.292	(0.832)	1.669**	(0.798)
$\partial r/\partial D3 \mid MNC = 1, ctry = US$	-0.623**	(0.247)	-1.232***	(0.255)	0.030	(0.237)	0.167	(0.256)
$\partial r/\partial D3 \mid MNC = 1, ctry = JP$	-0.883***	(0.318)	-0.653**	(0.316)	-0.653**	(0.256)	0.056	(0.197)
Observations	314,244		314,244		314,244		314,244	
R Squared	0.292		0.283		0.283		0.291	

Significance levels are designated as *** p<0.01, ** p<0.05, and * p<0.1, with standard errors clustered by firm. All panel regressions include firm-specific intercepts and German (DE), U.S. (US), and Japanese (JP) market co-movement slope parameters (not shown), plus a full set of day one through three event window interaction terms, $D1$-$D3$, as defined in Section 3. Only day-three interaction effects are shown. $I[MNC]$ and I_Haven represent binary indicators of multinational and tax haven activity, respectively.

Table 8: Day-Three ACAR Effects by Nationality, MNC Status, Tax Savings, and Deferred Tax Liabilities

	5/9/08 *(1)*		6/27/08 *(2)*		8/18/08 *(3)*		10/1/08 *(4)*		11/28/08[a] *(5)*	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
$I[ctry = DE] \times I[MNC = 0]$	1.330	(0.852)	-5.030***	(1.084)	-0.928	(0.793)	-1.337	(1.165)	-0.925	(1.497)
$I[ctry = DE] \times I[MNC = 1]$	-1.334	(1.016)	-10.381***	(2.334)	2.654	(2.659)	-0.736	(1.717)	0.228	(2.152)
$I[ctry = DE] \times I[MNC = 1] \times TS$	-5.926	(4.990)	-7.766	(11.796)	-16.025	(11.575)	15.203*	(7.899)	61.001***	(10.361)
$I[ctry = DE] \times I[MNC = 0] \times DTL$	-1.558	(1.842)	8.554***	(2.956)	-1.807	(1.765)	-10.306***	(3.238)	-2.708	(4.098)
$I[ctry = DE] \times I[MNC = 1] \times DTL$	8.299	(5.240)	39.461***	(14.001)	-26.326*	(15.059)	-9.222	(9.176)	0.804	(12.996)
$I[ctry = DE] \times I[MNC = 1] \times TS \times DTL$	24.517	(30.547)	61.438	(75.746)	111.623	(72.389)	-107.978**	(50.423)	-385.707***	(64.155)
$I[ctry = US] \times I[MNC = 0]$	0.144	(0.983)	-1.193	(1.136)	-1.248**	(0.553)	-4.699***	(1.101)	0.509	(1.045)
$I[ctry = US] \times I[MNC = 1]$	1.000**	(0.507)	-2.396***	(0.688)	-0.822	(0.636)	-3.532***	(1.068)	0.564	(0.720)
$I[ctry = US] \times I[MNC = 1] \times TS$	-0.282	(2.681)	5.369*	(3.057)	-2.227	(2.459)	3.603	(4.818)	-1.472	(2.437)
$I[ctry = US] \times I[MNC = 0] \times DTL$	0.525	(1.046)	2.381*	(1.274)	1.571**	(0.761)	1.766	(1.334)	0.994	(1.155)
$I[ctry = US] \times I[MNC = 1] \times DTL$	-0.422	(0.584)	2.634***	(0.864)	0.788	(0.732)	0.620	(1.326)	0.453	(0.892)
$I[ctry = US] \times I[MNC = 1] \times TS \times DTL$	0.390	(3.003)	-5.832	(3.840)	1.943	(2.919)	-5.876	(5.770)	0.951	(3.006)
$I[ctry = JP] \times I[MNC = 0]$	2.091***	(0.398)	0.851***	(0.288)	-0.392	(0.332)	-0.537	(0.440)	-0.139	(0.410)
$I[ctry = JP] \times I[MNC = 1]$	-0.485	(1.411)	0.492	(1.184)	-0.165	(0.787)	-0.118	(1.776)	0.125	(1.750)
$I[ctry = JP] \times I[MNC = 1] \times TS$	3.413	(4.653)	-6.023	(4.751)	-0.967	(3.016)	-1.093	(7.055)	1.730	(6.100)
$I[ctry = JP] \times I[MNC = 0] \times DTL$	-1.385	(3.943)	-4.943*	(2.576)	1.541	(1.799)	-1.111	(2.630)	-5.895*	(3.504)
$I[ctry = JP] \times I[MNC = 1] \times DTL$	9.474	(20.666)	-24.678	(18.064)	-3.044	(12.308)	-28.996	(26.400)	2.319	(27.675)
$I[ctry = JP] \times I[MNC = 1] \times TS \times DTL$	-42.988	(69.098)	154.428**	(71.842)	33.217	(45.371)	74.607	(104.505)	19.399	(98.458)
Average Marginal Effects										
$\partial r/\partial D3 \mid MNC = 1, ctry = DE$	-0.425	(0.355)	-4.271***	(0.444)	-1.200**	(0.479)	-2.245***	(0.690)	0.870	(0.698)
$\partial r/\partial D3 \mid MNC = 1, ctry = US$	0.684***	(0.154)	-0.252	(0.212)	-0.350**	(0.174)	-3.248***	(0.340)	0.777***	(0.203)
$\partial r/\partial D3 \mid MNC = 1, ctry = JP$	0.254	(0.232)	-0.210	(0.217)	-0.102	(0.166)	-1.130***	(0.305)	0.922**	(0.401)
$\partial r/\partial TS \mid MNC = 1, ctry = DE$	-2.256**	(1.016)	1.432	(2.088)	0.686	(2.750)	-0.962	(3.049)	3.257	(3.021)
$\partial r/\partial TS \mid MNC = 1, ctry = US$	0.015	(0.877)	0.934	(1.340)	-0.750	(0.960)	-0.865	(1.923)	0.005	(0.005)
$\partial r/\partial TS \mid MNC = 1, ctry = JP$	0.717	(1.092)	3.663***	(1.282)	1.116	(1.015)	3.586**	(1.656)	2.947	(2.274)
$\partial r/\partial DTL \mid MNC = 1, ctry = DE$	11.887**	(4.752)	48.451***	(9.965)	-9.991	(8.413)	-25.023***	(9.510)	-55.641***	(9.539)
$\partial r/\partial DTL \mid MNC = 1, ctry = US$	-0.351	(0.499)	1.573**	(0.654)	1.141**	(0.516)	-0.449	(0.931)	-0.001	(0.003)
$\partial r/\partial DTL \mid MNC = 1, ctry = JP$	0.046	(7.250)	9.188	(6.982)	4.241	(6.941)	-12.635	(9.621)	6.573	(12.272)
$\partial r/\partial D3 \mid MNC = 0, ctry = DE$	1.079***	(0.296)	-3.657***	(0.475)	-1.218***	(0.283)	-2.992***	(0.520)	-1.360**	(0.658)
$\partial r/\partial D3 \mid MNC = 0, ctry = US$	0.545**	(0.276)	0.631	(0.396)	-0.044	(0.347)	-3.346***	(0.567)	1.270***	(0.378)
$\partial r/\partial D3 \mid MNC = 0, ctry = JP$	2.007***	(0.291)	0.553**	(0.228)	-0.299	(0.288)	-0.604	(0.374)	-0.494	(0.337)
$\partial r/\partial DTL \mid MNC = 0, ctry = DE$	-1.558	(1.842)	8.554***	(2.956)	-1.807	(1.765)	-10.306***	(3.238)	-2.708	(4.098)
$\partial r/\partial DTL \mid MNC = 0, ctry = US$	0.525	(1.046)	2.381*	(1.274)	1.571**	(0.761)	1.766	(1.334)	-0.003	(0.004)
$\partial r/\partial DTL \mid MNC = 0, ctry = JP$	-1.385	(3.943)	-4.943*	(2.576)	1.541	(1.799)	-1.111	(2.630)	-5.895*	(3.504)
Observations	233,604		233,604		233,604		233,604		233,604	
R Squared	0.287		0.288		0.287		0.295		0.309	

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Table 8: Day-Three ACAR Effects by Nationality, MNC Status, Tax Savings, and Deferred Tax Liabilities

	12/12/08		12/19/08		1/23/09		3/27/09	
	(6)		*(7)*		*(8)*		*(9)*	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
$I[ctry = DE] \times I[MNC = 0]$	2.923	(2.049)	6.250***	(1.983)	-1.528	(1.361)	2.476**	(1.235)
$I[ctry = DE] \times I[MNC = 1]$	7.487	(4.949)	10.360**	(4.397)	-0.032	(4.947)	8.233***	(2.971)
$I[ctry = DE] \times I[MNC = 1] \times TS$	-17.838	(28.220)	19.897	(29.395)	9.192	(22.052)	-35.056**	(15.930)
$I[ctry = DE] \times I[MNC = 0] \times DTL$	3.487	(5.217)	-8.391	(7.813)	14.702***	(4.860)	-7.444**	(3.466)
$I[ctry = DE] \times I[MNC = 1] \times DTL$	-19.368	(31.936)	-45.670*	(26.862)	-4.994	(30.626)	-41.708**	(16.173)
$I[ctry = DE] \times I[MNC = 1] \times TS \times DTL$	125.165	(181.400)	-128.803	(188.580)	-61.266	(143.356)	216.955**	(97.356)
$I[ctry = US] \times I[MNC = 0]$	-2.097**	(0.996)	-0.755	(1.801)	0.778	(0.892)	1.026	(1.237)
$I[ctry = US] \times I[MNC = 1]$	1.344**	(0.684)	-2.131**	(0.828)	0.040	(0.647)	1.157	(0.808)
$I[ctry = US] \times I[MNC = 1] \times TS$	-1.361	(2.920)	1.158	(3.498)	0.828	(2.330)	2.701	(2.440)
$I[ctry = US] \times I[MNC = 0] \times DTL$	2.179**	(1.044)	0.440	(2.049)	-0.902	(1.062)	-2.463*	(1.353)
$I[ctry = US] \times I[MNC = 1] \times DTL$	-2.113**	(0.883)	1.778	(1.084)	-0.415	(0.829)	-1.460	(1.001)
$I[ctry = US] \times I[MNC = 1] \times TS \times DTL$	3.219	(3.601)	-3.671	(4.418)	0.870	(3.112)	-3.704	(3.091)
$I[ctry = JP] \times I[MNC = 0]$	0.218	(0.434)	-2.411***	(0.417)	-0.223	(0.424)	1.228**	(0.504)
$I[ctry = JP] \times I[MNC = 1]$	-3.896***	(1.291)	1.762	(1.245)	-0.652	(1.475)	-0.570	(0.744)
$I[ctry = JP] \times I[MNC = 1] \times TS$	9.800*	(5.509)	-9.684*	(4.963)	-3.265	(5.797)	1.797	(3.905)
$I[ctry = JP] \times I[MNC = 0] \times DTL$	0.393	(3.393)	2.372	(3.177)	5.761**	(2.692)	-3.637	(3.599)
$I[ctry = JP] \times I[MNC = 1] \times DTL$	46.143**	(20.614)	-47.069**	(19.412)	-7.847	(22.472)	13.160	(12.016)
$I[ctry = JP] \times I[MNC = 1] \times TS \times DTL$	-128.923	(86.774)	178.107**	(75.587)	86.219	(87.844)	-45.053	(58.953)
Average Marginal Effects								
$\partial r/\partial D3 \vert MNC = 1, ctry = DE$	4.705***	(0.810)	3.628***	(0.888)	-0.770	(0.789)	1.587**	(0.802)
$\partial r/\partial D3 \vert MNC = 1, ctry = US$	-0.585**	(0.273)	-1.095***	(0.292)	-0.082	(0.268)	0.006	(0.272)
$\partial r/\partial D3 \vert MNC = 1, ctry = JP$	-0.662*	(0.353)	-0.816**	(0.337)	-0.651**	(0.277)	0.018	(0.216)
$\partial r/\partial TS \vert MNC = 1, ctry = DE$	0.901	(2.923)	0.614	(3.834)	0.020	(3.454)	-2.576	(3.084)
$\partial r/\partial TS \vert MNC = 1, ctry = US$	1.522	(1.546)	-1.633	(1.594)	3.442**	(1.502)	-0.116	(1.277)
$\partial r/\partial TS \vert MNC = 1, ctry = JP$	1.714	(1.745)	1.486	(2.005)	2.142	(1.556)	-1.029	(1.150)
$\partial r/\partial DTL \vert MNC = 1, ctry = DE$	-1.051	(21.465)	-64.519**	(26.286)	-13.960	(21.233)	-9.959	(8.373)
$\partial r/\partial DTL \vert MNC = 1, ctry = US$	-0.719	(0.713)	1.110	(0.770)	-0.376	(0.704)	-2.134***	(0.684)
$\partial r/\partial DTL \vert MNC = 1, ctry = JP$	17.869*	(10.341)	-8.010	(10.356)	11.061	(8.919)	3.280	(6.276)
$\partial r/\partial D3 \vert MNC = 0, ctry = DE$	3.483***	(0.838)	4.903***	(1.254)	0.833	(0.780)	1.281**	(0.557)
$\partial r/\partial D3 \vert MNC = 0, ctry = US$	-1.166**	(0.478)	-0.419	(0.736)	1.832***	(0.484)	-0.859*	(0.440)
$\partial r/\partial D3 \vert MNC = 0, ctry = JP$	0.242	(0.369)	-2.268***	(0.332)	0.124	(0.352)	1.009**	(0.398)
$\partial r/\partial DTL \vert MNC = 0, ctry = DE$	3.487	(5.217)	-8.391	(7.813)	14.702***	(4.860)	-7.444**	(3.466)
$\partial r/\partial DTL \vert MNC = 0, ctry = US$	2.113	(1.310)	0.440	(2.049)	-0.150	(1.196)	-2.463*	(1.353)
$\partial r/\partial DTL \vert MNC = 0, ctry = JP$	0.393	(3.393)	2.372	(3.177)	5.761**	(2.692)	-3.637	(3.599)
Observations	233,604		233,604		233,604		233,604	
R Squared	0.294		0.286		0.287		0.294	

See Table 7 footnotes.

Table 9: Day-Three ACAR Effects by Nationality, MNC Status, Tax Savings, and Intangible Intensity

	5/9/08		6/27/08		8/18/08		10/1/08		11/28/08[a]	
	(1)		*(2)*		*(3)*		*(4)*		*(5)*	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
$I[ctry = DE] \times I[MNC = 0]$	0.151	(1.048)	-2.608**	(1.241)	-1.740	(1.074)	-3.116*	(1.718)	-1.355	(1.605)
$I[ctry = DE] \times I[MNC = 1]$	-0.613	(0.884)	-5.909***	(1.402)	-0.370	(1.276)	-2.309	(1.512)	0.419	(1.806)
$I[ctry = DE] \times I[MNC = 1] \times TS$	5.587	(8.112)	27.221**	(11.130)	0.377	(9.459)	-1.374	(10.914)	-20.855*	(12.225)
$I[ctry = DE] \times I[MNC = 0] \times INT\_INT$	4.462	(6.647)	-4.012	(7.381)	4.358	(6.973)	-1.673	(10.030)	-2.053	(10.697)
$I[ctry = DE] \times I[MNC = 1] \times INT\_INT$	1.000	(4.091)	5.652	(6.937)	-7.241	(5.492)	3.551	(7.767)	0.273	(8.950)
$I[ctry = DE] \times I[MNC = 1] \times TS \times INT\_INT$	-55.703	(61.663)	-189.492**	(86.270)	7.578	(64.593)	-15.037	(91.413)	176.135*	(90.104)
$I[ctry = US] \times I[MNC = 0]$	0.410	(0.317)	2.007***	(0.497)	0.408	(0.451)	-2.985***	(0.693)	3.868***	(0.567)
$I[ctry = US] \times I[MNC = 1]$	0.341	(0.597)	2.852***	(0.672)	-0.265	(0.690)	-5.893***	(1.208)	3.782***	(0.908)
$I[ctry = US] \times I[MNC = 1] \times TS$	2.386	(2.457)	-0.210	(2.819)	3.327	(2.542)	1.519	(4.655)	-5.194*	(2.947)
$I[ctry = US] \times I[MNC = 0] \times INT\_INT$	0.132	(1.105)	-6.735***	(1.500)	-3.208**	(1.272)	0.652	(2.188)	-2.572	(1.735)
$I[ctry = US] \times I[MNC = 1] \times INT\_INT$	0.642	(1.122)	-7.066***	(1.319)	-0.131	(1.286)	6.078***	(2.327)	-6.166***	(1.667)
$I[ctry = US] \times I[MNC = 1] \times TS \times INT\_INT$	-4.735	(4.650)	1.063	(5.483)	-8.245*	(4.722)	-5.728	(9.036)	7.764	(5.418)
$I[ctry = JP] \times I[MNC = 0]$	2.497***	(0.672)	0.245	(0.605)	-1.528**	(0.715)	-0.802	(0.855)	-1.444**	(0.617)
$I[ctry = JP] \times I[MNC = 1]$	0.060	(1.010)	1.858	(1.498)	0.645	(1.157)	0.314	(2.197)	2.802	(2.410)
$I[ctry = JP] \times I[MNC = 1] \times TS$	0.163	(2.701)	1.572	(3.858)	-0.634	(2.777)	3.169	(6.156)	-0.949	(6.749)
$I[ctry = JP] \times I[MNC = 0] \times INT\_INT$	-1.527	(1.743)	0.190	(1.552)	3.380*	(1.806)	0.489	(2.234)	3.022*	(1.656)
$I[ctry = JP] \times I[MNC = 1] \times INT\_INT$	0.114	(2.413)	-7.483*	(3.904)	-2.751	(3.097)	-5.171	(5.557)	-6.691	(5.815)
$I[ctry = JP] \times I[MNC = 1] \times TS \times INT\_INT$	1.123	(6.758)	4.813	(10.301)	4.665	(7.679)	-0.128	(15.703)	6.850	(16.384)
Average Marginal Effects										
$\partial r/\partial D3 \vert MNC = 1, ctry = DE$	-0.690*	(0.399)	-4.630***	(0.551)	-1.324***	(0.480)	-2.225***	(0.742)	0.750	(0.692)
$\partial r/\partial D3 \vert MNC = 1, ctry = US$	0.682***	(0.133)	-0.393**	(0.180)	-0.408***	(0.150)	-3.262***	(0.288)	0.602***	(0.180)
$\partial r/\partial D3 \vert MNC = 1, ctry = JP$	0.227	(0.208)	-0.252	(0.197)	-0.167	(0.157)	-0.963***	(0.298)	0.604*	(0.362)
$\partial r/\partial TS \vert MNC = 1, ctry = DE$	-3.260	(2.234)	-2.874	(3.397)	1.580	(2.915)	-3.762	(5.128)	7.119*	(3.839)
$\partial r/\partial TS \vert MNC = 1, ctry = US$	0.178	(0.650)	0.286	(0.935)	-0.519	(0.789)	-1.152	(1.502)	0.011***	(0.004)
$\partial r/\partial TS \vert MNC = 1, ctry = JP$	0.588	(1.035)	3.393***	(1.195)	1.131	(0.974)	3.121*	(1.670)	1.643	(2.165)
$\partial r/\partial INT\_INT \vert MNC = 1, ctry = DE$	-7.042	(8.324)	-21.705*	(12.167)	-6.147	(8.390)	1.381	(10.532)	25.702**	(10.504)
$\partial r/\partial INT\_INT \vert MNC = 1, ctry = US$	-0.237	(0.836)	-6.869***	(0.920)	-1.661**	(0.825)	5.015***	(1.542)	0.028***	(0.005)
$\partial r/\partial INT\_INT \vert MNC = 1, ctry = JP$	0.358	(1.395)	-6.436***	(2.000)	-1.737	(1.728)	-5.199*	(2.945)	-5.201*	(3.154)
$\partial r/\partial D3 \vert MNC = 0, ctry = DE$	0.754	(0.899)	-3.151***	(0.998)	-1.151	(0.943)	-3.343**	(1.356)	-1.632	(1.446)
$\partial r/\partial D3 \vert MNC = 0, ctry = US$	0.445*	(0.230)	0.260	(0.293)	-0.424*	(0.255)	-2.815***	(0.417)	3.201***	(0.420)
$\partial r/\partial D3 \vert MNC = 0, ctry = JP$	1.982***	(0.223)	0.309	(0.202)	-0.388*	(0.226)	-0.637**	(0.301)	-0.425	(0.266)
$\partial r/\partial INT\_INT \vert MNC = 0, ctry = DE$	4.462	(6.647)	-4.012	(7.381)	4.358	(6.973)	-1.673	(10.030)	-2.053	(10.697)
$\partial r/\partial INT\_INT \vert MNC = 0, ctry = US$	0.132	(1.105)	-6.735***	(1.500)	-3.208**	(1.272)	0.652	(2.188)	0.008	(0.007)
$\partial r/\partial INT\_INT \vert MNC = 0, ctry = JP$	-1.527	(1.743)	0.190	(1.552)	3.380*	(1.806)	0.489	(2.234)	3.022*	(1.656)
Observations	314,244		314,244		314,244		314,244		314,244	
R Squared	0.283		0.284		0.283		0.292		0.308	

Continued on next page

Table 9: Day-Three ACAR Effects by Nationality, MNC Status, Tax Savings, and Intangible Intensity

	12/12/08		12/19/08		1/23/09		3/27/09	
	(6)		*(7)*		*(8)*		*(9)*	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
$I[ctry = DE] \times I[MNC = 0]$	4.867**	(2.112)	5.058*	(2.912)	2.239	(1.498)	-0.834	(1.187)
$I[ctry = DE] \times I[MNC = 1]$	10.046***	(2.380)	8.406***	(1.935)	-3.123***	(1.191)	1.345	(2.176)
$I[ctry = DE] \times I[MNC = 1] \times TS$	-4.026	(14.115)	-59.636***	(15.491)	3.939	(19.149)	-30.254**	(14.329)
$I[ctry = DE] \times I[MNC = 0] \times INT\_INT$	-11.808	(11.325)	-9.288	(15.075)	-9.627	(8.064)	11.763	(7.585)
$I[ctry = DE] \times I[MNC = 1] \times INT\_INT$	-32.234**	(13.384)	-28.389***	(9.654)	11.887*	(6.606)	2.692	(10.759)
$I[ctry = DE] \times I[MNC = 1] \times TS \times INT\_INT$	15.259	(107.150)	451.219***	(114.646)	-33.374	(156.884)	227.740**	(105.171)
$I[ctry = US] \times I[MNC = 0]$	-0.820	(0.600)	-1.405*	(0.801)	2.427***	(0.504)	-2.458***	(0.507)
$I[ctry = US] \times I[MNC = 1]$	-1.578*	(0.858)	-1.730	(1.177)	0.440	(0.935)	-3.698***	(1.180)
$I[ctry = US] \times I[MNC = 1] \times TS$	1.648	(2.936)	-3.277	(4.408)	5.182	(3.991)	3.560	(3.495)
$I[ctry = US] \times I[MNC = 0] \times INT\_INT$	-2.419	(1.852)	2.465	(2.876)	-4.267***	(1.541)	3.328*	(1.826)
$I[ctry = US] \times I[MNC = 1] \times INT\_INT$	1.899	(1.676)	1.050	(2.262)	-1.722	(1.788)	7.339***	(2.136)
$I[ctry = US] \times I[MNC = 1] \times TS \times INT\_INT$	-2.792	(5.974)	7.248	(8.373)	-6.690	(7.478)	-2.586	(6.724)
$I[ctry = JP] \times I[MNC = 0]$	0.591	(0.770)	-3.163***	(0.844)	-0.275	(0.848)	1.520	(0.932)
$I[ctry = JP] \times I[MNC = 1]$	0.901	(1.905)	-2.136	(1.761)	2.519	(1.709)	-3.256**	(1.361)
$I[ctry = JP] \times I[MNC = 1] \times TS$	-7.142	(5.434)	-1.279	(5.145)	-2.807	(4.339)	5.599	(3.640)
$I[ctry = JP] \times I[MNC = 0] \times INT\_INT$	-1.968	(2.112)	2.808	(2.202)	1.390	(2.220)	-0.434	(2.325)
$I[ctry = JP] \times I[MNC = 1] \times INT\_INT$	-5.603	(4.695)	2.779	(4.524)	-9.339**	(4.514)	8.836***	(3.360)
$I[ctry = JP] \times I[MNC = 1] \times TS \times INT\_INT$	24.001*	(12.827)	9.020	(14.042)	12.351	(11.950)	-15.868*	(9.301)
Average Marginal Effects								
$\partial r/\partial D3 \| MNC = 1, ctry = DE$	4.631***	(0.687)	3.737***	(0.825)	-1.292	(0.822)	1.669**	(0.767)
$\partial r/\partial D3 \| MNC = 1, ctry = US$	-0.623**	(0.247)	-1.232***	(0.253)	0.030	(0.235)	0.167	(0.248)
$\partial r/\partial D3 \| MNC = 1, ctry = JP$	-0.883***	(0.316)	-0.653**	(0.313)	-0.653***	(0.251)	0.056	(0.193)
$\partial r/\partial TS \| MNC = 1, ctry = DE$	-1.603	(4.158)	12.027***	(4.617)	-1.361	(7.141)	5.916	(3.898)
$\partial r/\partial TS \| MNC = 1, ctry = US$	0.346	(1.218)	0.104	(1.238)	2.062*	(1.117)	2.354*	(1.223)
$\partial r/\partial TS \| MNC = 1, ctry = JP$	1.938	(1.588)	2.134	(1.853)	1.866	(1.446)	-0.405	(1.081)
$\partial r/\partial INT\_INT \| MNC = 1, ctry = DE$	-30.031**	(12.751)	36.752***	(13.433)	7.068	(23.368)	35.570**	(14.287)
$\partial r/\partial INT\_INT \| MNC = 1, ctry = US$	1.380	(1.121)	2.395	(1.554)	-2.964**	(1.322)	6.859***	(1.346)
$\partial r/\partial INT\_INT \| MNC = 1, ctry = JP$	-0.384	(2.485)	4.741*	(2.504)	-6.653**	(2.603)	5.385***	(1.800)
$\partial r/\partial D3 \| MNC = 0, ctry = DE$	3.271**	(1.531)	3.802*	(2.038)	0.938	(1.090)	0.756	(1.025)
$\partial r/\partial D3 \| MNC = 0, ctry = US$	-1.447***	(0.427)	-0.765	(0.571)	1.320***	(0.361)	-1.594***	(0.383)
$\partial r/\partial D3 \| MNC = 0, ctry = JP$	-0.073	(0.314)	-2.216***	(0.283)	0.194	(0.293)	1.373***	(0.313)
$\partial r/\partial INT\_INT \| MNC = 0, ctry = DE$	-11.808	(11.325)	-9.288	(15.075)	-9.627	(8.064)	11.763	(7.585)
$\partial r/\partial INT\_INT \| MNC = 0, ctry = US$	-2.419	(1.852)	2.465	(2.876)	-4.267***	(1.541)	3.328*	(1.826)
$\partial r/\partial INT\_INT \| MNC = 0, ctry = JP$	-1.968	(2.112)	2.808	(2.202)	1.390	(2.220)	-0.434	(2.325)
Observations	314,244		314,244		314,244		314,244	
R Squared	0.292		0.283		0.283		0.291	

See Table 7 footnotes.

Table 10: Cumulated Event Date AAR Effects by Nationality, MNC Status, and Tax Haven Presence

	Event Date (d)								
	5/9/08	6/27/08	8/18/08	10/1/08	11/28/08	12/12/08	12/19/08	1/23/09	3/27/09
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I[ctry = DE] \times I[MNC = 0]$	0.299	-1.583***	-2.548***	-2.566***	-3.945***	-3.465***	-4.041***	-3.662**	-3.466*
	(0.288)	(0.485)	(0.799)	(0.927)	(1.117)	(1.291)	(1.349)	(1.566)	(1.794)
$I[ctry = DE] \times I[MNC = 1]$	0.455*	-1.875	-3.421***	-0.944	-3.264*	-1.846	-0.851	-0.827	2.307
	(0.274)	(1.294)	(1.183)	(1.538)	(1.914)	(2.038)	(3.054)	(3.095)	(3.776)
$I[ctry = DE] \times I[MNC = 1] \times I\_Haven$	-1.276***	-1.768	-0.951	-5.207***	-4.707**	-4.161*	-4.643	-5.199	-6.365
	(0.353)	(1.375)	(1.273)	(1.762)	(2.174)	(2.331)	(3.337)	(3.425)	(4.092)
$I[ctry = US] \times I[MNC = 0]$	0.383**	0.268	0.567**	0.074	-0.145	2.122***	3.070***	3.779***	1.974***
	(0.153)	(0.201)	(0.238)	(0.339)	(0.424)	(0.476)	(0.634)	(0.660)	(0.646)
$I[ctry = US] \times I[MNC = 1]$	0.179	0.292	0.433	-0.943*	-2.097**	-2.029**	-1.848	-1.253	-1.792
	(0.270)	(0.400)	(0.412)	(0.555)	(0.865)	(0.984)	(1.134)	(1.208)	(1.228)
$I[ctry = US] \times I[MNC = 1] \times I\_Haven$	0.038	-0.215	-0.507	-0.254	0.921	1.757*	2.167*	2.036	2.248*
	(0.285)	(0.426)	(0.450)	(0.598)	(0.911)	(1.034)	(1.195)	(1.285)	(1.307)
$I[ctry = JP] \times I[MNC = 0]$	0.399***	0.366**	0.196	-0.463	0.318	1.443***	0.322	0.864**	1.513***
	(0.121)	(0.168)	(0.210)	(0.285)	(0.296)	(0.332)	(0.375)	(0.423)	(0.462)
$I[ctry = JP] \times I[MNC = 1]$	-0.098	0.066	0.128	-0.700	-0.303	-1.170*	-1.334*	-1.839**	-1.161
	(0.184)	(0.238)	(0.317)	(0.481)	(0.504)	(0.646)	(0.722)	(0.802)	(0.746)
$I[ctry = JP] \times I[MNC = 1] \times I\_Haven$	-0.044	-0.161	-0.352	0.005	0.819	-0.079	-0.428	-0.471	-0.335
	(0.268)	(0.354)	(0.434)	(0.624)	(0.706)	(0.885)	(0.964)	(1.062)	(1.034)
Average Marginal Effects									
$\frac{\partial r}{\partial Dd} \vert MNC = 1, ctry = DE$	-0.665***	-3.426***	-4.255***	-5.513***	-7.395***	-5.498***	-4.925***	-5.389***	-3.279**
	(0.198)	(0.437)	(0.437)	(0.777)	(0.934)	(1.025)	(1.238)	(1.341)	(1.458)
$\frac{\partial r}{\partial Dd} \vert MNC = 1, ctry = US$	0.212**	0.102	-0.015	-1.168***	-1.283***	-0.476	0.068	0.546	0.196
	(0.084)	(0.137)	(0.167)	(0.206)	(0.273)	(0.304)	(0.357)	(0.412)	(0.422)
$\frac{\partial r}{\partial Dd} \vert MNC = 1, ctry = JP$	-0.124	-0.028	-0.078	-0.697**	0.178	-1.216***	-1.586***	-2.116***	-1.358***
	(0.137)	(0.183)	(0.218)	(0.306)	(0.357)	(0.444)	(0.479)	(0.526)	(0.521)
Observations					322,973				

Significance levels are designated as *** p<0.01, ** p<0.05, and * p<0.1, with standard errors clustered by firm. All panel regressions include firm-specific intercepts and German (DE), U.S. (US), and Japanese (JP) market co-movement slope parameters (not shown). Coefficients shown are event date $d = 1, \ldots 9$ interaction effects, artificially treating separate event dates as a single sequence of contiguous days. $I[MNC]$ and I_Haven represent binary indicators of multinational and tax haven activity, respectively.

Table 11: Cumulated Event Date AAR Effects by Nationality, MNC Status, and Tax Savings

	Event Date (d)								
	5/9/08 (1)	6/27/08 (2)	8/18/08 (3)	10/1/08 (4)	11/28/08 (5)	12/12/08 (6)	12/19/08 (7)	1/23/09 (8)	3/27/09 (9)
$I[ctry = DE] \times I[MNC = 0]$	0.299	-1.583***	-2.548***	-2.566***	-3.945***	-3.465***	-4.041***	-3.662**	-3.466*
	(0.288)	(0.485)	(0.799)	(0.927)	(1.117)	(1.291)	(1.349)	(1.566)	(1.794)
$I[ctry = DE] \times I[MNC = 1]$	-0.463*	-3.586***	-4.333***	-5.501***	-7.809***	-5.372***	-4.214***	-4.682***	-2.829
	(0.257)	(0.582)	(0.590)	(1.082)	(1.242)	(1.310)	(1.594)	(1.728)	(1.922)
$I[ctry = DE] \times I[MNC = 1] \times TS$	-1.396	1.103	0.539	-0.083	2.872	-0.870	-4.928	-4.898	-3.115
	(1.051)	(1.836)	(1.440)	(3.200)	(3.577)	(4.270)	(5.501)	(6.004)	(7.555)
$I[ctry = US] \times I[MNC = 0]$	0.383**	0.268	0.567**	0.074	-0.145	2.122***	3.070***	3.779***	1.974***
	(0.153)	(0.201)	(0.238)	(0.339)	(0.424)	(0.476)	(0.634)	(0.660)	(0.646)
$I[ctry = US] \times I[MNC = 1]$	0.252**	0.089	0.142	-1.111***	-1.405***	-0.242	0.631	1.197**	0.710
	(0.108)	(0.175)	(0.209)	(0.286)	(0.391)	(0.409)	(0.478)	(0.562)	(0.596)
$I[ctry = US] \times I[MNC = 1] \times TS$	-0.217	0.069	-0.846	-0.310	0.657	-1.258	-3.033*	-3.508*	-2.771
	(0.406)	(0.659)	(0.810)	(0.995)	(1.289)	(1.381)	(1.618)	(1.844)	(2.071)
$I[ctry = JP] \times I[MNC = 0]$	0.399***	0.366**	0.196	-0.463	0.318	1.443***	0.322	0.864**	1.513***
	(0.121)	(0.168)	(0.210)	(0.285)	(0.296)	(0.332)	(0.375)	(0.423)	(0.462)
$I[ctry = JP] \times I[MNC = 1]$	-0.413*	-0.366	-0.338	-1.392***	-0.339	-2.485***	-3.100***	-3.429***	-2.492***
	(0.223)	(0.282)	(0.348)	(0.479)	(0.578)	(0.739)	(0.766)	(0.856)	(0.865)
$I[ctry = JP] \times I[MNC = 1] \times TS$	1.328*	1.554	1.197	3.196*	2.379	5.833**	6.966**	6.039*	5.216
	(0.704)	(0.953)	(1.207)	(1.674)	(2.236)	(2.693)	(2.815)	(3.234)	(3.255)
Average Marginal Effects									
$\frac{\partial r}{\partial Dd} \vert MNC = 1, ctry = DE$	-0.665***	-3.426***	-4.255***	-5.513***	-7.395***	-5.498***	-4.925***	-5.389***	-3.279**
	(0.203)	(0.444)	(0.439)	(0.815)	(0.956)	(1.043)	(1.248)	(1.355)	(1.486)
$\frac{\partial r}{\partial Dd} \vert MNC = 1, ctry = US$	0.212**	0.102	-0.015	-1.168***	-1.283***	-0.476	0.068	0.546	0.196
	(0.084)	(0.137)	(0.167)	(0.206)	(0.273)	(0.305)	(0.358)	(0.411)	(0.422)
$\frac{\partial r}{\partial Dd} \vert MNC = 1, ctry = JP$	-0.124	-0.028	-0.078	-0.697**	0.178	-1.216***	-1.586***	-2.116***	-1.358***
	(0.136)	(0.182)	(0.218)	(0.304)	(0.357)	(0.439)	(0.472)	(0.521)	(0.517)
Observations					322,973				

Significance levels are designated as *** p<0.01, ** p<0.05, and * p<0.1, with standard errors clustered by firm. All panel regressions include firm-specific intercepts and German (DE), U.S. (US), and Japanese (JP) market co-movement slope parameters (not shown). Coefficients shown are event date $d = 1, ...9$ interaction effects, artificially treating separate event dates as a single sequence of contiguous days.

APPENDIX

A Variables definition and financial data

Our proxy for effective tax rates (ETR) is based on Orbis' profits and loss variables as follows:

$$AETR_i = \frac{\sum_{t=2006}^{2008} tax_{i,t}}{\sum_{t=2006}^{2008} pti_{i,t}}, \tag{5}$$

where $AETR_i$ is the average ETR of parent i. For foreign AETR, denoted $AETR\_for_i$ (resp. domestic AETR, denoted $AETR\_dom_i$), we use subsidiaries (resp. parents) reported taxation and pre-tax income, censored to $[0, 1]$.

$$AETR\_sub_i = \sum_{k=1}^{N} w_k * AETR_k, \tag{6}$$

where $AETR\_sub_i$ is the average ETR of all subsidiaries of parent i, N is the number of subsidiaries owned by MNC i, $AETR_k$ is subsidiary k's AETR defined in 5. Importantly for this measure, $\sum_{t=2006}^{2008} tax_{i,t}$ and $\sum_{t=2006}^{2008} pti_{i,t}$ are previously censored at 0 (non-negative), and the resulting AETR is censored to be in $[0, 1]$. Each subsidiary's AETR with is weighted with defined as $w_k = \frac{pti_k}{\sum_{k=1}^{N} pti_k}$, where pti_k is the 3-year average pre-tax income of subsidiary k from 2006 to 2008. We also experiment with weights based on taxation, retained earnings, sales, and total assets.

$$METR\_sub_i = \sum_{k=1}^{N} w_k CTR_{k,c}, \tag{7}$$

where $METR\_sub_i$ is the average of marginal ETRs of all subsidiaries of parent i, and $CTR_{k,c}$ is the top corporate tax rate in country c where parent i's subsidiary k is located.

$$METRC\_sub_i = \sum_{k=1}^{N} w_k (CTR_{k,c} + WTR_{k,c}), \tag{8}$$

where $METRC\_sub_i$ is the average of marginal combined ETRs of all subsidiaries of parent i, and WTR_k is the average withholding tax rate (average of dividends, royalty and interest tax rates) in country c where parent i's subsidiary k is located, and is based on parent i's ownership share of its subsidiary k. Specifically $WTR_{k,c} = s_{i,k} WTR_{k,c}$

$$AETR\_med\_sub_i = \sum_{c=1}^{M} w_c * median(AETR_c), \tag{9}$$

where $AETR\_med_i$ is the average over all countries where MNC i has at least one subsidiary of the median AETRs of all subsidiaries in country c, M is the number of country where MNC i has at least one subsidiary, and w_c is the country weight defined in as $w_c = \frac{pti_c}{\sum_{c=1}^{M} pti_c}$, where pti_c is the sum of 3-year averages pre-tax income of all subsidiaries in country c from 2006 to 2008. We also experiment with weights based on taxation, retained earnings, sales, and total assets.

$$AETR\_min\_sub_i = \sum_{c=1}^{M} w_c * min(AETR_c), \tag{10}$$

where $AETR\_min_i$ is the average over all countries where MNC i has at least one subsidiary of the minimum AETRs of all subsidiaries in country c.

Our proxy for liquidity constraints is common in the literature and calculated at parent i level as $LQ_i = \frac{1}{3} \frac{\sum t{=}20062008(\text{Net\_income}_{i,t}+\text{Depreciation}_{i.t})}{\sum t{=}20062008 PPE_{i,t}}$.[37] We use Orbis' variables "P/L for period [=Net income]", "Depreciation", and "Net Property, Plant & Equipment", (which we believe are equivalent to Compustat items #18,#14, and #8, respectively).

Our proxy for deferred tax liability is defined at parent i's level as $DTL_i = \frac{1}{3} \frac{\sum t{=}20062008 Deferred\_tax_liabiliti}{Total_current_liabilities_{i,t}}$ We use Orbis' variables "Deferred Taxes" and "Total Current Liabilities" (from balance sheet's liabilities).[38] For Japanese firms only, we also define a dummy for parent i's fiscal year ending on April 1 as FYE_apr1_i.

B Industry list

We select 19 industries presented in Table A.2. We exclude financial industries and real estate, rental and leasing. We matched by hand 107 Japanese JIP codes with corresponding NAICS codes at the 2-digit level (Orbis data provide NAICS codes, but not corresponding JIP codes).

C Intangible intensity

First we calculate intangible intensity at the industry-level based on investment and stocks in intangible assets and in physical assets and over time. Then we construct an average measure of intangible intensity over 3 years, from 2006 to 2008. The data for 107 industries in Japan are obtained from the Research Institute of Economy, Trade, and Industry (RIETI), described in detail in Miyagawa and Hisa (2013), and the data for the U.S. are obtained from various sources, listed in (Dauchy, 2013; Chen and Dauchy,

[37] See e.g., Fazzari and Peterson (1993); Almeida and Campello (2007); Edgerton (2010).

[38] All Orbis' variables used to calculate, at the parent level, average tax rates, liquidity constraints, and the share of deferred tax liabilities are previously winsorized at 2% above and below.

2013b).[39] For Germany, we do not have data on total intangible assets. To circumvent this limitation, we use information on the sale of observed intangible assets at the industry level. Specifically we use the EU KLEMS database from 2005 to 2007 and calculate a measure of intangible intensity based on the share of investment in computing equipment, communications equipment, and software (in the EU KLEMS database, these variables are I_IT, ICT, and I_software).[40]

Our proxy for intangible intensity is

$$INT\_INT_j = \frac{\sum_{t=2006}^{2008} INT_{j,t}}{\sum_{t=2006}^{2008}(INT_{j,t} + TAN_{j,t}}, \tag{11}$$

where INT_INT_j is the three-year average intangible intensity measure in industry j, $INT_{j,t}$ is intangible stock (respectively investment) in industry j and in year t, and $TAN_{j,t}$ is physical assets stock (respectively investment), where physical assets are national accounts assets, which include equipment and machinery, and buildings and structures. Table A.3 shows average intangible intensity in the U.S. and in Japan (based on investment) for each industry listed in A.2. Table A.4 shows average intangible intensity in Japan and in Germany based on our limited measure of investment, obtained from reported intangibles.[41] Comparing the RIETI's comprehensive measure of intangible intensity from table A.3 and the KLEMS-based measure of intangible intensity from table A.4 in Japan, one can notice that the latter is about 3 times smaller than the former, which is expected since our KLEMS-based measure only includes intangible assets reported in firms' annual reports. However, the ranking across industries is similar.
We match this measure to each company in our sample (both parents and foreign subsidiaries) based on their reported industry classification. Although NAICS codes are generally accurately reported and provided in Orbis data, JIP codes (Japan Industrial Productivity codes, used in Japan accounts and by the RIETI) are not provided in Orbis data. The RIETI provides a correspondence table between JIP codes and ISIC codes, but we found these correspondence table unusable, because the codes do not accurately match. Therefore, we matched all JIP codes with NAICS codes by hand. The EU KLEMS uses NACE codes, which we also match with NAICS codes. Investment and stocks for NAICS codes 54 and 55 (respectively professional and management services) are combined because JIP codes do not differentiate between these business services.

