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"Internal Ownership Structures of Multinational Firms"

Leslie Robinson
Tuck Business School at Dartmouth

March 26, 2013 (Tuesday)
NYU School of Law
Vanderbilt Hall-208
Time: 4:00-5:50pm
Number 8

SCHEDULE FOR 2013 NYU TAX POLICY COLLOQUIUM

(All sessions meet on Tuesdays from 4-5:50 pm in Vanderbilt 208, NYU Law School)

1. January 22 – David Kamin, NYU Law School, "Are We There Yet?: On a Path to Closing America's Long-Run Deficit."

2. January 29 – Edward McCaffery, USC Law School, "Bifurcation Blues: The Perils of Leaving Redistribution Aside."

3. February 5 – Jake Brooks, Georgetown Law School, "Taxation, Risk, and Portfolio Choice: The Treatment of Returns to Risk Under a Normative Income Tax."

4. February 12 – Lilian Faulhaber, Boston University School of Law, "Tax Expenditures, Charitable Giving, and the Fiscal Future of the European Union."

5. February 26 – Peter Diamond (with Emmanuel Saez), MIT Economics Department, "The Case for a Progressive Tax: From Basic Research to Policy Recommendations."

6. March 5 – Darien Shanske, University of California at Hastings College of Law, "Modernizing the Property Tax."

7. March 12 – Dhammika Dharmapala, U. of Illinois Law School, "Competitive Neutrality among Debt-Financed Multinational Firms."

8. **March 26 – Leslie Robinson, Tuck Business School at Dartmouth, "Internal Ownership Structures of Multinational Firms."**

9. April 2 – Alan Viard, American Enterprise Institute, "Progressive Consumption Taxation: The Choice of Tax Design."

10. April 9 – Brian Galle, Boston College Law School, "A Nudge is a Price."

11. April 16 – Sarah Lawsky, University of California, Irvine School of Law, "Modeling Uncertainty in Tax Law."

12. April 23 – Larry Bartels, Department of Political Science, Vanderbilt University, "Inequality as a Political Issue in the 2012 Election."

13. April 30 – Itai Grinberg, Georgetown Law School, "A Governance Structure to Mediate the Battle Over Taxing Offshore Accounts."

14. May 7 – Raj Chetty, Harvard Economics Department, "Active vs. Passive Decisions and Crowd-Out in Retirement Savings Accounts: Evidence from Denmark."

Internal Ownership Structures of Multinational Firms

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Abstract

This paper is the first comprehensive analysis of the foreign ownership structures of U.S. multinational firms. Though the vast majority of foreign subsidiaries are ultimately wholly-owned by their U.S. parents, we show that the way these subsidiaries are arranged within ownership structures varies considerably from simple to highly complex, and that much of this variation cannot be explained by basic firm characteristics, such as size, age, industry, or diversification. Though the structures received much public attention in recent years, especially because of their role in tax planning by U.S. multinationals, no academic study to date investigates the different trade-offs involved in designing them jointly. This paper begins to fill this gap. After establishing a basic taxonomy and set of key facts about the structures, we look inside the black box of complex firms to investigate what forces drive internal ownership choices. We find strong evidence of several distinct tax motives, but also uncover a number of non-tax factors, including internal financing costs, expropriation risks, and legal liability.

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At the end of 2011, the U.S. direct investment position abroad was $4.2 trillion (Barefoot and Ibarra-Catton, 2012). One way a firm might structure its foreign investments would be to set up a directly-owned subsidiary in each country in which it operates. Though some multinationals adopt such flat ownership structures, other firms are substantially more complex. Foreign subsidiaries sometimes form long ownership chains, so that the U.S. parent owns many affiliates indirectly, and the chains can be linked to each other creating intricate structures such as that of Hewlett Packard Co (HPCO) in Fig. 1 (reproduced from U.S. Senate (2012)).