D Tax systems and tax rates

This appendix section presents our sources and data for tax systems and tax rates.

[39] http://www.rieti.go.jp/en/database/. We use tables on "capital inputs", and "Investment and capital stock in intangible asset."

[40] These data can be found at www.euklems.net.

[41] KLEMS data are available for a number of countries including Japan and Germany, but not the U.S..

D.1 Country-level information

We use historical statutory information for Japan, the United States, and Germany as well as for each country where subsidiaries of Japan, U.S. or German parents are located, annually from 2006 to 2012 (although we only make use of information from 2006 to 2009). We collect information on statutory top corporate income tax rates, which include combined federal and state/provincial tax rates at the federal and combined levels. For Japan and the U.S., we also collect withholding tax rates on dividends, royalties, and interest payments, with detailed information on the ownership threshold that applies to them. We did not collect comparable information on withholding tax rates for countries that have tax treaties with Germany. While we collect top statutory corporate tax rates (because MNCs are usually very large firms, and for consistency across countries) we use information on all withholding tax rates by ownership threshold. Although collecting this level of details required a significant amount of time, we did so because (i) tax rate is a critical measure for our study and we want to be as precise as possible, and (ii) Our use of Orbis data permits us to have access to detailed ownership data (i.e., the detailed % ownership share of subsidiaries that are owned by at least 25%.).

At this point, it is worth mentioning that data on statutory corporate tax rates are the same regardless of whether the parent is located in Japan or in the U.S.. For instance, a subsidiary of a Japanese parent located in Germany faces the same statutory top corporate tax rate as a German subsidiary of a U.S. parent. This is not the case for withholding tax rates and applicable ownership thresholds, because withholding tax rates depend on country-specific tax treaties. For instance, in 2008, the tax treaty between the U.S. and Italy provided a minimum withholding dividends tax rate of 5% (respectively 10% and 15%) for ownership of at least 50% of a U.S. subsidiary located in Italy (respectively for ownership of 10% to 50%, and for ownership of less than 10%). By contrast, the minimum withholding dividends tax rate allowed under the Japan-Italy tax treaty was 10%.

For the U.S., we collect corporate tax rates and withholding tax rates for 135 countries from multiple sources listed in table A.5 The statutory tax rates include sub-central (statutory) corporate income tax. For smaller counties, we go to each country's tax bureau's websites, or visit the *Tax Rate Guide and Tax Help Website* (e.g., for South Africa). For Japan, we collect data on the withholding tax rates of 54 countries where we observe a Japanese subsidiary (also from 2006 to 2009). To collect withholding tax rates defined in Japanese treaties, we use the reports published by the Japan External Trade Organization (JETRO).[42] To supplement the information on the withholding tax rates for the countries that JETRO's data do not cover, in cases where Japan has tax treaties with these countries, we directly use the withholding tax rates determined from tax treaties.

For Germany, we only collect data on corporate tax rates for each country where a German MNC has subsidiary (as we do not have information on withholding tax rates).

Our sources for tax systems (territorial and residential systems, and countries with no corporate taxation) are listed in table A.5. Our list of tax tax haven status combines Gravelle (2013) and Hines (2010)'s lists.

[42] The data are available at http://www.jetro.go.jp/world/reports/.

Table A.6 provides summary statistics of corporate and withholding tax rates aggregated across all subsidiaries of Japanese and U.S. publicly traded companies in Orbis, from 2006 to 2008.

Table A.1: Sample Selection

	Japan	U.S.	Germany
All observations	3,242	8,590	787
MNCs[a]	983	2,749	267
	30.3%	32%	33.9%
Self-owned	983	2,749	247
Domestic	2,259	5,841	520
	69.7%	64.4%	55.3%
Self-owned	2,233	5,532	435
Top quartile sample			
All observations	579	577	91
MNCs[a]	218	397	49
	37.7%	68.8%	53.8%
Self-owned	218	397	45
Domestic	361	180	42
	62.3%	31.2%	46.2%
Self-owned	361	176	32
Share of MNCs with:[b]			
1 subsidiary or more in a tax haven	26.45%	56.3 %	52.4%
1 subsidiary or more in a country with no tax	6.31	29.7	15.4
1 subsidiary or more in a territorial system	64.6	82.1	89.9
1 subsidiary in a residential system	88.7	60.6	75.7
1 subsidiary in Japan	n.a.	22.3	18.4

[a] Firms with at least 1 subsidiary.

[b] All observations.

Table A.2: Industries

Industry in sample	Description	NAICS codes
1	Agriculture, forestry, fishing and hunting	11
2	Mining	21
3	Utilities	22
4	Construction	23
5	Food, beverage, tobacco, textiles, apparel, and leather manufacturing	31
6	Wood, paper, printing, petroleum, chemical, plastics, rubber, and non-metallic minerals manufacturing	32
7	Metal, machinery, computer, electronic, electrical equipment, transportation equipment, furniture, and miscellaneous manufacturing	33
8	Wholesale trade	42
9	Retail trade	44
10	Transportation	48
11	Couriers and warehousing	49
12	Information	51
13	Professional and technical services	54
14	Administrative and waste services	56
15	Educational services	61
16	Health care and social assistance	62
17	Arts, entertainment, and recreation	71
18	Accommodation and food services	72
19	Other services, except public administration	81

Table A.3: Intangible intensity in Japan and in the U.S., by industry, average 2006-2008 (based on investment)

NAICS Codes	United States (U.S.)	Japan (JP) [RIETI]	Ratio JP / U.S.	*Rank (1=smallest intensity)* United States	Japan
11	0.020	0.053	2.6	21	20
21	0.063	0.210	3.3	18	14
22	0.034	0.161	4.6	20	15
23	0.318	0.404	1.2	14	8
31	0.654	0.328	0.5	2	10
32	0.528	0.367	0.6	7	9
33	0.572	0.430	0.7	4	5
42	0.647	0.407	0.6	3	7
44	0.515	0.286	0.5	8	11
48	0.122	0.098	0.8	17	17
49	0.055	0.159	2.8	19	16
51	0.558	0.629	1.1	6	2
52	0.736	0.539	0.7	1	3
53	0.268	0.028	0.1	15	21
54	0.561	0.654	1.1	5	1
56	0.483	0.271	0.5	9	12
61	0.481	0.092	0.1	10	18
62	0.246	0.091	0.3	16	19
71	0.320	0.449	1.4	13	4
72	0.333	0.214	0.6	12	13
81	0.344	0.410	1.1	11	6

Table A.4: Intangible intensity in Japan and Germany, by industry, average 2006-2008 (based on investment, limited measure)

				Rank (1=smallest intensity)	
NAICS Codes	Japan (JP) [KLEMS]	Germany (DE) [KLEMS]	Ratio JP / DE	Japan	Germany
11	0.005	0.021	2.4	21	20
21	0.042	0.061	3.4	19	19
22	0.096	0.091	1.7	14	16
23	0.077	0.144	2.8	15	10
31	0.131	0.146	2.2	10	8
32	0.186	0.120	3.0	8	13
33	0.184	0.143	3.0	9	11
42	0.232	0.253	1.6	6	4
44	0.254	0.234	1.2	5	5
48	0.107	0.069	1.4	12	17
49	0.555	0.468	0.3	2	1
51	0.452	0.284	2.2	3	3
52	0.724	0.394	1.3	1	2
53	0.009	0.003	9.2	20	21
54	0.375	0.210	3.1	4	6
56	0.067	0.098	2.7	16	15
61	0.049	0.144	0.6	18	9
62	0.127	0.130	0.7	11	12
71	0.050	0.098	4.5	17	14
72	0.102	0.162	1.3	13	7
81	0.205	0.064	6.3	7	18

Table A.5: Sources for tax rates and tax systems

Sources for tax rates
1- OECD's corporate tax rates databases (*Taxation of Corporate and Capital Income*), http://www.oecd.org/tax/tax-policy/oecdtaxdatabase.htm
2- KPMG's *Corporate and Indirect Tax Survey* http://www.kpmg.com/Global/en/services/Tax/tax-tools-and-resources/Pages/corporate-tax-rates-table.aspx
3- Ernst & Young's *Worldwide Corporate Tax Guide*,
4- PricewaterhouseCoopers' *Worldwide Tax Summaries*,
5- Deloitte: http://dits.deloitte.com/
Sources for tax systems
1- Ernst & Young's *Worldwide Corporate Tax Guide*, from 2006 through 2012, for most recent, see link: http://www.ey.com/GL/en/Services/Tax/Worldwide-Corporate-Tax-Guide---Country-list?tab=2
2- Tax Foundation's Report, Aug. 10, 2012 http://taxfoundation.org/article/global-perspective-territorial-taxation
3- Tax Rate Guide and Tax Help Website: http://www.taxrates.cc/html/
4- Markle (2010)

Table A.6: Summary Statistics of Foreign Tax Rates for subsidiaries of Japanese and U.S. Multinationals from 2006 to 2008

Japan	**mean**	**sd**	**min**	**max**	**N**
Statutory Corporate Tax Rate	0.314	0.074	0	0.400	14,292
Withholding Tax Rate on Dividends	0.059	0.063	0	0.350	14,262
Withholding Tax Rate on Royalty	0.098	0.045	0	0.350	14,262
Withholding Tax Rate on Interest	0.070	0.061	0	0.353	14,262

United States	**mean**	**sd**	**min**	**max**	**N**
Statutory Corporate Tax Rate	0.276	0.086	0	0.550	70,122
Withholding Tax Rate on Dividends	0.087	0.075	0	0.350	70,080
Withholding Tax Rate on Royalty	0.059	0.063	0	0.300	70,080
Withholding Tax Rate on Interest	0.045	0.068	0	0.355	70,080

The Effect of Moving to a Territorial Tax System on Profit Repatriations: Evidence from Japan*

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Abstract

The design of international tax policies, regarding whether and how to tax corporate incomes earned in foreign countries, has received a great deal of attention from policymakers and economists. Japan's worldwide tax system taxed foreign source income upon repatriation. To stimulate dividend repatriations from Japanese-owned foreign affiliates, Japan introduced a foreign dividend exemption in 2009 that exempts from home taxation dividends remitted by Japanese-owned foreign affiliates to their parent firms. This paper examines the effect of dividend exemption on profit repatriations by Japanese multinationals. We find no evidence that the dividend exemption system stimulated dividend repatriations of the typical foreign affiliate that had paid no dividends under the worldwide tax system. However, the responses of Japanese multinationals to dividend exemption were heterogeneous. Foreign affiliates with a large stock of retained earnings increased dividend payments more than other affiliates with the enactment of dividend exemption in 2009, but the increase in dividend payments was not associated with foreign tax rates.

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1 Introduction

In an increasingly globalized world, the design of international tax policies, regarding whether and how to tax corporate incomes earned in foreign countries by multinational firms, has received a great deal of attention from policymakers and economists in advanced countries. While taxing foreign source income would raise revenue, international tax rules significantly influence the business activities of multinational corporations, including the location of foreign direct investment, income reallocation (income shifting) through transfer pricing, and profit repatriation. The United States taxes foreign income upon repatriation, allowing foreign tax credits for corporate income taxes and other related taxes paid to foreign governments under the so-called *worldwide income tax system*. In contrast to a worldwide income tax system, a *territorial tax system* exempts foreign income from home taxation; such systems are employed by many advanced countries, including Australia, Belgium, Canada, France, Germany, Italy, and the Netherlands.[1] In the United States, policymakers and economists have long discussed changing the current worldwide tax system to a territorial tax system.

Japan, the focus of this study, had a worldwide income tax system until the end of March 2009. At that time, the Japanese government was concerned that under the worldwide tax system, Japanese multinational corporations retained abroad a large portion of foreign profits earned by their affiliates and did not repatriate them to Japan. Japanese firms arguably had incentive to do so because their foreign incomes were taxed at high rates (as high as 40 percent) upon such repatriation.[2] To stimulate dividend repatriations from Japanese-owned foreign affiliates, Japan introduced a permanent foreign dividend exemption in April 2009 and exempted from home taxation dividends remitted by foreign affiliates to their Japanese parent firms. Thus, with the introduction of the dividend exemption system, the Japanese corporate tax system moved to a territorial tax system.

This paper examines the effect of dividend exemption on profit repatriations by Japanese multinationals. Using affiliate-level data, we investigate whether the switch to the dividend exemption system increased the amount of dividend payments by foreign affiliates, as the Japanese government expected, and whether the responsiveness of dividend remittances to foreign tax rates (corporate income taxes and withholding income taxes on repatriated dividends) was changed by the adoption of the dividend exemption system. Few studies have empirically tested the effects of a "permanent" dividend exemption and examined the actual outcomes of changing the regime from a worldwide tax system to a territorial tax

[1] As of 2008, 21 of the 30 OECD countries employed a territorial tax system (METI, 2008).

[2] In 2009, the corporate income tax rate of Japan was the highest among the OECD member countries (OECD, 2010).

system.[3] Egger et al. (2011) study foreign dividend exemption enacted in the tax reform of the United Kingdom in 2009 and find that foreign affiliates owned by U.K. multinational firms responded to the tax reform by increasing dividend payments to their owners. Tajika et al. (2012) investigate the impact of Japan's dividend exemption on dividends received by Japanese parent firms from their foreign subsidiaries.[4] They find that more parent firms, especially those facing greater demand for cash, increased dividends received from their foreign affiliates in response to the enactment of dividend exemption in 2009.[5] Unlike Tajika et al. (2012), this paper studies the effect of dividend exemption on dividend payments at the affiliate level and the responsiveness of dividend payments to repatriation tax costs. Each foreign affiliate faced a different tax cost of paying dividends to its parent firm in Japan under the worldwide tax system, depending on the corporate tax payments to the host country and the withholding tax payments on dividends. Thus, the advantage of our study is that we can utilize the variations in the tax costs of dividend repatriations among affiliates to identify the impact of the tax reform on dividend repatriations.

We use the micro database of the annual survey conducted by the Ministry of Economy, Trade and Industry of Japan (METI), *The Survey of Overseas Business Activities*. The survey provides information on the financial and operating characteristics of Japanese firms operating abroad, including dividends paid to Japanese investors. We analyze the data from 2007 to 2009 to focus on the first-year response of Japanese multinationals to the dividend exemption system, noting that the first-year response is likely to be different from that in subsequent years for two reasons. First, as we will explain in detail in the next section, most Japanese multinationals expected the introduction of the dividend exemption system before the end of the 2008 accounting year. Thus, they might have reduced dividend repatriations in 2008 in anticipation of the adoption of the dividend exemption system and increase them in 2009. Second, some firms may have repatriated as a one-time choice in 2009 large amounts of foreign income that they had retained and accumulated over a long period to avoid taxation in Japan.[6]

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[3] The previous literature utilizes cross-country differences in international tax systems to examine the effect of corporate taxes under the two tax regimes on foreign direct investment (Slemrod, 1990; Hines, 1996; Altshuler and Grubert, 2001). Desai and Hines (2004) estimate a tax burden on foreign income of $50 billion per year under the U.S. worldwide income tax system.

[4] Sakurada and Nakanishi (2011) and Bradley et al. (2013) examine investor reactions to news of Japan's dividend exemption using an event study methodology.

[5] Some studies have investigated the effects of the one-time dividend deductions permitted by the American Jobs Creation Act of 2004 on the profit repatriations, domestic investment and employment, market values, and income shifting behavior of U.S. multinational corporations (Oler et al., 2007; Blouin and Krull, 2009; Redmiles, 2009; Bradley, 2011; Dharmapala et al., 2011).

[6] In addition, the response specific to the first year of the dividend exemption system, if any, would be important in the comparison with the American Job Creation Act of 2004 enacted in the United States, which gave U.S. corporations a one-time deduction of 85 percent of dividends received from their foreign

We find that Japanese corporate taxes had a significant negative effect on dividend repatriations before 2009 under the worldwide income tax system. Despite the dividend exemption system substantially eliminating corporate tax liabilities on repatriated dividends in Japan, our analysis of the survey data provides no evidence that the dividend exemption system stimulated dividend repatriations of the typical foreign affiliate that had paid no dividends under the worldwide tax system. However, the response of Japanese multinationals to dividend exemption was heterogeneous. Foreign affiliates that had retained and accumulated large profits under the worldwide tax system increased dividend payments more than other affiliates with the enactment of dividend exemption in 2009. Therefore, dividend exemption fulfilled the main aim to stimulate dividend repatriations from foreign affiliates with a large stock of retained earnings in line with the expectation of the Japanese government.

Surprisingly, we find no evidence that the responsiveness of dividend repatriations to foreign tax rates changed with the enactment of dividend exemption. More precisely, the increase in dividend payments was not associated with either the grossed-up tax rate difference between Japan and foreign countries, or the withholding tax rates on repatriated dividends. The Japanese government was concerned that adopting a territorial tax system may facilitate tax avoidance by multinational corporations shifting foreign income to low tax countries. Though it might take more time for companies to change their tax strategies in response to the tax reform, our results suggest that Japanese parent firms did not immediately respond to dividend exemptions by reallocating their foreign profits to their foreign affiliates in low tax countries and increasing dividend repatriations by those affiliates in 2009.

The paper proceeds as follows. The next section describes the background and the provisions of dividend exemption enacted in Japan. Section 3 calculates the tax costs of remitting profits from foreign subsidiaries to their parent firms in Japan by dividends, royalties or interest, and shows how Japanese dividend exemption has changed the tax costs of profit repatriations. Section 4 describes the data we use. Section 5 presents empirical results from our preliminary analysis regarding the first-year response of Japanese multinationals to dividend exemption. Section 6 extends the empirical model in Section 5 to analyze the heterogeneity of the responses to dividend exemption depending on the size of the stock of retained earnings of foreign affiliates. Section 7 present the results of robustness tests and alternative specifications. Section 8 concludes.

affiliates under some conditions. As we will discuss in the next section, the laws enacted in Japan and the United States are quite different in terms of the conditions and procedures of exempting received dividends.

2 The Dividend Exemption System Enacted in Japan in 2009

In May 2008, a subcommittee on international taxation at METI began to discuss the introduction of a dividend exemption in the corporate tax reform for 2009; this was publicly known because newspaper articles reported this development at the time.[7] In August 2008, the subcommittee released an interim report and proposed introducing a dividend exemption (METI, 2008). In the report, METI estimated that the stock of retained earnings of Japanese-owned foreign affiliates was 17 trillion Japanese yen as of 2006.[8] Their concern was that an excessive amount of profit was retained in foreign countries to avoid home-country taxation in Japan, which distorted the decisions of Japanese corporations on the timing of profit repatriations and reduced domestic R&D investment that could be financed from foreign-source income.[9] In November 2008, the Tax Commission also recommended the introduction of a dividend exemption system. Finally, this regime change was included in the legislation of the 2009 tax reform. The legislation was passed into law on March 27, 2009 and came into effect on April 1, 2009.[10]

The dividend exemption system permits Japanese resident corporations to deduct from taxable income 95 percent of dividends received from foreign affiliates in accounting years commencing on or after April 1, 2009. The rest (five percent) of the dividends are regarded as expenses incurred by parent firms for earning the dividends and are added to the calculation of their taxable incomes in Japan.[11] In order to qualify for dividend exemption, a parent firm must have held at least 25 percent of the shares of its affiliate for at least six months as of the dividend declaration date. While dividend exemption would reduce corporate tax liabilities on repatriated dividends in Japan, foreign tax credits no longer apply to withholding taxes on repatriated dividends imposed by host countries.[12]

[7] The discussion of Japan's foreign dividend exemption in this section largely draws on Aoyama (2009) and Masui (2010).

[8] Seventeen trillion yen are worth about 15 billion U.S. dollars at the 2006 exchange rate of 1 USD = 116.299 JPY (UNCTAD, 2012).

[9] The subcommittee also examined the possibility of introducing a one-time dividend exemption similar to the American Jobs Creation Act of 2004, limiting the use of dividends exempted from home taxation. However, the subcommittee concluded that a one-time dividend exemption would stimulate dividend repatriations only during the period under the exemption rule and would have an aftereffect that would counteract the effect of dividend exemption. They were also concerned that limiting the use of exempted dividends would distort the managerial decisions and undermine managerial efficiency of Japanese corporations (METI, 2008).

[10] The details of the development of the dividend exemption legislation are described by Bradley et al. (2013)

[11] The expenses corresponding to the five percent of the repatriated dividends are assumed to be deducted from the taxable incomes of parent firms when they invest in their subsidiaries, and thus, would not be exempted upon repatriation under the new exemption system.

[12] There were also transitional measures of the new exemption regime in relation to the controlled foreign

The new system is still quite distant from pure source-based taxation. As the term "dividend" exemption suggests, it only exempts foreign income in the form of paid dividends and does not apply to other types of foreign source income, including royalties, interest payments, income earned by foreign branches, and capital gains. Foreign taxes imposed on those income types continue to be creditable under the direct foreign tax credit system in Japan.

Finally, because this paper focuses on the first-year response to dividend exemption, the difference between Japan's foreign dividend exemption enacted under the 2009 tax reform and the dividend tax deduction under the American Jobs Creation Act of 2004 (AJCA) is also noteworthy. First, while the AJCA provides U.S. multinational corporations with a special one-time deduction of 85 percent of dividends received from their foreign affiliates, Japan's dividend exemption is permanent. Second, under the AJCA, the 85 percent exemption applies only to "extraordinary dividends," which are defined as dividend payments exceeding average repatriations over a five-year period ending before July 1, 2003, excluding the highest and lowest years.[13] Therefore, the exemption is limited to a part of dividends paid (extraordinary dividends), and U.S. multinationals could claim the exemption only if they received foreign dividends more than the average amount. On the other hand, Japan's dividend exemption applies to 95 percent of *all* dividends as long as the conditions described above are satisfied.[14] Thus, we note that the exemption permitted under the new tax system in Japan is quite different from and more generous than the exemption under the AJCA in the United States.

3 How Dividend Exemption Affects Profit Repatriations of Japanese Multinationals

Hartman (1985) demonstrated that under certain conditions, repatriation taxes do not affect the decisions on marginal investment and dividend payments made by "mature" subsidiaries

corporation (CFC) legislation. The transitional rules provided that dividends paid by foreign subsidiaries subject to the CFC rules be eligible for dividend exemption if these dividends are paid out of pro ts in accounting years commencing on or after April 1, 2009. The Ministry of Finance published on January 22 the instructions for these transitional rules, explaining that the date of right allotment of dividends (the dividend declaration date) must belong to accounting years commencing on or after April 1, 2009. Nonetheless, this provision seemed to confuse shareholders and tax accountants as to when dividends paid by CFC subsidiaries would first qualify for exemption.

[13] In addition, to be eligible for the dividends-received deduction, dividends must be paid in cash and invested in approved activities in the United States, although this requirement may not be binding for U.S. multinationals (Blouin and Krull, 2009; and Dharmapala et al., 2011).

[14] The Japanese government estimates that given the requirements described above, more than 95 percent of foreign affiliates would be eligible for dividend exemption.

that finance their marginal investment out of their own retained earnings. However, this result depends on the assumption that repatriation tax rates are constant over time. This assumption could fail to hold because repatriation tax rates on dividends change depending on the foreign tax credit positions of parent firms under a worldwide income tax system and the definition of taxable income (tax bases) in host countries.[15]

In addition to those cases, repatriation tax rates also vary because of changes in the international tax regime. As we discussed in the previous section, Japanese firms learned at the latest in May 2008 that the government was discussing the introduction of a dividend exemption. Thus, they could expect the tax regime change before the end of the 2008 accounting year, and some firms may have expected it even earlier. In this situation, as we show in the appendix, even mature foreign affiliates would increase dividend payments to their parent firms in response to a decrease in the repatriation tax rate due to the enactment of dividend exemption.

In what follows, we calculate the tax costs of remitting profits from foreign subsidiaries to their parent firms in Japan by dividends, royalties, or interest, given their decisions on foreign direct investment and show how Japan's dividend exemption has changed the tax costs of profit repatriations. We will then make predictions for our empirical analysis based on the changes in the repatriation tax costs.

To consider tax liabilities on foreign dividends under Japan's worldwide tax system (before April 2009) and the new exemption system (after April 2009), we calculate the tax costs of remitting an additional dollar of foreign income to Japan by dividends, royalties or interest. Let Y_{ijc} denote the pre-tax profit of affiliate i operating in country c owned by parent j and T_{ijc} the foreign corporate income tax paid by subsidiary i. We define the average subsidiary tax rate as $\tau_{ijc} = T_{ijc}/Y_{ijc}$. Denote the statutory corporate tax rate of Japan and country c by τ_H and τ_c, respectively. The withholding tax rates on dividends, royalties, and interest payments are w_c^D, w_c^R, and w_c^I, respectively.

Under the worldwide tax system in Japan before April 2009, the tax liability of parent j to receive one dollar of dividends from its own affiliate i in country c depends on the excess foreign tax credit position of parent j: whether the parent is in a situation of *excess limit* or *excess credit*. A parent firm whose foreign tax payments are less than the foreign tax credit limit, where the foreign tax credit limit is calculated as the total foreign taxable income times the Japanese corporate tax rate, is referred to as being in excess limit. In contrast, if the foreign tax payments are greater than the foreign tax credit limit, the parent is referred

[15] There is evidence that repatriation taxes discourage dividend payouts of U.S. corporations (Hines and Hubbard, 1990; Grubert, 1998; Desai et al., 2001). In contrast, using Japanese affiliate-level data, Tajika and Nakamura (2008) find no evidence of a significant effect of corporate taxes on dividend repatriation by Japanese multinationals.

to as being in excess credit and can use excess foreign tax credits — the difference between the foreign tax payments and the foreign tax credit limit — to reduce the Japanese tax obligations on foreign source income in the next three years.

Suppose parent firm j is in excess limit. Then it could claim foreign tax credits for the taxes paid to host country c when affiliate i remits one dollar of dividends. The dollar of dividends would be deemed as $1/(1-\tau_{ijc})$ dollars of taxable income in Japan (gross-up formula), which yields the corporate tax liability of $\tau_H/(1-\tau_{ijc})$. Parent i also has to pay withholding taxes on the dividend w_c^D to country i. Thus, the total tax payment to receive one dollar of dividends is $\left[\tau_H/(1-\tau_{ijc})+w_c^D\right]$. Parent i can also claim foreign tax credits for the taxes paid to country c: the corporate tax payment $\tau_{ijc}/(1-\tau_{ijc})$ and the withholding tax on the dollar of dividends w_c^D. Thus, the net tax payment of parent j to receive one dollar of dividends from its affiliate i in country c can be written as P_{ijc} such that

$$P_{ijc} \equiv \left[\frac{\tau_H}{1-\tau_{ijc}} + w_c^D\right] - \left[\frac{\tau_{ijc}}{1-\tau_{ijc}} + w_c^D\right] = \frac{\tau_H - \tau_{ijc}}{1-\tau_{ijc}},$$

which is the difference between the Japanese statutory tax rate and the subsidiary average tax rate grossed up by the subsidiary average tax rate.

If parent j is in an excess credit position, the parent can use excess foreign tax credits to wipe out the Japanese corporate tax liability.[16] Then the net tax payment is w_c^D. In sum, the tax costs of remitting one dollar of dividends can be written as

$$\begin{cases} P_{ijc} = (\tau_H - \tau_{ijc})/(1-\tau_{ijc}) & \text{if parent } j \text{ is in excess limit;} \\ w_c^D & \text{if parent } j \text{ is in excess credit.} \end{cases} \tag{1}$$

After the introduction of the dividend exemption system (after April 2009), parent j can exclude 95 percent of dividends from its taxable income and has to include only five percent of the dividends in taxable income. Thus, the net tax payment to receive the dollar of dividends from affiliate i, or the repatriation tax rate under the new exemption system, is

$$0.05\tau_H + w_c^D. \tag{2}$$

Therefore, if parent j is in an excess limit position, the dividend exemption system eliminates almost the entire corporate tax liability in Japan.[17] The repatriation tax cost of

[16] Even when parent j is in an excess credit position, the foreign tax credit that parent j can claim is limited up to the Japanese tax liability on the dollar of dividends $(\tau_H/(1-\tau_{ijc}))$.

[17] We note that most Japanese corporations are expected to be in excess limit positions because of the relatively high corporate tax rate of Japan. In the data from 2007 to 2009, only 6.9 percent of foreign affiliates faced average tax rates higher than the Japanese corporate tax rate. Thus, it is reasonable to assume that

repatriating dividends decreases from $(\tau_H - \tau_{ijc})/(1 - \tau_{ijc})$ to $0.05\tau_H$ when controlling for the withholding tax rate on dividends w_c^D.[18] On the other hand, because the withholding taxes on dividends are no longer creditable under the dividend exemption system, parent i has to pay w_c^D, which would have been creditable under the worldwide tax system before 2009.

When the repatriation tax costs decrease to $0.05\tau_H$ (controlling for w_c^D), which is the same for all firms, foreign affiliates will increase dividend payments under the new exemption system as long as repatriation taxes are a binding constraint on their dividend payout decisions. In addition, Japanese multinationals face different repatriation tax costs depending on their foreign tax credit positions and the corporate tax policies of the host countries. Because dividend exemption eliminates Japanese corporate tax liability on repatriated dividends (P_{ijc}), dividend payments should become less sensitive to the difference between the Japanese statutory tax rate and the subsidiary average tax rate grossed up by the subsidiary average tax rate (P_{ijc}) after 2009. In other words, when we measure dividend payments as a fraction of affiliate sales to control for the firm size, foreign affiliates in lower-tax countries (higher P_{ijc}) should pay more dividends scaled by sales than other affiliates under the exemption system. Therefore, we expect the following effects of dividend exemption on profit repatriations by Japanese multinationals:

H1: Dividend repatriations from foreign affiliates increase when controlling for the withholding tax rate on dividends.

H2: Foreign affiliates in lower-tax countries (higher P_{ijc}) should pay more dividends scaled by sales than other affiliates.[19]

H3: Dividend payments become more sensitive to the withholding tax rates on dividends.

While the dividend exemption system substantially changes the tax costs of repatriating foreign dividends, it does not change the tax treatments of repatriated royalties and interest

most parent firms are in excess limit situations or that even if they are in excess credit, they do not have ssubstatial excess foreign tax credits.

[18] In this section, we assume $P_{ijc} = (\tau_H - \tau_{ijc})/(1 - \tau_{ijc}) > 0.05\tau_H$. In the data from 2007 to 2009, 91.8 percent of foreign affiliates satisfy this condition.

[19] Under the Japanese worldwide tax system, foreign tax credits apply to dividends paid by foreign subsidiaries directly owned by Japanese parent firms and their second-tier subsidiaries (sub-subsidiaries). Our data has information on dividend paid by foreign subsidiaries owned by Japanese parents but does not have information on dividend indirectly paid by the second-tier subsidiaries through the first-tier subsidiaries. Therefore, the tax differential P_{ijct} could misrepresent the tax costs for dividends paid by first-tier foreign subsidiaries if a large portion of those dividends originally come from second-tier subsidiaries and if the second tier-subsidiaries face substantially different corporate tax rates in their host countries from those faced by the first-tier subsidiaries.

payments at all. Consider the tax costs of remitting one dollar of a royalty or interest from affiliate i to its parent j. Because they are deductible payments, remitting an additional dollar as a royalty or interest will reduce the corporate tax payment in country c by τ_c. The corporate tax liability on the dollar of deductible payments is τ_H. Parent j also has to remit to the government of country c the withholding tax on one dollar of a royalty w_c^R or on the dollar of interest w_c^I.

Then, if parent j is in excess limit, it would claim a foreign tax credit for the withholding tax on the dollar of royalty or interest (w_c^R or w_c^I). The net tax payment of remitting one dollar of deductible payments is $(\tau_H - \tau_c)$. If parent j is in an excess credit position, excess foreign tax credits would reduce the tax liability in Japan by up to τ_H, and the net tax costs would be $\left(w_c^R - \tau_c\right)$ for the royalty payment and $\left(w_c^I - \tau_c\right)$ for the interest payment.

In summary, regardless of the introduction of the dividend exemption system, the net tax costs of remitting one dollar of a royalty can be written as

$$\begin{cases} \tau_H - \tau_c & \text{if parent } j \text{ is in excess limit;} \\ w_c^R - \tau_c & \text{if parent } j \text{ is in excess credit.} \end{cases} \tag{3}$$

The net tax costs of remitting one dollar of interest payments can be written as

$$\begin{cases} \tau_H - \tau_c & \text{if parent } j \text{ is in excess limit;} \\ w_c^I - \tau_c & \text{if parent } j \text{ is in excess credit.} \end{cases} \tag{4}$$

As Grubert (1998) shows, those tax costs could affect dividend repatriations to the extent that royalties and interest payments substitute or complement dividends as an alternative means of profit repatriations. In the following sections, we empirically examine how the response of dividend payments by Japanese-owned foreign affiliates to the repatriation tax costs changed due to the introduction of the dividend exemption regime and test hypotheses H1-H3.

4 Data

We use the micro database of the annual survey conducted by METI, *The Survey of Overseas Business Activities*. The main purpose of this survey is to obtain basic information on the business activities of foreign subsidiaries of Japanese firms. The survey covers all Japanese firms that owned affiliates abroad as of the end of the fiscal year (March 31). A foreign affiliate of a Japanese firm is defined as a firm that is located in a foreign country in which the Japanese firm had at least a 10 percent equity share. The survey provides data on the financial and operating characteristics of Japanese firms operating abroad, including dividends and royalties paid to Japanese investors. Industrial classification is available at the two-digit level.

To control for parent-firm characteristics, we use another METI survey, *The Basic Survey of Japanese Business Structure and Activities*. This survey covers all firms with 50 or more employees and capital or an investment fund of at least 30 million yen, for both manufacturing and non-manufacturing industries. The survey provides data on the financial and operating characteristics of Japanese parent firms.

We merge these two annual cross-section surveys to develop a longitudinal (panel) data set of foreign subsidiaries from 2007 to 2009. Each subsidiary is traced throughout the period using information such as parent and affiliate IDs as a key.[20] After dropping observations with missing dividend values, our panel from the METI surveys contains 27,713 observations of foreign affiliates from 2007 to 2009 with information on dividend payments available.[21]

Table 1 provides summary statistics of dividend payments by foreign affiliates for each year from 2007 to 2009. Notably, both the sum and mean of dividend payments in 2009 are larger than those in 2007 and 2008. The total amount of dividend payments decreased from 2007 to 2008 by 22.5 percent and increased from 2008 to 2009 by 70 percent. There is a similar trend in the mean of dividend payments. However, it is worth noting that those changes are caused by a small number of foreign affiliates. Although the sum and means of dividends are larger in 2009 than in 2007 and 2008, dividend payments in the seventy-fifth and ninety-fifth percentiles in 2009 are smaller than in 2007 and 2008. This implies that dividend payments above the ninety-ninth percentile in 2009 were larger by far than those in 2007 and 2008.[22] We also note that the distribution of dividend payments is heavily skewed to the left. Most foreign affiliates paid no dividends (as detailed in Table 3).

=== Table 1 ===

Table 2 provides summary statistics of dividend payments by foreign affiliates scaled by their sales to control for the size of the affiliates and changes in foreign exchange rates.[23] While the mean in 2009 is lower that in 2007, the dividend payments as a fraction of sales are larger in 2009 than those in 2007 and 2008 in the ninety-fifth percentile and above. Table

[20] The parent ID is obtained from *The Basic Survey of Japanese Business Structure and Activities*. We also used the information on location and establishment year to trace each subsidiary.

[21] Before 2007, the first METI survey collected dividend payments to Japanese investors every four years.

[22] We cannot indicate the maximum and minimum values for the sake of maintaining the confidentiality of the data.

[23] The Japanese yen consistently appreciated over the period as follows: 1 USD = 118 JPY in 2007, 103 JPY in 2008, and 94 JPY in 2009 (UNCTAD, 2012). Thus, the increase in dividend repatriations could be undervalued as measured by Japanese yen without scaling.

3 shows the numbers of foreign affiliates that paid no dividends and that paid dividends to Japanese investors in each year from 2007 to 2009. Strikingly, the proportion of foreign affiliates paying dividends is lowest in 2009 (25.8 percent) among the three years.

=== Tables 2 and 3 ===

In summary, while dividend payments at higher percentiles increased, the proportion of foreign affiliates paying dividends did not increase in 2009. This is suggestive of the heterogeneous response of Japanese multinationals to dividend exemption. Although the dividend exemption system may not stimulate profit repatriations from most foreign affiliates that had not paid dividends under the worldwide tax system, a small portion of firms that had paid large amounts of dividends under the worldwide tax system may increase dividends paid further as a result of dividend exemption. Those observations motivate our regression analysis in the following sections by taking into account the possibility that the response of foreign affiliates to dividend exemption varies depending on the stock of retained earnings right before 2009.

5 Preliminary Analysis

To test our hypotheses H1-H3, we examine how the dividend exemption system affected the repatriation behavior of Japanese multinational corporations and changed the responsiveness of repatriated dividends to repatriation taxes (corporate taxes and withholding taxes) in 2009. One limitation in our data set is that it does not include information on the foreign tax credit positions of parent firms (*excess limit* or *excess credit*). Thus, we cannot identify the tax costs of remitting dividends for each affiliate based on its parent's credit position. However, as Grubert (1998) and Desai et al. (2001) point out, because companies are uncertain about their long-run credit positions and foreign tax credit positions are endogenous to repatriation behavior, adjusting the repatriation tax costs depending on parent foreign tax credit positions would also be problematic.

As a preliminary analysis of dividend repatriation patterns before and after the tax reform, our identification strategy in this section employs a before-and-after comparison using a post-reform dummy variable.[24] We attempt to control for confounding factors that potentially affect dividend payments (measured in Japanese yen), such as macroeconomic conditions, foreign exchange rates, tax policies of host countries, and parent firm characteristics, as follows. First, we scale dividend payments by affiliate sales. Second, in our regression

[24] Several studies have employed a before-and-after comparison approach to examine policy effects. See, for example, Kim and Kross (1998), Blouin et al. (2004), Chetty and Saez (2005), and Kiyota and Okazaki (2005).

analysis described below, country-industry fixed effects are included to control for systematic differences in dividend payments across different industries and countries, which are possibly due to country-specific macroeconomic conditions over the entire data period. We also control for foreign exchange rates between Japanese yen and local currencies. To take into account demand for internal cash by parent firms, we will control for the profitability and the total debt of parent firms.[25]

We estimate the following equation in the spirit of Grubert (1998):

$$\begin{aligned}\text{Dividend}_{ijct} &= \alpha_0 + \alpha_1 P_{ijct} + \alpha_2 w^D_{ct} + \alpha_3 w^R_{ct} + \alpha_4 w^I_{ct} + \alpha_5 \tau_{ct} \\ &\quad + \beta_0 DE_t + \beta_1 \left(DE_t * P_{ijct}\right) + \beta_2 \left(DE_t * w^D_{ct}\right) + \beta_3 \left(DE_t * w^R_{ct}\right) \\ &\quad + \beta_4 \left(DE_t * w^I_{ct}\right) + \beta_5 \left(DE_t * \tau_{ct}\right) + \gamma X_{ijct} + u_{ijct}, \qquad (5)\end{aligned}$$

where Dividend_{ijct} is the dividend payments of affiliate i located in country c to its Japanese parent j divided by affiliate sales, in year t. The dummy variable DE_t is equal to one if $t = 2009$ and equal to zero otherwise. This dummy variable and its interaction terms with the tax variables are intended to capture the changes in dividends paid and responsiveness of dividends to the tax variables. As defined in the previous section, P_{ijct} is the grossed-up tax rate differential between Japan and foreign country c.[26] The withholding tax rates of country c in year t on dividends, royalties, and interest payments are w^D_{ct}, w^R_{ct}, and w^I_{ct},

[25] One may argue that we can create control and treatment groups using the information on fiscal year end months of parent companies and employ a difference-in-differences estimation, noting that dividend exemption applies to dividends received by parent companies in the accounting years starting on or after April 1, 2009. This requirement implies that parent firms whose accounting years end in March can apply for dividend exemption in the accounting years from 2009, while other firms can do so in the accounting years from 2010. However, we cannot tell from the data exactly when foreign subsidiaries pay dividends to their parents in a year. In addition, if fiscal year end months of parent companies are not March, their foreign subsidiaries should have an incentive to delay dividend payments so that the parents receive them in the accounting year of 2010 (but in the data period for 2009) and can claim exemption for those dividends. Therefore, it is difficult to identify dividends that did not qualify for dividend exemption in the data for 2009.

[26] To apply the gross-up calculation to $P_{ijc} = (\tau_H - \tau_{ijc})/(1 - \tau_{ijc})$ appropriately, we dropped observations with negative corporate tax payments ($T_{ijct} < 0$). The average subsidiary tax rate ($\tau_{ijc} = T_{ijct}/Y_{ijct}$) is set to 0 if $T_{ijct} = 0$ and $Y_{ijct} = 0$, where Y_{ijct} is the pre-tax profit of affiliate j, and is also set to 0.5 because foreign tax credits would apply up to 50% of foreign taxable income.

respectively.[27] The statutory tax rate of country c in year t is τ_{ct}.[28] The vector of other control variables are denoted as X_{ijct}, including the exchange rate between Japanese yen and the local currency in country c normalized to one at the level in 2005, lagged parent net profit scaled by total assets, lagged parent total debt scaled by total assets, country dummies, and industry dummies. To mitigate the influence of outliers, we winsorize all the scaled variables used in the analysis at the top and bottom one percent. Table 5 provides summary statistics for all of these variables before the winsorization.

=== Table 5 ===

From the hypotheses proposed in the previous section, we expect the signs of the key parameters to be as follows. If the dividend exemption system uniformly stimulated dividend repatriations by foreign affiliates of Japanese multinational firms, the coefficient on DE_t would be estimated to be positive, as hypothesized in H1 ($\beta_0 > 0$). The coefficient on P_{ijct} is expected to be negative ($\alpha_1 < 0$) because higher repatriation tax costs would discourage dividend payments under the worldwide tax system. If dividend payments became less sensitive to the tax rate differential between Japan and foreign countries under the new exemption system as hypothesized in H2, the coefficient on ($DE_t * P_{ijct}$) would be estimated to be positive ($\beta_1 > 0$). Another interpretation of H2 is that if dividend repatriations from lower-tax countries (high P_{ijct}) were discouraged under the worldwide tax system, foreign affiliates in these countries should pay more dividends scaled by sales than other affiliates when dividend exemption substantially eliminates the repatriation tax burden.

The coefficient on w^D_{ct} is expected to be negative ($\alpha_2 < 0$) because the tax price of dividends equals the withholding tax rate on dividends (w^D_{ct}) if a parent firm is in excess credit. If dividend repatriation becomes more sensitive to the withholding tax rates on dividends under the new exemption system, as hypothesized in H3, the coefficient on ($DE_t * w^D_{ct}$) would be estimated to be negative ($\beta_2 < 0$). The signs of the coefficients on the

[27] We collect information on withholding tax rates on dividends, royalties, and interest from the database of the Japan External Trade Organization (JETRO), J-FILE (http://www.jetro.go.jp/world/search/cost/). These data provide up-to-date information on the withholding tax rates of 75 countries for 2011. We also collect information on the withholding tax rates of 46-51 countries for 2007-2010 from the reports published by JETRO (http://www.jetro.go.jp/world/reports/). To supplement the information on the withholding tax rates for the countries that JETRO's data do not cover, in cases where Japan has tax treaties with these countries, we use the withholding tax rates determined in the tax treaties. We also obtain the information on the withholding tax rates from the *Worldwide Corporate Tax Guide*, which is published by Ernst & Young, and the *Worldwide Tax Summaries*, which is published by PricewaterhouseCoopers. Finally, our data contains information on the withholding tax rates of 96 countries from 2007 to 2009, which is used in our current analysis.

[28] Data on statutory corporate income tax rates are obtained from the KPMG Corporate and Indirect Tax Survey 2011. The statutory tax rates include sub-central (statutory) corporate income tax rates.

withholding tax rates and the statutory tax rates would depend on how strongly dividends substitute for royalties or interest as an alternative means of profit repatriations.

We employ a Tobit procedure because most affiliates (72 percent of all affiliates in the sample) pay zero dividends, and thus, the dependent variable in equation (5) could be considered as a right-censored variable. We estimate the equation including country and industry fixed effects to control for systematic difference in dividend payments across different industries and countries, and thus use across-affiliate variations to identify the parameters.[29].

Table 6 presents the estimation results. The point estimates are marginal effects on the latent dependent variable, which can be interpreted as a "desired" amount of dividend payments.[30] Notably, the estimated coefficient on DE_t is not positive and significantly different from zero in any specifications. This suggests that the dividend exemption system did not increase dividend payments of the "typical" (or median) affiliate that did not pay dividends under the worldwide tax system. This result is inconsistent with hypothesis H1. The coefficient on DE_t, of course, could falsely attribute the change in dividend payments in 2009 due to unobserved macroeconomic factors or the relevant structural shift in the Japanese economy during the data period.[31] However, this result is still surprising because we had expected that multinational firms demonstrate the largest response in the first year of the new exemption system by repatriating accumulated profits in foreign countries.

=== Table 6 ===

The estimated coefficient on the tax price of dividends (P_{ijct}) is negative and statistically different from zero at the one-percent level in all specifications. This suggests that the Japanese worldwide tax system significantly discouraged dividend repatriations from foreign affiliates in low tax countries because dividend repatriations triggered an additional tax liability proportional to the difference between Japanese and foreign tax rates under the worldwide tax system. However, the estimated coefficient on ($DE_t * P_{ijct}$) is also negative in all specifications, which is inconsistent with hypothesis H2. This suggests that dividend payments did not become less sensitive to the tax rate differential between Japan and foreign

[29]We do not include affiliate fixed effects in the Tobit models because of the incidental parameters problem, which renders estimators in non-linear panel data models with fixed effects inconsistent and biased and would be especially serious in a short panel like ours (Greene, 2007).

[30]In our analysis, the key parameters of interest are the interaction terms of DE_t and other tax variables. As Ai and Norton (2003) shows, the interaction effect in nonlinear models is different from the marginal effect of the interaction term. Therefore, in the estimation of our empirical models using a Tobit procedure, the marginal effect of the interaction terms on the observed dividend payments (conditional on positive dividend payments) cannot be calculated in a normal manner. Thus, we focus on the marginal effects on the latent variable for dividend payments, which is a linear function of independent variables.

[31]Most notably, the financial crisis triggered by the bankruptcy of Lehman Brothers severely hit the Japanese economy in 2008.

countries in the first year of the dividend exemption system. In other words, foreign affiliates in lower tax countries did not significantly increase dividend payments to their parents more than other affiliates. The coefficient on $(DE_t * w^D_{ct})$ is estimated to be negative, which is consistent with hypothesis H3 but not significant in either of specifications (3) and (4).

In summary, we find no evidence that the dividend exemption system stimulated dividend repatriations of "typical" foreign affiliates as hypothesized in H1 and H2. There are caveats for interpreting the estimation results. First, one limitation of relying on the DE_t dummy variable to measure the average change in the level of dividend payments of foreign affiliates is that the estimated coefficient on DE_t might falsely capture possible effects of cyclical and secular macroeconomic trends on profit repatriations in spite of our attempt to control for those confounding factors by the various control variables described above. Second, as Tables 1 and 2 may imply, the response of foreign affiliates to dividend exemption is heterogeneous. Foreign affiliates that have larger payout capacity of dividends than other affiliates, for example those with a large stock of retained earnings, may have responded more flexibly to dividend exemption by increasing dividend payments to their parent firms.

6 Heterogeneous Response to Dividend Exemption: By Stock of Retained Earnings

As we described in Section 2, one of the main goals of dividend exemption is to stimulate dividend repatriations from foreign affiliates that had retained and accumulated large amounts of foreign profit to avoid home taxation in Japan. Foreign affiliates with a large stock of retained earnings are also expected to show a stronger response to dividend exemption because dividends are distributed from after-tax profits and the stock of retained earnings. In this section, we study a heterogeneous response to dividend exemption depending on the size of retained earnings of foreign affiliates and examine whether foreign affiliates with a large stock of retained earnings in 2008 increased dividend payments in a manner consistent with our hypotheses H1 and H2.

We use information on the stock of retained earnings at the end of years 2007 and 2008 and construct a dummy variable equal to one if the stock of retained earnings scaled by sales is greater than the median value in the sample in the previous year, which is denoted as R_{ijct}, where i is the index for the affiliate owned by parent firm j. Table 7 summarizes dividend payments by foreign affiliates with the stock of retained earnings is larger than the median value in 2008 ($R_{ijc2009} = 1$) and dividend payments by foreign affiliates with $R_{ijc2009} = 0$. While the mean of dividend payments increased by 28.4 percent from 34 million yen in 2008 to

43 million yen in 2009 for foreign affiliates with $R_{ijc2009} = 0$, the mean of dividend payments by those with $R_{ijc2009} = 1$ increased much more sharply by 76.9 percent from 180 million yen in 2008 to 319 million yen in 2009. The mean of dividend payments as a fraction of affiliate sales for affiliates with $R_{ijc2009} = 1$ increased from 4.7 percent in 2008 to 5.5 percent in 2009 while the mean for affiliates with $R_{ijc2009} = 0$ remained almost at the same level between the two years (0.4 percent of affiliate sales). This suggests that foreign affiliates that retained large amounts of foreign profits at the end of 2008 paid larger amount of dividends in 2008 than other affiliates and, in addition, increased sharply dividend payments more sharply in 2009 than other affiliates.

=== Table 7 ===

To take into account the heterogeneity of the response to dividend exemption in the regression equation, we estimate equation (5) including the dummy variable R_{ijct} and the interaction terms of the dummy variable with each of DE_t, P_{ijct}, w^D_{ct}, $(DE_t * P_{ijct})$, and $(DE_t * w^D_{ct})$ as independent variables. Table 8 presents the estimation results. The coefficient on DE_t is still estimated to be negative as in Table 6. The coefficient on R_{ijct} is significantly positive, implying that foreign affiliates that had a large stock of retained earnings in the previous year paid more dividends in the next year. In addition, the coefficient on $(R_{ijct} * DE_t)$ is also significantly positive. This suggests that a foreign affiliate with a larger stock of retained earnings in 2008 paid more dividends than other affiliates in 2009, which is consistent with hypothesis H1.[32] The estimated coefficient on $(T_{ij} * DE_t)$ in column (4) implies that foreign affiliates with a large stock of retained earnings desired more dividend payments than other affiliates by 1.8 percent of affiliate sales in 2009.[33]

=== Table 8 ===

The coefficients on $(DE_t * P_{ijct})$ and $(R_{ijct} * DE_t * P_{ijct})$ are not precisely estimated in specifications (3) and (4), although we expected that foreign affiliates with a large stock of retained earnings should pay more dividends than other affiliates in 2009 as the grossed-up tax differential between Japan and the host country becomes larger. The coefficient on $(R_{ijct} * DE_t * w^D_{ct})$ is negative, which is consistent with our hypothesis H3, but is not significantly different from zero. These results suggest that the changes in dividend payments in 2009

[32] To investigate whether foreign affiliates with a large stock of retained earnings increased desired dividend payments, we also tested whether the sum of the coefficients on DE_t and $(R_{ijct} * DE_t)$ is positive and statistically different from zero. However, we cannot reject the null hypothesis that the sum of these coefficient is less than or equal to zero, possibly because the coefficient on DE_t is not precisely estimated.

[33] For the reason described in footnote 30, we focus on the marginal effect on the latent dependent variable (desired amount of dividend payments).

were not associated with foreign tax rates (corporate income tax rates and withholding tax rates on dividends), while the negative and significant coefficients on P_{ijct} and w_{ct}^{D} imply that the tax costs on dividends discouraged dividend payments under the worldwide tax system. This may suggest that Japanese multinationals did not aggressively pursue the opportunity to reduce the repatriation tax cost by repatriating more incomes through foreign affiliates in low tax countries in 2009, or that they just did not enough time to change their tax strategies in the first year after the tax regime change.[34]

In summary, the response of Japanese-owned affiliates to dividend exemption is heterogeneous depending on the size of the stock of retained earnings. Even though we could not find an significant effect of dividend exemption on the typical affiliates, foreign affiliates that had retained large amounts of foreign profits increased dividend payments more than other affiliates with the enactment of dividend exemption. In this sense, dividend exemption helped to fulfill the main aim to stimulate dividend repatriations from foreign affiliates with a large stock of retained earnings in line with the expectation of the Japanese government.

On the other hand, we find no evidence that the responsiveness of dividend repatriations to foreign tax rates significantly changed with the enactment of dividend exemption. The change in dividend payments was not associated with either the grossed-up tax rate difference between Japan and foreign countries, or the withholding tax rates on dividends, which is inconsistent with our hypotheses H2 and H3. The Japanese government was concerned that adopting a territorial tax system may facilitate tax avoidance by multinational corporations shifting foreign income to low tax countries. Though it might take more time for companies to change their tax strategies in response to the tax reform, our results suggest that Japanese parent firms did not immediately respond to dividend exemption by reallocating their foreign profits to their foreign affiliates in low tax countries and increasing dividend repatriations by those affiliates in 2009, and thus may alleviate the concern of the Japanese government.

7 Robustness Tests and Alternative Specifications

7.1 Robustness Tests

In this section, we describe the results from various robustness tests to see how sensitive the above results are to different specifications. First, one possible concern about the results obtained in the previous sections is that, because the dividend payout capacity increases as

[34] Similar results are obtained when we define the dummy variable R_{ijct} equal to one if the stock of retained earnings scaled by sale is greater than the 75 percentile value in the previous year's sample, and when we define R_{ijct} as a continuous variable equal to the stock of retained earnings scaled by affiliate sales in the previous year.

the profits of foreign subsidiaries increase, the significant positive coefficient on $(R_{ijct} * DE_t)$ may be caused by an increase in the profitability of foreign subsidiaries with a large stock of retained earnings in 2009 and may not be due to the enactment of dividend exemption. To investigate this issue, we estimate the same regression equations as those in Tables 6 and 8 replacing the dependent variable by pre-tax profit scaled by affiliate sales.[35] While the coefficient on DE_t is not significant and the coefficient on R_{ijct} is significantly positive, the coefficient on $(R_{ijct} * DE_t)$ is then estimated to be no longer significantly positive. This implies that the positive effect of dividend exemption on dividend payments by foreign affiliates with a large stock of retained earnings is not passed through the improvement of the profitability of foreign subsidiaries with large retained earnings. We also estimate the regression equations using dividend payments scaled by pre-tax profit as a dependent variable and then find similar results to those in Tables 6 and 8. This implies that foreign affiliates that had accumulated large foreign profits increased dividend payments relative to its pre-tax profit in 2009 than other affiliates.

Second, there may be a concern about division bias when we used dividend payments scaled by affiliate sales. Though the scaling variable is used to control for the subsidiary size, the dependent variable could be overly affected by the year-to-year fluctuation of subsidiary sales, which may bias the estimated coefficients. To explore this issue, we try scaling dividend payments by affiliate capital and estimating the same regression equations in Tables 6 and 8 by replacing the dependent variable by dividend payments scaled by capital. We then obtain similar results to those in Tables 6 and 8. Therefore, noting that we also obtained the similar results when scaling dividends by pre-tax profit, we conclude that our results do not depend on whether to scale dividend payments by affiliate sales, pre-tax profit, or capital, which alleviates the concern about division bias.

7.2 Alternative Specifications with One Summary Tax Price

The estimation equations in Section 5 and 6 focus on capturing the change in the dividend repatriation behavior of Japanese-owned foreign subsidiaries by the dummy variable DE_t and its interaction terms with foreign tax rates including the tax rate differential between Japan and foreign countries (P_{ijct}), the withholding tax rates, and the statutory tax rates of host countries. We employed that specification because our three hypotheses feature the changes in the sensitiveness of dividend repatriations to each of those foreign tax rates separately. However, as an alternative specification, we could use one tax price summarizing

[35] Unlike the estimation equation for dividend payments, there is no issue on the right-censoring for the pre-tax profits of foreign subsidiaries. Thus, we employ ordinary least squares to estimate the pre-tax profit equation.

the tax costs of dividend repatriations over 2007-2009 and see the responsiveness of dividend payments by foreign affiliates to the summary tax variable.

Assuming parent firm j is in excess limit position, dividend exemption changed the tax cost of paying a dollar of dividends by foreign affiliate i in country c in 2009 from P_{ijc} to $(0.05\tau_H + w_c^D)$, where P_{ijc} is the grossed-up difference between Japan's statutory tax rate and the average subsidiary tax rate, τ_H is the Japanese statutory corporate tax rate, and w_c^D is the withholding tax rate on dividends in country c. Thus the tax price on dividends over the data period can be summarized by

$$\text{Tax Price}_{ijct} \begin{cases} P_{ijc} = (\tau_H - \tau_{ijc})/(1 - \tau_{ijc}) & \text{if } t = 2007, 2008 \\ 0.05\tau_H + w_c^D. & \text{if } t = 2009. \end{cases}$$

We estimate a version of the regression equations in Tables 6 and 8 including Tax Price$_{ijct}$ as an independent variables instead of using P_{ijct} , w_c^D, and the interaction terms of DE_t with other tax variables as independent variables. Tables 9 and 10 present the estimation results. Specifications (1) and (2) in Table 9 and the specification (1) in Table 10 do not include DE_t or its interaction terms with Tax Price$_{ijct}$ and R_{ijct}. In these specification, the significantly negative coefficient on Tax Price$_{ijct}$ suggests that the tax price on dividends discouraged dividend payments by Japanese multinationals over the entire data period.

=== Tables 9 and 10 ===

Specifications (3) and (4) in Table 9 and specifications (2)-(4) in Table 10 include DE_t or its interaction terms with Tax Price$_{ijct}$ and R_{ijct} as independent variables. The coefficients on (DE_t∗Tax Price$_{ijct}$) and ($R_{ijct} * DE_t$∗Tax Price$_{ijct}$) are intended to capture the possible change in the responsiveness of dividend payments to the tax price in 2009. The coefficients on DE_t and $(R_{ijct}*DE_t)$ are intended to capture the change in the level of dividend payments that is not related to the tax price in 2009. In specification (4) in Table 9 and specifications (3) and (4) in Table 10, the estimated coefficient on DE_t is negative. The coefficient on $(R_{ijct} * DE_t)$ is estimated to be significantly positive in both specifications (3) and (4) in Table 10. This suggests that while the typical affiliate decreased dividend payments in 2009, foreign affiliates that had a large retained earnings in 2008 increased dividend payments more than other affiliates with the enactment of dividend exemption and supports the robustness of the result in the previous section.

On the other hand, the estimated coefficients on (DE_t∗Tax Price$_{ijct}$) and ($R_{ijct}*DE_t$∗Tax Price$_{ijct}$) is more difficult to interpret because as the signs of these coefficients change depending on whether to include DE_t and $(R_{ijct} * DE_t)$ as in specification (4) in Tables 9 and 10. While the coefficient on Tax Price$_{ijct}$ is significantly negative in all specifications, the sum of the coefficient on Tax Price_{ijct} and that on (DE_t*Tax Price_{ijct}) is 0.002 in specification (4) in Table 9 and the sum of the coefficients on Tax Price_{ijct} and its interaction terms with DE_t and R_{ijct} is also close to zero in specifications (2) and (4) in Table 10. This may suggest that dividend payments became less sensitive to the tax price on dividends in 2009.

8 Conclusion

Japan introduced a permanent dividend exemption and moved to a territorial tax system in April 2009. We provide the first evidence about the behavioral response of foreign affiliates to the transition from a worldwide income tax system to a territorial tax system by studying Japan's dividend exemption. We find no evidence that the dividend exemption system stimulated dividend repatriations of the typical foreign affiliate that had paid no dividends under the worldwide tax system. However, the response of Japanese multinationals to dividend exemption was heterogeneous. Foreign affiliates that had retained large amounts of profits were more responsive to the tax system change and started to pay more dividends than other affiliates in 2009. Therefore, dividend exemption helped to fulfill the main aim to stimulate dividend repatriations from foreign affiliates with a large stock of retained earnings in line with the expectation of the Japanese government. On the other hand, we find no evidence that the responsiveness of dividend repatriations to foreign tax rates significantly changed with the enactment of dividend exemption. The change in dividend payments was not associated with either the grossed-up tax rate difference between Japan and foreign countries, or the withholding tax rates on dividends in 2009.

Our results may be informative for international corporate tax policy design in the United States. The Japanese worldwide tax system was similar to that of the United States, and the two countries have the highest corporate tax rates among OECD countries. However, the response of U.S. multinationals to dividend exemption could be somewhat different than that of Japanese multinationals for two reasons.

First, the impact of a dividend exemption on profit repatriations should crucially depend on the proportion of parent firms in excess credit positions. Because foreign affiliates owned by parent firms in excess credit would not face repatriation taxes (P_{ijct}) in home countries under the worldwide tax system, their repatriation behavior would not change substantially with the introduction of dividend exemption. Thus, if the proportion of Japanese multinationals in excess credit positions under the worldwide tax system was larger than that of U.S.-owned affiliates, the impact of dividend exemption in Japan would be smaller than in the United States. In addition, unlike that of the United States, the Japanese worldwide tax system did not require multinational firms to calculate their foreign tax credits for foreign taxes on passive and active incomes separately. Thus, it might have been easier for Japanese multinationals to avoid the repatriation taxes by using excess foreign tax credits (cross-crediting) under the worldwide tax system than for U.S. multinationals.

Second, unlike the United States, Japan has tax-sparing agreements with several countries (Bangladesh, Brazil, China, Philippines, Sri Lanka, Thailand, and Zambia as of June 2012) in its tax treaties. Foreign affiliates in those countries may be less responsive to dividend exemption because the tax sparing provisions could substantially decrease their repatriation tax costs under the worldwide tax system for some of those foreign affiliates. Therefore, the response of U.S. multinationals to dividend exemption could be different (possibly larger) than that of Japanese multinationals. However, even given those considerations, our findings about the heterogeneous response depending on the stock of retained earnings are worth noting.

In conclusion, there are several research issues for the future that are worth mentioning. First, from the policy point of view, it important to analyze a general equilibrium effect of dividend exemption, focusing on the potential trade-off between the decline in tax revenues and the increases in dividend payments; however this issue is beyond the scope of this paper.[36] Second, a focus on foreign direct investment would be an important extension. Under the new exemption system, because foreign dividends are exempt from home taxation and Japanese multinationals must pay corporate income taxes only to host country governments, they should be likely to have more incentive to invest in low-tax countries than they did before April 2009. Because foreign direct investment is conducted from mid- to long-term perspectives, to address these issues, it is imperative that the quality and coverage of firm-affiliate-level panel data be improved and expanded.

[36] See Caves (2007, Chapter 8) for a survey on the welfare effects of taxation.

Appendix

In this appendix, we theoretically examine how the Hartman result changes when firms expect a decrease in repatriation tax rates on dividends using a simple three-period model based on Grubert (1998) and Altshuler and Grubert (2003). The model consists of three periods, 0, 1, and 2. Periods 0 and 1 are the periods before the introduction of the dividend exemption system, and period 2 is the period under the new exemption system. Denote the repatriation tax rates on dividends in period t by τ_t^D for $t = 0, 1, 2$. As we will show in the next subsection, dividend exemption decreases the repatriation tax rates on dividends. Thus we assume that $\tau_0^D = \tau_1^D > \tau_2^D$. Consider a parent firm in Japan and its "mature" foreign affiliate located in country c that has enough retained earnings ($\overline{R}$) to finance its investment. The foreign affiliate produces output using capital with the production function $f(K)$, where K is capital input. The production function is strictly concave, strictly increasing, continuous, and continuously differentiable, and satisfies the Inada condition: $\lim_{K\downarrow 0} f'(K) = \infty$. For simplicity, we assume that capital does not depreciate over time.

At the end of period 0, the affiliate determines the amount of retained earnings out of the stock of retained earnings $\overline{R}$ for reinvestment in period 1, denoted by E. The rest of earnings ($\overline{R} - E$) is repatriated to the parent by dividends. At the beginning of period 1, investment takes place using capital input E and the profit from the investment comes at the end of period 1. At the end of period 1, the affiliate repatriates D_1 of the after-tax affiliate income, retaining R to reinvest in period 2. Denote the statutory tax rate of country c by τ_c. Then D_1 can be written as $D_1 = ((1 - \tau_c)f(E) - R)$. In period 2, the affiliate produces using $(E + R)$ of capital and repatriates the entire net wealth to the parent firm in Japan at the end of the period by dividends. Thus $D_2 = (1 - \tau_c)f(E + R) + E + R$. The parent firm determines E and R so as to maximize the present value of the net cash flows:

$$\begin{aligned} \max_{E,R} \quad & \left(1 - \tau_1^D\right)\left(\overline{R} - E\right) + \frac{1}{1+r}\left(1 - \tau_1^D\right)\left((1 - \tau_c)f(E) - R\right) \\ & + \frac{1}{(1+r)^2}\left[\left(1 - \tau_2^D\right)(1 - \tau_c)f(E + R) + \left(1 - \tau_2^D\right)(E + R)\right], \end{aligned}$$

where r is the real interest rate.

The first order conditions for the maximization problem with respect to E and R are

$$\begin{aligned} -\left(1 - \tau_1^D\right) + \frac{1}{1+r}\left(1 - \tau_1^D\right)(1 - \tau_c)f'(E) + \frac{1}{(1+r)^2}\left[\left(1 - \tau_2^D\right)(1 - \tau_c)f'(E + R) + 1 - \tau_2^D\right] &= 0, \\ -\frac{1}{1+r}\left(1 - \tau_1^D\right) + \frac{1}{(1+r)^2}\left[\left(1 - \tau_2^D\right)(1 - \tau_c)f'(E + R) + 1 - \tau_2^D\right] &= 0. \end{aligned}$$

These two conditions can be rewritten as

$$(1-\tau_c)f'(E) \;=\; r, \tag{A-1}$$

$$(1-\tau_c)f'(E+R) \;=\; \frac{(1+r)\left(1-\tau_1^D\right)-\left(1-\tau_2^D\right)}{1-\tau_2^D}. \tag{A-2}$$

Equation (A-1) implies that the initial investment E does not depend on the repatriation tax rates. If the repatriation tax rate is constant over all the periods ($\tau_1^D = \tau_2^D$), R also does not depend on the repatriation tax rate because equation (A-2) then yields $(1-\tau_c)f'(E+R) = r$. Therefore, as Hartman (1985) shows, if $\tau_1^D = \tau_2^D$, the repatriation tax rate affects neither foreign investment nor dividend payments by the subsidiary.

However, if $\tau_1^D \neq \tau_2^D$, Hartman's result fails to hold. The total differentiation of equations (A-1) and (A-2) with respect to τ_1^D and τ_2^D yields

$$\frac{\partial R}{\partial \tau_1^D} \;=\; -\frac{1+r}{(1-\tau_2^D)\,(1-\tau_c)f''(E+R)} > 0, \tag{A-3}$$

$$\frac{\partial R}{\partial \tau_2^D} \;=\; \frac{(1-\tau_c)f'(E+R)+1}{(1-\tau_2^D)\,(1-\tau_c)f''(E+R)} < 0. \tag{A-4}$$

Equation (A-3) says that when the repatriation tax rate in period 1 is higher given the repatriation tax rate in the next period, the affiliate increases dividend payments in period 2. Equation (A-4) says that when the repatriation tax rate decreases in period 2, the affiliate will retain more profits in period 1 by decreasing dividend payments in that period and will increase them in period 2.

These results imply that Japan's foreign dividend exemption will stimulate dividend repatriations in two ways. Dividend exemption decreases the repatriation tax rate, and as a result, Japanese multinationals face the same lowered repatriation tax rate after the introduction of the dividend exemption system ($\tau_1^D > \tau_2^D$). Thus, as equation (A-4) shows, the lower repatriation tax rate (τ_2^D) will stimulate the dividend repatriations of Japanese multinationals given τ_1^D. As we will see in the next subsection, Japanese multinational firms had faced different repatriation tax rates under the worldwide tax system (τ_1^D) depending on their foreign tax credit positions and the corporate tax policies of host countries (e.g., corporate tax rates and bases). Therefore, as equation (A-3) implies, foreign affiliates that had faced higher repatriation tax rates will pay out more dividends under the new exemption system.

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Table 1: Dividend Payments by Foreign Affiliates (in million yen)

year	sum	mean	sd	p50	p75	p95	p99	N
2007	1109637	131.29	1552.53	0	11	338	2116	8452
2008	859563	92.10	811.13	0	5	287	1575	9333
2009	1458072	146.86	2296.52	0	2	253	1651	9928
Total	3427272	123.67	1687.13	0	5	293	1731	27713

Table 2: Dividend Payments by Foreign Affiliates as a Proportion of Sales

year	mean	sd	p50	p75	p95	p99	N
2007	.0473	1.2753	0	.0055	.0623	.2185	8076
2008	.0264	.7823	0	.0037	.0627	.2004	8871
2009	.0404	1.3320	0	.0025	.0762	.2954	9399
Total	.0378	1.1565	0	.0039	.0667	.2451	26346

Table 3: Proportion of Foreign Affiliates Paying Dividends

Year	Dividend > 0	Dividend $= 0$	Total Number of Affiliates	Proportion
2007	2530	5922	8452	30.0 %
2008	2587	6746	9333	27.7 %
2009	2564	7364	9928	25.8 %
Total	7681	20032	27713	27.7 %

Table 4: Definitions of Variables

Variable	Definition
Sales	Subsidiary operating revenues without including non-operating income
Dividend/Sales	Subsidiary dividend payments scaled by sales
P_{ijct}	Grossed-up difference between Japanese statutory tax rate and the subsidiary average tax rate
w_{ct}^{D}	Withholding tax rate on dividends
w_{ct}^{R}	Withholding tax rate on royalties
w_{ct}^{I}	Withholding tax rate on interest
τ_{ijct}	Average subsidiary tax rate, which is defined as the corporate tax payment divided by the pretax profit of subsidiary i
τ_{ct}	Statutory corporate tax rate
Exchange$_{ct}$	Exchange rate between Japanese yen and local currency, which is normalized to one in 2005
Parent Net Profit/Assets	Parent net profit scaled by total assets
Parent Total Debt/Assets	Parent total debt (total current and fixed liabilities) scaled by total assets
Retained Earning/Sales	Subsidiary retained earnings at the end of the account year scaled by sales
Pre-tax Profit/Sales	Subsidiary pretax profit scaled by sales

The subscripts i, j, c, and t intend to indicate the subsidiary, its parent firm, the country where the subsidiary is located, and the year, respectively.

Table 5: Descriptive Statistics

variable	**mean**	**sd**	**p25**	**p50**	**p75**	**N**
Dividend/Sales	.0378	1.1565	0	0	.0039	26346
P_{ijct}	.2648	.1673	.1660	.3188	.4069	29009
w_{ct}^{D}	.0672	.0627	0	.1	.1	39034
w_{ct}^{R}	.0887	.0598	.0525	.1	.1	39011
w_{ct}^{I}	.1035	.0448	.1	.1	.1	39011
τ_{ijct}	.1574	.1613	0	.1293	.2889	29009
τ_{ct}	.2883	.0702	.25	.2944	.33	39048
Exchange$_{ct}$	.9921	.1392	.8832	.9505	1.0664	39105
Parent Net Profit/Assets	.0074	.0668	-.0003	.0149	.0337	39031
Parent Total Debt/Assets	.5699	.2265	.3995	.5908	.7550	39181
Retained Earning/Sales	-.1360	36.8798	-.0098	.0839	.2733	28226
Pre-tax Profit/Sales	.0199	5.8587	.0005	.0336	.0914	31981

Table 6: Regressions of the Dividend Equation

	Affiliate Dividend Payment/Sales			
	(1)	(2)	(3)	(4)
DE_t	-0.001		-0.001	-0.012
	(0.002)		(0.008)	(0.011)
P_{ijct}	-0.117***	-0.113***	-0.109***	-0.126***
	(0.005)	(0.005)	(0.006)	(0.008)
$DE_t * P_{ijct}$		-0.014***	-0.024***	-0.005
		(0.005)	(0.008)	(0.010)
w_{ct}^D	-0.066	-0.067	-0.071	-0.063
	(0.059)	(0.059)	(0.061)	(0.083)
$DE * w_{ct}^D$			-0.002	-0.023
			(0.029)	(0.036)
w_{ct}^R	-0.077	-0.079*	-0.062	-0.030
	(0.047)	(0.047)	(0.048)	(0.100)
$DE_t * w_{ct}^R$			0.050	0.078
			(0.048)	(0.060)
w_{ct}^I	-0.055	-0.038	-0.023	-0.124
	(0.115)	(0.115)	(0.117)	(0.178)
$DE_t * w_{ct}^I$			-0.077	-0.064
			(0.052)	(0.064)
τ_{ct}	0.027	0.015	0.020	-0.030
	(0.027)	(0.027)	(0.027)	(0.244)
$DE_t * \tau_{ct}$			0.036	0.063*
			(0.028)	(0.035)
Foreign Exchange Rate	0.005	0.013*	0.002	-0.009
	(0.008)	(0.007)	(0.008)	(0.035)
Lagged Parent Net Profit/Assets				0.044**
				(0.022)
Lagged Parent Total Debt/Assets				-0.018***
				(0.006)
Constant	-0.052*	-0.058**	-0.051*	0.027
	(0.027)	(0.027)	(0.028)	(0.130)
Country and Industry Dummies	Yes	Yes	Yes	Yes
Observations	24,084	24,084	24,084	12,696

DE_t: dummy variable equal to one if $t = 2009$ and equal to zero otherwise. P_{ijct}: grossed-up difference between Japanese statutory corporate tax rate and the subsidiary average tax rate. w_{ct}^D, w_{ct}^R, w_{ct}^I: withholding tax rates on dividends, royalties, and interest, respectively. τ_{ct}: statutory tax rate of country c. Robust standard errors clustered by affiliate in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Dividend Payments of Foreign Afffiliates and the Size of the Stock of Retained Earnings

	Affiliates with $R_{ijc2009} = 0$		Affiliates with $R_{ijc2009} = 1$	
Year	Dividend (million yen)	Dividend/Sales	Dividend (million yen)	Dividend/Sales
2008	33.58	0.00413	180.26	0.0468
2009	43.11	0.00405	318.91	0.0597

This table shows the mean of dividend payments in 2008 and 2009 by foreign affiliates in each of the two groups ($R_{ijc2009} = 0$ and $R_{ijc2009} = 1$). Foreign affiliates with $R_{ijc2009} = 0$ are those with a stock of retained earnings scaled by sales less than or equal to the median value in the 2008 sample. Foreign affiliates with $R_{ijc2009} = 1$ are those with a stock of retained earnings scaled by sales greater than the median value in the 2008 sample.

Table 8: Regressions of the Dividend Equation including the Stock of Retained Earnings

	Affiliate Dividend Payments/Sales			
	(1)	(2)	(3)	(4)
DE_t	-0.004		-0.016	-0.017
	(0.004)		(0.011)	(0.011)
R_{ijct}	0.062***	0.042***	0.031***	0.031***
	(0.003)	(0.004)	(0.005)	(0.005)
$R_{ijct} * DE_t$	0.011***		0.016**	0.018***
	(0.003)		(0.007)	(0.007)
P_{ijct}	-0.085***	-0.136***	-0.146***	-0.146***
	(0.007)	(0.009)	(0.011)	(0.011)
$DE_t * P_{ijct}$		-0.019**	-0.001	0.001
		(0.009)	(0.013)	(0.013)
$R_{ijct} * P_{ijct}$		0.095***	0.115***	0.114***
		(0.013)	(0.015)	(0.015)
$R_{ijct} * DE_t * P_{ijct}$		0.020*	-0.016	-0.019
		(0.011)	(0.019)	(0.019)
w^D_{ct}	-0.113	-0.086	-0.160*	-0.157*
	(0.078)	(0.075)	(0.084)	(0.085)
$DE_t * w^D_{ct}$			0.022	0.020
			(0.051)	(0.051)
$R_{ijct} * w^D_{ct}$			0.056	0.055
			(0.044)	(0.044)
$R_{ijct} * DE_t * w^D_{ct}$			-0.047	-0.045
			(0.052)	(0.053)
w^R_{ct}	-0.027	-0.067	0.017	0.008
	(0.097)	(0.092)	(0.099)	(0.101)
$DE_t * w^R_{ct}$			0.068	0.061
			(0.059)	(0.059)
w^I_{ct}	-0.047	-0.046	-0.001	-0.004
	(0.184)	(0.182)	(0.186)	(0.188)
$DE_t * w^I_{ct}$			-0.070	-0.065
			(0.063)	(0.064)
τ_{ct}	-0.047	0.112	-0.153	-0.097
	(0.236)	(0.203)	(0.239)	(0.243)
$DE_t * \tau_{ct}$			0.046	0.048
			(0.035)	(0.035)
Foreign Exchange Rate$_{ct}$	-0.014	0.016	-0.031	-0.022
	(0.033)	(0.019)	(0.034)	(0.034)
Constant	-0.012	-0.092	0.069	0.034
	(0.125)	(0.098)	(0.126)	(0.128)
Parent Controls	Yes	Yes	No	Yes
Country and Industry Dummies	Yes	Yes	Yes	Yes
Observations	11,731	11,731	11,881	11,731

R_{ijct}: dummy variable equal to one if the stock of retained earnings scaled by sales is greater than the median value in the previous year's sample. Parent controls include the lagged net profit and the lagged total debt scaled by parent assets. Robust standard errors clustered by affiliate in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Dividend Regression Equation with the Single Tax Price

	Affiliate Dividend Payment/Sales			
	(1)	(2)	(3)	(4)
DE_t				-0.033***
				(0.005)
Tax Price$_{ijct}$	-0.084***	-0.097***	-0.084***	-0.115***
	(0.005)	(0.007)	(0.005)	(0.008)
DE_t*Tax Price$_{ijct}$			-0.030**	0.117***
			(0.012)	(0.023)
w^R_{ct}	-0.064	0.025	-0.069	-0.120
	(0.042)	(0.078)	(0.043)	(0.081)
w^I_{ct}	-0.165	-0.187	-0.167	-0.114
	(0.108)	(0.149)	(0.108)	(0.148)
τ_{ct}	0.071***	-0.242	0.058**	0.343*
	(0.027)	(0.178)	(0.027)	(0.206)
Foreign Exchange Rate	-0.050***	-0.103***	-0.042***	0.045
	(0.006)	(0.014)	(0.006)	(0.030)
Lagged Parent Net Profit/Assets		0.047**		0.040*
		(0.022)		(0.022)
Lagged Parent Total Debt/Assets		-0.017***		-0.018***
		(0.006)		(0.006)
Constant	-0.020	0.199**	-0.022	-0.190*
	(0.027)	(0.087)	(0.027)	(0.113)
Country and Industry Dummies	Yes	Yes	Yes	Yes
Observations	24,998	13,386	24,998	13,386

DE_t: dummy variable equal to one if $t = 2009$ and equal to zero otherwise. Tax Price$_{ijct}$ is the tax cost on dividends. w^R_{ct}, w^I_{ct}: withholding tax rates on royalties and interest, respectively. τ_{ct}: statutory tax rate of country c. Robust standard errors clustered by affiliate in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 10: Dividend Regression Equation with the Single Tax Price and the Stock of Retained Earnings

	Affiliate Dividend Payment/Sales			
	(1)	(2)	(3)	(4)
DE_t			-0.019***	-0.043***
			(0.004)	(0.006)
R_{ijct}	0.071***	0.055***	0.064***	0.035***
	(0.003)	(0.004)	(0.003)	(0.004)
$R_{ijct} * DE_t$			0.013***	0.039***
			(0.003)	(0.006)
Tax Price_{ijct}	-0.057***	-0.096***	-0.066***	-0.140***
	(0.007)	(0.009)	(0.007)	(0.011)
DE_t*Tax Price_{ijct}		-0.086***		0.110***
		(0.027)		(0.040)
$R_{ijct}*$Tax Price_{ijct}		0.064***		0.118***
		(0.012)		(0.015)
$R_{ijct} * DE_t*$Tax Price_{ijct}		0.125***		-0.082*
		(0.030)		(0.047)
w^R_{ct}	-0.031	-0.019	-0.104	-0.094
	(0.079)	(0.080)	(0.082)	(0.082)
w^I_{ct}	-0.081	-0.070	-0.029	0.005
	(0.169)	(0.171)	(0.168)	(0.173)
τ_{ct}	-0.074	-0.094	0.235	0.237
	(0.179)	(0.188)	(0.206)	(0.207)
Foreign Exchange Rate	-0.056***	-0.058***	0.008	0.020
	(0.015)	(0.019)	(0.029)	(0.030)
Lagged Parent Net Profit/Assets	0.038*	0.038*	0.036*	0.035
	(0.021)	(0.021)	(0.021)	(0.021)
Lagged Parent Total Debt/Assets	0.009*	0.009	0.009	0.008
	(0.006)	(0.006)	(0.006)	(0.006)
Constant	0.029	0.051	-0.160	-0.154
	(0.087)	(0.095)	(0.111)	(0.112)
Country and Industry Dummies	Yes	Yes	Yes	Yes
Observations	12,243	12,243	12,243	12,243

DE_t: dummy variable equal to one if $t = 2009$ and equal to zero otherwise. R_{ijct}: dummy variable equal to one if the stock of retained earnings scaled by sales is greater than the median value in the previous year's sample. Tax Price_{ijct} is the tax cost on dividends. w^R_{ct}, w^I_{ct}: withholding tax rates on royalties and interest, respectively. τ_{ct}: statutory tax rate of country c. Robust standard errors clustered by affiliate in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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Consequences of the New UK Tax Exemption System: Evidence from Micro-level Data

Abstract

Until 2009, the United Kingdom operated a system of worldwide taxation. Taxation of foreign income was deferred until repatriated as dividends, leaving UK-owned multinational firms the possibility of avoiding UK taxation by delaying dividend payments and keeping earnings abroad. In 2009, the UK switched to a system under which all foreign-earned income is exempted from taxation. This fundamental change had a number of straightforward implications for UK-owned multinational firms and particularly changed incentives to repatriate profits. This paper assesses the effects of the reform on the foreign affiliates of UK-owned multinational firms. We use data provided by Bureau van Dijk on 61,738 foreign affiliates located in one of 29 European countries to estimate the impact of the reform on the repatriation pattern and other outcomes of UK-owned affiliates. We use an identification approach that quasi-randomizes over the country of residence of the ultimate firm owners, allowing us to compare outcomes of treated UK-owned foreign affiliates to control non-UK-owned foreign affiliates. Our results suggest that the switch to tax exemption not only changed dividend repatriation behavior of firms but also the conditions under which foreign entities operate in general, for instance, with regard to investment behavior.

JEL-Code: F230, H250.

Keywords: UK Tax Reform 2009, tax exemption system, dividend exemption, foreign direct investment.

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1 Introduction

The debate about efficiency aspects of international taxation has been dominated by two basic concepts: capital export neutrality (CEN) and capital import neutrality (CIN). Both concepts were formulated by Peggy Musgrave in 1963 and 1969, respectively (see Brewer Richman, 1963; Musgrave, 1969). In her model, CEN ensures an efficient international allocation of capital and has therefore been considered for many years as a benchmark for evaluating international tax systems. The concepts of CEN and CIN are reflected in the distinction between tax systems following a residence-based or a source-based approach of taxation. A residence-based system guarantees CEN, because an investor faces only the tax imposed by her residence country so that the decision about which country to invest in is not affected. As the most prominent example, the United States follow this approach by taxing worldwide income of its residents while providing a foreign tax credit (*tax credit system*) for the amount of taxes paid to foreign countries.[1] CIN, on the other hand, ensures that all investors in a market are subject to the same tax and, therefore, there is no distortion of competition between firms active in the same market. At the same time, since taxes differ between jurisdictions, CIN does not satisfy global optimality criteria. In practice, CIN is guaranteed by a source-based tax system, which is the most common approach used by the majority of countries. In such a system, investors are taxed in the source country and exempted in the residence country (*tax exemption system*).