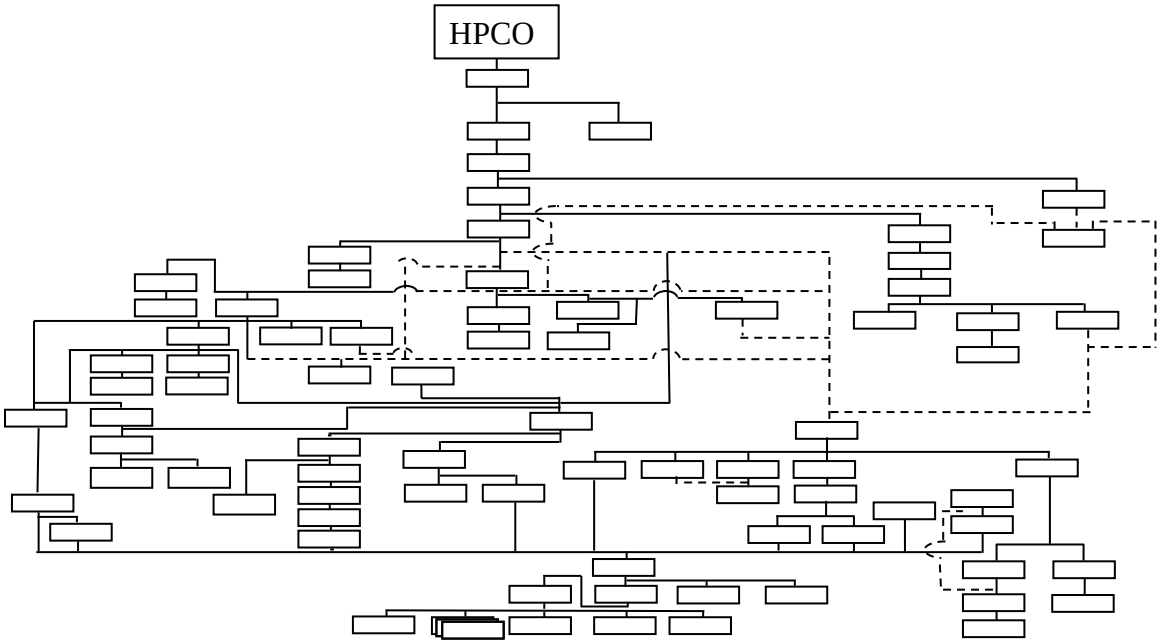

Fig. 1: Ownership structure of HPCO for fiscal year 2010. The figure is reproduced from U.S. Senate (2012). Each box denotes an affiliate, and each line denotes an equity ownership link. Most affiliates are located outside of the U.S., including Germany, Spain, Netherlands, Luxemburg, Denmark, Israel, China, Japan, Taiwan, and Bermuda.

This paper defines, documents, and analyzes internal ownership structures of U.S. multinational firms. Our goal is to begin understand the potential forces that drive these structures – both their nature and relative importance. We label the structures *internal* to emphasize the fact that the vast majority of foreign subsidiaries of U.S. firms are ultimately wholly-owned by their U.S. parent and are, thus, not pyramids in the sense of LaPorta, Lopez-de-Silanes, and Shleifer (1999).

Multinationals account for a large fraction of the U.S. economy, and understanding how they are organized is important for economists and policy makers for two reasons. First, the ability to create structures like those in Fig. 1 can affect firms' real choices, such as, where to locate assets, employment, or production. Without accounting for this flexibility, the real decisions cannot be fully

understood. Second, if firms design the internal structures to circumvent tax and legal constraints imposed by their host countries, then recognizing the potential responses is important to understand the ultimate economic effects of these policies.

The use of ownership structures by U.S. firms to save taxes has been especially widely publicized. A recent study by the *Wall Street Journal* of 60 large U.S. firms reports that these firms "parked $166 billion offshore last year, [which] shielded more than 40% of their annual profits from U.S. taxes" (*WSJ*, March 10, 2013). Other public accounts describe how complex structures enable firms to reduce taxes on foreign income (e.g., U.S. Senate (2012) on Microsoft and U.S. Senate (2003) on Enron). Academic literature also points to tax motives behind some ownership choices (Altshuler and Grubert, 2002, Desai, Foley, and Hines, 2003, Grubert (2012)). However, no research to date attempts to address the potential trade-offs jointly. For example, it is not clear how much of the variation in ownership structures can be explained with tax motives, and which of the many potential tax considerations are important. Also, it is not clear what factors besides taxes play an incremental role (though UNCTAD (2013), among others, speculates about the existence of such non-tax factors). Our goal in this paper is to begin to fill this gap.

This paper is, to our knowledge, the first broad analysis of internal ownership structures, and thus, we start by establishing a simple taxonomy and a few basic facts about the structures. By an *internal ownership structure* we mean, loosely speaking, the way a firm's foreign affiliates are connected through ownership links. The evidence is based on a sample of 1,352 major U.S. multinational firms and their 47,965 foreign subsidiaries in years 1994, 1999, 2004, and 2009; and the data come from the Bureau of Economic Analysis (BEA).[1]

The first striking observation is that seemingly similar firms choose to organize their foreign ownership in vastly different ways. Close to 50% of our sample firms are *flat* in the sense that their foreign affiliates are owned directly by a U.S. parent, while the remaining firms – which we denote as *complex* – establish ownership links among their foreign affiliates (*chains*; see definitions in Appendix A). Even within the latter sample, the level of complexity (i.e., the degree to which a structure deviates from the flat benchmark) varies considerably across firms, and some firms appear extremely complex. On average, complex firms arrange 42% of their foreign subsidiaries (and 57% of foreign operating assets) into ownership chains, but both fractions are 93% and 100% at the 95th

[1] Note that internal ownership structures can also be observed in other datasets, such as Bureau Van Dijk.

percentile. Similarly, ownership chains are typically only two countries (layers) long, but five percent of complex firms have chains longer than five layers.

Second, the degree of complexity shifted over time. While the proportion of complex firms in our sample declines steadily from 55% in 1994 to 45% in 2009, the complex firms themselves became increasingly more complex. For example, the fraction of operating assets organized in chains increased over time (from 47% to 68%), and the chains became longer. Third, using observable firm characteristics, such as size, age, industry, or diversification, we are able to explain up to 38% of the variation in complexity across firms. Thus, much of the variation is unexplained, and our main tests (described below) look inside the black box of complex firms to gain an insight into what drives internal ownership choices.

We begin by developing a general framework for thinking about internal ownership decisions and arrive at five potential forces that might affect these choices. To test these hypotheses, we focus on two key features of ownership structures: the characteristics of owners (i.e., foreign affiliates that own other foreign affiliates), and the characteristics of owner-daughter pairs (i.e., pairs in which two foreign affiliates form a direct ownership link). The focus on owners is a useful step towards understanding the structures more broadly because the owners' location, activities, and connections to other affiliates provide insights into why a specific structure was formed.[2] Thus, the first set of tests are logit regressions in which the unit of observation is an individual subsidiary. The model analyzes a firm's choice to place a given subsidiary in the position of an owner within its structure. The second set of tests are tobit regressions where the unit of observation is a country pair. These regressions analyze a firm's decision to form a direct ownership link across two countries.

We find that tax considerations are an important – but not a unique – factor in structuring foreign ownership. There is strong evidence of several specific tax motives, including minimization of U.S. repatriation taxes, as well as foreign income, withholding, and capital taxes. We highlight two examples for brevity (complete analysis is in Section 2). At the most basic level, subsidiaries with excess cash and low foreign income tax rates should avoid repatriation of profits to the U.S. and should instead finance investment opportunities abroad, thus becoming owners. Consistent with these

[2] In our sample, owners account for 18% of complex firms' foreign subsidiaries, but they control (directly or indirectly) 57% of their firms' total foreign assets. Owners are often more than simply holding companies: 40% of them report that most of their income is attributable to their own operations rather than the operations of the subsidiaries they own.

incentives, we find that owner subsidiaries have significantly higher retained earnings and significantly lower foreign tax rates than other entities within a structure.