Since the contributions of Musgrave (1963, 1969), other aspects of CEN and CIN as well as alternative systems of taxation and their optimality properties have been discussed in a by now large body of literature (for a survey, see Devereux, 2008a).[2] For instance, it has been pointed out that CEN was consistent with the production efficiency concept of Diamond and Mirrlees (1971). While recognizing the limitations of the production efficiency theorem, Devereux (2008b) argues that it remains a useful benchmark to evaluate tax systems. Others emphasize that production efficiency is not directly ap-

[1]In practice, the observed residence-based systems are *limited* credit systems, since the tax credit granted for foreign tax paid is limited to the home-country tax liability due on foreign-earned income.

[2]Several models account for new challenges associated with the increased international integration and/or consider further dimensions of neutrality (national neutrality, Musgrave, 1969; capital ownership neutrality, Desai and Hines, 2003; market neutrality, Devereux, 1990, 2000; global portfolio neutrality, Desai and Dharmapala, 2009).

plicable in an international setting (Keen and Wildasin, 2004). Some tax experts deny the applicability of CEN in a world with increased international integration (Frisch, 1990; Hufbauer, 1992), while others object this view (Grubert and Mutti, 1995). The very recent discussion in the literature on optimal systems of taxation (Desai and Hines, 2003; Becker and Fuest, 2008, 2010, 2011a,b) shows that eventually too little is known about how investors organize their activities in response to the tax regime under which they operate in order to draw firm conclusions about the optimality of one or the other system.

Relative to the large body of normative work, there is little positive evidence on the matter. One reason for the latter is that countries rarely change their system of taxation, and most countries implemented their system at times before good data were available. Only a few studies have tried to assess the impact of a move towards exemption of dividends. Altshuler and Grubert (2001) investigate how the introduction of dividend exemption would affect location incentives of US corporations. Their findings imply that dividend exemption would not significantly alter the location decisions of US firms. Desai, Foley, and Hines (2001) find that repatriation taxes reduce dividend repatriations by US foreign affiliates and quantify the induced efficiency losses. Smart (2010) exploits variation in dividend repatriation taxes faced by Canadian MNEs and shows that tax exemption of dividend repatriation (through new tax treaties concluded with foreign countries) is associated with an increase in outbound foreign direct investment (FDI) by about 80%.

This paper utilizes a reform of the United Kingdom's tax system in 2009, when the country switched from tax credit to tax exemption, in an attempt to quantify the behavioral responses of foreign affiliates of UK-owned multinational firms (MNEs). This reform provides a unique opportunity to examine the (short-run) impact of such a fundamental change in the taxation of foreign income.[3] Since only repatriated profits were subject to taxation in the UK under the credit system, one obvious implication of the tax reform was that MNEs with foreign affiliates faced new incentives with respect to dividend repatriation after the reform relative to the outset. Empirically, a challenge lies in the identification of the true effects of the reform. For this,

[3]Note that also Germany introduced general tax exemption in 2001. However, foreign income of German-owned MNEs was virtually exempt through the country's extensive bilateral tax treaty network that existed already prior to 2001. The conclusions that could be drawn from the German experiment are therefore limited.

we use an identification approach that quasi-randomizes over the location of residence of ultimate firm owners. Such an approach allows us to compare outcomes of *treated* UK-owned foreign affiliates to *control* non-UK-owned foreign affiliates. We construct a control group of non-treated (non-UK-owned) foreign affiliates that have the same propensity to be UK-owned as the treated (UK-owned) foreign affiliates. For the empirical investigation, we use the Amadeus database provided by Bureau van Dijk. This micro-level database includes balance-sheet information on MNEs in European countries. The data provide information on a number of outcome variables and allow us to identify parent firms and ultimate owners as well as affiliates before and after the tax reform. We investigate effects primarily on dividend policy but also on firms' foreign sales-to-fixed-asset ratios and investment. The latter two variables may be indirectly affected by the fundamental reform of the UK tax system through their relationship to dividend payments as well. Our results suggest that the reform induced firms to pay out significantly more dividends, as expected. The average UK-owned affiliate is estimated to have paid out about US$ 2.15mn more dividends (immediately after the reform) than the counterfactual affiliate in the absence of the reform. Another remarkable finding is that the average UK-owned affiliate cut investment by about US$ 3.05mn in response to the reform. The investment effect implies that the reform indirectly affected real outcomes via the change in incentives for profit repatriation.

The remainder of the paper is structured in the following way. Section 2 summarizes the main aspects of the UK tax reform and its expected effects on UK-owned foreign affiliates. In Section 3, we present the empirical approach and describe the data utilized. Section 4 offers the results including various robustness tests, and the last section concludes with a summary of the key findings.

2 Aims and Expected Effects of UK's Reform of Taxing Foreign-earned Profits

Until 2009, the UK operated a system of worldwide taxation or tax credit system. Under this system, UK residents were taxed on their worldwide income while, for taxes paid in foreign countries, a foreign tax credit was provided to avoid double taxation. Taxation of foreign income was deferred until repatriated as dividends, leaving UK-owned MNEs the possibility of avoiding UK taxation by delaying dividend payments and keeping earnings abroad.[4] In 2009, the UK abolished the system of worldwide taxation and established a tax exemption system, under which all foreign-earned income is exempted from UK tax.

This fundamental change of the tax system has a number of straightforward implications for UK-based MNEs – particularly for their incentives to repatriate profits. As of 2008, UK companies were subject to a statutory corporation tax rate of 28%. Thus, until 2008, repatriated foreign-source income was taxed at 28% and a tax credit was provided for taxes paid at the foreign locations up to the limit of the UK tax of 28%. Assume, for example, that a UK-owned affiliate located in Poland, where the corporate income tax rate was 19% in 2008, generated a profit of £100 there, so that £19 of tax were due in Poland. Had it repatriated the remaining £81 as dividends to the UK, it would have faced the UK corporate tax rate of 28% on the £100 gross profits and gotten a credit of £19 for the foreign tax, having had to pay £9 tax in the UK. The total tax burden equaled the UK corporate tax rate of 28%, and net dividend income amounted to £72. In this example, the repatriation of the dividends brought about a tax obligation of £9, which could have been avoided by leaving the profits abroad. Thus, under the tax-credit system, UK-owned firms located in foreign countries where the local tax rate was *lower* than in the UK had a disincentive to repatriate profits to the UK. UK-owned foreign affiliates located in countries with a local tax rate that was *higher* than in the UK did not face an additional tax upon repatriating dividends to the UK and had no tax disincentive to repatriate income.[5]

As of 2009, foreign dividends received by UK companies are exempt from taxation in the UK. The tax burden is determined by the foreign corporate tax rate. In the example above, the tax burden amounts to the Polish corporate tax rate of 19%, and the UK parent receives now a net dividend

[4]However, "controlled foreign company" (CFC) rules in the UK restrained this possibility by apportioning undistributed profits of the CFC to the UK parent and taxing them. A foreign affiliate falls under the CFC regime if the foreign tax rate is less than 75% of the UK tax rate and the profits attributed to the UK owner represent 25% or more of the foreign affiliate's profits.

[5]Those firms got a tax credit equal to 28% of the foreign profits. Unlike in the US, which also has a tax credit system, UK-owned firms were not allowed to average their worldwide foreign income tax payments to claim a tax credit. On-shore pooling of dividends and using excess tax credit against other foreign dividends received by the company were allowed only to some extent.

income of £81. Under the new exemption system, UK companies investing in countries with a *lower* tax rate than in the UK no longer face a tax penalty for dividend repatriation and exhibit higher after-tax returns on their investments. Besides, under the credit system, UK-based MNEs investing in low-tax countries had a disadvantage against MNEs based in countries with an exemption system. This disadvantage vanished with the switch to foreign dividend exemption.

When the first proposal of the reform was presented in 2007 by the UK Treasury, it stated explicitly that the goal of the tax reform was to make UK firms more competitive by simplifying the tax regime for foreign dividends. The government's objective "*that the tax system should not distort commercial decisions*" would be achieved by exempting foreign dividends so that firms would no longer leave profits off-shore for tax reasons and could use repatriated profits to fund other foreign investment from the UK. Further, the switch to exemption would also make firms investing in high-tax countries more competitive by reducing compliance costs, since even in the absence of an additional tax liability upon repatriating highly taxed foreign profits, "*the administrative costs for multinational business of complying with the credit regime can be material*" (HM Treasury, 2007, p. 13). In particular, the government concluded that the old system reduced the competitiveness of UK businesses and resulted in a significant administrative burden for both businesses and HM Revenue & Customs, while it produced only a modest amount of direct tax yield (HM Treasury, 2009, p. 4). As part of the European Union, where most countries operate an exemption system, policy makers as well as economists argued in favor of this move, which was expected to equalize the terms on which UK-owned firms were competing with foreign-owned ones (Griffith, Hines, and Sørensen, 2010).

Table 1 lists and describes the various outcomes of foreign affiliates we examine in the empirical analysis. We broadly distinguish between outcomes affecting the *repatriation pattern* of firms and *other indicators*, capturing likely indirect reform effects. The latter may not only be related to a new repatriation policy but also to the removal of compliance costs by introducing a simpler system of taxation "*enabling multinational business to operate more effectively*" in general (HM Treasury 2009, p. 5).

As for the repatriation pattern, we expect the reform to have induced firms to repatriate foreign-source income that had been kept abroad to avoid taxation. The magnitude of this effect depends on the foreign tax burden relative to the UK and on the availability of profitable investment opportunities abroad. In fact, to the extent that UK companies deferred UK taxation and kept profits abroad for reasons not related to the tax credit system in the pre-reform period, the reform did not change the actual tax burden of foreign affiliates in the short run (see Gammie, Griffith, and Miller, 2008). Of course, in the long run, upon repatriation of profits to the UK, this is no longer the case.[6]

– Table 1 –

As for other indicators, we might expect indirect effects of the reform. On the one hand, dividend repatriation may affect real outcomes because financing funds are withdrawn from foreign affiliates. This, on the other hand, may improve efficiency of foreign affiliates, since less cash flow is available and over-investment is reduced (see Jensen, 1986). Efficiency may also be improved through the reduction in compliance costs associated with the simpler tax exemption system. To capture these two aspects, we investigate possible effects of the reform on investment and the sales-to-fixed-asset ratio of foreign entities.[7]

[6]While an increase in the flow of repatriated dividends seems to be a natural prediction as the tax system (tax credit vs. tax exemption) of the ultimate owner affects repatriation policy of firms directly, it is not clear for which purposes hitherto deferred foreign-earned income is used in the ultimate owner country in case of repatriation. Although, for example, US MNEs have been pressing the government for a tax break – in which case, so their claim, they would repatriate income accumulated at foreign subsidiaries to the US for investment purposes (see New York Times, June 19, 2011, http://www.nytimes.com/2011/06/20/business/20tax.html?hp) – Dharmapala, Foley, and Forbes (2011) show that the 2005 US one-time tax holiday for the repatriation of foreign income did not lead to more real domestic activity (investment, employment, or R&D) but, instead, "*a \$1 increase in repatriations was associated with an increase of almost \$1 in payouts to shareholders*" (Dharmapala, Foley, and Forbes, 2011). Our data-set does not permit a rigorous investigation of outcomes at the level of owners in the UK, but it supports an analysis of outcomes at the level of foreign affiliates by identified ultimate owners in the UK.

[7]Of course, efficiency is a rather abstract concept and it is not clear how to measure it in the present context.

3 Empirical Approach

3.1 Some Notation and Concepts

To estimate *treatment* effects of the UK tax reform, we aim at comparing outcomes of *treated* affiliates where the ultimate shareholder is actually located in the UK with *control* affiliates held by non-UK shareholders. Since ultimate owners (and ultimate owner countries) are not randomly assigned to affiliates, the goal of the empirical investigation is to evaluate UK-owned firms relative to non-UK-owned ones that exhibit the same propensity to be UK-owned but whose ultimate owner is actually located somewhere else.

We approach this empirical problem by adopting an approach of *selection on observables* based on matching on the propensity score. In a first step, we estimate the propensity of an affiliate to be UK-owned from a *location choice* model.[8] Let us denote affiliates by $i = 1, \ldots, N$ and countries these affiliates may be held from by $j = 1, \ldots, J$. Each affiliate i may principally be owned ultimately in one of the J countries in the data. For convenience, let us refer to the UK by $j = 1$ and to all other locations (where at least some ultimate owners are located) by $j = 2, \ldots, J$. In general, we focus on the choice of ultimate owner location for affiliate i in the year 2008 and on outcome effects of the tax reform measured in 2009. For the sake of simplicity, we abstract from using a time index. Location choice is modeled as a function of observables as of the year 2008.

Let us denote the actual location of the ultimate owner in 2008 of affiliate i by $C_i \in \Lambda$, where Λ refers to the set of countries that could be chosen in the sample. Furthermore, define the scalar D_i^j which is unity if i's owner is located in j ($C_i = j$) and zero else. Each potential ownership location in J for affiliate i involves a potential outcome $\tilde{y}_i^j$. The latter should be distinguished from actual outcome. Suppose affiliate i is actually owned in j. Then, its actual outcome can be denoted by y_i^j. Hence, no matter where i's owner actually resides, we can determine a potential (hypothetical or imputed) outcome associated with ownership in j.

Our goal is to estimate the average effect of the adoption of the UK's tax exemption system on UK-owned affiliates ($j = 1$) relative to non-UK-

[8]Note that MNEs are faced with two types of location choices, one about affiliates and one about headquarters (or the ultimate owner). Here, we focus on the latter. This seems plausible against the strong evidence of mergers and acquisitions as the dominant form of (foreign and domestic) ownership of affiliates.

owned affiliates ($j \neq 1$) – an *average treatment effect on the treated* (ATT) – on outcome, conditional on observables. The latter invokes the following assumption.

A*ssumption 1. Conditional mean independence*

$$E(y_i^1|D_i^1 = 1, \mathbf{X} = \mathbf{x}_i^j) = E(y_i^1|\mathbf{X} = \mathbf{x}_i^j),$$
$$E(\tilde{y}_i^j|D_i^1 = 1, \mathbf{X} = \mathbf{x}_i^j) = E(\tilde{y}_i^j|\mathbf{X} = \mathbf{x}_i^j)\; \forall\, i = 1, ..., N; j \neq 1,$$

where $\mathbf{x}_i^j$ *is the specific realization of an* $1 \times L$ *random vector of covariates* $\mathbf{X}$. That is, after conditioning on observable characteristics $\mathbf{x}_i^j$, treatment (UK-ownership) is independent of actual or potential outcome.

Define the propensity score for affiliate i to be ultimately owned in country 1 by

$$p_i^1 \;\equiv\; Pr(C_i = 1|\mathbf{X} = \mathbf{x}_i^j). \tag{1}$$

The elements p_i^1 can be collected in the $N \times 1$ vector $\mathbf{p}^1$. We further desire all elements $0 < p_i^1 < 1$ of $\mathbf{p}^1$ to comply with the following assumption.

A*ssumption 2. Balancing condition*

$$D_i^1 \perp \mathbf{x}_i^1|p_i^1(\mathbf{x}_i^j).$$

Then, conditional mean independence implies that outcome with treatment state *UK ownership*, y_i^1, and outcome with counterfactual state *non-UK ownership*, y_i^j for $j = 2, \ldots, J$, are independent of assignment of UK ownership given the propensity score of being UK-owned, p_i^1.

Using Assumptions 1 and 2, we may define the ATT of the inception of tax exemption in the UK on UK-owned foreign affiliates as

$$ATT^{1j} = E(y_i^1 - \tilde{y}_i^j|D_i^1 = 1, \mathbf{X} = \mathbf{x}_i^1).$$

3.2 Implementation

There is a number of options for modeling the multinomial choice problem determining p_i^j in general and p_i^1 in particular through nonlinear multinomial probability models. Examples thereof are the classes of multinomial probit-type models and multinomial logit-type models. With a huge number of foreign affiliates N each with an ultimate owner in one of J potential parent countries, it is natural to resort to multinomial logit-type models due to their tractability and numerical stability.[9] In the class of logit-type models, the mixed-logit or random-coefficients logit is a natural candidate since it allows for heteroskedasticity and correlation across alternatives.[10]

We postulate that affiliate i would receive latent net profits π_i^j from having an ultimate owner located in country j according to

$$\pi_i^j = \mathbf{x}^j \boldsymbol{\beta}_i + \alpha_i^j, \quad i = 1, ..., N, \ j = 1, ..., J, \tag{2}$$

where the $1 \times L$ vector $\mathbf{x}^j$ contains determinants of profits which are alternative-(country-)specific. α_i^j represent unobservable variables affecting the choice. The $L \times 1$ vector of random weights $\boldsymbol{\beta}_i$ on $\mathbf{x}^j$ are unknown and vary in the population. We postulate them to depend on both observables and unobservables in the following way

$$\boldsymbol{\beta}_i = \mathbf{y}_i \boldsymbol{\gamma} + \boldsymbol{\delta}_i, \tag{3}$$

where the $1 \times L$ vector $\mathbf{y}_i$ contains determinants of profits which are affiliate specific, and $\boldsymbol{\delta}_i$ is unobserved and randomly distributed over firms with density $f(\boldsymbol{\theta})$.[11]

The actual choice $C_i \in \{1, ..., J\}$ is based on the maximum attainable profit, $\arg\max(\pi_i^1, ..., \pi_i^J)$. Assuming that the α_i^j are independently distributed across alternatives with a type I extreme value distribution, that the $\boldsymbol{\delta}_i$ are normally distributed, and using the functional form of the logit model, we obtain the probability of the actual choice to be $C_i = j$ as

$$p_i^j = \int \frac{\exp(\mathbf{x}^j \mathbf{y}_i \boldsymbol{\gamma} + \mathbf{x}^j \boldsymbol{\delta}_i)}{\sum_{j=1}^J \exp(\mathbf{x}^j \mathbf{y}_i \boldsymbol{\gamma} + \mathbf{x}^j \boldsymbol{\delta}_i)} \phi(\boldsymbol{\delta}_i | \mu, \Omega) d\boldsymbol{\delta}, \quad \text{for all } i, j, \tag{4}$$

[9] Multivariate probit-type models require integrating numerically a multivariate normal whose dimensions are determined by the number of choices taken. In spite of the efficient simulation algorithms available nowadays, it is computationally extremely demanding to estimate p_i^j by multinomial probit-type models in a choice problem that is as large as the one here.

[10] The computationally more convenient conditional logit is restrictive due to the well-known property of independence from irrelevant alternatives. This means that the choices taken with regard to alternatives j versus ℓ are not affected when adding further alternatives, and the model predicts that a change in an attribute of alternative j will change the probabilities of all other alternatives in the same proportion.

[11] Hence, we specify latent profits as $\pi_i^j = \mathbf{x}^j \mathbf{y}_i \boldsymbol{\gamma} + \mathbf{x}^j \boldsymbol{\delta}_i + \alpha_i^j$ with fixed coefficients $\boldsymbol{\gamma}$ on interactions of country-and-affiliate-specific variables and random coefficients $\boldsymbol{\delta}_i$ on country-specific variables.

where $\phi(.)$ is the normal density with mean μ and covariance Ω.

The mixed logit model in (2) is estimated by simulated maximum likelihood[12] and delivers estimates $\hat{p}_i^1$ for being owned by an ultimate owner in the UK. Notice that these choice probabilities depend in part on country- (i.e., UK-)specific observables in $\mathbf{x}_i^1$ and in part on ones specific to affiliate i which is actually or potentially (but, in any case, likely) owned in the UK. Notice that, by design, the former fulfill the balancing property Assumption 2: when focusing on ATT^{1j} – i.e., the average treatment effect of being treated on average foreign affiliate outcome from being owned in the UK (superscript 1) relative to elsewhere (superscript j) – we only compare affiliates that are actually UK-owned with potentially (but not actually) UK-owned ones. The i-specific variables involve the total assets (TA_i) of affiliate i in interactive terms. Hence, it will suffice to illustrate the suitability of the i-specific variable total assets TA_i in terms of the balancing condition.

In terms of the matching algorithm to construct the control group, we employ radius matching with a radius of one percent – a special form of kernel matching based on a uniform kernel with the radius as the bandwidth. Provided that the balancing condition holds, this ensures a certain quality of matching, because it requires the estimated propensities of control units to lie within a specific radius around the estimated propensity of a treated unit. For estimating the ATT^{1j} we require for every affiliate i' with an ultimate owner in $j \neq 1$ which is matched onto affiliate i with an ultimate owner in $j = 1$ that $|\hat{p}_i^{1,j=1} - \hat{p}_{i'}^{1,j\neq 1}| \leq 0.01$.

3.3 Data

We use data on $N = 61,738$ affiliates which are located in one of 29 European countries as provided by Bureau van Dijk's Amadeus database. The data contain information not only about the country of location of the affiliate and associated balance-sheet data but also on the nationality of their ultimate owner. The ultimate owners in the data locate in one of $J = 72$ countries. As said before, we utilize information about the location of ultimate owners in 2008 and measure observables determining this location as in (2) in the same year.

The vector $\mathbf{x}_i^j$ contains the following observable regressors determining ultimate owner location choice. *Statutory tax rate*$_j$ is the statutory corporate

[12]See Train (2009) for details on the mixed-logit model and its estimation.

profit tax rate in country j. The tax data are collected from databases provided by the International Bureau of Fiscal Documentation (IBFD) and tax surveys provided by Ernst&Young, PricewaterhouseCoopers, and KPMG. $\textit{log GDP per capita}_j$ and $\textit{log GDP}_j$ measure real GDP per capita and real GDP in country j in 2008 at constant US dollars (base year 2000) and are taken from the World Bank's World Development Indicators 2009. These variables measure aggregate market size and demand characteristics at market j. Moreover, we include a number of variables measuring the perceived quality of governance in country j as available from the World Bank's Worldwide Governance Indicators (WGI) 2011. $\textit{Voice and accountability}_j$ captures the extent to which citizens are able to participate in selecting their government, as well as freedom of expression, association, and press. $\textit{Control of corruption}_j$ measures the perceived extent to which public power is exercised for private gain. $\textit{Government effectiveness}_j$ captures the perceived quality of public and civil services and the independence of the latter from political pressures, the quality of policy formulation, and implementation and the credibility of the government's commitment to such policies. $\textit{Political stability}_j$ measures the perceived likelihood of a coup or government destabilization by unconstitutional or violent means. $\textit{Regulatory quality}_j$ measures perceived government ability to formulate and implement sound policies and regulations that permit and promote the development of a private sector. $\textit{Rule of law}_j$ captures perceptions of the extent to which agents have confidence in and abide the rules of society, in particular, the quality of contract enforcement, property rights, police, and courts. $\textit{Common language}_{lj}$ and $\textit{Colony}_{lj}$ are indicators for common language and former colonial ties between countries l (the host country of the affiliate) and j (the potential residence of the ultimate owner), and $\textit{log Distance}_{lj}$ is the log of the distance (in kilometer) between the most populated cities in countries l and j. These bilateral geographical and cultural variables are published by the Centre d'Études Prospectives et d'Informations Internationales. Finally, our location choice model includes interaction terms of the listed country-j-specific variables with affiliate-i-specific characteristics to improve the precision of the propensity score estimates. To capture affiliate characteristics, we employ the total assets (TA_i) of foreign affiliates.

Beyond the observables (summarized in Table 2) determining ultimate ownership location and, hence, treatment status after adoption of tax exemption, the Amadeus data-set also contains information on outcomes of interest as listed in Table 3.

– TABLES 2 and 3 –

4 Effects of the 2009 UK Tax Reform

4.1 Aggregate Effects and Macro Environment around the Reform

While the quasi-experimental approach as suggested in Section 3 relies on subsidiary-firm-level information, it may be interesting to take a look at different macro variables around the time of the tax reform first. Of course, the purpose of the approach using micro data is to find out about the real effects associated with the switch to tax exemption that are concealed when looking at aggregate statistics. The first such statistic depicts dividend income of UK residents on investments abroad over time (data source: Office for National Statistics, UK Balance of Payments, 2011). Figure 1 suggests that dividends increased sharply from 2008 to 2009 and then decreased slightly in 2010. This pattern would be in line with the 2009 switch to tax exemption. But we should note that the figure includes non-corporate residents, for which tax incentives did not change.

– FIGURE 1 –

Figures 2, 3, and 4 are produced by aggregating over all units in our micro-level data-set (using all corporate entities in the Amadeus data-set for which ultimate owners are known). First, Figure 2 depicts the total assets aggregated over all affiliates over time. It seems that foreign direct investment measured in total assets increased slightly for US foreign affiliates. For the other countries included, the total assets did not change in a noticeable way from 2008 to 2009. Second, Figure 3 depicts how aggregated dividends changed over time. All countries but France experienced a drop in dividends from 2008 to 2009. However, there is no change of notable significance in the UK data compared with other countries. Finally, we may look at the total number of foreign entities over time. Figure 4 reveals that the number of foreign affiliates of multinational firms remained fairly constant over the period of investigation, which is a reassuring result.

– FIGURES 2, 3 AND 4 –

Since we identify treatment with UK-ownership, it is important to make sure that UK-owned firms did not have better investment opportunities in the UK relative to other countries in the year of the reform on average. This would have induced dividend repatriations for non-tax reasons, otherwise. To see that this was not the case, consider the macro-economic environment in the UK and other countries at the time around the reform. Figure 5 shows that exchange rates of different currencies before and after the July 2009 reform were relatively stable and lacked large fluctuations (data source: OECD). Hence, drastic currency exchange rate movements do not seem to be of concern.

– Figure 5 –

Another aggregate statistic to be considered are long-term interest rates. Figure 6 suggests slight fluctuations of long-term interest rates (data source: OECD). However, over the whole year 2009, UK interest rates did not change significantly relative to Euro area interest rates, so that investors did not face significant changes in investment opportunities which might confound the effect of the tax regime change.

– Figure 6 –

Overall, apart from Figure 1, the aggregate statistics in Figures 2-6 look generally stable and do not exhibit noticeable changes so that the change in Figure 1 is likely attributable to the tax reform. An empirical approach that exploits micro-level information is called for in the present context in order to condition out not only country-level but also some firm-level interactive determinants of the selection of affiliates into UK ownership for the sake of identifying the effects of the reform. Such an approach principally permits heterogeneous responses of affiliates with differing characteristics, and it then helps avoiding an associated aggregation bias of the ATT of the reform.

4.2 Parametric Unconditional and Conditional Treatment Effects

Before turning to the main results of our analysis, let us provide preliminary results regarding average treatment effects on outcome of interest of

UK-owned firms.[13] Two types of average treatment effects are of particular interest to our analysis: an unconditional (mean) comparison of outcome of UK-owned versus non-UK-owned firms outside of the UK from a linear regression model of outcome on a binary indicator variable for UK ownership along with a constant, and a conditional comparison from a linear regression model of outcome on a binary indicator variable for UK ownership along with a constant and relevant covariates.

In the sample at hand, the parametric unconditional mean comparison of dividends paid in 2009 ($DIV_{i,2009}$) between UK-owned and non-UK-owned firms outside of the UK amounts to US$ 2mn, which is not significantly different from zero at a standard error of about US$ 1.6mn. The conditional mean comparison based on a linear regression yields an average treatment effect of about US$ 1.03mn at a standard error of US$ 1.7mn. The unconditional and conditional parametric mean comparisons point to average treatment effects of UK ownership in the reform year of about 5 percentage points (significant at 1%) on the dividend payout ratio $DIVREL_{i,2009}$, which captures actually distributed dividends relative to the maximum amount that could have been distributed. In view of an average value of $DIVREL_{i,2009}$ of about 13%, this is a sizable average treatment effect (which is quantitatively consistent with the change in Figure 1 relating to aggregate dividend payments).

Two further variables considered in the analysis are the ratio of sales to fixed assets of unit i in 2009 ($SA/FA_{i,2009}$) and the level of net investment as a change in fixed assets between 2008 and 2009 ($INV_{i,2009}$). The unconditional mean comparisons for $SA/FA_{i,2009}$ and $INV_{i,2009}$ are 88.7 and US$ -2.2mn with standard errors of 48.04 and US$ 2.8mn, respectively. The corresponding parametric conditional mean comparisons for $SA/FA_{i,2009}$ and $INV_{i,2009}$ are 83.8 and US$ -2.8mn with standard errors of 48.4 and US$ 2.7mn, respectively.

[13] Of course, it would be very interesting to examine parent-level outcomes using the same empirical approach. We tried to do so, but the present version of Amadeus on unconsolidated balance sheets of multinational firms does not provide a sufficient number of foreign-affiliate-UK-parent matches, for which information on outcomes is available.

4.3 Nonparametric Conditional Average Treatment Effects on the Treated

The remainder of the paper is concerned with ensuring a better comparability of treated and untreated units than in unconditional or parametric conditional mean comparisons. Such comparability is ensured by a nonparametric identification strategy for ATTs implemented by a matching approach as described in Section 3. Matching is based on predicted probabilities (or propensities) from ownership-location-choice-model estimates. We always enforce a common probability support of the treated and control units in order to ensure better comparability of matched units.

– Table 11 –

Table 11 reports ownership-location-choice-model estimates for two alternative econometric models: a conditional logit model and a mixed logit model. While the conditional logit model assumes an independence of irrelevant alternatives, the mixed logit model relaxes this assumption by allowing for correlation in unobserved factors over alternatives. Hence, the mixed logit model is less restrictive than the conditional logit. Either model includes three types of covariates: country-pair (between any potential ownership residence country j and the foreign affiliate's host country l) specific covariates; parent country j-specific covariates; and interactive terms between affiliate i-specific characteristics and parent country j-specific variables.[14] Among the parent-country-specific regressors, there are $\textit{Statutory tax rate}_j$, $\textit{log GDP per capita}_j$, $\textit{log GDP}_j$, $\textit{Voice and accountability}_j$, $\textit{Control of corruption}_j$, $\textit{Government effectiveness}_j$, $\textit{Political stability}_j$, $\textit{Regulatory quality}_j$, and $\textit{Rule of law}_j$, as introduced in Subsection 3.3. All of those are – in addition to entering as main effects – interacted with the affiliate i-specific total assets (TA_i). Finally, the ownership location choice models include three potential parent-by-host (l-by-j) country specific variables: $\textit{Common language}_{lj}$, $\textit{Colony}_{lj}$, and $\textit{log Distance}_{lj}$.[15]

[14] The location choice model used is per se an alternative-specific estimation approach. Therefore, the specifications include country (alternative-specific) variables as well as interaction terms thereof with affiliate-specific variables, but not affiliate-specific variables on their own. While we do not aim at interpreting coefficients, the controls are useful to obtain precise estimates for the location probabilities used in the matching approach.

[15] We have estimated more parsimonious models than the ones in Table 11. However, we suppress them for the sake of brevity here.

For estimating the location choice models, it is elemental to construct a data-set which allows each affiliate to be principally owned in any one of the 72 ownership countries in the sample. With $61,738$ affiliates, this leads to $72 \cdot 61,738 = 4,445,136$ choices. It turns out that the relaxation of the assumption of independence of the estimated propensities of irrelevant alternatives does not have an important impact on the findings, here. For instance, Spearman's rank correlation coefficient between the propensities as estimated from the mixed logit model and the conditional logit amounts to 0.77 and Kendall's τ amounts to 0.58. Hence, there is a high correlation of propensities which leads to similar control groups for the treated selected from one or the other model (see Subsection 4.5 for further evidence on this matter). However, we will base our main findings on propensities estimated from the mixed logit model since it is less restrictive than the conditional logit model.

– Table 4 –

ATTs derived from matching-based conditional mean comparisons are presented in Table 4 for the four different outcomes as of 2009: dividends paid in 2009 ($DIV_{i,2009}$); the dividend payout ratio ($DIVREL_{i,2009}$); the sales-to-fixed-asset ratio ($SA/FA_{i,2009}$); and net investments in fixed assets ($INV_{i,2009}$). The findings indicate that a randomly chosen foreign affiliate with a UK owner distributes about US$ 2.15mn more on dividends in 2009 ($DIV_{i,2009}$) than a comparable counterfactual affiliate with an ultimate owner outside of the UK. This (about 35% margin over the untreated) is an economically significant effect when considering that these funds are withdrawn from foreign entities in response to a change in tax policy in the home country.[16] The effect is also statistically significant at conventional levels. There is also a positive and significant effect of the UK reform on the dividend payout ratio $DIVREL_{i,2009}$. The coefficient implies that UK-ownership is associated with a five percentage points higher ratio than non-UK-ownership after the reform (but, as we will see, not prior to it). Again, this is a sizeable effect when considering that the average value of $DIVREL_{i,2009}$ for the whole sample equals 13%. Hence, as expected, the new incentives generated by the reform seem to have induced firms to adjust their repatriation policy.

[16]Notice that the change in aggregate earnings of UK residents on investment income abroad rose by about 70% in the comparison year, according to Figure 1. However, the latter includes income of non-corporate entities (private residents) so that the two figures are not directly comparable.

As argued in Section 2, effects beyond those on dividend policy are likely. On the one hand, new repatriation incentives may translate into real investment effects since financial funds are withdrawn from foreign affiliates (with less attractive investment opportunities than ones in the UK). This is a short-run effect. On the other hand, in the long run, this may reduce inefficiencies at the level of foreign affiliates, especially if the reform reduced compliance costs associated with the old tax credit system in a significant way. Considering the sales-to-fixed-assets ratio as one efficiency measure, we find a positive and statistically significant ATT of about 82 on that outcome. This nonparametric, conditional mean comparison is of a similar magnitude as the unconditional mean comparison reported in the previous subsection.

Such efficiency gains should be expected to translate into investment effects. The estimated ATT on real investment of foreign entities implies that UK-owned foreign affiliates invested on average about US$ 3mn (or about 88%) less than their counterfactual affiliates in 2009. This ATT is larger than its unconditional mean comparison counterpart reported in the previous subsection. In combination with the finding for dividend repatriation, this indicates that tax incentives indeed may have induced firms to avoid repatriation so that free cash flow was available for investments in unproductive projects.[17]

4.4 Heterogeneous Conditional Average Treatment Effects on the Treated

While the previous two subsections focused on *average* treatment effects on the treated across *all* comparable treated and untreated control units, one would expect the effects to vary (rise in magnitude) with the tax incentives in place. This subsection is devoted to shed light on this conjecture. Before doing so, recall that the nonparametric propensity score matching approach could be cast as a weighted linear regression that regresses outcome on a constant and a binary treatment indicator for UK ownership of foreign affiliates with the weights being the Kernel weights from the matching procedure (see Robins and Rotnitzky, 1995; Hirano and Imbens, 2002; Blundell and Costa Dias, 2009).[18] If the ATT would vary systematically with the host

[17]This argument is aligned with Jensen (1986), who argues that free cash flow may be used to invest below the cost of capital.

[18]In principal, that weighted regression could condition on the observables as included in the ownership location choice model. However, this appears to be unnecessary and

country's corporate tax rate, one could use this weighted least squares approach to propensity score matching and regress outcome on a constant, a binary treatment indicator for UK ownership of foreign affiliates, and an interactive term between that binary treatment indicator and the *demeaned* corporate tax rates. The latter would subtract the average corporate tax rate among the treated from the original value of the corporate tax rate to ensure that the parameter on the uninteracted treatment indicator variable still measures the ATT (see Wooldridge, 2002, p. 613; Blundell and Costa Dias, 2009; Abadie and Imbens 2011; Fitzenberger, Sommerfeld and Steffes, 2012). Again, the weights of this regression model are the Kernel weights from the matching procedure.

– FIGURE 7 –

Figure 7 illustrates the variability of ATTs across affiliate-country tax rates as estimated by the aforementioned weighted regression approach (using the mixed logit regression model as in Table 11 and uniform Kernel weights corresponding to radius matching with a radius of 0.01). The solid flat line indicates the ATT on dividends for the average affiliate and applied corporate tax rate in a host country. This ATT amounts to about US$ 2.13mn which is statistically indistinguishable from the ATT of about US$ 2.15mn based on propensity score matching and reported in Table 4. The negatively sloped line indicates how the ATT varies across host country statutory corporate tax rates. Notice that the two lines cross at a value of the corporate tax rate of about 0.28 (28%). With the UK's corporate tax rate of 28%, this is exactly the point where foreign tax incentives to repatriate remained unchanged (zero) before and after the reform. To the left of that point, the treatment effect on dividends is *higher than the average* for affiliates located in lower-tax countries. For affiliates located in countries with a higher tax rate than the UK, the treatment effect is also positive albeit *lower than the average*. The latter finding is in line with arguments that a tax exemption system tends to reduce compliance costs in general. However, we should admit that this interpretation does not pay attention to details regarding the actual tax status of parent firms in the UK.

only would lead to an efficiency loss here, since there is no indication of a violence of the balancing property, by which the treated and matched control units do not differ (on average) in any of the dimensions of the included vector of observables.

4.5 Sensitivity Analysis

A number of issues appear of particular interest when thinking about the sensitivity of the above results. First, the most important consideration here is the question of whether the results on endogenous UK ownership may indeed be interpreted as reform effects. Notice that we have estimated ATTs as of the year 2009 when the reform took place, but it could be that the same effect had occurred already in 2008, so that the ATT should not be ascribed to the reform. We shed light on this question by illustrating that there is no evidence of significant ATTs (of UK ownership) in the pre-reform year, 2008. The corresponding set of results is presented for all outcomes in Table 5.

– Table 5 –

Clearly, the table suggests that the *placebo* treatment in 2008 does not lead to significant ATTs with the same sign in Table 5 as in Table 4.[19] Hence, the ATT may indeed be interpreted as a UK ownership times reform treatment ATT as proposed rather than just an ATT for UK ownership per se.

Second, we estimate the ATTs separately for countries whose corporate tax rate is lower than the one in the UK. To some extent, this is similar to the question asked in Subsection 4.4. However, in that subsection we enforced linearity in the variability of ATTs with corporate tax rates so that the ATT for below-UK corporate tax rates may have been driven by affiliates in countries with quite high tax rates. This problem can be avoided by relaxing the assumption of poolability of data for affiliates with below-UK and above-UK corporate tax rates. In other words, let us look at those foreign affiliates where the tax disincentive of the tax credit system was particularly high before the introduction of tax exemption of corporate profits. Although we do not know the exact tax status of multinational firms – for example, whether firms had unused foreign tax credit before the reform, whether firms could offset losses, whether dividend payments were channeled through intermediate entities, or whether affiliates operated under preferential tax regimes – we would expect that the ATT was more pronounced for this subgroup.

– Table 6 –

Table 6 presents the estimated ATTs suggesting that treatment effects on $DIV_{i,2009}$ and $DIVREL_{i,2009}$ are indeed bigger for affiliates located in lower-tax countries than the UK. Note, however, that the number of treated entities

[19] An interesting finding is the positive ATT for $INV_{i,2009}$, which is in line with the above argument about inefficient investment when free cash flows are available.

is now less than half of what it was before. Consequently, the confidence intervals are overlapping between the subsample in Table 6 and the overall sample in Table 4, akin to the result in Figure 7.

Third, we explore whether the effects prevail in different subsamples in terms of characteristics beyond the statutory corporate tax rates. As we are interested in treatment effects associated with switching into tax exemption, we may want to construct a control group that consists of affiliates located in countries using the tax exemption system, too. In other words, we exclude control affiliates with ultimate owners located in countries that apply a tax credit system from the sample.[20] Naturally, this leads to a reduction in potential control units on which we can match treated units in Table 7.

– Table 7 –

However, the results in the associated Table 7 show that all ATTs have the same sign compared with the benchmark results in Table 4, with slightly larger estimates of the ATTs.

Fourth, we exclude all control affiliates for which related entities in the UK are observed. In fact, if a UK entity is related to an entity of the control group, the former unit might be used as a vehicle to channel dividends to other locations (to other affiliates or to the ultimate owner). In this sense, these controls are indirectly treated, and it makes sense to restrict attention to units for which this possibility is ruled out.

– Table 8 –

Except for investment, the results in Table 8 suggest that this leads to significantly bigger ATTs. The effect on dividends exceeds the benchmark estimate by about US$ 1.4mn, the estimated effect on the payout ratio exceeds the benchmark estimate by about 1.4 percentage points. By excluding firms with affiliates in the UK we can guarantee that the control group is not confounded by reform effects.

Another test relates to the size of multinationals' affiliate networks. Table 9 distinguishes between multinational firms consisting of only one entity, ones that have 2 to 5 entities, and ones with more than 5 entities. Of course, this approach results in drastically smaller subsamples, which is particularly the case when focusing on single-entity multinationals. For example, in the analysis of dividends, 187 treated are matched onto 7,023 control units. For

[20]The list of such countries is reported in the notes to Table 7.

these 187 treated single-entity firms, we can ensure that dividends are not repatriated to some other intermediate affiliate but only to the ultimate UK owner.

– Table 9 –

Apparently, the size of the treatment effect concerning the level of dividends largely depends on the size of the affiliate network, with the *more-than-5-affiliate* multinationals exhibiting the biggest treatment effect. However, Table 9 also demonstrates that the findings are qualitatively very robust across the different subsamples, and treatment effects are mostly statistically significant and estimated with the correct sign.

Finally, we shed light on the qualitative insensitivity of the results to using a conditional logit ownership location choice model instead of the mixed logit model. Recall that the rank correlation coefficient between the two propensity score vectors is quite high (Spearman's rank correlation coefficient amounted to 0.77 and Kendall's τ was 0.58). While this makes similar results for conditional logit based and mixed logit based propensity score matching likely, it does not ensure such similarity.

– Table 10 –

The ATT estimates based on conditional logit corresponding to the ones based on mixed logit in Table 4 are presented in Table 10. These results confirm all findings presented in Table 4. Magnitudes of ATTs seem to be slightly underestimated when using conditional logit propensity scores in Table 10 compared to the benchmark ATTs in Table 4.