The second example concerns firms' ability to use ownership chains to consolidate legal entities for U.S. tax purposes, even if the entities reside in different countries (see Appendix B on Subpart F and hybrid structures). This ability is important because it allows firms to make certain payments between affiliates, such as interest, royalties, or dividends, across countries without triggering an immediate U.S. tax. Using interest and royalty payments, firms can then shift income from high-tax to low-tax countries within chains (see descriptions in Altshuler and Grubert (2005), Grubert (2012), U.S. Senate (2012)). The structures in our data are consistent with such strategies. For instance, we find that an ownership link is more likely when the daughter country has a higher tax rate than the owner country, suggesting incentives to shift income up ownership chains, and mirroring this pattern, royalty and interest payments are also more likely to flow up the chains (though the evidence on interest flows is indirect). In addition, owners are more likely to engage in R&D than other entities within a structure. This last finding points to potentially important, and as yet unexplored, interactions between taxes and real activities, such as R&D.[3]

In addition to tax motives, concerns about political and expropriation risks help explain ownership structures. A firm can limit those risks by taking advantage of international agreements designed to protect foreign investors against various forms of expropriation. We find that these bilateral investment treaties (BITs) are relevant in how firms structure their foreign operations. For example, two subsidiaries are more likely to form an ownership link with each other if their host countries have a BIT in place. Similarly, countries with extensive BIT networks are preferred locations for owners.

Four additional pervasive patterns emerge from our tests. First, two subsidiaries within a given structure located in countries with stronger economic and cultural ties (e.g., common language, religion, or colonial history) are substantially more likely to form an ownership link. This suggests that business and financing ties overlap within multinational groups, consistent with firms choosing the financing ties to minimize transaction costs. Second, the presence of an outside owner within a group has a significant impact on its ownership structure. Subsidiaries with outside owners tend to be

[3] Perhaps recognizing these interactions, Belgium, Ireland, Luxembourg and Netherlands each offer tax benefits to firms with significant intangible assets and also offer generous tax climate to domestic entities with investments in foreign subsidiaries (see Eicke, 2009, Dorfmueller, 2003, and Macovei and Rasch, 2011).

indirectly owned by their U.S. parent, and they are unlikely themselves to be owners. Both findings are consistent with the structures limiting financial exposure to foreign partners. Third, owners hold large financial assets, such as cash or intra-company loans, in addition to their equity holdings, suggesting that equity and debt financing functions coincide within legal entities, likely reducing both taxes and transaction costs. Fourth, owners tend to locate in better developed countries. This last finding highlights the importance of a country's institutions – beyond tax policies – in attracting indirect capital flows.

This paper relates to three distinct areas of economics and finance. For instance, it follows a long tradition of economic research focused on interactions between governments and firms. In finance, researchers have long been interested in the effects of tax policy on capital structure (see review in Graham (2003)), and more recently, on governance (e.g., Desai, Dyck, and Zingales (2007)). This paper examines the role of taxes in explaining firms' *internal* rather than external financing choices. Importantly, it documents a considerable and puzzling variation in large firms' responses to multinational tax rules, and thus, raises questions about these firms' ability and willingness to minimize taxes more broadly.