5 Conclusions

This paper evaluates how the 2009 UK tax reform affected the behavior of foreign affiliates of UK-owned multinational firms immediately after the reform. One key element of the reform was to introduce a new *tax exemption system*, replacing the *tax credit system* which was in place before. This change had fundamental implications for the tax incentives for multinational firms' behavior: while foreign earnings of UK-owned firms were taxed under the tax credit system, the tax exemption system entails that foreign income is taxed at foreign entities but repatriated income remains tax-exempt in the UK under the new regime.

We suggest an identification strategy to assess the impact of the tax reform on foreign affiliates of UK-owned multinational firms that relies on matching on observables based on propensity scores that are estimated from a multivariate location choice model. This approach allows comparing outcomes of *treated* foreign affiliates which are ultimately owned in the UK with imputed outcomes of counterfactual *control* foreign affiliates which are ultimately owned outside of the UK but exhibit a propensity to be UK-owned which is very similar to the treated units.

Our results imply that foreign affiliates of UK owners responded to the reform by repatriating more foreign dividends than without the reform. The responses are not only statistically but also economically significant with an average effect on the treated firms' dividends of more than US$ 2mn. Apart from dividend repatriation, which was directly affected by the reform, other economic outcomes are found to be affected too. For example, the reform affected affiliate-level investment negatively and the affiliate-level sales-to-fixed-assets ratio positively. However, the latter are only examples of indirect effects of the reform. A more encompassing (short- and long-run) analysis thereof would require an in-depth theoretical analysis to provide more-thoroughly informed empirical work as we can deliver here. Placebo treatments using the same approach in the year prior to the reform provide statistically insignificant estimates for different outcomes, confirming that the identified effects do not represent statistical artifacts. Further robustness tests are reassuring and suggest that measured firm responses are indeed caused by the implementation of the tax reform.

Future research should focus not only on how the change in repatriation policy of UK multinationals affected their operations in the home market in general but in particular whether firms became more competitive (in the home and foreign markets). The latter would be interesting since UK tax authorities emphasized this as one important goal of the reform. But of course, while the reform changed repatriation incentives in a fundamental way, it is not clear how productivity or real investment behavior at home is affected by such a reform and how this is to be measured in a reliable way.

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Tables and Figures

Table 1: Outcome Variables

	Repatriation Pattern:
$DIV_{i,2009}$	is dividends (DIV) paid in 2009
$DIVREL_{i,2009}$	is defined as the ratio of the actual dividends paid in 2009 relative to the maximum payable amount of dividends in 2009
	Other Indicators:
$SA/FA_{i,2009}$	is defined as the sales-to-fixed-asset ratio of affiliate i
$INV_{i,2009}$	is affiliate i's investment in fixed assets

Notes: Since dividend payments are not directly observed in the data, we calculate $DIV_{i,2009}$ as the difference between available shareholder funds for distribution after current profits in 2008 (Amadeus codes: $SHFD_{i,2008} + PL_{i,2008}$) and available shareholder funds for distribution before current profits in 2009 ($SHFD_{i,2009}$). In case we observe negative values, $DIV_{i,2009}$ is set to zero. Investment is defined as the change in the fixed assets from 2008 to 2009.

Table 2: Descriptive Statistics (Determinants of Ultimate Owner Location)

	Mean	Std. Dev.	Min.	Max.
Statutory tax rate$_j$	0.263	0.084	0.100	0.550
log GDP per capita$_j$	9.657	0.856	7.169	11.326
log GDP$_j$	26.177	1.580	22.934	30.182
Voice and accountability$_j$	0.431	0.960	-1.889	1.568
Control of corruption$_j$	0.544	1.075	-1.337	2.421
Government effectiveness$_j$	0.656	0.930	-1.236	2.194
Political stability$_j$	0.223	0.896	-2.756	1.444
Regulatory quality$_j$	0.656	0.857	-1.689	1.835
Rule of law$_j$	0.565	0.968	-1.586	1.937
Common language$_{lj}$	0.037	0.188	0	1
Colony$_{lj}$	0.031	0.147	0	1
log Distance$_{lj}$	7.995	1.083	1.900	9.883
TA$_i$ $\times$ Statutory tax rate$_j$	3.438	37.419	-0.282	6,532.679
TA$_i$ $\times$ *log* GDP$_j$	342.077	3,550.793	-15.516	358,490.800
TA$_i$ $\times$ *log* GDP per capita$_j$	126.201	1,312.758	-5.823	134,529.500
TA$_i$ $\times$ Voice and accountability$_j$	5.640	143.161	-22,440.860	18,623.990
TA$_i$ $\times$ Control of corruption$_j$	7.117	163.755	-15,875.910	28,758.940
TA$_i$ $\times$ Government effectiveness$_j$	8.573	152.659	-14,686.230	26,059.570
TA$_i$ $\times$ Political stability$_j$	2.921	125.688	-32,739.400	17,146.470
TA$_i$ $\times$ Regulatory quality$_j$	8.575	146.605	-20,059.380	21,797.330
TA$_i$ $\times$ Rule of law$_j$	7.389	152.422	-18,835.240	23,006.310

Notes: Descriptive statistics for all variables based on 4,445,136 observations used in the location choice model (see Table 11); TA denotes the total assets of affiliate i in 10mn US$; for a detailed description of the variables used (including data sources), see Section 3.3.

Table 3: Descriptive Statistics (Outcome Variables)

	Whole Sample								
	All affiliates			UK-owned (Treated)			Non-UK-owned (Control)		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N
$DIV_{i,2009}$	6,290.806	116,736.800	58,345	8,097.743	73,683.920	2,393	6,213.526	118,228.800	55,952
$DIVREL_{i,2009}$	0.132	0.233	58,331	0.181	0.267	2,393	0.129	0.231	55,938
$SA/FA_{i,2009}$	125.986	1,879.337	60,044	202.652	2,207.152	2,517	122.632	1,863.628	57,527
$INV_{i,2009}$	5,956.385	288,649.600	61,620	2,470.110	129,624.600	2,585	6,109.041	293,651.100	59,035
	Matched Sample								
	All affiliates			UK-owned (Treated)			Non-UK-owned (Control)		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N
$DIV_{i,2009}$	4,022.099	55,816.830	58,050	6,064.583	37,399.970	2,382	3,934.702	56,469.620	55,668
$DIVREL_{i,2009}$	0.132	0.233	58,036	0.182	0.267	2,382	0.129	0.231	55,654
$SA/FA_{i,2009}$	126.532	1,884.266	59,723	203.613	2,212.390	2,505	123.157	1,868.535	57,218
$INV_{i,2009}$	3,443.149	97,963.31	61,292	430.031	38,082.610	2,573	3,575.181	99,766.710	58,719

Notes: Dividends and Investment are measured in 1,000 US$.

Figure 1: Earnings of UK Residents on Investment Income Abroad

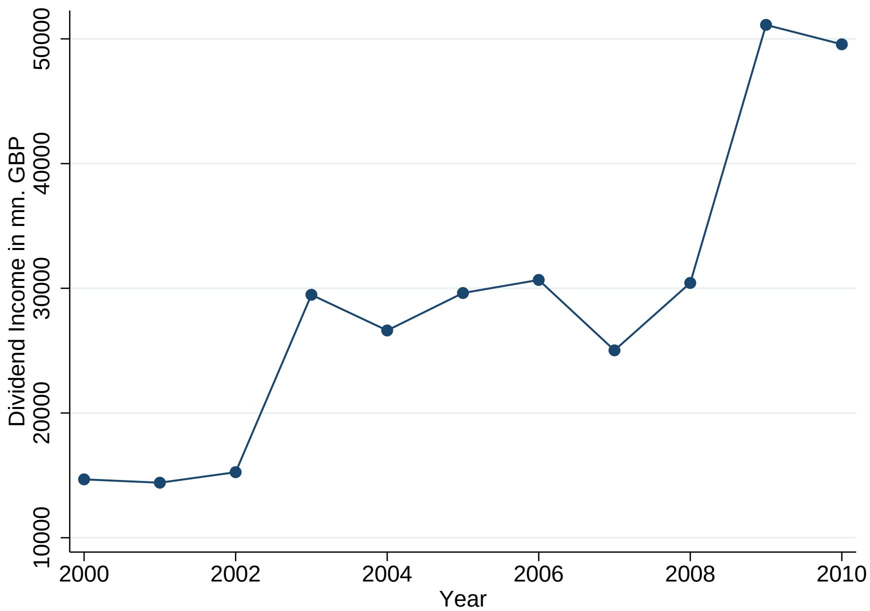

Figure 2: Aggregate Total Assets of Foreign Affiliates

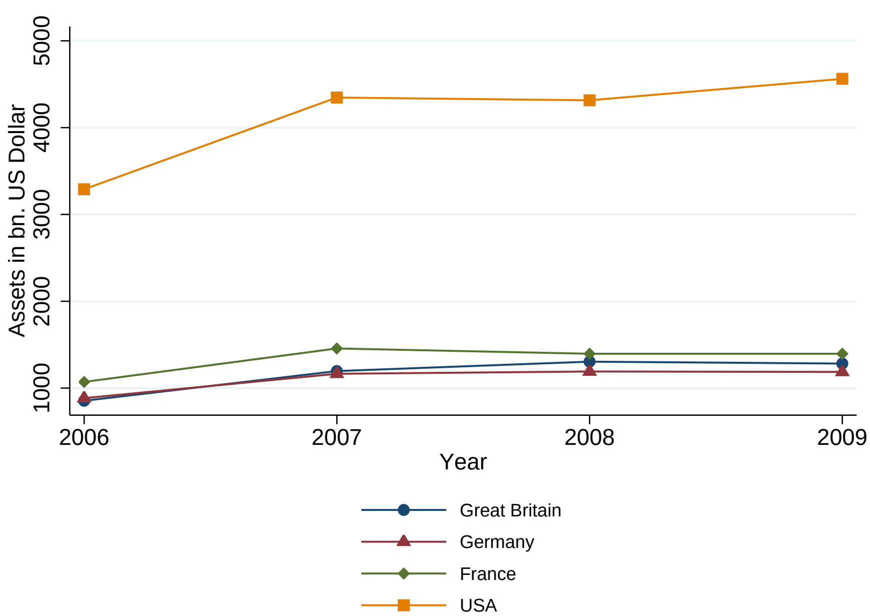

Figure 3: Aggregate Dividends of Foreign Affiliates

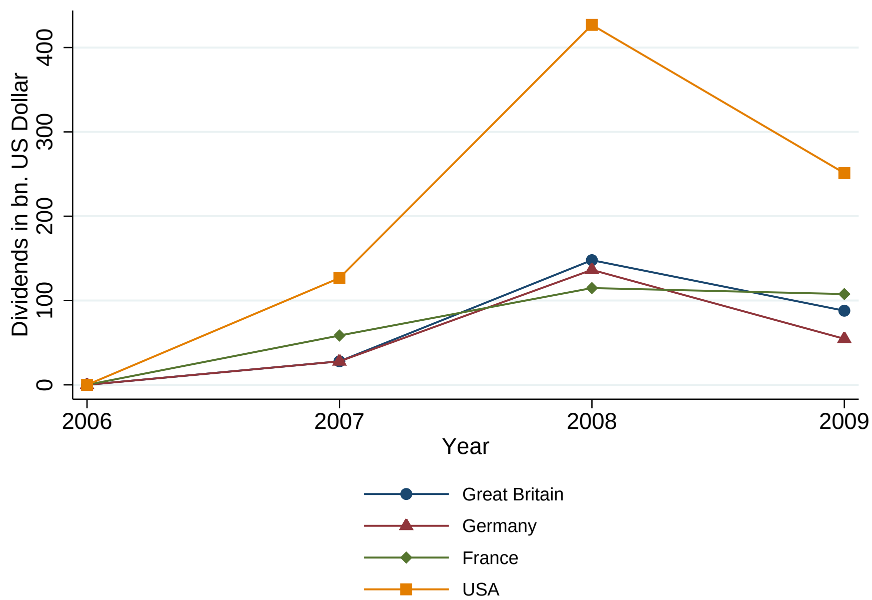

Figure 4: Total Number of Foreign Affiliates

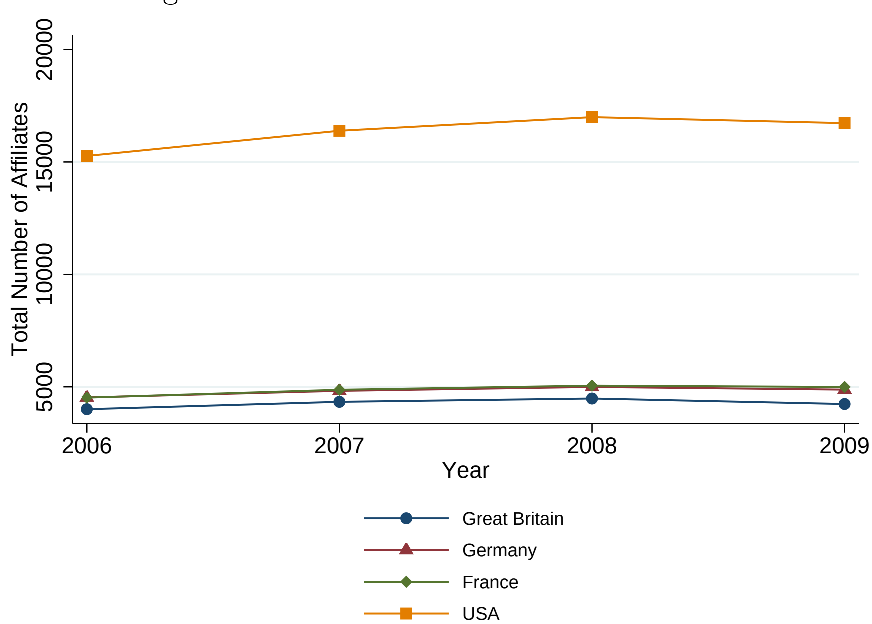

Figure 5: Currency Exchange Rates

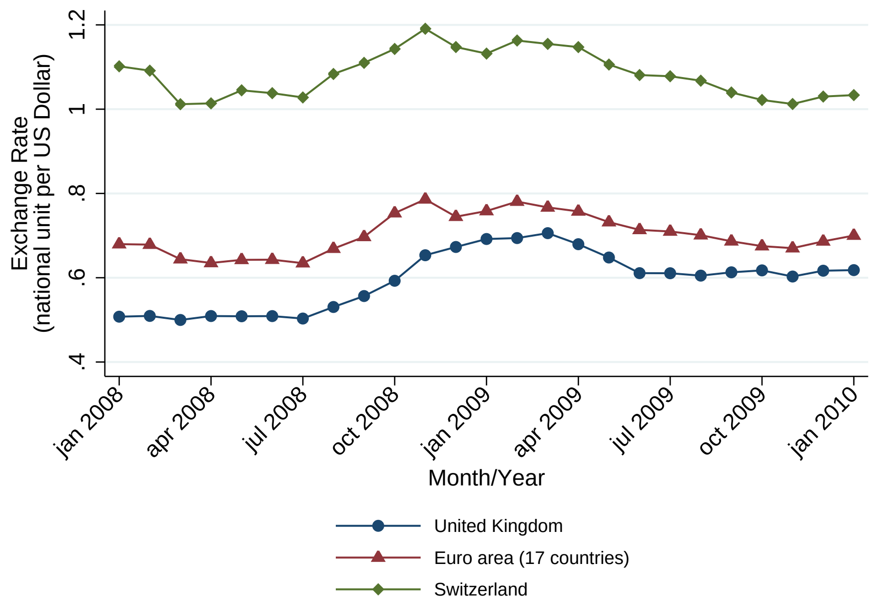

Figure 6: Long Term Interest Rate

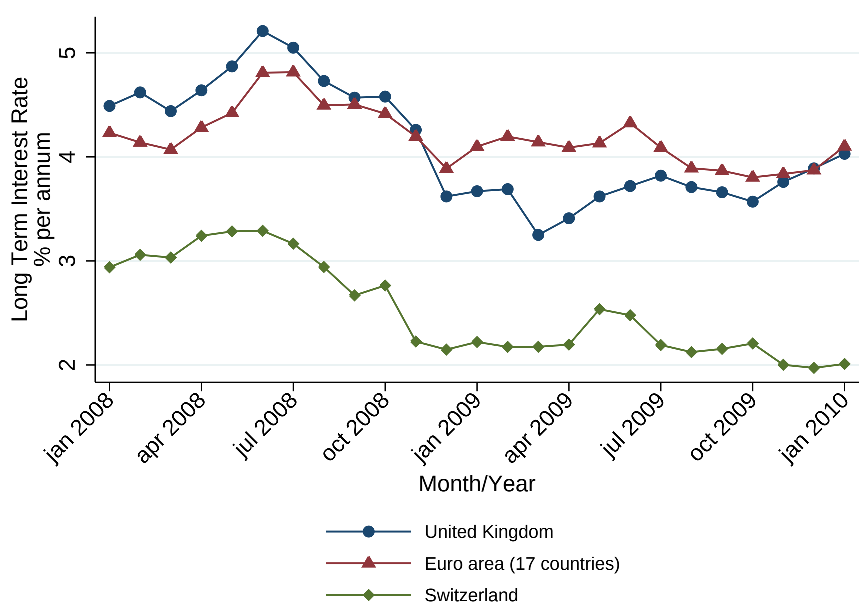

Table 4: ATTs for Different Outcomes

Outcome	ATT	Std. Error	# Treated	# Untreated
$DIV_{i,2009}$	2,150.574***	(804.009)	2,382	55,668
$DIVREL_{i,2009}$	0.051***	(0.005)	2,382	55,654
$SA/FA_{i,2009}$	82.559*	(44.913)	2,505	57,218
$INV_{i,2009}$	-3,050.042***	(859.802)	2,573	58,719

Notes: Coefficients correspond to the average treatment effect on the treated (ATT); # Treated is the number of treated firms and # Untreated the number of matched untreated firms; Matching is on the propensity score from the mixed logit model for the ultimate owner's location choice reported in Table 11; The balancing condition is fulfilled for each outcome, tests available upon request; ***, **, and * indicate significance at 1, 5, and 10 percent, respectively.

Figure 7: Allowing for Heterogeneous Tax Effects

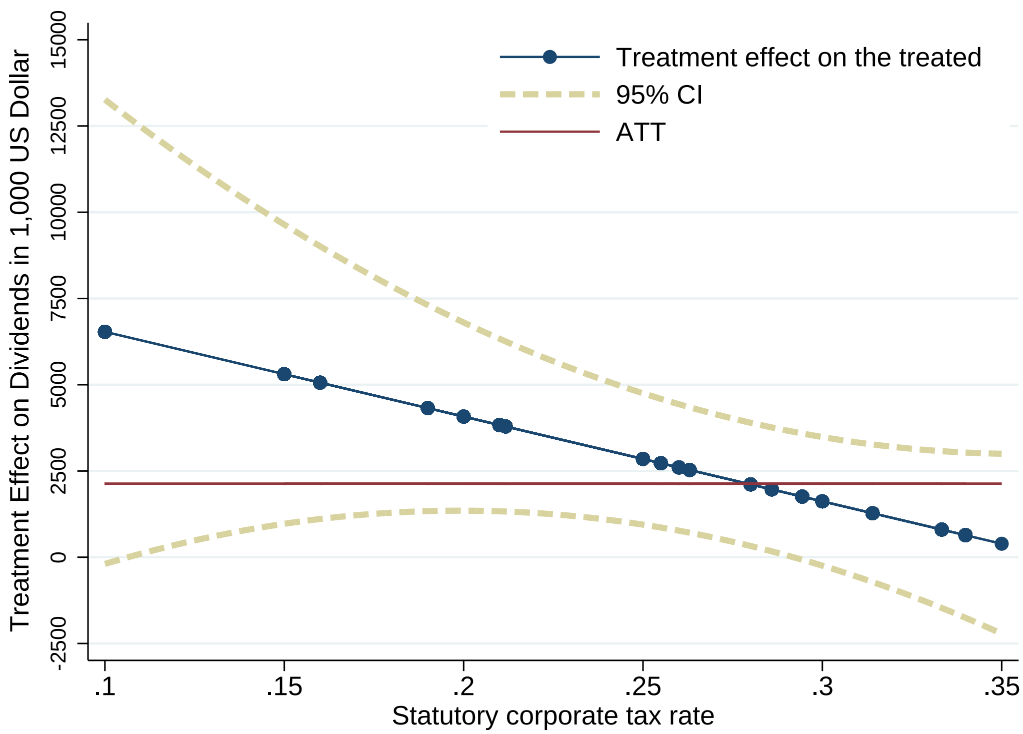

Table 5: Placebo Treatment

Outcome	ATT	Std. Error	# Treated	# Untreated
$DIV_{i,2008}$	-65.445	(2,206.294)	2,191	52,079
$DIVREL_{i,2008}$	0.005	(0.005)	2,191	52,055
$SA/FA_{i,2008}$	33.057	(65.970)	2,444	55,534
$INV_{i,2008}$	4,179.767**	(1,792.085)	2,395	55,264

Notes: Coefficients correspond to the average treatment effect on the treated (ATT); # Treated is the number of treated firms and # Untreated the number of matched untreated firms; Matching is on the propensity score from the mixed logit model for the ultimate owner's location choice reported in Table 11; The balancing condition is fulfilled for each outcome, tests available upon request; ***, **, and * indicate significance at 1, 5, and 10 percent, respectively.

Table 6: ATTs for Different Outcomes ($Tax_j > Tax_i$)

Outcome	ATT	Std. Error	# Treated	# Untreated
$DIV_{i,2009}$	3,153.790**	(1,368.667)	902	50,872
$DIVREL_{i,2009}$	0.055***	(0.008)	902	50,861
$SA/FA_{i,2009}$	88.773	(101.461)	878	52,586
$INV_{i,2009}$	-3,210.492***	(972.145)	903	53,923

Notes: Coefficients correspond to the average treatment effect on the treated (ATT); # Treated is the number of treated firms and # Untreated the number of matched untreated firms; Matching is on the propensity score from the mixed logit model for the ultimate owner's location choice reported in Table 11; The balancing condition is fulfilled for each outcome, tests available upon request; ***, **, and * indicate significance at 1, 5, and 10 percent, respectively.

Table 7: ATTs for Different Outcomes (Excluding affiliates from owner countries applying a tax credit system)

Outcome	ATT	Std. Error	# Treated	# Untreated
$DIV_{i,2009}$	2,442.054***	(817.541)	2,382	46,144
$DIVREL_{i,2009}$	0.052***	(0.005)	2,382	46,131
$SA/FA_{i,2009}$	91.852**	(44.956)	2,505	47,436
$INV_{i,2009}$	-3,280.160***	(898.955)	2,573	48,710

Notes: Coefficients correspond to the average treatment effect on the treated (ATT); # Treated is the number of treated firms and # Untreated the number of matched untreated firms; ***, **, and * indicate significance at 1, 5, and 10 percent, respectively; These results exclude affiliates whose ultimate owner is located in the following countries, which apply a tax credit system: Brazil, Chile, China, Colombia, India, Ireland, Japan, Korea, Malaysia, Malta, Mexico, New Zealand, Poland, Romania, Singapore, Thailand, and United States.

Table 8: ATTs for Different Outcomes (Excluding affiliates which have affiliated companies located in the UK)

Outcome	ATT	Std. Error	# Treated	# Untreated
$DIV_{i,2009}$	3,604.311***	(611.732)	2,369	30,454
$DIVREL_{i,2009}$	0.065***	(0.005)	2,369	30,446
$SA/FA_{i,2009}$	108.801**	(45.750)	2,493	31,390
$INV_{i,2009}$	-1,758.992***	(544.45)	2,560	32,122

Notes: Coefficients correspond to the average treatment effect on the treated (ATT); # Treated is the number of treated firms and # Untreated the number of matched untreated firms; ***, **, and * indicate significance at 1, 5, and 10 percent, respectively; These results exclude affiliates which have affiliated companies (subsidiaries with the same ultimate owner) located in the UK.

Table 9: ATTs for Different Outcomes (By size of the multinationals' affiliate network)

Single affiliates

Outcome	ATT	Std. Error	# Treated	# Untreated
$DIV_{i,2009}$	414.421*	(249.064)	187	7,023
$DIVREL_{i,2009}$	0.041**	(0.019)	187	7,022
$SA/FA_{i,2009}$	-4.677	(38.663)	215	7,369
$INV_{i,2009}$	-422.912*	(253.663)	220	7,515

2-5 affiliates

Outcome	ATT	Std. Error	# Treated	# Untreated
$DIV_{i,2009}$	796.597**	(319.192)	305	10,215
$DIVREL_{i,2009}$	0.061***	(0.015)	305	10,215
$SA/FA_{i,2009}$	32.217	(62.581)	345	10,698
$INV_{i,2009}$	488.798	(713.915)	352	10,974

More than 5 affiliates

Outcome	ATT	Std. Error	# Treated	# Untreated
$DIV_{i,2009}$	1,804.904*	(1,027.304)	1,885	38,315
$DIVREL_{i,2009}$	0.047***	(0.006)	1,885	38,302
$SA/FA_{i,2009}$	96.695*	(56.852)	1,940	39,029
$INV_{i,2009}$	-4,070.565***	(1,139.650)	1,996	40,135

Notes: Coefficients correspond to the average treatment effect on the treated (ATT); # Treated is the number of treated firms and # Untreated the number of matched untreated firms; ***, **, and * indicate significance at 1, 5, and 10 percent, respectively; *Single affiliate* refers to the group of affiliates which do not have any other affiliated enterprizes (other than the ultimate owner), *2-5 affiliates* refers to the group of affiliates with 2 to 5 other affiliated enterprizes, and *More than 5 affiliates* refers to the group of affiliates with more than 5 other affiliated enterprizes.

Table 10: ATTs for Different Outcomes (Matching based on a Conditional Logit Model)

Outcome	ATT	Std. Error	# Treated	# Untreated
$DIV_{i,2009}$	1,615.473**	(805.890)	2,382	55,679
$DIVREL_{i,2009}$	0.048***	(0.005)	2,382	55,665
$SA/FA_{i,2009}$	78.035*	(44.952)	2,505	57,229
$INV_{i,2009}$	-3,549.242***	(865.783)	2,573	58,730

Notes: Coefficients correspond to the average treatment effect on the treated (ATT); # Treated is the number of treated firms and # Untreated the number of matched untreated firms; Matching is on the propensity score from a conditional logit model for the ultimate owner's location choice; The balancing condition is fulfilled for each outcome, tests available upon request; ***, **, and * indicate significance at 1, 5, and 10 percent, respectively.

Table 11: Ultimate Owner Location Decision

	Mixed logit		Conditional logit
	Mean	Standard Deviation	
Statutory tax rate$_j$	-1.236***	-9.507***	6.382***
	(0.203)	(0.273)	(0.133)
log GDP per capita$_j$	0.938***	-0.004	0.159***
	(0.031)	(0.039)	(0.024)
log GDP$_j$	1.273***	0.496***	0.872***
	(0.010)	(0.012)	(0.005)
Voice and accountability$_j$	1.693***	0.001	0.557***
	(0.039)	(0.024)	(0.024)
Control of corruption$_j$	0.317***	0.011	-0.210***
	(0.043)	(0.021)	(0.033)
Government effectiveness$_j$	1.781***	-0.013	0.049
	(0.058)	(0.032)	(0.040)
Political stability$_j$	-0.259***	0.009	0.337***
	(0.023)	(0.030)	(0.015)
Regulatory quality$_j$	-1.903***	0.004	-0.693***
	(0.049)	(0.022)	(0.041)
Rule of law$_j$	-0.937***	-0.001	0.385***
	(0.064)	(0.020)	(0.048)
Common language$_{lj}$	-0.369***	0.097	-0.504***
	(0.024)	(0.063)	(0.020)
Colony$_{lj}$	-0.209***	0.098	0.007
	(0.028)	(0.062)	(0.022)
log Distance$_{lj}$	-2.664***	1.926***	-1.648***
	(0.015)	(0.016)	(0.005)
TA$_i$ × Statutory tax rate$_j$	-0.003		-0.002*
	(0.002)		(0.001)
TA$_i$ × *log* GDP$_j$	0.001***		0.000***
	(0.000)		(0.000)
TA$_i$ × *log* GDP per capita$_j$	0.001**		0.001***
	(0.000)		(0.000)
TA$_i$ × Voice and accountability$_j$	0.001*		0.000*
	(0.000)		(0.000)
TA$_i$ × Control of corruption$_j$	-0.001		-0.001**
	(0.001)		(0.000)
TA$_i$ × Government effectiveness$_j$	0.003***		0.003***
	(0.000)		(0.000)
TA$_i$ × Political stability$_j$	0.000		0.000
	(0.000)		(0.000)
TA$_i$ × Regulatory quality$_j$	-0.001**		-0.001*
	(0.000)		(0.000)
TA$_i$ × Rule of law$_j$	-0.002**		-0.002**
	(0.001)		(0.001)

Notes: 4,445,136 observations; TA denote the total assets of affiliate i; Standard errors reported in parenthesis; For the mixed logit model, the estimated standard deviation of the coefficient is reported for those variables with random coefficients; ***, **, and * indicate significance at 1, 5, and 10 percent, respectively.

Discussion Paper No. 13-088

Effects of Territorial and Worldwide Corporation Tax Systems on Outbound M&As

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Non-Technical Summary

The United States (U.S.) is the last major economy to impose repatriation taxes on international FDI activities. If earnings from foreign subsidiaries are repatriated, the U.S. taxes the dividend at the domestic corporate tax rate of 35 % (plus state taxes), while granting a tax credit for foreign taxes already paid on the profits underlying the dividends (tax credit system). In contrast, all other important economies refrain from imposing such taxes (exemption system).

Repatriation taxes to be paid on a target's profits following international mergers and acquisitions reduce the discounted future cash flows to the investor, which results in a lower valuation of the target and a lower bid price compared to an identical investor from an exemption country. Investors from the U.S. should thus less frequently succeed in acquiring targets. In this paper, we empirically investigate if a foreign tax credit system indeed impedes foreign acquisitions and quantify the implied loss in efficiency.

In 2009, the U.K. and Japan switched from credit to exemption. This is the first time that two major capital exporting economies fundamentally changed their international taxation regimes, which provides us with a very promising quasi-natural experiment to identify the effect of repatriation taxes on international mergers and acquisitions.

We analyze a large sample of cross-border mergers and acquisitions with acquirers from 20 OECD member states in the period from 2004 to 2010. For every target firm, we estimate the probability to observe an acquirer from each of the eventual acquirer-countries in order to infer how the probability to observe an acquirer from the U.K. and Japan changed due to the introduction of the exemption system.

We find empirical evidence for repatriation taxes reducing the competitiveness of investors from tax credit countries in the international market for corporate control. The economic importance of this effect depends on the level of the domestic profit tax rate in place. The larger the domestic profit tax rate, the larger the repatriation taxes due. Since the Japanese profit tax rate (40.69 %) in 2009 is higher than the U.K. profit tax rate (28 %), the reform effect is more pronounced for Japan than for the U.K. We estimate the Japanese 2009 abolishment of the tax credit system to have increased the number of international mergers and acquisitions with a Japanese acquirer by 31.9 %. The estimated effect for the U.K. is only 3.9 %. We finally simulate a U.S. switch from credit to exemption. According to our results, such a reform of the U.S. international tax system would increase the number of international mergers and acquisitions with U.S. acquirers by 17.1 %.

Das Wichtigste in Kürze

Die USA sind das letzte Land, das noch Repatriierungssteuern auf ausländische Direktinvestitionen erhebt. Werden Gewinne einer ausländischen Tochtergesellschaft an die Muttergesellschaft ausgeschüttet, besteuern die USA diese Dividenden mit 35 % (zzgl. Staatssteuern). Bereits im Ausland gezahlte Steuern auf die den Dividenden zugrunde liegenden Gewinne werden dabei angerechnet (Anrechnungsverfahren). In allen anderen großen Volkswirtschaften sind solche Dividendenzahlungen von zusätzlicher Besteuerung befreit (Freistellungsverfahren).

Mögliche Repatriierungssteuern auf Gewinne einer Zielgesellschaft nach einer grenzüberschreitenden Unternehmensübernahme verringern den Barwert der erwarteten zukünftigen Nettogewinne für den potentiellen Erwerber. Diese niedrigere Bewertung der Zielgesellschaft führt verglichen mit einem sonst gleichen Mitbewerber aus einem Freistellungsland zu einer geringeren Zahlungsbereitschaft des US-Investors, der dadurch bei Bieterverfahren um attraktive Zielgesellschaften seltener zum Zuge kommen dürfte. In der vorliegenden Studie wird empirisch untersucht, inwiefern das Anrechnungsverfahren tatsächlich Unternehmensübernahmen im Ausland behindert und der damit verbundene Effizienzverlust abgeschätzt.

Mit Großbritannien und Japan haben im Jahr 2009 erstmals zwei große Kapital exportierende Volkswirtschaften ihr internationales Besteuerungssystem fundamental geändert und das Anrechnungsverfahren durch das Freistellungsverfahren ersetzt. Diese Reformen erlauben es, den Effekt von Repatriierungssteuern auf die internationale Übernahmeaktivität in einem quasi-natürlichen Experiment zu untersuchen.

Die vorliegende Studie analysiert grenzüberschreitende Übernahmen im Zeitraum 2004 bis 2010 mit Erwerbergesellschaften in 20 OECD-Ländern. Dabei wird für jedes Zielunternehmen und für jedes potentielle Erwerberland die Wahrscheinlichkeit geschätzt, einen Erwerber aus dem jeweiligen Land zu beobachten, um Rückschlüsse darüber zu ziehen, wie sich die Wahrscheinlichkeit einen Erwerber aus Großbritannien bzw. Japan zu beobachten durch die Einführung des Freistellungsverfahrens geändert hat.

Die empirische Analyse bestätigt, dass Repatriierungssteuern die Wettbewerbsfähigkeit im Bieterverfahren um ausländische Zielgesellschaften verringern. Die ökonomische Relevanz hängt vom Steuersatz im jeweiligen potentiellen Erwerberland ab. Da der japanische Gewinnsteuersatz im Jahr 2009 (40,69 %) höher war als der Britische (28 %), ergibt sich auch ein stärkerer Reformeffekt für Japan. Gemäß den Simulationen in der vorliegenden Studie hat die Abschaffung des Anrechnungsverfahrens die Zahl der grenzüberschreitenden Übernahmen mit japanischen Erwerbern um 31,9 % erhöht. Für Großbritannien ergibt sich eine Steigerung um 3,9 %. Eine analoge Simulation einer hypotetischen Reform in den USA führt zu einem Anstieg der Übernahmezahl mit US-Erwerber um 17,1 %.

Effects of territorial and worldwide corporation tax systems on outbound M&As*

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Abstract

Repatriation taxes reduce the competitiveness of multinational firms from tax credit countries when bidding for targets in low tax countries. This comparative disadvantage with respect to bidders from exemption countries violates ownership neutrality, which results in production inefficiencies due to second-best ownership structures. This paper empirically estimates the magnitude of these effects. The abolishment of repatriation taxes in Japan and in the U.K. in 2009 has increased the number of acquisitions abroad by Japanese and British firms by 31.9 % and 3.9 %, respectively. A similar policy switch in the U.S. is simulated to increase the number of U.S. cross-border acquisition by 17.1 %. We estimate the yearly gain in efficiency to be around 525 million dollar due to the Japanese reform and 13.5 million dollar due to the U.K. reform. Simulating such a reform for the U.S. results in a yearly efficiency gain of 1134 million dollar.

Keywords: International taxation, ownership neutrality, cross-border M&As, repatriation taxes

JEL-Classification: H25, F23, G34

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1 Introduction

> "*No one is satisfied with the U.S. corporate tax system. Some argue (...) But others say, the main problem is that the United States has a higher corporate tax rate than any other major country and, unlike other countries, imposes severe taxes on income earned outside its borders. This, they argue, unfairly burdens companies engaged in international competition and discourages the repatriation of profits earned abroad.*" (Lawrence Summers in the Washington Post July 7th, 2013).

This paper analyzes a particular aspect in which tax systems may distort the international competition between firms: the effect of repatriation taxes on international mergers and acquisitions. When profits from foreign subsidiaries are repatriated by a United States (U.S.) corporate parent, the U.S. taxes the dividend at the domestic corporation tax rate of 35 % (plus state taxes), while crediting the foreign taxes already paid on the repatriated profits (foreign dividend tax credit system). In contrast, all other major developed countries generally exempt dividends received by the parent from foreign subsidiaries from taxation (dividend exemption system).

Repatriation taxes to be paid on a target's profits following international mergers and acquisitions reduce the discounted future cash flows to the investor, which results in a lower valuation of the target. Ceteris paribus, due to repatriation taxes, the bid price of U.S. investors is relatively lower than that of an identical investor from an exemption country. Investors from the U.S. should thus less frequently succeed in acquiring targets. Put differently, the U.S. corporate tax system may "unfairly burden companies engaged in international competition" for corporate control. In this paper, we empirically investigate if a foreign tax credit system indeed impedes foreign acquisitions and we quantify the implied loss in efficiency.

This is a particularly relevant issue given the important role that cross-border mergers and acquisitions play for foreign direct investment (FDI) especially between developed economies. In 2011, their value increased by 53 % to \$ 526 billion and the implied loss in efficiency due to distortions in the market for corporate control may therefore be correspondingly huge.

In 2009, the United Kingdom (U.K.) and Japan switched from a tax credit system to an exemption system. This is the first time that two major capital exporting economies fundamentally changed their international taxation regimes — an event, which allows us to directly identify the regimes' effect on international mergers and acquisitions. In contrast, previous empirical identification strategies had to rely on indirect changes in double taxation due to variations of withholding taxes or corporate tax rates in either the capital exporting or capital importing country. With such an indirect approach, it is possible that the observed effect of double taxation is actually an artifact which should instead be attributed to the underlying changes themselves — for example, the fact that a tax treaty has been concluded or that the corporate income tax rate has changed.

We consider a large sample of cross-border mergers and acquisitions in the period from 2004 to 2010. For every target firm, we analyze the origin of the eventual acquirer by estimating conditional logit models, nested logit models, and simulated maximum likelihood models. The treatment group in the sample is represented by the acquirer countries, which switch from a foreign tax credit regime to an exemption regime, while the strength of the treatment is moderated by the tax rate differentials between acquirer and target countries.

We find that repatriation taxes reduce the competitiveness of investors from tax credit countries in the international market for corporate control. The size of this effect is conditional on the acquirer's tax rate relative to the the rest of the world: the larger the home country's corporate income tax rate, the larger the repatriation taxes due. Accordingly, the effect of the reform is more pronounced for Japan than for the U.K. because the Japanese tax rate of 40.69 % is higher in 2009 than the British tax rate of 28 %. We estimate the abolishment of the tax credit system in Japan to have increased the number of international mergers and acquisitions with a Japanese acquirer by 31.9 %. The estimated effect for the U.K. is only 3.9 %. We finally simulate a switch in the U.S. from a credit to an exemption regime, which implies an increase in the number of international mergers and acquisitions with U.S. acquirers by 17.1 %.

The empirical results are relevant for the ongoing discussion on the U.S. corporate tax system as well as for the scientific discussion on the design of international tax systems. The seminal paper by Musgrave (1969) argues that a foreign tax credit system is optimal from a global perspective because it establishes production efficiency by means of capital export neutrality. On the other hand, Desai and Hines (2003) and Becker and Fuest (2010) develop the counterargument that ownership neutrality may be more relevant for efficiency in a world in which FDI takes place mainly by means of mergers and acquisitions and not by means of greenfield investment. In this case, repatriation taxes distort production efficiency as they distort ownership structures in favor of parent firms, which are not subject to these kind of taxes. Ownership advantages (e.g. expected synergies) are therefore not optimally exploited.

Based on these arguments, Griffith et al. (2010) recommend the abolishment of foreign tax credits in the U.K. in favor of exempting dividends to improve the competitiveness of U.K.-based multinational companies in the international market for corporate control. The controversial discussion of the two systems of double taxation relief with respect to neutrality properties would be rather moot if the two systems - as they are actually put in practice - resulted in identical empirical patterns. However, our results confirm that ownership structures are indeed distorted by asymmetries in international taxation, as a policy switch from credit to exemption does increase the amount of acquisitions abroad. With respect to distortions of ownership neutrality, we estimate the yearly gain in efficiency in the form of additional synergies raised to be in the order of 525 million dollar for the Japanese tax reform and 13.5 million dollar for the tax reform in the U.K. A simulation of a policy change to an exemption system in the U.S. implies gains of 1,134 million dollar.

Several papers deal with the empirical effects of international taxation on FDI in general (see e.g. Slemrod (1990), Swenson (1994), Hines (1996), Gropp and Kostial (2000), Bénassy-Quéré et al. (2005) and Hajkova et al. (2006)). However, the empirical literature on the effect of international taxation on mergers and acquisitions is scarce. Di Giovanni (2005), Herger et al. (2011) and Arulampalam et al. (2012) consider the effect of host country corporate taxation. Huizinga and Voget (2009) additionally include withholding taxes in their analysis, while Barrios et al. (2012) consider the establishment of new foreign subsidiaries. In contrast to the previous literature, we directly identify the effect of a systematic change in international taxation. Furthermore, instead of analyzing the choice of location for investment, we focus on the location of the investor, as our ultimate interest is in the loss of efficiency due to violations of ownership neutrality.

In the following, section 2 describes the tax treatment of foreign source dividends within multinational firms, and it presents the empirical framework for estimating the effect of this international tax on the location of the investor in deals. Section 3 describes the data and the control variables. Section 4 presents the empirical results and section 5 concludes.

2 International Taxation and the Valuation of Firms

In line with the recommendations of the OECD model tax treaty, cross-border dividend repatriations from foreign subsidiaries to their corporate parent within the OECD are generally governed by one of two methods of double taxation relief: either the dividends are exempted from further taxation at the level of the corporate parent (exemption system) or the repatriated dividends are subject to the corporate income tax in the parent's country while receiving a tax credit for taxes already paid abroad (foreign tax credit system). This additional tax burden on repatriated dividends may put acquirers from countries with a foreign credit system at a disadvantage when bidding for foreign corporations, specifically in low tax locations because the additional tax is inversely related to the target firm's corporate income tax. The unique feature in our period of observation is the policy switch of two major capital exporting countries - Japan and the U.K. - from a foreign tax credit system to an exemption system in 2009.[3] Accordingly, the empirical analysis is particularly designed to isolate the effect of this policy change from other developments in the tax system. Furthermore, even country-specific reactions to the financial crisis should not affect our estimation results, as the proposed identification strategy relies on changes at the bilateral level.