The paper also relates to the literature on Foreign Direct Investments (FDI).[4] Though we do not examine FDI directly, we show that significant foreign investments of U.S. firms are indirect in the sense that capital is channeled – for tax, legal, or transaction costs reasons – through intermediate owner entities located in third countries. At the most basic level, this has implications for measurement of FDI. Aggregate FDI statistics typically do not account for indirect ownership by multinational firms (Lipsey (2007)), and thus, can provide a misleading picture of *real* cross-border investments. For example, in our sample, Netherlands and Luxemburg are ranked as the 2nd and the 3rd largest host countries of U.S. multinationals (based on total assets invested there by our sample firms in 2009), but close to 50% of these investments are "flow-through", i.e., represent equity holdings in other affiliates.[5]

[4] This research can be traced back many decades (see, for example, Mundell (1957)). Bhagwati et al. (1987) and others examine the effects of trade policy on FDI, while Wilson (1999), Davies and Ellis (2007), Blonigen and Davies (2004) and others focus on tax policy and tax competition.

[5] Recognizing these challenges, the European Commission required in 2007 that EU countries supplement the traditional FDI statistics with data on foreign investments by the country of the ultimate (rather than the direct) owner of the assets (see Foreign Affiliates Statistics (FATS) Regulation (EC) No 716/2007).

Finally, a large literature in economics and management science is concerned with *organizational* structures of firms.[6] Our data does not allow us to examine organizational structures directly (we do not observe reporting units), but we document a strong overlap between the ownership and the economic (and cultural) ties between business units. This suggests that ownership and reporting hierarchies might interact – for example, if internal ownership is used to motivate managers – and that these interactions could help explain complex organizations more broadly.

A number of prior studies examine financing and investment choices of U.S. multinationals (Mintz and Weichenrieder (2010) investigate German multinationals). Researchers have analyzed, for example, the multinational firms' use of debt, their dividend policies, decisions to form joint ventures with foreign firms, and the importance of financing frictions for investment, (Desai, Foley, and Hines (2004a, 2004b, and 2006) and Desai, Foley, and Forbes (2008)). In addition, Desai, Foley, and Hines (2006) examine use of tax havens, Altshuler and Grubert (2002) show how tiered ownership can minimize repatriation tax. Finally, Desai, Foley, and Hines (2003) show that investment of foreign subsidiaries is more sensitive to foreign tax rates when subsidiaries are owned indirectly because U.S. repatriation taxes are deferred.

The remainder of this paper is organized as follows. Section 1 develops our theoretical framework. Section 2 describes the data and sample construction. The empirical tests and results are discussed in Section 3, and Section 4 concludes.

1 Determinants of internal ownership structures

This section develops a framework for analyzing internal ownership structures. As we explain earlier, our focus is on two features of the structures: the attributes of owner subsidiaries and their host countries and the attributes of country pairs with direct ownership links. We lay out five forces that could drive internal ownership decisions (the list is likely not complete) and derive predictions for how each force should affect these two features of the observed structures.

The two sets of predictions are illustrated in Fig. 2. The first set of predictions concerns the attributes of owner subsidiaries, such as entities A, B, and G, as compared to a benchmark sample of non-chain subsidiaries C, D, and E. (In some settings, the benchmark can also include bottom subsidiaries, such as F and H.) The second set of predictions concerns the attributes of country pairs

[6] Examples include Jennergren (1981), Radner (1993), Bolton and Dewatripont (1994), Garicano (2000), Rajan and Zingales (2001), and Harris and Raviv (2002).

that are connected to each other through direct ownership links (such as pairs A-F, B-G, and G-H) as compared to other country pairs that could have formed a direct ownership link but do not (e.g., pairs F-A, C-D, or G-B). Note that the position of the subsidiary in the owner-daughter link is important to the design of our empirical test (e.g., A-F forms an ownership link while F-A does not). The hypotheses are described below and are summarized in Fig. 3. More detailed definitions are in Appendix A.