2.1 Empirical Model

Following Mitchell and Mulherin (1996) and Becker and Fuest (2010), let us assume that takeovers reflect the synergies from combining two firms and that all assets are priced at fair value. Let

$$V_{ijk} = \alpha T_{ij} + \boldsymbol{\beta}^\top \boldsymbol{x}_{ijk} + \epsilon_{ijk} \tag{1}$$

be the value of firm k in country j if it was owned by an investor from country i.[4] The term T_{ij} captures the cost of additional taxation to be paid when dividends are repatriated from country j to country i. The variable vector $\boldsymbol{x}_{ijk}$ and the error term ϵ_{ijk} represent other observable and unobservable factors, which capture the general size of firm k's profits as well as ownership-specific synergies which are realized by combining firm k with a particular investor.[5] Country-specific and time-specific effects are accounted for by means of dummy variables. The error term ϵ_{ijk} follows an extreme value distribution as seen in McFadden (1974), and the coefficients α and $\boldsymbol{\beta}$ are parameters to be estimated. A given target firm will be acquired by an investor from country i if the corresponding reservation price is higher than for any other acquirer,

$$V_{ijk} \geq V_{hjk}, \quad \forall h \in (1, ..., I) \tag{2}$$

the probability of which is given by[6]

$$P(V_{ijk} \geq V_{hjk} | T_{1jk}, \boldsymbol{x}_{1jk}, ..., T_{Ijk}, \boldsymbol{x}_{Ijk}) = \frac{exp(\alpha T_{ij} + \boldsymbol{\beta}^\top \boldsymbol{x}_{ijk})}{\sum_{l=1}^{I} exp(\alpha T_{lj} + \boldsymbol{\beta}^\top \boldsymbol{x}_{ljk})} \quad \forall h, \tag{3}$$

[3] New Zealand also switched to an exemption system in 2009. In the interest of brevity, we will focus our discussion on the cases of Japan and the U.K.

[4] A subscript t indicating the time-period is suppressed.

[5] Arulampalam et al. (2012) give an example, in which labeling goods with a well-known brand allows the firm to raise prices resulting in larger profits. In Jensen and Ruback (1983) and Palepu (1986), more efficient management increases the target firm's value.

[6] The probability is conditional on the takeover being profitable for at least one acquirer. We expect this condition to be independent of $P(V_{ijk} \geq V_{hjk})$.

where I indicates the number of potential acquirer countries.[7] The parameters α and $\boldsymbol{\beta}$ can then be estimated by a conditional logit regression in a sample of deals. A negative value for α would be in line with the conjecture of Desai and Hines (2003), that firms subject to repatriation taxes are at a disadvantage when bidding for foreign firms. While the conditional logit model is conceptually straightforward, estimates may be biased if the independence of irrelevant alternatives assumption is violated. Alternatively, mixed logit regressions and nested logit regressions are therefore applied as specified in robustness checks of the empirical analysis.

2.2 Identification Strategy

The first, most parsimonious approach analyzes the policy change as a treatment effect: countries with a foreign tax credit system apply the treatment (i.e. additional taxes) to dividends from sources with a lower tax level, in which case the treatment dummy variable takes the value one.[8] The treatment is abolished by starting to exempt foreign-source dividends from taxation. Unobserved factors are controlled for by country-fixed effects and time-fixed effects.[9] Specifically, the variable of interest is constructed as

$$T_{ij}^{dummy} = \begin{cases} 1, & \text{if } \tau_i > \tau_j \text{ and country } i \text{ applies foreign tax credit system} \\ 0, & \text{otherwise,} \end{cases} \tag{4}$$

where τ_j is the corporate income tax rate in the subsidiary's country j and τ_i the tax rate in the parent's country i. However, the parsimony of this approach comes at the cost of precision because the treatment is assumed to be homogenous. In a second step, the heterogeneity of the treatment is therefore taken into account by using the tax differential between host and home country as a measure for the dose of the treatment - the size of repatriation taxes:

$$T_{ij}^{\Delta} = \begin{cases} \tau_i - \tau_j, & \text{if } \tau_i > \tau_j \text{ and country } i \text{ applies foreign tax credit system} \\ 0, & \text{otherwise.} \end{cases} \tag{5}$$

[7]For the current research question, it is sufficient to analyze the matching of target firms with acquiring countries instead of the matching of target firms with particular acquiring firms — for which it would be challenging to construct an appropriate choice set. Variations in the number of potential acquiring firms across countries are subsumed in country-specific effects, which are accounted for in all regressions.

[8]Foreign tax credits are always limited such that the tax on the repatriated dividends cannot become negative when corporate income taxes are higher in the subsidiary's country than in the parent's country.

[9]Time-fixed effects simply cancel out in this estimation framework as they apply equally to all potential acquirers of a target firm.

If this repatriation tax handicaps the acquisition of foreign firms, one should find a negative effect when estimating its coefficient in expression (3). Some countries do not fully exempt foreign-source dividends. A certain percentage of the dividends may be deemed to be non-deductible expenses and be added to the parent's taxable income, leading to a repatriation tax burden. Moving further away from the treatment effect design, the measure of repatriation taxes can therefore be refined in a third step by also taking into account that some countries such as Germany or France do not fully exempt foreign-source dividends. Instead, usually 5 % of foreign-source dividends remain subject to corporate income taxes, such that the variable of interest is defined as

$$T_{ij}^{\Delta 2} = \begin{cases} \tau_i - \tau_j, & \text{if } \tau_i > \tau_j \text{ and country } i \text{ applies foreign tax credit system} \\ (1-\tau_j)x\tau_i, & \text{if country } i \text{ exempts only a share of (1-}x\text{)} \\ 0, & \text{otherwise.} \end{cases} \tag{6}$$

The above measure accounts only for the tax on dividends imposed by the parent country. The subsidiary's country, however, may impose additional withholding taxes on dividends. Though withholding taxes are creditable foreign taxes, these additional taxes may cause an excess credit situation and the overall double tax on dividend repatriations may increase. If the subsidiary's country levies withholding taxes on dividends, the compound double tax is calculated as[10]

$$T_{ij}^{\Delta 3} = \begin{cases} max[\tau_i - \tau_j, (1-\tau_j)\omega_{ij}], & \text{if country } i \text{ applies foreign} \\ & \text{tax credit system} \\ (1-\tau_j)\omega_{ij} + (1-\tau_j)(1-\omega_{ij})x\tau_i, & \text{if country } i \text{ exempts} \\ & \text{only a share of (1-}x\text{)} \\ (1-\tau_j)\omega_{ij}, & \text{otherwise,} \end{cases} \tag{7}$$

where ω_{ij} is the applicable withholding tax rate for dividend payments from a subsidiary in country j to its parent in country i. Foreign corporation tax is difficult to avoid even if dividends are eventually repatriated via third countries (e.g. by interposing a foreign conduit company). Dividend routing, however, matters in case of withholding taxes. These taxes may be reduced significantly or even avoided if received by the parent via interposed foreign companies. In line with this, Barrios et al. (2012) find that the establishment of new foreign subsidiaries does not appear to be affected by withholding taxes, which could be attributed to the use of conduit companies.[11] This potential difference in effect

[10] See Huizinga and Voget (2009) or Barrios et al. (2012) for comparison.

[11] For example, Mintz and Weichenrieder (2010) provide evidence that high withholding tax rates tend to be avoided by conduit companies.

conditional on the source of repatriation taxes is further investigated in robustness checks of the empirical analysis.

Table 1: Tax Rates and Dividend Repatriation Taxation Systems

	Tax Rate		System	
Acquirer country	2004	2010	2004	2010
Australia	0.30	0.30	E	E
Austria	0.34	0.25	E	E
Belgium	0.34	0.34	E95	E95
Canada	0.34	0.31	E	E
Denmark	0.30	0.25	E	E
Germany	0.36	0.29	E95	E95
Finland	0.29	0.26	E	E
France	0.34	0.33	E95	E95
Ireland	0.13	0.13	C	C
Italy	0.37	0.31	E95	E95
Japan	0.42	0.41	C	E95
Luxembourg	0.30	0.29	E	E
Netherlands	0.35	0.26	E	E
New Zealand	0.33	0.30	C	E
Norway	0.28	0.28	E	E97
Spain	0.35	0.30	E	E
Sweden	0.28	0.26	E	E
Switzerland	0.24	0.21	E	E
United Kingdom	0.30	0.28	C	E
United States	0.39	0.39	C	C

C: credit, E: exemption, E95: 95 % exemption, E97: 97 % exemption
2004:
Australia applied the tax credit system for subsidiaries located in Chile, Estonia, Greece, Island, Israel, Luxembourg, Portugal and Turkey. Canada applied the tax credit system for subsidiaries located in Greece and Turkey. Spain applied the tax credit system for subsidiaries located in New Zealand and Finland applied the tax credit system for subsidiaries located in Chile.
2010:
Canada applied the tax credit system for subsidiaries located in Greece and Turkey. Finland applied the tax credit system for subsidiaries located in Chile.

Other features of international taxation cannot be explicitly accounted for because it would require speculative assumptions — not only about the actual acquirer but also about its contenders — with respect to their international structure and the timing of repatriations. For example, the repatriation tax may be deferred until the foreign profits are distributed reducing the effective repatriation tax burden. This is implicitly taken into account as it attenuates the estimated coefficient of the statutory double tax measure. Similarly, acquirers may find the potential double tax less relevant if they are in a position of having excess foreign tax credits due to a pre-existing large share of business in high-tax countries. Again, this would be reflected in attenuated coefficient estimates of the statutory double tax measure.

Table 1 summarizes the prevalent method of double tax relief for the potential acquirer locations at the beginning and at the end of our sample period. The U.S. is currently the only country left, which still applies a foreign tax credit system, apart from Ireland, where the method of double tax relief is practically irrelevant due to the low Irish corporate income tax rate of 12.5 %. In Japan the foreign tax credit system was replaced by an exemption system in 2009. The reform was first announced in December 2008 and the legislation passed on March 27, 2009. Since April 1, 2009, dividends received have generally been exempt, although 5 % of repatriated profits are still subject to Japanese corporate income taxes as they are deemed to be non-deductible expenses.[12] Similarly, the U.K. started to exempt dividends from July 1, 2009. The first proposal was made in June 2007. In July 2008, the Financial Secretary to the Treasury wrote an open letter in which he announced a possible dividend exemption. In December 2008, a draft for discussion was made.[13] In addition, New Zealand replaced its foreign tax credit system with an exemption system on January 1, 2009.[14] General or country-specific shocks around 2009 should not interfere with the previously described identification strategy because the existence and the magnitude of the abolished tax treatment varies at a bilateral level.

3 Data Description

From the Zephyr Bureau van Dijk database, we collect all cross-border corporate deals between OECD countries in the 2004-2010 period, through which majority control of the target firm has been attained.[15] To keep the mixed logit regressions computationally feasible, the set of acquiring countries considered is restricted to the twenty most frequent acquirer locations. This renders a sample of 12597 deals. Table 5 in the Appendix lists the number of acquirers by country of origin over time, while Figure 1 illustrates the spatial distribution of acquirer locations. The variation in the total number of deals over time reflects the cyclical nature of mergers and acquisitions activity, which generally follows the trends in stock markets: the number of deals peaked in 2007 and fell thereafter. In 2010, the number of deals recovered to the level at which it had started in 2004. These general developments — even if country-specific — should not distort the estimation results as the proposed identification strategy relies on changes at a bilateral level. In line with the findings by Di Giovanni (2005), countries with large stock markets such as the U.S. and the U.K. also exhibit the largest number of acquirers.

Variable definitions and data sources are listed in Table 6 in the Appendix. Table 7 in

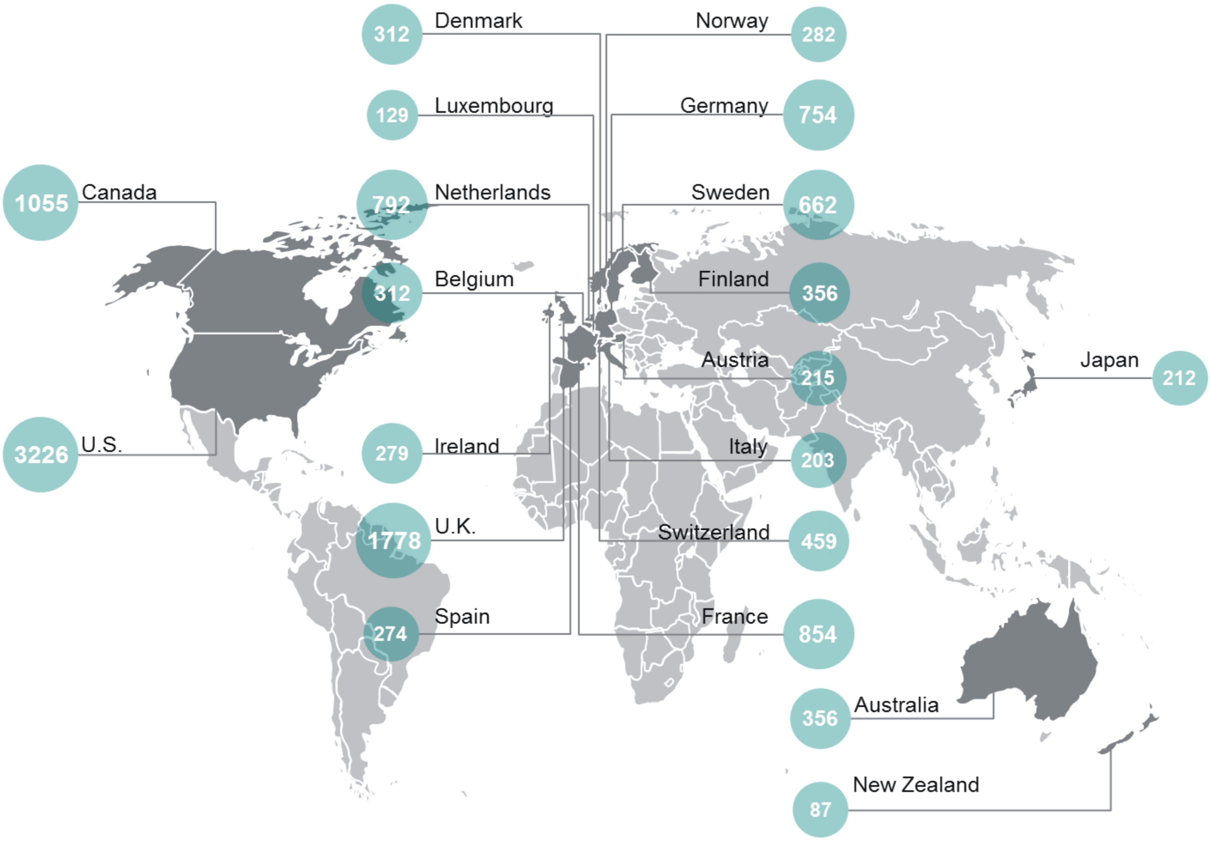
[12]See Smith et al. (2009), Ernst & Young (2011), p. 562, Carr et al. (2009) and Gutiérrez at al. (2011), p. 553 - 554.

[13]See House of Lords (2009), Ernst & Young (2011), p. 1179, Carr et al. (2009) and Gutiérrez at al. (2011).

[14]See Ernst & Young (2011), p. 789 - 790 and Gutiérrez at al. (2011), p. 759.

[15]Deals without a uniquely determined acquirer or target are excluded.

Figure 1: Spatial distribution of acquirers



the Appendix provides summary statistics for the control variables used in the empirical work. At the level of the acquirer country, the corporate income tax rate, τ_i, controls for shocks to the parent firm's investment, which serves as a common input in a multinational production process. For example, Becker and Riedel (2012) find a negative effect of parent country tax rates on foreign affiliate investment. The gross domestic product per capita, $GDPC_i$, and the gross domestic product growth rate, $GDPG_i$, may have a positive effect, reflecting differences in productivity across potential acquirers. Good financing conditions as proxied by a country's stock market capitalization relative to GDP, $Stock_i$, should increase the likelihood of a successful bid. Furthermore, a strong exchange rate, $Exch_i$, may facilitate foreign acquisitions (Blonigen (1997)). The variables $GDPS_{ki}$ and $Deals_{ki}$ capture the specialisation of acquirer countries in particular industries. $GDPS_{ki}$ measures the share of the target's industry sector in the GDP of the acquiring country one year prior to the deal, whereas $Deals_{ki}$ counts how many cross-border deals in the target firm's industry originated from the acquirer country over the preceding 5 years. Several variables such as distance, $Dist_{ij}$, and indicators for common borders, $Neighb_{ij}$, common languages, $Lang_{ij}$, former colonial relationships $Colony_{ij}$, and formerly having been part of the same nation, $Same_{ij}$, control for bilateral variation in transaction costs which increase with the cultural and geographic distance between countries. These control variables were also found to be relevant for cross-border mergers and acquisitions by Di Giovanni (2005).

4 Empirical Results

Table 2 presents the results of multinomial choice regressions explaining the acquirer's country of origin in the previously described sample. For every deal, the dependent variable equals one for the actual acquirer's country of origin and zero for the counterfactual acquirer locations. In the conditional logit regression (1), the variable of interest is the parsimonious treatment dummy, T_{ij}^{dummy}, defined in expression (4), which indicates an additional tax on dividend repatriations due to insufficient foreign tax credits. The negative coefficient implies that the switch to an exemption system by Japan and the U.K. facilitates successful bids for target firms in countries with relatively lower tax rates.

A heterogenous treatment effect is allowed for in regression (2), as the variable of interest T_{ij}^{Δ}, defined in expression (5), measures the size of potential repatriation taxes on dividends. Again, the coefficient is found to be negative, although its p-value is now substantially smaller than in regression (1). The higher significance is most probably due to removing the assumption of homogenous repatriation taxes.

Following Cameron and Trivedi (2009, p. 502), the economic effect implied by regression (2) is estimated by the change in predicted probabilities, as the variable of interest is perturbed while keeping all other variables constant. In particular, we simulate the counterfactual that the U.K. had not exempted foreign-source dividends from taxation in 2009 and 2010. Table 3 lists the average predicted probabilities of harboring the successful acquirer in a cross-border deal based on the actual variables in column (1), and based on the simulated variables in column (2). The comparison implies that the switch to an exemption system has increased British acquisitions abroad by 3.9 % (= (0.1581 − 0.1522)/0.1522) or by 1.8 billion U.S. dollar in terms of yearly volume. Along the same lines, we simulate that Japan had not introduced an exemption system in 2009. The corresponding predicted probabilities for the actual and the counterfactual situation in columns (1) and (3) imply that Japanese acquisitions abroad have increased by 31.9 % or by 4.1 billion U.S. dollar in terms of yearly volume. The more pronounced effect is due to the Japanese corporate income tax rate of 40.7 % being considerably higher than the British corporate income tax rate of 28 %. Hence, the abolished potential double taxation of Japanese dividend repatriations was larger and occured in more cases than for British repatriations. In fact, the Japanese tax rate is the maximum tax rate through the whole sample period. Inspired by the discussion in the U.S. for a reform of foreign

Table 2: Regression estimates

	Conditional logit		Mixed logit			
	(1)	(2)	(3)	(4)	(5)	(6)
T_{ij}^{dummy}	-0.1210*					
	(0.052)					
$T_{ij}^{\triangle}$		-2.7896***	-2.7111***	-2.7111***	-2.7111**	-2.7111***
		(0.000)	(0.000)	(0.009)	(0.017)	(0.000)
τ_i	-1.7916**	-1.4887*	-1.8587**	-1.8587	-1.8587*	-1.8587
	(0.021)	(0.057)	(0.032)	(0.155)	(0.055)	(0.207)
$GDPC_i$	0.0520**	0.0513**	0.0526**	0.0526*	0.0526**	0.0526*
	(0.018)	(0.019)	(0.022)	(0.090)	(0.035)	(0.072)
$GDPG_i$	0.0719***	0.0732***	0.0754***	0.0754***	0.0754***	0.0754***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Stock_i$	0.0022***	0.0020**	0.0021**	0.0021**	0.0021**	0.0021*
	(0.009)	(0.019)	(0.019)	(0.045)	(0.040)	(0.088)
$Exch_i$	-0.0091	-0.0040	-0.0044	-0.0044	-0.0044	-0.0044
	(0.188)	(0.547)	(0.510)	(0.565)	(0.541)	(0.562)
$GDPS_{ki}$	0.0081***	0.0082***	0.0081***	0.0081***	0.0081**	0.0081**
	(0.000)	(0.000)	(0.000)	(0.002)	(0.032)	(0.026)
$Deals_{ki}$	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Dist_{ij}$	-0.5375***	-0.5213***	-0.5316***	-0.5316***	-0.5316***	-0.5316***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Neighb_{ij}$	0.2541***	0.2746***	0.3204***	0.3204***	0.3204***	0.3204***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
$Lang_{ij}$	0.7547***	0.7761***	0.8284***	0.8284***	0.8284***	0.8284***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Colony_{ij}$	0.3816***	0.3487***	0.3587***	0.3587***	0.3587***	0.3587***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Same_{ij}$	0.6123***	0.6100***	0.8181***	0.8181***	0.8181***	0.8181***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	240364	240364	240364	240364	240364	240364
Log-Likelihood	-27680.99	-27663.90	-27639.02	-27639.02	-27639.02	-27639.02

Notes: the dependent variable equals one if country i is the actual acquirer's country of origin. It is zero if country i is a counterfactual acquirer location. Regression (1) and (2) are conditional logit regressions, while regressions (3) to (6) are mixed logit regressions. All regressions control for acquirer country specific effects, which follow a random distribution in the mixed logit regressions. The parameter estimates for the acquirer country-specific estimates in the mixed logit regressions are shown in Table 8. Regressions (4) to (6) are identical to regression (3) except for standard errors, which are robust to clustering on the target-country/year level, target-country/industry level and the industry/year level, respectively. p-values in parentheses, * denotes significance at the 10 %-level, ** at the 5 %-level and *** at the 1 %-level respectively.

corporate income taxation, we also simulate that the U.S. had exempted foreign-source dividends in 2009 and 2010, the average predicted probabilities of which are listed in column (4). Such a policy change is calculated to increase the number of U.S. acquisitions abroad by 17.1 % or by 15.9 billion U.S. dollar in terms of yearly volume.[16]

[16] The calculation of yearly volumes is based on the acquiring country's average deal value in the sample period 2004-2010.

Table 3: Effect of policy change based on regression (2) of Table 2

Country	Reforms 2009 - 2010: Actual state 2009-2010	No Reform U.K. 2009-2010	No Reform Japan 2009-2010	Reform U.S. 2009-2010
Australia	0.0295	0.0297	0.0297	0.0274
Austria	0.0158	0.0159	0.0159	0.0146
Belgium	0.0262	0.0264	0.0263	0.0244
Canada	0.0900	0.0902	0.0902	0.0873
Denmark	0.0232	0.0234	0.0234	0.0215
Finland	0.0220	0.0222	0.0222	0.0203
France	0.0721	0.0726	0.0725	0.0666
Germany	0.0752	0.0758	0.0756	0.0695
Ireland	0.0140	0.0141	0.0141	0.0127
Italy	0.0152	0.0154	0.0153	0.0141
Japan	0.0211	0.0212	0.0160	0.0195
Luxembourg	0.0095	0.0095	0.0095	0.0089
Netherlands	0.0639	0.0642	0.0642	0.0595
New Zealand	0.0077	0.0078	0.0078	0.0071
Norway	0.0219	0.0221	0.0220	0.0202
Spain	0.0192	0.0193	0.0193	0.0178
Sweden	0.0534	0.0538	0.0537	0.0493
Switzerland	0.0356	0.0357	0.0357	0.0331
United Kindom	0.1581	0.1522	0.1589	0.1483
United States	0.3394	0.3410	0.3411	0.3973

Numbers are relative frequencies of all deals with acquirer from the specific country in the given period predicted based on regression (2).

Among the control variables, the likelihood of a successful bid is negatively related to the acquirer's corporate income tax rate, τ_i, as shocks to investment in common input factors at the parent level appear to decrease the value of acquisitions abroad. The positive signs of gross domestic product per capita, $GDPC_i$, and of the gross domestic product growth rate, $GDPG_i$, suggest that highly productive firms are more likely to engage in FDI as argued by Helpman, Melitz and Yeaple (2004). The positive effect of stock market capitalization over GDP, $Stock_i$, reflects the comparative advantage of acquirers with access to well developed capital markets. The exchange rate does not show a significant effect. Specialization in the target's industry — as measured by the relevant industry sector share in the acquiring country's GDP, $GDPS_{ki}$, and the acquiring country's number of cross-border acquisitions in the relevant industry over the preceding 5 years, $Deals_{ki}$ — also appears to explain the prevailing acquirer location. The significant effects of distance, $Dist_{ij}$, common borders, $Neighb_{ij}$, common languages, $Lang_{ij}$, former colonial relationships, $Colony_{ij}$, and formerly having been part of the same nation, $Same_{ij}$, suggest the presence of bilateral transaction costs, for example, in the form of cultural frictions or information costs.

The conditional logit regressions may be inconsistent if the assumption of independence of irrelevant alternatives (IIA) is violated. We test the IIA assumption by a series of 20 Hausman tests, in which one country at a time is excluded from the choice set. In half of the cases, the estimates based on the reduced samples differ significantly from the full sample estimates, which casts doubt upon the validity of the IIA assumption. On the other hand, Cheng and Long (2006) argue that tests of the IIA assumption based on restricted choice sets perform very poorly even in large samples. Nevertheless, the IIA assumption appears to be rather strong from a theoretical perspective, for example, if acquirer countries' industrial specialisations cannot be sufficiently controlled for by observables: a manufacturing firm, may be more likely to be acquired by a German firm, whereas a target financial firm may be more likely to be acquired from the U.K. or from the U.S. One set of acquirer-country fixed effects for the whole sample would therefore be too restrictive, as the effects should vary across industries. Similarly, regional markets may integrate at different speeds than the global market and a target may be more likely (or less likely) to be acquired from a country within the same regional market than from overseas. In both cases the IIA assumption is violated. Allowing for a larger number of fixed effects — acquirer-country by industry, acquirer-country by target-country or even a combination of the two — by means of dummy variables is not a viable approach as the large number of parameters would result in an incidental parameter bias (Greene (2012), p. 659-661).

Instead, a mixed logit estimator (Train (2009), p. 138) is applied in regression (3) of Table 2, in which the vector of coefficients for the country-specific effects $\boldsymbol{\gamma}$ is allowed to be random according to a normal distribution with mean $\boldsymbol{g}$ and covariance $\boldsymbol{W}$. Parameters are estimated by simulated maximum likelihood with 50 Halton draws. The estimated standard deviations of the normal distribution are highly significant indicating that this approach should be preferred to the conditional logit regression. Therefore, we stick to mixed logit regressions for most of the remaining analysis. Eventually, this choice is immaterial because the basic implications remain similar: the coefficient of the variable of interest, Tax_{ij}^{Δ}, remains significantly negative in regression (3). As previously conducted, we simulate counterfactual policies in the U.K., Japan, and the U.S. for taxing foreign-source dividends in the period 2009-2010. The change in average predicted probabilities suggests that exempting dividends has increased — or, in the case of the U.S., would have increased — the number of acquisitions abroad by 3.7 % for the U.K., by 30.4 % for Japan, and 16.2 % for the U.S. Regressions (4) through (6) are similar to regression (3), but standard errors are now robust to clustering at the level of the target-country/year pairs (regression (4)), at the level of target-country/industry pairs (regression (5)) and at the level of industry/year pairs (regression (6)). The level of significance is hardly sensitive to the choice of clustering. The same result is found when errors are simply clustered by industry.

As mentioned before, the unique feature in our data is the policy switch of two major capital exporting countries - Japan and the U.K. - from a foreign tax credit system to an exemption system. However, tax rates varied between 2004 and 2010, which also affects our repatriation tax measure T_{ij}^{Δ}. In regression (1) of Table 4, we therefore rely solely on regime changes for identification by calculating repatriation taxes with tax rates fixed to their values in 2008, one year prior to the British and Japanese reforms. The estimates remain similar, which confirms that the effect is indeed identified by the changes in the method of double tax relief and not by variations in the underlying corporate income tax rates.

Acquisition behavior may have already adjusted in the run-up to the effective change in policy if agents started to anticipate the eventual introduction of an exemption system. Therefore, regression (2) of Table 4 excludes all observations from 2008, the year prior to the reforms, without much change in the results.

Profitable target firms may indeed be bought for the future profits they promise while loss-making firms may be bought for strategic reasons such as removing the threat of a potential future competitor or acquiring a common input factor. The former group of acquisitions could be more affected by taxes on dividend repatriations than the latter group. This hypothesis is tested in regression (3) of Table 4 by allowing the coefficient of T_{ij}^{Δ} to differ between the two groups. Indeed, repatriation taxes appear to have a stronger effect in case of profitable target firms than in case of loss-making target firms. The difference in the coefficients is significant at a p-value of 0.0543.[17]

Regression (4) of Table 4 controls for further heterogeneity in target firms by allowing the propensity to be acquired by a particular country to vary conditional on target-specific controls (total assets and profitability). The coefficient for repatriation taxes remains significant and increases in size. Table 9 lists the coefficients of the target-specific variables per acquirer location except for the U.S., which serves as the country of reference. Interestingly, the coefficients for target profitability are significantly positive for quite a number of acquirer locations, but never significantly negative. This pattern implies that the probability of a U.S. acquirer decreases in the target firm's profitability, which may reflect that highly profitable firms are relatively less valuable to U.S. acquirers due to repatriation taxes — in line with the findings of the previous robustness check, where the acquisition of profitable targets was more affected by repatriation taxes than the acquisition of loss-making firms.

[17] Correspondingly, a one-sided test for a more negative coefficient in case of profitable firms would have a p-value of 0.0271.

Table 4: Robustness checks

	Mixed Logit								Nested Logit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
T_{ij}^{Δ}	-1.5979***	-2.7164***		-5.4768***	-3.9874***				-2.8007***
	(0.002)	(0.000)		(0.000)	(0.000)				(0.000)
$T_{ij}^{\Delta}(Profit_k)$			-2.9824***						
			(0.000)						
$T_{ij}^{\Delta}(Loss_k)$			-1.4876**						
			(0.033)						
$T_{ij}^{\Delta 2}$						-2.7292***		-2.6575***	
						(0.000)		(0.000)	
$T_{ij}^{\Delta 3}$							-0.2314		
							(0.326)		
$Withholding_{ij}$								0.3767	
								(0.142)	
τ_i	-2.1991**	-1.1207	-2.0650**	0.8411	-1.6156**	-1.8140**	-2.2118**	-1.7998**	-1.0107
	(0.011)	(0.242)	(0.017)	(0.547)	(0.048)	(0.037)	(0.011)	(0.038)	(0.128)
$GDPC_i$	0.0526**	0.0672***	0.0507**	0.0169	0.0550**	0.0524**	0.0502**	0.0527**	0.0553***
	(0.022)	(0.009)	(0.027)	(0.651)	(0.018)	(0.022)	(0.029)	(0.021)	(0.002)
$GDPG_i$	0.0737***	0.0779***	0.0727***	0.0634***	0.0744***	0.0753***	0.0730***	0.0755***	0.0557***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Stock_i$	0.0023***	0.0018	0.0022**	0.0026*	0.0021**	0.0021**	0.0024***	0.0021**	0.0014**
	(0.009)	(0.118)	(0.013)	(0.089)	(0.021)	(0.019)	(0.008)	(0.019)	(0.038)
$Exch_i$	-0.0079	-0.0023	-0.0099	0.0013	-0.0032	-0.0058	-0.0135**	-0.0051	-0.0028
	(0.248)	(0.737)	(0.136)	(0.911)	(0.637)	(0.387)	(0.042)	(0.448)	(0.432)

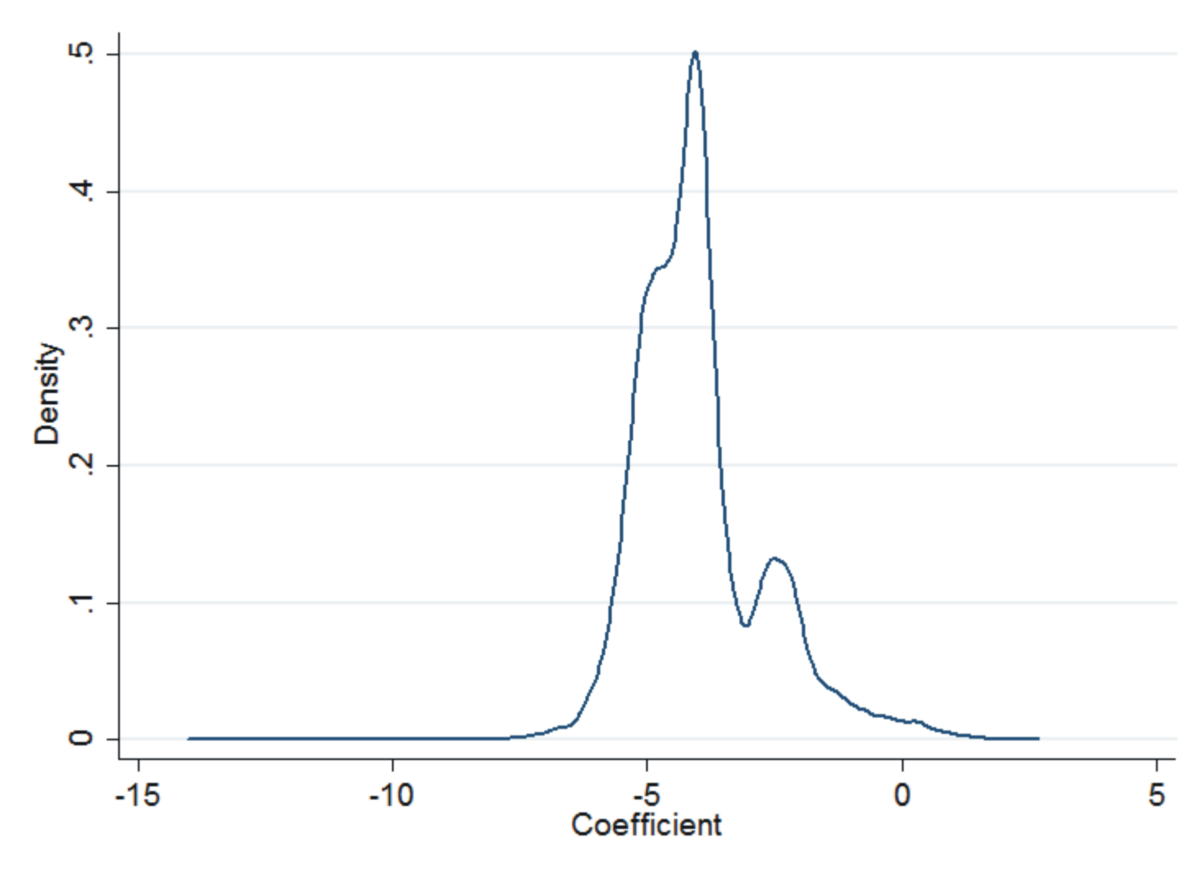
to be continued on next page

Table 4: Robustness checks - continued

	Mixlogit								Nested Logit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$GDPS_{ki}$	0.0082***	0.0067***	0.0082***	0.0051	0.0084***	0.0081***	0.0081***	0.0082***	0.0078***
	(0.000)	(0.003)	(0.000)	(0.132)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Deals_{ki}$	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Dist_{ij}$	-0.5371***	-0.5319***	-0.5363***	-0.5938***	-0.5326***	-0.5316***	-0.5474***	-0.5377***	-0.4765***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Neighb_{ij}$	0.3057***	0.3310***	0.3034***	0.5617***	0.3096***	0.3200***	0.2949***	0.3142***	0.2688***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Lang_{ij}$	0.8250***	0.8241***	0.7999***	0.8200***	0.8272***	0.8291***	0.8044***	0.8487***	0.6502***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Colony_{ij}$	0.3728***	0.3606***	0.3962***	0.1671**	0.3588***	0.3582***	0.3956***	0.3542***	0.2669***
	(0.000)	(0.000)	(0.000)	(0.019)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Same_{ij}$	0.8297***	0.7811***	0.8199***	0.6622***	0.6402***	0.8187***	0.8401***	0.8105***	0.5010***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$T_{ij}^{\triangle}$ Std. dev.					-5.7331***				
					(0.000)				
Observations	240364	203943	240364	87980	240364	240364	240364	240364	240364
Log-Likelihood	-27651.03	-23266.86	-27636.56	-10724.60	-27635.11	-27638.95	-27655.34	-27637.87	-27612.61

Notes: the dependent variable equals one if country i is the actual acquirer's country of origin. It is zero if country i is a counterfactual acquirer location. Regressions (1) to (8) are mixed logit regressions, while regression (9) is a nested logit regression, in which countries are grouped according to their geographic location in Asia/Australasia, Europe, and North America at the first level of a two-level choice process. All regressions control for acquirer country-specific effects. Regression (1) fixes tax rate differences to the values of the year 2008 for computing $T_{ij}^{\triangle}$. Regression (2) excludes all deals from 2008. Regression (3) allows a separate coefficient of $T_{ij}^{\triangle}$ for profitable and not profitable targets. Regression (4) expands the set of control variables by the target firm specific control variables $Asset_k$ and $Prof_k$, the coefficients of which are presented in Table 9 as their effect varies across the potential acquirer locations. Regression (5) randomizes the coefficient of $T_{ij}^{\triangle}$. Regressions (6) to (8) use more precise measures of repatriation taxes. p-values in parentheses, * denotes significance at the 10 %-level, ** at the 5 %-level and *** at the 1 %-level respectively.

Figure 2: Kernel density of simulated coefficients of T_{ij}^{Δ}



The figure shows the kernel distribution of simulated coefficients of T_{ij}^{Δ} in specification (5) of Table 4 using the method described by Train (2009, p.256) with 50 Halton draws. The mean of the simulated coefficients is -3.99, the standard deviation is 1.28. The bandwidth for the kernel density is 0.13.

Instead of modeling the source of heterogeneity explicitly, regression (5) of Table 4 accounts for different sensitivity to double taxation by also allowing the coefficient of T_{ij}^{Δ} to be randomly distributed. With a value of -3.99, the average coefficient is more negative than in the previous regressions. Specific values of the coefficients per target firm can be simulated as in Train (2009, p.256). Figure 2 displays a kernel density estimate of these simulated coefficients. In line with the previous robustness checks investigating the relationship between double taxation and target profitability, there is a significant difference in target profitability when the sample is split at the median of the simulated coefficients of T_{ij}^{Δ}. Observations with more negative coefficients have an average profits-to-assets ratio of 4.1 % whereas observations with less negative coefficients have an average profits-to-assets ratio of 2.8 %.[18]

[18] Extreme outliers of profit-to-assets ratios below -1 or above 1 were disregarded. Otherwise the sample

Regression (6) of Table 4 departs from the treatment effect design by using the repatriation tax measure $T_{ij}^{\Delta 2}$ defined by expression (6) on p. 6, which also accounts for repatriation taxes due to incomplete exemption of dividends as some countries exempt only 95 or 97 % of repatriated dividends from taxation. The estimated coefficients are very similar to previous results.

The measure $T_{ij}^{\Delta 2}$ in expression (6) accounts only for the tax on dividends imposed by the parent country. This tax is difficult to avoid even if dividends are eventually repatriated via third countries. The overall double tax on dividend repatriations $T_{ij}^{\Delta 3}$ defined by expression (7) can be larger if the subsidiary's country imposes withholding taxes, which a multinational may or may not be able to circumvent by means of conduit companies. In regression (7) of Table 4, the coefficient for $T_{ij}^{\Delta 3}$ is considerably attenuated compared to previous estimates and it is no longer significant, which suggests that withholding taxes may have a different effect than taxes imposed by the parent firm's country. This hypothesis is explicitly investigated in regression (8) of Table 4 by including

$$Withholding_{ij} = T_{ij}^{\Delta 3} - T_{ij}^{\Delta 2} \tag{8}$$

as a separate variable, which captures the potential additional tax burden due to withholding taxes, while $T_{ij}^{\Delta 2}$ controls for taxes imposed by the parent firm's country. The two coefficients are found to be significantly different with a p-value of less than 0.01. The negative coefficient of $T_{ij}^{\Delta 2}$ is similar to previous estimates while the insignificant coefficient of $Withholding_{ij}$ with a point estimate close to zero suggests that withholding taxes can be avoided at low cost. This result is similar to the finding of Barrios et al. (2012) that the establishment of new foreign subsidiaries does not appear to be affected by withholding taxes.

The nested logit regression (9) in Table 4 is an alternative to the mixed logit approach, which is also robust to violations of the IIA assumption. As a generalization of the conditional logit regression, it allows for a two-level choice process: at the first level a preferred subset of choices is determined, while the specific choice is picked at the second level from within the subset.[19] However, some structure has to be imposed ex-ante by defining the relevant subsets of choices. In the current setting, a geographic grouping of potential acquirer countries appears most sensible. In particular, we distinguish between acquirers from Asia/Australasia, from Europe, and from North-America. As before, T_{ij}^{Δ} has a signifcantly negative effect.