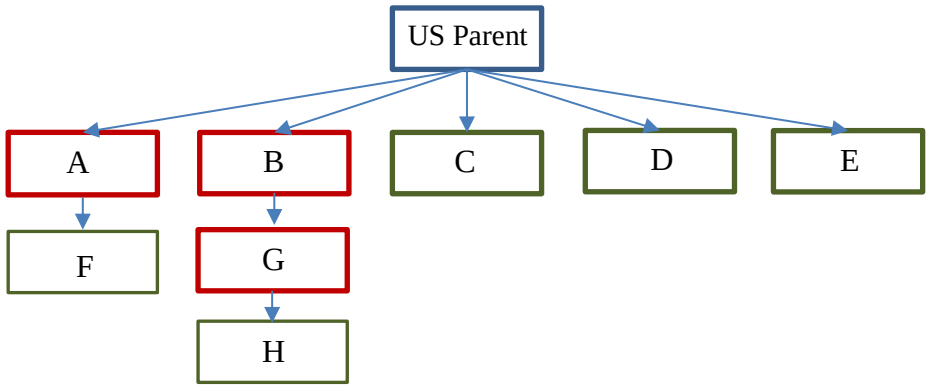

Fig. 2: Example of a hypothetical ownership structure. In the figure each subsidiary is located in a different country and is ultimately wholly-owned by the U.S. parent.

1.1 Baseline hypothesis: historical accident

Our benchmark hypothesis assumes that firms set up a separate subsidiary in each country they operate but that, otherwise, they face no transaction costs, taxes, or other frictions. In this world, the choice of ownership structures is irrelevant for the firm (as in Modigliani-Miller), and consequently, the structures may evolve randomly over time. At the time of the initial expansion abroad, the U.S. parent sets up a number of directly owned subsidiaries. As the firm evolves, additional subsidiaries are added to (or eliminated from) the structure. The ownership links of new affiliates are random: any affiliate can be owned either directly by the parent or by any other affiliate in the group with equal probability.

The pure historical-accident scenario can be rejected as long as ownership structures are not completely random but follow some systematic patterns. It is possible, however, that historical factors explain some regularities within the structures. For example, if these factors are important, we would expect that older subsidiaries are more likely to be owners, and that they are located higher up in ownership chains.

1.2 Transaction costs

As a next step, suppose that transferring funds across subsidiaries is costly, though less so than obtaining cash from outside the group. So when a new affiliate is formed (or when an existing affiliate needs additional funds), the subsidiaries that have excess cash at that time will be more likely to provide capital. This implies that, other things equal, historically more profitable entities have higher odds of becoming owners. (This pattern would be reinforced if the firm tries to defer repatriation of profits to the U.S. for tax reasons, which we discuss separately below.)

Next, suppose that the costs of transferring funds across subsidiaries are not uniform across a multinational group. In particular, the costs are lower for entities that transact with each other for commercial (rather than financing) reasons, for example, through customer-supplier relationships, through conducting operations in the same product market or geographic area, or through collaboration on projects. If so, we expect that such economically connected entities will be more likely to have ownership links.

Finally, suppose that firms actively minimize transaction costs by centralizing their financing functions within separate units. These entities, which we call financing hubs, would then specialize in performing financial services for the group, including raising capital from outside parties, intra-company lending, or cash management. They would arise as long as centralizing these activities creates economies of scope or scale. Because hubs specialize in financing of other affiliates, they are naturally more likely to become owners, and might thus be responsible for the ownership structures we observe. (As we explain below, tax motives reinforce the complementarity between ownership and lending, e.g., because of the U.S. tax treatment of cross-border interest payments between foreign affiliates.) Finally, if some owners focus on financing activities, we expect them to locate in better developed countries, i.e., countries with stronger property rights and better-functioning financial markets.

1.3 Taxes

This section outlines implications of foreign and U.S. tax rules for the firms' choice of owner subsidiaries and owner-daughter pairs within multinational groups. The discussion is far from complete: the number of strategies used in practice is larger and is changing over time. Background on taxation of multinational firms is in Appendix B.

1.3.1 Cross-country differences in taxation of foreign income

Differences in countries' basic approach to taxing foreign income and cross-border flows can make a country a more or less attractive location for owner subsidiaries. Two features are especially important. First, firms should be more likely to locate owners in countries that have either a territorial tax system or a worldwide tax system with a broad exemption for foreign dividends. In these cases, the dividends paid from the daughter subsidiary to the owner are typically not subject to a residual tax in the country of the owner.