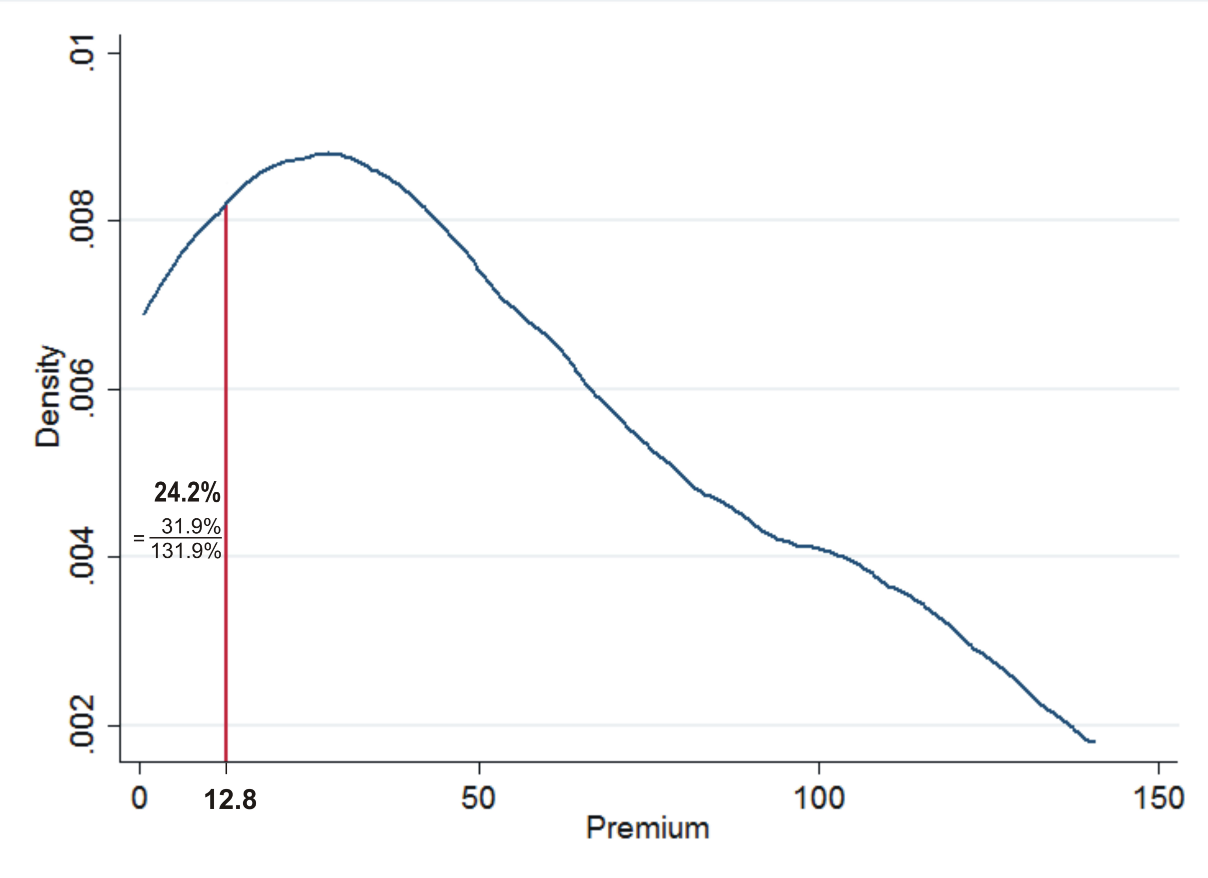
The results above show that taxes on dividend repatriations distort cross-border ownership patterns. As the additional tax burden differs between acquirer locations, one

variance would increase from 0.045 to 334 and the kurtosis would increase from 7.9 to 4553.

[19]See, for example, Greene (2012), p. 808-810, for more details.

expects the observed ownership structures to be inefficient. Larger synergies could be exploited by an alternative matching of acquirers and targets.

Figure 3: Distribution of premiums paid by Japanese acquirers



The figure shows the kernel density estimate of premiums paid by Japanese acquirers for foreign listed companies. The premium is defined as hundred times the difference between the acquisition price and the price one day prior to the announcement of the acquisition, divided by the latter. 24.2 % of the mergers and acuisitions have a premium smaller than 12.8. The bandwidth for the kernel density is 22.0.

In order to calculate the decrease in synergies due to second-best ownership, we cut-off the left tail of the distribution of take-over premiums offered by Japanese acquirers, as displayed in Figure 3, such that the proportion of the left tail relative to the whole distribution is equal to the increase in the total number of mergers and acquisitions due to switching from a credit to an exemption system (as calculated on p. 10). At the cut-off, the premium is 12.8 percentage points. This value is the upper bound for the loss in synergies caused by inefficient ownership due to double taxation. This upper bound is reached, for example, under the (polar) assumption that for all the acquisitions by Japanese firms, the second-best bidder is never willing to pay more for a target firm than the going market price. Hence, if all Japanese acquirers decreased their premiums offered by 12.8 percentage points, then 24.2 % of the acquisitions would no longer have a Japanese acquirer. The synergies reflected in the take-over premiums of these acquisitions would no longer be realized.[20]

The loss in synergies would be correspondingly smaller than this upper bound if there exist second-best bids close to the-first best bids of the Japanese acquirers - because then a smaller reduction in the premiums offered by Japanese acquirers would already cause the same proportion of mergers and acquisitions to be lost.

The increase in mergers and acquisitions with Japanese acquirers due to switching to an exemption system (estimated on p. 10) represents an average yearly deal volume of 4,100 million U.S. dollar. Hence, the yearly efficiency loss due to inefficient ownership caused by Japanese double taxation may have been up to 525 million U.S. dollar (=12.8% × 4,100 million U.S. dollar).

Similar calculations show the value of synergies raised to be in the order of 13.5 million dollar per year for the case of the British international tax reform. Simulating such a reform for the U.S. results in a yearly value of 1,134 million dollar of additional synergies.

5 Conclusion

The empirical analysis finds that multinationals from countries which impose taxes on repatriated profits do indeed face a comparative disadvantage in acquiring foreign firms. Japan and the U.K. both started to exempt foreign-source dividends from tax in 2009. These reforms are found to have increased the number of foreign acquisitions by Japanese firms by 31.9 %, whereas the number of foreign acquisitions by British firms increased by 3.9 %. The identification approach relies directly on policy changes in double tax relief and not on changes in tax rates, so we can exclude that the observed effects are just an artifact of a change in the underlying corporate income tax. The implied loss in efficiency due to violations of ownership neutrality is sizeable: in the case of double taxation of multinationals based in the U.S., the loss in efficiency of 1,134 million dollar per year is in the order of 1.2 % of the yearly total value of U.S. acquisitions abroad. In that sense, one could draw the conclusion that the U.S. — as the only remaining major country still relying on a foreign tax credit system — should follow the British and Japanese example of exempting foreign source dividends in order to create a level playing field for competing acquirers and thereby avoid second-best ownership structures.

However, our results should not be interpreted as suggesting that exempting dividends from tax is a panacea for all inefficiencies which may arise in the international investment process. First, as Becker and Fuest (2010) argue, even for mergers and acquisitions

[20] Andrade et al. (2001) show that synergies are almost fully reflected in take-over premiums.

the exemption system is not optimal from a national perspective if foreign acquisitions rely on rival input factors from the headquarters, for example, management capacity. Foreign activities would then crowd out domestic forms of engagement. Second, the aspect of capital export neutrality raised by Musgrave (1969) still applies to the classic mode of FDI, in which capital is exported. Eventually, the optimal balance between ownership neutrality and capital export neutrality should depend on the relative share of greenfield investment versus mergers and acquisitions in FDI. The alternative option of discriminating the two modes of FDI for tax purposes may not be feasible in practice.

Appendix

Table 5: Regional origin of acquirers

Country	2004	2005	2006	2007	2008	2009	2010
Austria	28	27	33	39	45	27	16
Australia	36	51	61	84	53	40	31
Belgium	45	46	68	46	42	31	34
Canada	170	169	154	157	137	104	164
Denmark	43	62	55	45	55	27	25
Finland	40	54	60	59	71	28	44
France	97	129	126	146	141	115	100
Germany	75	108	117	148	120	102	84
Ireland	46	40	42	81	31	18	21
Italy	19	29	40	38	39	19	19
Japan	24	36	32	33	33	26	28
Luxembourg	8	23	24	28	15	13	18
Netherlands	89	123	129	148	134	81	88
New Zealand	14	17	9	21	17	5	4
Norway	25	58	58	50	44	23	24
Spain	40	42	48	50	47	22	25
Sweden	66	100	103	138	103	72	80
Switzerland	56	66	67	75	91	60	44
United Kingdom	224	317	309	354	242	142	190
United States	450	514	524	521	448	318	451
all countries	1595	2011	2059	2261	1908	1273	1490

The table reports the number of cross-border M&As per country of acquirer and year.

Table 6: Variables

τ_i	Corporate income tax rate of the candidate-country including average state and municipal taxes, measured in percentage-points (0.01 = one %). Used to compute T_{ij}^{dummy}, T_{ij}^{Δ} and $T_{ij}^{\Delta 2}$. Sources: Chennells and Griffith (1997), Eurostat (2004), and KPMG (2003). IBFD (2010a). Previous issues of these publications were consulted as well.
τ_j	Corporate income tax of the target-country including average state and municipal taxes, measured in percentage-points (0.01 = one %). Used to compute T_{ij}^{dummy}, T_{ij}^{Δ} and $T_{ij}^{\Delta 2}$. Sources: like τ_i
ω_{ij}	Withholding tax rate applicable for dividends distributed from country j to a parent located in country i. Sources: Coopers & Lybrand (1998) and IBFD (2010a, 2010b). Previous issues of these publications were consulted as well.
$GDPC_i$	Per capita gross domestic product in thousand dollars in the year before the announcement date in the candidate-country converted to international dollar using purchasing power parity rates. Source: Worldbank (2010).
$GDPG_i$	Growth rate of gross domestic product of the candidate-country in the year of the announcement date, measured in percentage-points. Sources: Worldbank (2010) and OECD (2010), "Aggregate National Accounts: gross domestic product", OECD National Accounts Statistics (database) for 2010 data.
$Stock_i$	Share price times the number of shares outstanding of listed companies in the candidate-country in the year before the announcement of the deal. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies do not include investment companies, mutual funds, or other collective investment vehicles. Measured in percentage of gross domestic product. Source: Worldbank (2010).
$Exch_i$	Exchange rate in the candidate-country, national currency per U.S. dollar. Sources: OECD (2010), "OECD Economic Outlook No. 88", OECD Economic Outlook: Statistics and Projections (database).
$GDPS_{ki}$	Fraction of the target industry sector (first, second or third) in the gross domestic product of the candidate country in the year before the announcement date. Source: Worldbank (2010), target sector taken from SIC-codes provided by Zephyr.

to be continued on next page

Table 6: (continued)

$Deals_{ki}$	Number of deals in the industry of the target-company (first character of the 4-digit-sic-code) with acquirer-company in the candidate-country in the 5-year period before the year of announcement of the deal. Source: Zephyr, Bureau van Dijk
$Dist_{ij}$	Logarithm of the simple distance between the most populated cities of the candidate- and target-country in km. Source: Mayer and Zignago (2005).
$Neighb_{ij}$	Dummy variable, 1 for contiguity of candidate- and target-country. Source: Mayer and Zignago (2005).
$Lang_{ij}$	Dummy variable, 1 for common official primary language in the candidate- and target-country. Source: Mayer and Zignago (2005).
$Colony_{ij}$	Dummy variable, 1 if candidate- and target-country pairs were ever in colonial relationship. Source: Mayer and Zignago (2005).
$Same_{ij}$	Dummy variable, 1 if candidate- and target-country were or are the same country. Source: Mayer and Zignago (2005).
$Asset_k$	Logarithm of pre-deal target total assets in thousand U.S. dollar in the last available year before the acquisition announcement. Source: Zephyr, Bureau van Dijk.
$Prof_k$	Pre-deal target profit after tax in thousand U.S. dollar in the last available year before the announcement divided by pre-deal target total assets in thousand U.S. dollar in the last available year before the acquisition announcement. Source: Zephyr, Bureau van Dijk.

Table 7: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
T_{ij}^{Δ}	240364	0.010	0.034	0	0.296
T_{ij}^{Δ} (2008 tax rates)	240364	0.011	0.035	0	0.283
$T_{ij}^{\Delta}(Profit_k)$	240364	0.003	0.019	0	0.296
$T_{ij}^{\Delta}(Loss_k)$	240364	0.001	0.011	0	0.283
$T_{ij}^{\Delta 2}$	240364	0.013	0.033	0	0.296
$T_{ij}^{\Delta 3}$	240364	0.078	0.087	0	0.302
$Withholding_{ij}$	240364	0.065	0.084	0	0.291
τ_i	240364	0.300	0.063	0.125	0.421
$GDPC_i$	240364	35.406	9.437	24.291	74.422
$GDPG_i$	240364	1.918	2.536	-8.019	6.474
$Stock_i$	240364	95.906	57.375	13.474	323.710
$Exch_i$	240364	7.237	23.558	0.500	117.755
$GDPS_{ki}$	240364	54.038	22.003	0.303	86.440
$Deals_{ki}$	240364	346.027	791.803	0	8184
$Dist_{ij}$	240364	7.886	1.293	4.088	9.883
$Neighb_{ij}$	240364	0.113	0.317	0	1
$Lang_{ij}$	240364	0.210	0.407	0	1
$Colony_{ij}$	240364	0.099	0.298	0	1
$Same_{ij}$	240364	0.010	0.100	0	1
$Asset_k$	87890	9.288	2.125	0.693	20.483
$Prof_k$	87890	0.2100	18.275	-57.588	1236.621

For detailed variable descriptions and data sources, see Table 6.

Table 8: Regression results for the candidate-country fixed effects, column (3) of Table 2

Variable name	Mean	P-value mean	Standard deviation	P-value standard deviation
AT	-2.9562	0.000	-0.7881	0.043
AU	-1.2810	0.000	-0.0516	0.831
BE	-3.6807	0.000	1.4807	0.000
CA	-1.6021	0.000	0.3481	0.258
CH	-3.9036	0.000	1.8072	0.000
DE	-1.6729	0.000	-1.1924	0.000
DK	-1.8686	0.000	0.0114	0.978
ES	-1.6131	0.000	0.2674	0.510
FI	-2.3660	0.000	0.9586	0.000
FR	-1.1623	0.001	-0.6353	0.084
UK	-0.7475	0.003	-0.2658	0.089
IE	-3.3576	0.000	-0.5147	0.136
IT	-1.8188	0.000	-0.5780	0.093
JP	-0.3221	0.674	-0.0621	0.888
LU	-5.9488	0.000	-0.0881	0.916
NL	-2.5249	0.000	-1.6621	0.000
NO	-2.6500	0.000	-0.0983	0.763
NZ	-2.0189	0.000	-0.2419	0.527
SE	-1.2508	0.000	-0.1006	0.598

The table reports the means and standard deviations of the random coefficients of the potential acquirer country dummy variables in regression (3) of Table 2. The U.S. represents the base category.

Table 9: Regression results for candidate-country fixed effects and target-specific variables $Asset_k$ and $Prof_k$, column (4) of Table 4

Variable name	Coefficient	P-value	Standard deviation	P-value standard deviation
AT*$Asset_k$	0.1711	0.001	-	-
AU*$Asset_k$	0.0409	0.521	-	-
BE*$Asset_k$	-0.0367	0.499	-	-
CA*$Asset_k$	0.0250	0.601	-	-
CH*$Asset_k$	0.0808	0.157	-	-
DE*$Asset_k$	0.1030	0.037	-	-
DK*$Asset_k$	-0.1309	0.003	-	-
ES*$Asset_k$	0.1503	0.000	-	-
FI*$Asset_k$	-0.1651	0.001	-	-
FR*$Asset_k$	0.0587	0.069	-	-
UK*$Asset_k$	-0.0125	0.650	-	-
IE*$Asset_k$	0.0358	0.547	-	-
IT*$Asset_k$	0.1760	0.000	-	-
JP*$Asset_k$	0.2013	0.001	-	-
LU*$Asset_k$	0.2995	0.000	-	-
NL*$Asset_k$	0.0875	0.013	-	-
NO*$Asset_k$	-0.1162	0.013	-	-
NZ*$Asset_k$	0.0922	0.533	-	-
SE*$Asset_k$	-0.0574	0.091	-	-
AT*$Prof_k$	0.1800	0.521	-	-
AU*$Prof_k$	0.2384	0.003	-	-
BE*$Prof_k$	0.1109	0.501	-	-
CA*$Prof_k$	0.0368	0.642	-	-
CH*$Prof_k$	0.1944	0.381	-	-
DE*$Prof_k$	0.2349	0.004	-	-
DK*$Prof_k$	0.1378	0.293	-	-
ES*$Prof_k$	0.0377	0.732	-	-
FI*$Prof_k$	0.2374	0.003	-	-
FR*$Prof_k$	0.1298	0.252	-	-
UK*$Prof_k$	0.2402	0.002	-	-
IE*$Prof_k$	0.2363	0.009	-	-
IT*$Prof_k$	-0.0641	0.165	-	-
JP*$Prof_k$	0.0080	0.947	-	-
LU*$Prof_k$	0.0946	0.749	-	-
NL*$Prof_k$	0.1548	0.238	-	-
NO*$Prof_k$	0.0894	0.454	-	-
NZ*$Prof_k$	0.2383	0.008	-	-
SE*$Prof_k$	-0.0338	0.357	-	-

to be continued on next page

Table 9: Regression results for candidate-country fixed effects and target-specific variables $Asset_k$ and $Prof_k$, column (4) of Table 4, continued

Variable name	Mean	P-value	Standard deviation	P-value Standard deviation
AT	-5.1742	0.000	1.2050	0.029
AU	-2.4318	0.001	0.0211	0.978
BE	-4.2108	0.0 00	-1.8320	0.000
CA	-3.1148	0.000	1.3847	0.000
CH	-6.2171	0.000	2.6419	0.000
DE	-5.2168	0.000	2.8341	0.000
DK	-0.9842	0.088	-0.1596	0.800
ES	-3.5507	0.000	-0.3294	0.358
FI	-1.6835	0.011	1.4481	0.000
FR	-2.2515	0.000	-0.2669	0.595
UK	-1.0358	0.032	-0.1062	0.679
IE	-3.5946	0.000	0.2005	0.752
IT	-4.0416	0.000	-0.4134	0.559
JP	-4.3595	0.006	1.4957	0.002
LU	-8.8030	0.000	-1.1255	0.129
NL	-3.2028	0.000	1.1377	0.005
NO	-1.4745	0.006	0.2611	0.492
NZ	-4.4730	0.015	0.7336	0.487
SE	-1.1132	0.033	0.3693	0.142

This table reports supplemental results of regression (4) in Table 4. The first part of the table lists the coefficients (and corresponding p-values) of the target-specific variables $Asset_k$ and $Prof_k$ interacted with potential acquirer locations. The second part of the table reports the means and standard deviations of the random coefficients of the potential acquirer country dummy variables and their corresponding p-values. In all cases, the U.S. represents the base category.

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TAX-HAVEN INCORPORATION FOR U.S.-HEADQUARTERED FIRMS: NO EXODUS YET

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U.S. income tax rules may encourage a U.S.-headquartered multinational corporation ("MNC") to adopt a tax-haven-parented structure. We study data from firms that conducted initial public offerings in the United States between 1997 and 2010 and offer evidence that U.S.-headquartered MNCs rarely incorporate in tax havens. Of the 918 U.S.-headquartered MNCs that we identify, only 27 are incorporated in tax havens. Others have pointed to the recent increase in the proportion of firms conducting U.S. IPOs that incorporate in tax havens as possible evidence that more U.S.-headquartered MNCs make this decision. We show instead that Chinese-headquartered firms drive this increase.

Keywords: international taxation, initial public offerings, tax havens, headquarters, incorporation

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I. INTRODUCTION

Multinational corporations (MNCs) face the challenge, and opportunity, of multijurisdictional tax planning (Desai and Dharmapala, 2010; Desai, 2009). One primary goal of multijurisdictional planning is to allocate as much taxable income as possible to low-tax jurisdictions, thereby minimizing corporate income tax (Clausing, 2009). While all MNCs have the opportunity to take advantage of this strategy, MNCs with parent corporations incorporated outside the United States, and in particular in tax havens, may have more options available to them (Desai and Hines, 2002). This is because the U.S. corporate residence rule permits a firm incorporated outside the United States to avoid U.S. taxpayer status, even if it is headquartered and managed in the United States (Shaviro, 2011). Therefore, using a tax-haven-incorporated parent may help U.S.-headquartered MNCs avoid the perceived burdens and anticompetitive features of the U.S. corporate tax system (Donmoyer, 1999; Samuels, 2009) and reduce tax on U.S. and non-U.S. income (U.S. Treasury, 2002). As a result, prior researchers have predicted an increase in U.S.-headquartered firms incorporating in tax havens as a response to onerous U.S. federal income tax rules (Desai and Dharmapala, 2010, Shaviro, 2011).

This paper considers the issue of the incorporation location choice of firms that conduct initial public offerings (IPOs) on U.S. markets. Specifically, it examines whether U.S.-headquartered MNCs incorporate in tax havens prior to IPO. We first consider the hypothesis that U.S.-headquartered MNCs incorporate parent corporations in tax-haven jurisdictions, and find that they rarely do so. In particular, only 27 firms, or about three percent of the 918 U.S.-headquartered MNCs that we identify, incorporate in tax havens. We also briefly consider the possibility that U.S.-headquartered MNCs may incorporate in non-U.S., non-tax-haven jurisdictions, and find only minimal evidence of this practice in our sample. We next consider whether U.S.-headquartered firms are responsible for the previously documented increase in the proportion of firms conducting U.S. IPOs that are incorporated in tax havens (Desai and Dharmapala, 2010). We find that Chinese- and Hong Kong-headquartered firms, as opposed to U.S.-headquartered firms, are responsible for the increase. Finally, we list and describe some features of the U.S.-headquartered, tax-haven-incorporated firms that we find, and suggest possible directions for future research.

Section II discusses the different incorporation options for MNCs and the associated costs and benefits. Section III documents our study design, and section IV our results. Section V concludes.

II. U.S.-HEADQUARTERED MNCs' INCORPORATION DECISIONS

A. U.S. versus Tax Haven Incorporation

A U.S.-headquartered MNC faces the choice of whether to incorporate its parent entity in the United States or in a non-U.S. jurisdiction. In this paper we focus on the choice between U.S. and tax-haven incorporation. This is consistent with the hypothesis that if a U.S.-headquartered firm incorporates outside the United States in response to onerous tax rules, it will do so in a tax haven. We consider firms' incorporation decisions prior to IPO rather than transactions involving inversions of stand-alone U.S.-parented firms into non-U.S.-parented structures.

Below, we discuss the existing laws and incentives that affect U.S.-headquartered, U.S.-incorporated firms and U.S.-headquartered, tax-haven-incorporated firms. We then consider the possibility that incentives to incorporate a tax haven parent have changed or will change over time. Finally, we discuss several nontax considerations relevant to incorporation decisions.

B. Tax Structure Options for U.S.-Headquartered MNCs

1. Taxation of MNCs with U.S. Parent

Corporations incorporated in the United States, for example in a U.S. state such as Delaware, are subject to U.S. federal income tax on worldwide income. Because the U.S. rules treat separately incorporated affiliates as separate taxpayers, non-U.S. corporate subsidiaries of a U.S. parent are not automatically required to pay U.S. federal income tax. However, a U.S.-parented MNC must currently pay U.S. tax on the income of its foreign subsidiaries to the extent such income falls into “subpart F income” categories, which include certain mobile and passive income. When income is repatriated from non-U.S. corporate subsidiaries as dividend distributions, the dividends are included in the income of the U.S. parent. U.S. federal income tax imposed on repatriations, including subpart F inclusions and dividend distributions, is subject to reduction under applicable foreign tax credit rules. A proportion of foreign income taxes paid by non-U.S. corporate subsidiaries is deemed paid by U.S. parents upon the U.S. parent’s inclusion of subpart F income or dividend distributions, and these deemed paid foreign taxes can support a foreign tax credit (Isenbergh, 2009).

Like all taxpayers, U.S-parented MNCs face an incentive to engage in tax planning to reduce or defer the amount of U.S., and non-U.S., tax they have to pay. International tax planning differs significantly from firm to firm. However, a typical structure for a U.S.-parented MNC features a U.S. parent corporation, with one or more non-U.S. intermediate holding corporations incorporated in a tax haven or other low-tax jurisdiction, and owned by the United States parent or by U.S. affiliates of the U.S. parent. The non-U.S. low-tax intermediate holding corporations then own one or more non-U.S. corporate operating subsidiaries (Fleming, Peroni, and Shay, 2009; Kleinbard 2011a). These structures are facilitated by "check-the-box" entity classification rules finalized by the United States in 1996 (Kleinbard, 2011a).

U.S.-parented MNCs may take advantage of this type of structure by using transfer pricing to construct intercompany transactions in a way that allocates income to the low-tax intermediate holding corporation(s) rather than to the United States or other jurisdictions that assert the right to tax other members of the MNC corporate group. For example, profit may be allocated to a low-tax intermediate holding affiliate because the low-tax affiliate is the owner, for tax purposes, of the MNC's non-U.S. intellectual property (Shay, 2004). The sharing of research and development payments under the so-called "cost sharing" regulations and the transfer of intellectual property offshore at relatively low valuations under the so-called "buy in" regulations facilitate the ownership of intellectual property by non-U.S. subsidiaries (Brauner, 2008). In addition, MNCs may structure intercompany transactions and external transactions such as contract manufacturing in a way that avoids the characterization of the low-tax affiliate's income as subpart F income. For example, the low-tax affiliate can be deemed to own a manufactured product throughout its manufacturing process until it is sold to a customer (Roin, 2008). Strategies such as these may permit U.S.-parented MNCs to allocate not only non-U.S. income, but also U.S. income, to low-taxed non-U.S. affiliates, and conversely to allocate deductions to U.S. parents (Clausing, 2009; Grubert, 2012).

U.S.-parented MNCs may also use foreign-tax-credit planning to ensure that their repatriations are sheltered from taxation. For example, they may choose to pay dividends from high-taxed rather than low-taxed subsidiaries, generating higher deemed paid foreign taxes. This strategy can shield both dividends and payments other than dividends, such as royalties, from non-U.S. tax (Grubert and Altshuler, 2008). Such MNCs may also use structures that maximize benefits under bilateral income tax treaties and non-U.S. tax laws and ensure that intercompany payments such as royalties and interest are not subject to non-U.S. withholding tax and/or are deductible under non-U.S. income tax law. In addition, alternatives to dividend repatriation, including intercompany loans and "blending" dividends from high-tax and low-tax affiliates, correlate with the prospect of a high tax liability imposed on dividend repatriation (Altshuler and Grubert, 2002).

As a result of this planning, prior research finds that U.S.-parented MNCs pay low rates of U.S. tax on non-U.S. income earned in non-U.S. subsidiaries. For example, in 2007, U.S.-parented MNCs paid about $18.1 billion in U.S. tax with respect to non-U.S. income. This represented an average 3.3 percent residual U.S. tax burden on such income based on 2007 Treasury tax return data (Costa and Gravelle, 2012).

Grubert and Mutti (2001) develop a broader model that calculates the U.S. tax burden on non-U.S. income in U.S.-parented MNC structures including not only taxes remitted but also "excess burden," or deadweight loss. Using this model, based in part on 1992 Treasury tax return data, Altshuler and Grubert (2001) estimate that the effective U.S. tax rate for the non-U.S. income of U.S.-parented MNCs is approximately 5.4 percent. This estimate includes a 1.7 percent "excess burden" deadweight loss generated by unrepatriated earnings in non-U.S. jurisdictions with an effective tax rate below ten percent, a result that is consistent with other research (Desai, Foley, and Hines, 2001). Grubert and Altshuler (2008) have also raised the possibility that the "implicit costs of deferral" may be greater than 1.7 percent for some firms.

Several costs contribute to the excess burden or deadweight loss of sequestering earnings offshore. For example, lower than optimal dividend payments may limit the ways in which earnings may be invested (Desai, Foley and Hines, 2001). Additionally, maintaining non-business assets offshore may increase a firm's cost of capital (Bryant-Kutcher, Eiler and Guenther, 2008). Finally, the firm directly incurs tax planning costs including the expense of creating an offshore structure and maintaining multiple affiliates and intercompany relationships and payments (Slemrod and Blumenthal, 1996).

2. Taxation of MNCs with Tax-Haven Parent

An alternative structure features a MNC headquartered in the United States, but whose parent is incorporated in a tax haven that imposes a very low, often zero, rate of corporate income tax. The tax-haven parent typically owns a U.S. subsidiary that houses the U.S. management and U.S. business operations of the firm, and also owns other subsidiaries incorporated in non-U.S. jurisdictions (U.S. Treasury, 2002). The U.S. rule for corporate tax residence turns on incorporation location, not on management and control (Shaviro, 2011). As a result, a tax-haven-parented MNC avoids exposure to U.S. federal income tax on non-U.S. business income, including subpart F income, earned by non-U.S. subsidiaries (Desai and Hines, 2002).

As mentioned earlier, a U.S.-parented MNC may attempt to allocate not only non-U.S. income, but also U.S. income, to low-taxed non-U.S. subsidiaries (Clausing, 2009; Grubert, 2012). This allocation may lessen the necessity of tax-haven incorporation.

However, tax-haven-parented firms, at least in some cases, have an advantage with respect to this kind of tax planning. Seida and Wempe (2004) and Desai and Hines (2002) suggest that a key benefit of a successful tax-haven-parented MNC structure is the use of earnings-stripping strategies, under which a U.S. subsidiary makes deductible interest or other payments to its tax-haven parent to reduce the amount of income subject to U.S. tax. In other words, a tax-haven-parented MNC structure may facilitate the reduction of tax on U.S. income compared to a U.S.-parented MNC structure. In recognition of this issue, a perennial U.S. legislative proposal would tighten anti-earnings-stripping rules for tax-haven-parented MNCs created in inversion transactions (Solomon, 2012).

Prior research provides some evidence of the benefits provided by the tax-haven parented structure. Seida and Wempe (2004) find evidence that earnings stripping by U.S. firms that inverted into tax-haven-parented structures, prior to the enactment of the 2004 anti-inversion rules, resulted in lower post-inversion effective tax rates for the inverted firms compared to a control sample. Cloyd, Mills and Weaver (2003) find no systematic increase in company valuation following the announcement of an inversion, but Desai and Hines (2002) observe that the markets exhibit more positive reactions to inversions in the presence of greater leverage. The research suggests that a tax-haven-parented structure provides tangible tax savings to some firms, which investors positively value.

Changing from a U.S.-parent to a tax-haven-parent structure is costly, as the applicable rules typically require shareholders to recognize gain (but prevent the recognition of loss) upon such an inversion (U.S. Treasury, 2002). Moreover, such a change is sometimes impossible. Under Section 7874 of the Internal Revenue Code, an anti-inversion provision enacted in 2004, a MNC is still treated as a U.S.-parented firm even after acquisition by a foreign corporation if i) at least 80 percent of the foreign corporation's stock is owned by former owners of the U.S. parent (by reason of their former ownership of the U.S. parent) and ii) the firm lacks "substantial business activities" in the country in which the new foreign parent is incorporated (Vanderwolk, 2010). Strategic acquisitions continue to provide a path to inversion (Wells, 2012). However, other recently used strategies, such as expatriation to a country where a firm arguably has substantial business activities (Webber, 2011) have been curtailed by recent regulations limiting the definition of substantial business activities (Temp. Treas. Reg. § 1.7874-3T(f)). The difficulty of changing incorporation location for an existing U.S.-incorporated firm may increase the incentive for firms to incorporate in a tax haven at inception.

C. Increasing Tax-Haven Incorporation Incentives?

The differences between the federal taxation of U.S.-parented and tax-haven parented MNCs are not new. But it has been argued that, over time, the differences have become more likely to lead to U.S.-headquartered MNCs opting for tax-haven parents, including at the time of initial incorporation (Desai and Dharmapala, 2010; Shaviro, 2011). One reason is the asserted increased ease, attributable to communications and other technological developments, of "decentering" companies, or placing financial, organizational and managerial "homes" in different countries (Desai, 2009, p. 1277). Another cited reason for an increased incentive for MNCs to incorporate outside the United States is that other countries have lowered their corporate income tax rates, relative to the United States, partially in an attempt to attract foreign direct investment (Altshuler and Grubert, 2006; Shaviro, 2011). A comparison of the statutory corporate income tax rate imposed by the United States to the statutory rates imposed by other countries reveals that the top U.S. statutory rate of 35 percent substantially exceeds the mean OECD rate of 25 percent, and is much greater than the typical tax-haven rate of zero percent (Sullivan, 2011).

Another factor that firms may consider in connection with tax-haven incorporation is the possibility of future changes in U.S. tax law. For example, in the wake of perceived abuse of the cost-sharing and buy-in regulations mentioned above, the U.S. government adopted revised regulations that had the effect of allocating deductions away from a U.S. parent corporation (in the case of regulations applicable to stock option costs) or allocating income to a parent corporation (in the case of platform contribution transaction buy-in pricing regulations) (Nadal, 2009). Use of a tax-haven parent avoids the possibility that similar rules reducing the ability of a U.S. parent to shift profits to low-tax subsidiaries will adversely affect a firm.

Another reform proposal would change the U.S. corporate income tax system to implement worldwide consolidation, or the current taxation of U.S.-parented MNCs on all of the income generated by non-U.S. subsidiaries (Kleinbard, 2011b), or at least on the income generated by low-taxed non-U.S. subsidiaries (White House and U.S. Treasury, 2012). Such a worldwide consolidation reform would not affect the U.S. federal income taxation of tax haven-parented MNCs.

However, there is also the risk that future tax laws may cut against tax-haven incorporation. For example, passage of a "managed and controlled" test for determining corporate residence could significantly undermine the strategy of tax-haven incorporation (Kleinbard, 2011b). Alternatively, rules directed specifically at low-taxed parents of U.S. subsidiaries could undo much of the benefit of, for example, earnings-stripping planning (Solomon, 2012). That said, a tax-haven-parented MNC could presumably domesticate and change into a U.S.-parented MNC if it concluded that the tax-haven-parented structure no longer offered sufficient advantages.

D. Nontax Considerations

Non-tax incentives, most importantly capital markets and related corporate governance concerns, can also affect a firm's choice of country of incorporation. Non-U.S. incorporation does not offer the benefit of access to Delaware corporate governance law (Kane and Rock, 2008), and this lack of access may translate to lower investor confidence in management (Hanlon and Slemrod, 2009). Related research on the reasons for cross-listing indicates that cross-listed firms trade at a premium because their willingness to comply with stricter accounting, disclosure and other rules serves as a "bonding" signal that reassures investors about low agency costs (Litvak, 2007).

More specific regulatory concerns may also play a role. Certain regulations, like those applicable to the airline industry, may favor U.S.-incorporated firms (Dobson and McKinney, 2009). On the other hand, incorporation outside the United States could facilitate listing outside the United States and the avoidance of some U.S. securities reporting requirements (Litvak, 2007), or could loosen applicable insurance regulations (Elliott, 2005) or shipping law requirements (Semerono, 2000).

These non-tax considerations, together with opportunities for U.S.-incorporated firms to reduce U.S. tax under existing law, may affect the expected benefits of tax-haven incorporation for some firms. However, as pointed out in other research (Desai and Dharmapala, 2010; Shaviro, 2011), tax-haven incorporation still appears to offer many firms the prospect of avoiding a small current U.S. tax on non-U.S. income and the possibility of eroding the U.S. tax base through earnings-stripping strategies. The question we engage is whether firms are taking advantage of this option.

III. STUDY DESIGN

A. Overview

As discussed above, U.S. tax rules may encourage a U.S.-headquartered MNC to adopt a tax-haven-parented structure. But to what extent have U.S.-headquartered MNCs in fact used tax-haven-parented structures, and has their use of these structures changed over time? These questions motivate our study. We seek to test two hypotheses. First, do U.S.-headquartered MNCs incorporate in tax havens prior to IPO? Second, are U.S.-headquartered firms responsible for the previously documented increase in the proportion of firms conducting U.S. IPOs that are incorporated in tax havens?

B. Use of IPO Data to Study Incorporation Location Decision

Our study examines firms that conducted initial public offerings ("IPOs") on U.S.-based exchanges between 1997 and 2010. We choose this set of firms because (1) it has been previously cited as support for the proposition that more U.S.-headquartered MNCs have begun to incorporate outside the United States, and in particular in tax havens (Desai and Dharmapala, 2010; Shaviro, 2011); (2) IPO filings contain not only data about incorporation location and listed headquarters, but also information that can be used to evaluate the "true" natural headquarters of a firm; (3) since IPO firms are often relatively young, use of the IPO sample allows us to observe the incorporation status of many firms relatively close to their original incorporation date; and (4) examining U.S. IPO firms will capture the U.S.-headquartered multinational population that we are interested in, under the assumption that MNCs are large enough to prioritize access to public equity markets.

Selection bias affects our sample to a limited extent. First, our sample excludes firms that do not conduct an IPO. Therefore we are unable to observe the incorporation decisions of firms who fail, are acquired prior to listing, or remain private. We have little reason to think that firms that fail or experience a strategic acquisition are more likely to choose tax-haven incorporation compared to firms that conduct an IPO. But it is possible that that a firm that plans to stay private may be more likely to choose tax-haven incorporation compared to firms that conduct an IPO. For example, it is possible that corporate governance and shareholders' rights offered by U.S. incorporation are more important for shareholders of a publicly held corporation than for owners of a closely held firm.

A second source of potential bias is that, although our sample includes firms that conduct an IPO on a U.S. exchange simultaneously with an offering on a non-U.S. exchange, we do not examine the incorporation decisions of firms that do not list on a U.S. exchange. There has been a significant drop in IPOs conducted on U.S. exchanges in recent years, and a concurrent increase on non-U.S. exchanges. If this dynamic is driven by U.S.-headquartered firms conducting their IPO on foreign markets, and these firms incorporate in tax havens, then our analysis would undercount the number of U.S.-headquartered firms that incorporate in tax havens.

In concurrent research, Doidge, Karolyi and Stultz (2012), examine the drivers of the growth of IPOs outside of the U.S. They show that the number of firms conducting an IPO only outside of their domestic market has grown from 55 in 1990 to 734 in 2007, with the associated proceeds increasing from $8.8 to $168.8 billion. While the authors do not document the total number of U.S. firms in this group, they do show that U.S. firms that do not list on a U.S. market generate only seven percent of the total proceeds from these issuances. They conclude that the growth of IPOs outside the United States is driven predominantly by non-U.S. firms conducting IPOs outside of U.S. exchanges. As a result, we do not believe our focus on U.S.-listed IPO firms omits a meaningful number of U.S.-headquartered MNCs.[1]

A final limitation with our study design is that each observation in our data set typically relates to an incorporation decision taken several years prior to the IPO date and therefore lags incorporation decisions made in response to historical developments. As a result, any decisions made in response to legislative changes in the recent past will most likely not be reflected in the data. For example, the observations of U.S-headquartered, tax-haven-incorporated firms are composed mainly of firms that incorporated prior to the 2004 enactment of I.R.C. Section 7874, which severely curtails the ability of a U.S.-parented MNC to invert into a non-U.S. parent structure.

[1] To provide additional evidence that U.S.-headquartered firms generally list on U.S. exchanges, we examined all firms that appear on the COMPUSTAT Fundamentals Annual (listed on North American Exchanges) and Global (international exchanges) databases for the sample period of 1997-2010. We identified all firms coded as U.S.-headquartered in the two databases (5,665 firms) and observed that 99 percent (5,622 firms) are, according to the databases, listed on an exchange (item EXCHG for fundamentals annual, EXCHC for global) located in the United States.

C. Default Incorporation Jurisdiction Assumption

Others have identified the challenge of identifying the counterfactual case of those firms that would have incorporated in the United States but for U.S. corporate tax rules (Desai and Dharmapala, 2010). We address this problem by assuming that the default jurisdiction of incorporation is the headquarters jurisdiction of the firm. This is consistent with a body of related corporate governance literature that finds a significant home-state advantage and a largely binary incorporation location choice between home state and Delaware for U.S. firms (Bebchuk and Cohen, 2003; Daines, 2002). Thus a decision by a U.S. firm to incorporate in the United States indicates that corporate tax, regulatory or other incentives are not sufficient to motivate non-U.S. incorporation. Alternatively, a decision by a U.S.-headquartered firm to incorporate in a tax-haven jurisdiction suggests that U.S. tax or other incentives are strong enough to motivate non-U.S. incorporation.

D. Sample Construction and Identification of Tax Havens

To build our sample, we collect a listing of all initial public offerings on a stock exchange in the United States from the Thomson Financial Services Database (aka Securities Data Company, or SDC) between 1997 and 2010. Table 1 details the sample construction. Panel A documents our initial sample of 2,911 IPOs after screening for missing data and eliminating certain investment funds. Panel B documents our collection of U.S.-headquartered firms within the larger sample. We identify 2,587 firms coded by SDC as U.S.-headquartered. We then examine the prospectuses of the 324 firms shown by SDC as headquartered elsewhere (item Nation not equal to U.S.) to ensure that the U.S.-headquartered coding is correct.[2] We classify all firms that disclose their principal

[2] The SDC "Nation" coding generally simply refers to the principal executive office listing on the face of the registration statement, which may not reflect a firm's strongest business nexus. Of the 302 non-U.S.-

office or more than 50 percent of their employees, floor area or revenue in the United States as being headquartered in the United States. This results in the identification of 35 additional U.S.-headquartered firms.

Panel C shows our identification of U.S.-headquartered MNCs. We use information provided by the 2011 COMPUSTAT fundamentals annual database to find evidence of foreign operations. Table 1, panel C documents this process. Of the 2,622 U.S.-headquartered IPO firms, we find 918 firms that show evidence of global operations. We code a firm with the selected screens equal to 'missing' as purely domestic. As it is likely that at least some of the 'missing' firms have foreign revenues, but do not specifically break out geographic information in their segment disclosures, this means we are likely undercounting the true number of MNCs.

IV. RESULTS

A. Summary

Our results are divided into three sections. First, we report the frequency with which U.S.-headquartered MNCs in our data set incorporate in tax-haven jurisdictions. We consider a firm to be incorporated in a tax haven if the incorporation country is classified as such by Desai and Hines (2009).[3] We also show descriptive data comparing U.S.-headquartered MNCs with tax-haven-incorporated parents to U.S.-headquartered MNCs

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incorporated firms for which we hand-collected principal executive office data, 277, or 92 percent, listed a principal executive office country that was the same as the SDC "Nation" code.

[3] The Desai and Hines list represents the consolidation of two different lists, one from Hines and Rice (1994) and one from an OECD (2000) report. A firm is classified as being incorporated in a tax haven jurisdiction if the 2 digit country code corresponds to a country listed as a tax haven on page 1067 of Dharmapala and Hines (2009). These countries are: Andorra, Anguilla, Antigua and Barbuda, Aruba, Bahamas, Bahrain, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Cyprus, Dominica, Gibraltar, Hong Kong, Ireland, Isle of Man, Jordan, Lebanon, Liberia, Lichtenstein, Luxembourg, Macao, Maldives, Malta, Marshall Islands, Mauritius, Monaco, Montserrat, Nauru, Netherland Antilles, Niue, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Seychelles, Singapore, Switzerland, Tonga, Turks and Caicos Islands, Vanuatu, and Virgin Islands (U.S).

with U.S.-incorporated parents. Second, we examine the previously noted increase of U.S.-listed IPO firms incorporating in tax havens (Desai and Dharmapala, 2010), and document where the firms driving this increase are headquartered. Finally, we list and describe the characteristics of the U.S.-headquartered firms that we find make the decision to incorporate in a tax-haven jurisdiction.

B. U.S.-Headquartered MNCs Overwhelmingly Incorporate in the United States

In this paper, we generally consider U.S.-headquartered firms' incorporation decisions as if they face a binary choice between U.S. incorporation and tax-haven incorporation. A third choice, non-U.S., non-tax-haven incorporation, also presents itself. Some anecdotal evidence of recent examples of the approach of non-U.S., non-tax-haven incorporation exists (Webber, 2011). Before turning to the United States-versus-tax-haven choice, we briefly consider the possibility that multinational firms in our sample choose to incorporate outside the United States, but not in tax havens, by examining the 918 U.S.-headquartered MNCs that we identify.

Table 2 presents the results. Of the 918 identified U.S.-headquartered MNCs in the sample, 44 incorporate outside the United States. Of these 44 firms, 17, or two percent of the total sample, incorporate in a non-U.S. country that is not a tax haven.[4] Israel is the only non-tax-haven country with more than a one percent share of the firms that incorporate outside the United States. Therefore, while the results indicate that a U.S.-headquartered MNC is overwhelmingly likely to incorporate in the United States, if it does not, it is most likely to incorporate in a tax haven.

[4] We obtain consistent figures when we consider the total sample of U.S.-headquartered firms without controlling for MNC status: only 69 firms, or 2.6 percent of the larger sample, incorporate outside the United States and 22 of these 69 firms incorporate in a non-U.S., non-tax-haven location.

We focus the remainder of our analysis on the choice between tax-haven and U.S. incorporation. This focus not only includes the majority of non-U.S. incorporation location choices made by U.S.-headquartered MNCs, but also responds most directly to the prediction of an increase in U.S.-headquartered, tax-haven-incorporated firms as a result of onerous U.S. federal income tax rules (Desai and Dharmapala, 2010; Shaviro, 2011). Table 3 shows the number of MNCs headquartered in the United States that incorporate in a tax haven compared to the total number of MNCs headquartered in the United States and incorporated in the United States or a tax haven. The overall number of tax-haven-incorporated firms in this subsample of issuers is only 27 out of 901, or three percent. Even if we assume that the additional 20 tax-haven firms that were missing evidence of foreign operations in COMPUSTAT are multinationals, and that no non-tax-haven firms missing information were multinationals, it would only increase the percentage of U.S.-headquartered MNCs that choose to incorporate in tax havens to just over five percent.

In some years, the percentage of tax-haven-incorporated firms is higher. For example, it is 16 percent in 2002 and nine percent in 2009. However, in both of those years, the absolute number of tax-haven firms is only three and two, respectively. The higher percentage in those years reflects the low number of total IPOs as opposed to an increase in the occurrence of U.S. MNCs incorporating in tax havens. The results indicate that U.S.-headquartered MNCs have not made the decision to incorporate in tax havens prior to IPO in significant numbers.

As noted in Panel C of Table 1, of the 918 multinational, U.S.-headquartered IPO firms that we identify, 588 have sufficient information about non-U.S income to permit a comparison of the financial characteristics of different firms. In keeping with our binary comparison, we focus on a subsample of 575 firms that are incorporated either in a tax haven or in the United States for the analysis. As Table 4 shows, 19 of these 575 firms are incorporated in a tax haven. Compared to firms not incorporated in tax havens, the tax-haven firms have significantly larger average assets ($ASSETS_t$ of \$1.7 billion versus about \$800 million) and market capitalization ($SIZE_t$ of \$3.1 billion versus \$1.3 billion). They are also more profitable as average return on assets (INC_t) in the year of IPO is 0.03 versus -0.04 for the U.S.-incorporated firms. Our data show research and development intensity (RD) that is slightly higher for U.S.-incorporated firms, but this difference is not statistically significant.

Finally, the tax-haven incorporated firms have a higher ratio of foreign income to total income (FORINC of 0.64 versus 0.23). This suggests that the U.S.-headquartered firms that incorporate in tax havens are the firms that expect to realize relatively larger benefits from the reduction of U.S. tax on their non-U.S., and perhaps also their U.S., income. However, the results also show that U.S.-incorporated MNCs still exhibit material foreign operations (FORINC of 0.23) which indicates that there may be a substantial number of U.S.-headquartered firms that could reap some tax benefits from incorporating in a tax haven, yet do not make that choice.

C. Chinese- and Hong Kong-Headquartered Firms Drive Increase in Tax-Haven-Incorporation Trend

We next examine the hypothesis that U.S.-headquartered firms are responsible for the previously documented increase in the proportion of firms conducting U.S. IPOs that are incorporated in tax havens (Desai and Dharmapala, 2010). We use the larger sample of all U.S. IPOs from 1997–2010, as shown in panel A of Table 1, to consider this question. The use of the larger sample, not screened for evidence of multinational activity, is consistent with the approach in Desai and Dharmapala.

Table 5 provides a breakdown of the U.S. IPO firms that incorporate in tax havens. We find that Chinese-, Greek-, and Hong Kong-headquartered firms are responsible for about 60 percent of the instances of tax-haven-incorporated firms conducting U.S. IPOs. Chinese- and Hong Kong-headquartered firms make up more than half of such firms, or 111 out of 210.

Figure 1 duplicates the results obtained by Desai and Dharmapala (2010) and shows that the proportion of U.S. IPO firms incorporated in tax havens increased dramatically around 2002. But, as Figure 1 also shows, the frequency of U.S.-headquartered firms incorporating in tax havens has increased only slightly over our sample period. Chinese- and Hong Kong-headquartered issuers, not U.S.-headquartered issuers, drive the recent dramatic proportional increase in tax-haven-incorporated firms conducting U.S. IPOs.

The finding that Chinese- and Hong Kong-headquartered firms regularly incorporate in tax-haven jurisdictions[5] has possible relevance to future research about whether U.S.-headquartered firms might at some point begin to regularly incorporate in tax havens or, more generally, outside the United States. In the case of Chinese- and Hong Kong-headquartered firms, there are several non-tax reasons that may support tax haven incorporation. These may include legislative restrictions relating to foreign ownership of Chinese-incorporated firms, shareholder and creditor rights, listing approval and foreign

[5] We also find that Chinese and Hong Kong firms are responsible for more than half – 124 out of 243 – of the instances of corporations incorporating outside their headquarters jurisdiction -- whether or not in a tax haven -- and that the overwhelming majority – 111 out of 124 – of those instances involve incorporation in a tax haven.

exchange convertibility (Howson and Khanna, 2010). In addition, the high quality and flexibility of tax havens' corporate governance regimes may increase the attractiveness of tax-haven incorporation (Dharmapala and Hines, 2009).

Tax considerations may also play a role. First, the tax savings attributable to tax havens' low or zero corporate tax rates increases the likelihood of tax-haven incorporation rather than incorporation in the U.S. or other countries. Domestic tax issues may also have relevance. Prior to the repeal of Chinese foreign direct investment incentives in 2007, Chinese investors had an incentive to "round-trip" their capital into China using non-Chinese investment vehicles to take advantage of these incentives (Li, 2007). Even after the repeal of this law, advisors may still continue to use tax-haven-parented corporate structures because of habit or path dependence.

With the above discussion we are not attempting to conclusively answer the question as to why Chinese- and Hong Kong-based firms have increasingly incorporated in tax havens. Rather, by introducing possible reasons for this development we hope to suggest directions for future research into the question of why some firms incorporate in tax havens, and others do not.

D. Forty-Seven U.S.-Headquartered, Tax-Haven-Incorporated Firms

We identify 47 U.S.-headquartered, tax-haven-incorporated firms in our larger sample of 2,911.[6] We list these firms in Table 6. In each case, a number of tax and non-tax decisions could have influenced the tax-haven-incorporation decision. We do not claim that tax considerations were the predominant driver for any of these firms' incorporation decision. Rather, we propose that the existence of these 47 firms leaves open the

[6] Largely because of missing data fields, not all of these 47 firms appear in our subsample of 918 U.S.-headquartered multinational firms.

possibility that tax advantages of tax-haven incorporation may be influential factors in incorporation decisions for at least some firms. Of these 47 firms, 17 incorporated in, or after, 2004, the year in which the U.S. enacted stringent anti-inversion legislation.

First, we observe a tendency of U.S.-headquartered corporations in particular lines of business, such as insurance or international transportation, to incorporate in tax-haven locations. Of the 47 firms, 13 are insurance carriers; four are engaged in marine transportation. For both of these industries, specific and favorable tax provisions suggest that corporate tax incentives provide some of the reasons for firms' choice of tax-haven-parented structures.

In the case of insurance, it is possible for a tax-haven parent to minimize taxation on passive portfolio income such as interest and dividends, in part because of the low or zero tax-haven rate. A tax-haven parent may also avoid having any business income taxed by the United States and may arrange for the U.S. subsidiary to make deductible payments to the tax-haven parent, thus eroding the income tax base of the U.S. subsidiary. If the tax-haven parent is incorporated in Bermuda, the goal of avoiding taxation of the tax-haven parent by the United States gains assistance from tax treaties that permit the use of a taxpayer-favorable permanent establishment provision specifically applicable to the insurance business (Elliott, 2005). Section 4371 of the Internal Revenue Code imposes excise taxes on premiums paid to a foreign insurer of four percent for some policy types including property and casualty and one percent for reinsurance and other policy types including life insurance. These excise taxes are subject to reduction under tax treaties, although IRS guidance limits the extent to which tax treaty relief can be claimed (Ocasal, Miles, and Tello, 2009). In some cases, premiums paid to a foreign reinsurer may escape state excise tax; and nontax regulatory concerns, such as the possibility of relaxed investment requirements, may also encourage tax-haven incorporation for some insurance firms (Bissell, 2003).

Shipping companies with tax-haven parents can take advantage of a different provision of U.S. law, which exempts income from the international operation of a ship from U.S. income tax if earned by a foreign corporation resident in a country that declines to tax similar income earned by U.S. corporations (Glicklich and Miller, 2012). Regulatory reasons may also encourage the use of non-U.S. shipping flags for certain types of shipping businesses. U.S. statutory law limits some commerce, such as "coastwise" shipping between two U.S. ports, to U.S.-flagged vessels. For commerce not so limited, non-U.S. registration may provide an advantage for non-tax regulatory reasons including possible avoidance of applicable labor regulations, union contracts, and requirements to use U.S. shipyards for vessel construction (Semenoro, 2000) as well as avoiding exposure to the choice of law doctrine that may require a U.S. forum in the event of worker injury for a U.S.-registered ship (Gilmore and Black, 1975).

Other companies, not in the insurance or shipping industries, appear to have made an internal decision to incorporate in tax havens. These include Accenture Ltd., the Arthur Andersen consulting spinoff; Lazard Ltd., the investment bank; and TyCom Ltd., a spinoff from Tyco International, which had previously expatriated (Desai and Hines, (2002). They also include Fresh Del Monte Produce Ltd. and Bunge Ltd., companies with significant agricultural operations outside the United States.

Finally, several of the companies we study conducted IPOs after a going-private transaction previously established a tax-haven parent. These include Seagate Technology

Holdings and Herbalife Ltd. The going-private transactions highlight the possibility that market participants such as private equity investors, or advisors such as particular law firms or investment banks, influence the decision to incorporate in a tax haven. Analogous market participant influence appears to affect some other firm decisions, such as those relating to takeover defense (Coates, 2001) and the use of “supercharged IPO” structures (Fleischer and Staudt, 2012).

There are at least two interesting aspects of the market participant story. First, it is possible that some market participants have specific interests or priorities that encourage tax-haven incorporation. Private equity firms might prioritize tax savings over corporate governance protections, for example. Second, if the decision to incorporate in a tax haven is mediated by communities of market participants, or their advisors that share advice and norms and imitate structures, this may affect how a change in behavior might come about. For example, there exists the possibility that a change in U.S.-based startups’ incorporation decisions may gather momentum quickly if an influential group of investors or advisors concludes that the default jurisdiction of incorporation for U.S. startups should be outside the United States.

V. CONCLUSION

Using data on firms conducting IPOs in the United States between 1997 and 2010, we examine two hypotheses. First, we consider whether U.S.-headquartered MNCs incorporate in tax havens, and provide evidence that they do not. Out of the 918 U.S.-headquartered MNCs that we identify, only 27 incorporate in tax havens. This suggests that some firms that could benefit from tax savings provided by tax-haven incorporation do not take advantage of this strategy.

Second, we test the hypothesis, suggested in Desai and Dharmapala (2010), that a recent increase in the proportion of U.S. IPO firms incorporated in tax havens shows that U.S.-headquartered firms have increasingly begun to incorporate in tax havens. For this second hypothesis, we use a larger sample of 2,911 firms. We find that the proportion of firms conducting IPOs in the United States that are incorporated in tax havens began to increase around 2002, consistent with Desai and Dharmapala (2010). However, we find that only 47 U.S.-headquartered firms incorporate in a tax haven, and that firms headquartered outside the United States, in particular in China and Hong Kong, drive the trend of increasing incorporation in tax havens.

Future research might focus on providing a better idea of why firms make incorporation location decisions. In particular, better defining how capital formation and home or host country corporate governance and regulatory regimes impact the choice of incorporation will help provide a better framework for evaluating how tax regimes influence incorporation location choice. Additionally, studying institutional factors, such as the variance of incorporation location choice cross-sectionally across industries, may help predict how firms will respond to changes in tax or other rules.

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Table 1

Sample Construction

Panel A: Total sample

Total U.S. IPOs, between 1997-2010, from SDC	3,939
Less:	
Non-original IPOs	-55
Duplicate entries	-18
Firms for which we could not obtain the country of incorporation	-259
SIC code filters:	
6000-6199: Depository and non-depository credit institutions	-144
6722: Open-end management investment offices	-2
6726: Closed-end management investment offices	-420
6798: Real estate investment funds	-107
6799: Other investors	-23
Initial sample	2,911

Panel B: Construction of U.S.-headquartered sample

Total US-headquartered firms per SDC coding	2,587
Added from review of prospectuses:	
Principal executive office listed = U.S.	1
More than 50% U.S. revenue	24
More than 50% floor area in U.S.	9
More than 50% U.S. employees	1
Total US-headquartered firms	2,622

Panel C: Constructions of U.S.-headquartered MNC sample

Total U.S.-headquartered firms	2,622
Number that could be identified in COMPUSTAT	2,465
U.S.-headquartered Firms with non-missing, non-zero amounts in the year of IPO or any of the subsequent three years:	
Pre-tax foreign income	588
Foreign deferred taxes	127
Foreign income tax expense	203
Total U.S.-headquartered multinational companies	918

Panel A:
We obtain a listing of all Initial public offerings in the United States from the Thomson Financial Services Database (aka Securities Data Company, or SDC) between 1997 and 2010. This results in 3,939 offerings. From SDC we obtained the firm name, issue date, SIC code, country of incorporation (item 'Country of Incorporation' or 'State of Incorporation'), and headquarters country (item 'Nation'). We eliminate all offerings which were not the firms' initial IPO (SDC category 'Original IPO' equal to 'No'), as well as 18 offerings that are duplicated in the database. We note 899 offerings that are missing the country of incorporation in SDC. For these offerings we manually review the firms' prospectus (i.e.. form S-1, F-1, S-11, N-2, etc.) to collect the country of incorporation at the time of offering. We obtain this information for all but 259 of the offerings. We also eliminate all depository and non-depository credit institutions (SIC Codes 6000-6199), real estate investment trusts (6798), closed-end management investment offices (6726), open-end management investment offices (6722), and other investors (6799). This leaves us with 2,911 firms with the countries of headquarters and incorporation identified.

Panel B:
We note that SDC typically uses the address given by the firm as the principal executive office to determine the headquarters country. To expand the definition of U.S.-headquartered firms, we review the prospectuses for all 324 firms not incorporated in the United States to find evidence that the firm is effectively domiciled in the United States. We apply four screens to make this determination: i) address of the principal executive office, ii) percentage of employees located in the United States, iii) percentage of floor area located in the United States, and iv) percentage of revenue generated in the United States. For the last three screens, if the percentage is greater than 50%, we code the firm as having a headquarters in the United States. This results in coding an additional 35 firms as U.S.-headquartered.

Panel C:
We use the firm's CUSIP number from SDC to obtain the GVKEY from the 2011 version of the COMPUSTAT fundamentals annual database. For firms that could not be identified in this manner we collect the CIK number from the SEC's EDGAR database and use it to identify the GVKEY in COMPUSTAT. For each firm we obtain the ending total assets (item AT), closing share price (PRCC_F), common shares (CSHO), and net income (NI) for the first fiscal year end after the conclusion of the IPO. We require that each firm have non-missing item AT for inclusion in the sample, leaving 2,465 firms available for analysis. For these firms we code each that reports a non-zero amount of pre-tax foreign income (COMPUSTAT item PIFO), foreign deferred tax liability (item TXDFO), or foreign tax expense (item TXFO) in the year of IPO or the subsequent three years as having foreign operations. If all of those amounts are zero or missing we code the firm as having solely domestic income.

Firms identified as U.S.-headquartered MNCs in Panel C are used for the analysis in Table 2.

Firms identified as U.S.-headquartered MNCs in Panel C and that also provide information regarding pre-tax foreign income (PIFO) and total pre-tax income (PI) are segregated for the analysis in Table 3.

Table 2

Incorporation locations of U.S.-headquartered MNC's

Country of Incorporation	Number	Percentage of total
United States	874	95
Tax Haven	27	3
Israel	10	1
Canada	3	0.3
Netherlands	2	0.2
Germany	1	0.1
Philippines	1	0.1
Total	918	

See Table 1 for sample description.

A firm is classified as incorporated in a tax haven jurisdiction if the 2 digit country code corresponds to a country listed as a tax-haven on page 1067 of Dharmapala and Hines (2009). These countries are:

Andorra, Anguilla, Antigua and Barbuda, Aruba, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Cyprus, Dominica, Gibraltar, Grenada. Hong Kong, Ireland, Isle of Man, Jordan, Lebanon, Liberia, Liechtenstein, Luxembourg, Macao, Maldives, Malta, Marshall Islands, Mauritius, Monaco, Montserrat, Nauru, Netherland Antilles, Niue, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Seychelles, Singapore, Switzerland, Tonga, Turks and Caicos Islands, Vanuatu, and Virgin Islands (U.S).

Table 3

Comparison of U.S-Headquartered MNCs that Incorporate in Tax Havens to Total U.S.-Headquartered MNCs that Incorporate in the United States or in Tax Havens

		Incorporated in a tax haven	
Year	Total	Number	Percentage
1997	139	3	2
1998	78	0	0
1999	127	1	1
2000	120	4	3
2001	37	1	3
2002	19	3	16
2003	22	1	5
2004	74	1	1
2005	65	3	5
2006	70	3	4
2007	80	3	4
2008	8	0	0
2009	23	2	9
2010	39	2	5
	901	27	3

See Table 1 for sample description.

See Table 2 footnote for list of tax havens.

Table 4

Descriptive Statistics for MNCs Headquartered in the United States that Report Pre-Tax Foreign Income, Segregated on Incorporation Location

($ amounts in millions)

	Incorporation Location			
Variable	US	Tax Haven	Diff	
$ASSETS_t$	832.9	1,725.4	892.5	**
$SIZE_t$	1,295.9	3,141.2	1,845.3	*
INC_t	-0.04	0.03	-0.07	*
FORINC	0.23	0.64	-0.41	***
RD	0.09	0.05	0.03	
N	556	19		

Asterisks denote significance at the 1% (***), 5% (**) and 10% (*) levels.

Significance is calculated using Satterthwaite standard errors.

See Table 1 for sample description.

See Table 2 footnotes for list of tax havens.

Variable definitions:

$ASSETS_t$	= total assets at the end of year t (item AT);
SIZE	= price per share at the end of the year (PRCC_F) multiplied by common shares outstanding (CSHO)
INC_t	= net income (NI)/AT
FORINC	= average of pre-tax foreign income (PIFO) divided by total pre-tax income (PI) from years t to t+3.
RD =	RandD Expense (XRD) divided by ending total assets (AT) in the year of IPO. If XRD is equal to missing, we code XRD as equal to zero.

All variables are winsorized at the 1% and 99% levels.

Table 5

Breakdown of the Headquarters Location of Firms that Incorporate in Tax Havens

Country HQ	Number	Percentage of total
China	98	47
United States	47	22
Greece	16	8
Hong Kong	13	6
Other	36	17
Total	210	

No other country composes greater than 1% of the tax-haven sample.

See Table 1 for sample description.

See Table 2 footnote for list of tax havens

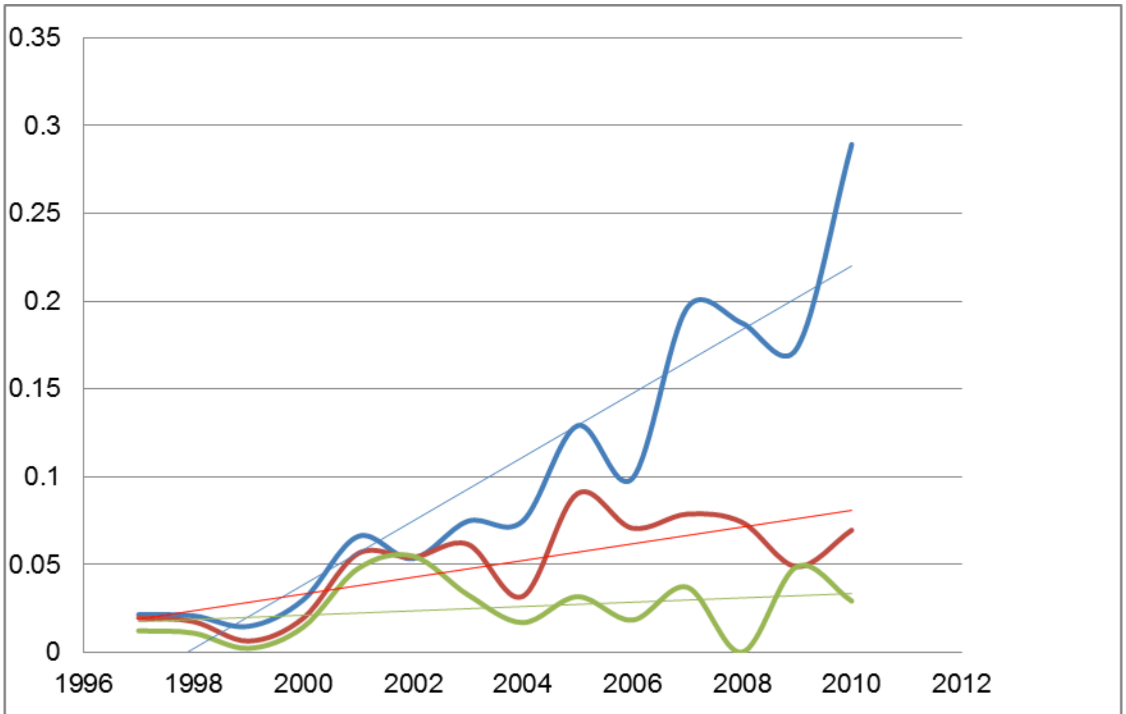
Table 6

U.S.-Headquartered, Tax-Haven-Incorporated U.S.-IPO Firms, 1997-2010

Accenture Ltd.	2001	7/18/01	Business Services
Aircastle Ltd.	2004	8/7/06	Business Services
Alcon Inc.	1971	3/20/02	Instruments and Related Products
Amdocs Ltd.	1988	6/19/98	Business Services
American Safety Insurance Group Ltd.	1986	2/13/98	Insurance Agents, Brokers, and Service
Apex Silver Mines Ltd.	1996	11/25/97	Metal Mining
Aspen Insurance Holdings Ltd.	2002	12/3/03	Insurance Carriers
Assured Guaranty Ltd.	2003	9/29/04	Insurance Carriers
Avago Technologies Ltd.	2005	8/5/09	Electronic and Other Equipment
Baltic Trading Ltd.	2009	3/9/10	Water Transportation
Bunge Ltd.	1995	8/1/01	Food and Kindred Products
CastlePoint Holdings Ltd.	2005	3/22/07	Insurance Carriers
CDC Software Corp.	2009	8/5/09	Business Services
CRM Holdings Ltd.	2005	12/20/05	Insurance Carriers
Eagle Bulk Shipping Inc.	2005	6/22/05	Water Transportation
Fabrinet	1999	6/24/10	Electronic and Other Equipment
FGX International Holdings Ltd.	2004	10/24/07	Instruments and Related Products
Flagstone Reinsurance Holdings Ltd.	2005	3/29/07	Insurance Carriers
Fresh Del Monte Produce Ltd.	1996	10/23/97	Food and Kindred Products
Garmin Ltd.	2000	12/8/00	Instruments and Related Products
Genco Shipping and Trading Ltd.	2004	7/21/05	Water Transportation
General Maritime Corp.	2001	6/12/01	Water Transportation
Global Crossing Ltd.	1997	8/13/98	Communication
Greenlight Capital Re	2004	5/24/07	Insurance Carriers
Herbalife Ltd.	2002	12/15/04	Wholesale Trade
interWAVE Communications International Ltd.	1994	1/28/00	Electronic and Other Equipment
Iridium World Communications Ltd.	1996	6/9/97	Communication
Lazard Ltd.	2004	5/4/05	Security and Commodity Brokers

Name	**Incorporation Year**	**IPO Date**	**Industry**
Marvell Technology Group Ltd.	1995	6/26/00	Electronic and Other Equipment
Max Re Capital Ltd.	1999	8/13/01	Insurance Carriers
MF Global Ltd.	2007	7/18/07	Security and Commodity Brokers
Montpelier Re Holdings	2001	10/9/02	Insurance Carriers
OneBeacon Insurance Group Ltd.	2006	11/8/06	Insurance Carriers
Open TV Corp	1999	11/23/99	Business Services
Platinum Underwriters Holdings Ltd.	2002	10/28/02	Insurance Carriers
Primus Guaranty Ltd.	1998	9/26/04	Security and Commodity Brokers
RSL Communications Ltd.	1996	9/30/97	Communication
Santa Fe International Corp.	1990	6/9/97	Oil and Gas Extraction
SeaCube Container Leasing Ltd.	2010	10/27/10	Business Services
Seagate Technology Holdings	2000	12/10/02	Industrial Machinery and Equipment
Stirling Cooke Brown Holdings Ltd.	1995	11/25/97	Insurance Carriers
TyCom Ltd.	2000	7/26/00	Communication
United National Group Ltd.	2003	12/15/03	Insurance Carriers
UTi Worldwide Inc.	1995	11/2/00	Transportation Services
Validus Holdings Ltd.	2005	7/24/07	Insurance Carriers
Vistaprint Ltd.	2002	9/29/05	Printing and Publishing
Warner Chilcott Holdings Co. Ltd.	2004	9/20/06	Chemicals and Allied Products

Figure 1
Ratios of Tax-Haven-Incorporated Issuers to Total Issuers



Sample	Trendline Slope	Trendline T-Value
Total	0.018	8.33 ***
No China or HKG	0.004	3.93 ***
US HQ Only	0.001	1.06

***,**,* - signficant at the 1%, 5%,

See Table 1 for sample description.

Rosanne Altshuler

Rosanne Altshuler is Professor and Chair of the Economics Department at Rutgers University. She holds a BA from Tufts University and a PhD in economics from the University of Pennsylvania. Rosanne's research focuses on federal tax policy and has appeared in numerous journals and books. She was an assistant professor at Columbia University and has been a visitor at Princeton University, New York University's School of Law, and the Robert F. Wagner School of Public Service at New York University. Rosanne was editor of the *National Tax Journal,* a member of the Board of Directors of the National Tax Association and a member of the Congressional Budget Office's Panel of Economic Advisers. She is currently on the Board of Trustees of the American Tax Policy Institute. Rosanne has also been active in the policy world serving as Director of the Urban-Brookings Tax Policy Center, Senior Economist to the 2005 President's Advisory Panel of Federal Tax Reform, and Special Advisor to the Joint Committee on Taxation.

Alan J. Auerbach

Alan J. Auerbach is the Robert D. Burch Professor of Economics and Law, Director of the Burch Center for Tax Policy and Public Finance, and former Chair of the Economics Department at the University of California, Berkeley. He is also a Research Associate of the National Bureau of Economic Research and previously taught at Harvard and the University of Pennsylvania, where he also served as Economics Department Chair. Professor Auerbach was Deputy Chief of Staff of the U.S. Joint Committee on Taxation in 1992 and has been a consultant to several government agencies and institutions in the United States and abroad. He served as an Executive Committee Member and Vice President of the American Economic Association and as Editor of that association's *Journal of Economic Perspectives* and *American Economic Journal: Economic Policy*. Professor Auerbach is a Fellow of the American Academy of Arts and Sciences, the Econometric Society, and the National Academy of Social Insurance, and currently Vice President of the National Tax Association, from which he received the Daniel M. Holland Medal in 2011.

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Sebastien Bradley is an assistant professor of economics at Drexel University, where he has taught since completing his Ph.D. at the University of Michigan in 2011. Prior to graduate school, Bradley worked as a research assistant at the Federal Reserve Board of Governors and completed his undergraduate degree in economics and biology at Williams College. He has also been affiliated with the U.S. Department of Commerce since 2010 as a special sworn employee of the Bureau of Economic Analysis.

Bradley's research examines the nature and scope of tax-induced distortions to consumer and firm behavior in environments distinguished by degree of tax transparency and visibility so as to provide practical and theoretical guidance in the area of tax policy design. His work ranges from consideration of tax-motivated investment and income reallocation by multinational corporations to the consequences of limited attention on the part of consumers with respect to property and airline taxes.

Mihir A. Desai

Mihir A. Desai is the Mizuho Financial Group Professor of Finance and the Chair of Doctoral Programs at Harvard Business School. He received his Ph.D. in political economy from Harvard University; his MBA as a Baker Scholar from Harvard Business School; and a bachelors degree in history and economics from Brown University. In 1994, he was a Fulbright Scholar to India.

Professor Desai's areas of expertise include tax policy, international finance and corporate finance. His academic publications have appeared in the leading economics, finance and public economics journals. His work has emphasized the appropriate design of tax policy in a globalized setting, the links between corporate governance and taxation, and the internal capital markets of multinational firms. His research has been cited in *The Economist*, *BusinessWeek*, *The New York Times*, and several other publications. He is also the author of *International Finance: A Casebook* (New York: John Wiley & Sons, 2006) which features his many case studies on international corporate finance.

He is a Research Associate in the National Bureau of Economic Research's Public Economics and Corporate Finance Programs, is the co-director of the NBER's India program. He is also on the Advisory Board of the International Tax Policy Forum.

Dhammika Dharmapala

Dhammika Dharmapala is Professor of Law and Professor of Finance (by courtesy) at the University of Illinois at Urbana-Champaign, and currently serves as the Walter Schaefer Visiting Professor of Law at the University of Chicago. He is also an International Research Fellow of the Oxford University Centre for Business Taxation and a Fellow of the CESifo Research Network (based in Munich). He holds a PhD in Economics from the University of California at Berkeley and an undergraduate degree from the University of Western Australia. He has previously held postdoctoral or visiting positions at Harvard University, the University of Michigan, Georgetown University Law Center, Northwestern University and the Australian National University. He previously held the positions of Assistant and Associate Professor of Economics at the University of Connecticut.

He serves on the editorial boards of the *American Economic Journal: Economic Policy*, *International Tax and Public Finance*, the *Review of Law and Economics*, and the *Journal of Law, Finance and Accounting*. From 2010-2013, he was Editor-in-Chief of the journal *International Tax and Public Finance*. He is also a member of the Board of Directors of the American Law and Economics Association and of the Board of Management of the International Institute of Public Finance, and formerly served as a member of the Board of Directors of the National Tax Association.

His research interests span the fields of tax policy and public finance, the economic analysis of law, and corporate finance and governance. His work has been published in leading scholarly journals in law, economics and finance, and has been cited in various media outlets, including the *New York Times*, the *Washington Post*, *Bloomberg Businessweek*, and *The Economist*.

C. Fritz Foley

André R. Jakurski Professor of Business Administration

Fritz Foley is a Professor in the Finance area at Harvard Business School. He is also a Faculty Research Fellow in the National Bureau of Economic Research's Corporate Finance and International Trade and Investment Programs and an Associate Editor of the *Journal of International Economics*. Professor Foley teaches the first-year course Field Immersion Experiences for Leadership Development and in various HBS Executive Education programs.

Professor Foley's research focuses on international corporate finance with a particular emphasis on the activities of multinational firms. He has investigated the use of international joint ventures, the determinants of multinational affiliate capital structure and dividend repatriations, the advantages associated with internal capital and labor markets, the impact of capital controls on multinationals, and the effects of stock market valuations on foreign direct investment. His work on how intellectual property rights influence international technological transfers has been funded by grants from the National Science Foundation, the World Bank, and the Asian Development Bank. His academic articles have appeared in several journals including *The Journal of Finance*, the *Journal of Financial Economics*, the *Journal of Public Economics*, the *National Tax Journal*, the *Review of Financial Studies*, and the *Quarterly Journal of Economics*.

Prior to joining HBS, Professor Foley taught at the University of Michigan Business School. He received a Ph. D. in Business Economics from Harvard University and a B.A. in Ethics, Politics, and Economics from Yale University. Professor Foley has also worked as a strategy consultant at Monitor Company and conducted research on multinational firms in the apparel export sector as a Fulbright Scholar in Sri Lanka.

Jason Furman

Jason Furman is the Chairman of the Council of Economic Advisers. Prior to this role, he served as the Principal Deputy Director of the National Economic Council. Furman has also previously served as Economic Policy Director for Obama for America, Director of the Hamilton Project at the Brookings Institution, and Special Assistant to the President for Economic Policy during the Clinton Administration. He has conducted research in a wide range of areas, including fiscal policy, tax policy, health economics, Social Security, and monetary policy. Furman earned his Ph.D. in economics and a M.A. in government from Harvard University and a M.Sc. in economics from the London School of Economics.

Michael J. Graetz

Michael J. Graetz is the Isidor and Seville Sulzbacher Professor of Law and the Columbia Alumni Professor of Tax Law at Columbia Law School. Before coming to Columbia in 2009, he was the Justus S. Hotchkiss Professor of Law at Yale University, where he had taught since 1983. Before Yale, he was a professor of law at the University of Virginia and the University of Southern California Law Schools and Professor of Law and Social Sciences at the California Institute of Technology. His publications on the subject of Federal taxation include a leading law school text and more than 60 articles on a wide range of tax, international taxation, health policy, and social insurance issues in books and scholarly journals. His most recent book is *100 Million Unnecessary Returns: A Simple, Fair, and Competitive Tax Plan for the United States,* published by Yale University Press, in 2008. His previous books include *Death by a Thousand Cuts: The Fight over Taxing Inherited Wealth* (Princeton University Press; 2005); *True Security: Rethinking Social Insurance* (Yale University Press, 1999); and *The U.S. Income Tax: What It Is, How It Got That Way and Where We go From Here,* (W.W. Norton & Co, 1999) (a paperback edition of the book originally published as *The Decline (and Fall?) of the Income Tax*) and *Foundations of International Income Taxation* (Foundation Press, 2003.) He is also the co-author of a leading law school coursebook, *Federal Income Taxation: Principles and Policies,* (Foundation Press; 2009).

During January-June 1992, Michael Graetz served as Assistant to the Secretary and Special Counsel at the Treasury Department. In 1990 and 1991, he served as Treasury Deputy Assistant Secretary for Tax Policy. Professor Graetz has been a John Simon Guggenheim Memorial Fellow, and he received an award from Esquire Magazine for courses and work in connection with provision of shelter for the homeless. He served on the Commissioner's Advisory Group of the Internal Revenue Service. He served previously in the Treasury Department in the Office of Tax Legislative Counsel during 1969-1972. He is a fellow of the American Academy of Arts and Sciences.

Professor Graetz is a graduate of Emory University (B.B.A. 1966) and the University of Virginia Law School (J.D. 1969). A native of Atlanta, Georgia, Michael Graetz is married to Brett Dignam and has five children.

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Jim Hines teaches at the University of Michigan, where he is the L. Hart Wright Collegiate Professor of Law in the law school and the Richard A. Musgrave Collegiate Professor of Economics in the Department of Economics. He also serves as the research director of the Office of Tax Policy Research in the Stephen M. Ross School of Business. His research is focused on various aspects of taxation. He holds a BA and MA from Yale University and a PhD from Harvard, all in economics. He taught at Princeton and Harvard universities prior to joining the Michigan faculty in 1997, and has held visiting appointments at Columbia University, the London School of Economics, the University of California, Berkeley, and Harvard Law School. He is a research associate of the National Bureau of Economic Research, co-editor of the *Journal of Public Economics*, and once, long ago, was an economist in the U.S. Department of Commerce.

Kevin Markle

Kevin Markle lives in Waterloo, Ontario, Canada and is an Assistant Professor at The University of Waterloo. Prior to joining the faculty at Waterloo, Kevin was a Visiting Assistant Professor at the Tuck School of Business at Dartmouth College. Kevin researches international tax issues, currently focusing on income shifting by multinational corporations. He obtained his Ph.D. from the University of North Carolina in 2010. Doug Shackelford was his Dissertation Chair. He and his wife, Robyn, have four children.

Susan Morse

Susan Morse is an Assistant Professor at the University of Texas School of Law. She studies and writes about international tax reform and tax compliance. In 2013, she served as the Abe Greenbaum Fellow at the University of New South Wales School of Taxation and Business Law, Sydney.
Susie clerked for the Honorable Michael Boudin of the United States Court of Appeals for the First Circuit. She spent seven years in business tax practice at Ropes & Gray, Boston and Wilson Sonsini Goodrich & Rosati, Palo Alto and regularly speaks on panels at practitioner conferences. Her recent papers include: A Simpler Offshore Profits Transition Tax, 73 Tax Notes Int'l 629 (February 17, 2014); Startup, Ltd.: Tax Planning and Initial Incorporation, 14 Fla. Tax Rev. 319 (2013); Tax Haven Incorporation for U.S. Firms: No Exodus Yet, 66 Nat'l Tax J. 395 (2013); A Corporate Offshore Profits Transition Tax, 91 N.C. L. Rev. 549 (2013); and Ask for Help, Uncle Sam: The Future of Global Tax Reporting, 57 Vill. L. Rev. 529 (2012).

Paul W. Oosterhuis

Mr. Oosterhuis is an international tax partner in the Washington, D.C. office of Skadden, Arps, Slate, Meagher & Flom LLP and is the firm-wide leader of its various regulatory practice groups. Mr. Oosterhuis has had extensive experience in cross-border acquisition and disposition transactions, financing arrangements and tax planning for U.S. and foreign-based multinational corporations. He also frequently represents clients on international tax controversy matters, as well as regulations and rulings proceedings, with the Internal Revenue Service. In particular, he frequently represents clients in intercompany pricing matters, including in Advance Pricing Agreement and Competent Authority negotiations.

He received his B.A. from Brown University and his J.D. Degree from Harvard Law School. In 1973 he became a Legislation Attorney for the Joint Committee on Taxation, U.S. Congress, and in 1977 and 1978 served as the Committee's Legislation Counsel. He entered private practice in 1979. He has also served as an Adjunct Professor at Georgetown University Law Center, where he taught International Taxation in the Master of Taxation graduate law program.

He is a member of the bar of the District of Columbia and is admitted to practice in the U.S. Tax Court.

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Martin Ruf is a Professor at Eberhard Karls University, Tübingen. Prior to joining Tübingen, Ruf was Assistant Professor (Habilitand) at Mannheim University. He was a visiting scholar at the Tuck School of Business at Dartmouth. He studies and writes about Tax Accounting, Business Taxation, Empirical Tax Research, and International Corporate Tax law.

His recent papers include: “The Taxation of Passive Foreign Investment: Lessons from German Experience”, Canadian Journal of Economics 45/4, 1504-1528 (2012), “Broadening the tax base of neutral business taxes”, Economic Letters 117/1, 81-83 (2012), “The Economic Unit of Effective Tax Rates”, World Tax Journal 3/2, 226-246 (2011).

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John Samuels is GE's Vice President and Senior Counsel for Tax Policy and Planning. He is responsible for GE's worldwide Tax Organization and for the Company's global tax planning and tax compliance operations. He is a member of GE's Corporate Executive Council, the GE Capital Corporation Board of Directors, the GE Finance Council and the GE Pension Board.

Prior to joining GE in 1988, he was a partner in the law firm of Dewey, Ballantine in Washington, D.C. and New York City. From 1976 to 1981 Mr. Samuels served as the Deputy Tax Legislative Counsel and Tax Legislative Counsel of the U.S. Department of Treasury in Washington, D.C.

Mr. Samuels is the Chairman of the International Tax Policy Forum, a Fellow of the American College of Tax Counsel, and a member of the University of Chicago Law School Visiting Committee. Mr. Samuels was an adjunct professor of taxation of NYU Law School (1975 to 1986), and currently is the Jacquin D. Bierman Visiting Lecturer at Yale Law School where he teaches courses in international taxation.

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Alan D. Viard is a resident scholar at the American Enterprise Institute (AEI), where he studies federal tax and budget policy. Prior to joining AEI, Viard was a senior economist at the Federal Reserve Bank of Dallas and an assistant professor of economics at Ohio State University. He has also been a visiting scholar at the US Department of the Treasury's Office of Tax Analysis, a senior economist at the White House's Council of Economic Advisers, and a staff economist at the Joint Committee on Taxation of the US Congress. While at AEI, Viard has also taught public finance at Georgetown University’s Public Policy Institute. Earlier in his career, Viard spent time in Japan as a visiting scholar at Osaka University’s Institute of Social and Economic Research.

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