Summary of hypotheses

Hypotheses:	Attributes of country pairs with ownership links. Fig. 2: pairs A-F, B-G, and G-H vs. other possible pairs	Attributes of owners vs. benchmark non-owners. Fig. 2: A, B, G vs. C, D, E
Historical accident	--	• Owners are older, more mature
Transaction / financing costs	• Ownership links are more likely between subsidiaries located in countries with stronger economic ties, proxied by: – Geographic distance – Cultural ties: same language, religion, colonial link – Bilateral trade flows, trade agreements	• Owners are historically more profitable • Owners have stronger economic ties to other affiliates – Are part of larger regional and industry groups within firms – Have larger trade flows with other subs within the group • Owners specialize in financing activities, such as intra-firm lending – Locate in countries with better institutions
Taxes	• Ownership links are more likely between subsidiaries located in countries – With lower withholding tax rates on dividends paid from the daughter to the owner country – With a tax treaty in place – Characterized as tax havens	• Owners are more profitable • Have lower effective (statutory) tax rates • Locate in countries: – with lower withholding tax rates on inbound dividends – with a territorial tax system, no capital or stamp duties, no anti-abuse legislation, better overall tax treaty network, and in tax havens
Expropriation risks	• Connected subsidiaries are more likely located in countries with a BIT in place	• Owners locate in countries with more extensive investment treaty network
Outside owners	--	• Owners have lower likelihood of outside ownership

Second, a country's approach to limiting tax avoidance by multinationals could play an incremental role in where firms locate owners. An example is controlled foreign corporation legislation which subjects foreign passive income – such as dividends, interest, and royalties – to an immediate residual tax in the country of the owner (the example is Subpart F in the U.S.; see

Appendix B). If firms consider anti-abuse rules as constraining, then they may locate their owner subsidiaries disproportionately in countries in which these rules are non-existent.

1.3.2 Taxes other than income taxes

Dividend, interest, and royalty payments made to residents of a foreign country are often subject to a withholding tax in the country of the payer. Withholding tax rates vary depending on the country pair, and they can be as high as 35%. By choosing its ownership links in a tax efficient manner, a firm can limit withholding taxes on cross-border dividend payments, or even eliminate them altogether. Other things equal, the preferred ownership link would involve a subsidiary located in a country with low (or zero) withholding tax rate on dividends flowing to the country of its direct owner. Moreover, firms should favor countries with low *average* withholding tax rates on inbound dividends as host countries for their owner subsidiaries.[7] In addition to dividends, capital contributions made by one affiliate to another can be subject to a capital duty, and some countries impose a stamp duty on transfer of shares or bonds. Other things equal, firms should place their owners in countries with no capital or stamp duties in place.

1.3.3 The U.S. tax system and tax deferral

When the home country of the multinational firm is the U.S., additional tax considerations can have a bearing on internal ownership structures. In particular, the U.S. tax system subjects foreign dividends to a residual U.S. tax upon repatriation to the U.S. and allows a tax credit for foreign taxes paid on the repatriated income. The most significant piece of anti-abuse legislation is subpart F which taxes certain passive income received by a foreign subsidiary – such as dividends, interest, and royalties – immediately rather than upon repatriation.

A direct implication of tax deferral is that foreign subsidiaries with excess cash should avoid repatriation of foreign profits and should instead use the profits to finance investment opportunities abroad. As a result, historically more profitable subsidiaries and those located in low-tax jurisdictions (i.e., benefiting most from deferral) should be more likely to become owners (Altshuler and Grubert (2002), Desai, Foley and Hines (2003) Edwards, Kravet, and Wilson (2012), Hanlon, Lester, and Verdi (2012)).

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[7] Unlike withholding taxes on dividends, those levied on royalties and interest payments generally apply independently of whether the transacting affiliates have a direct ownership connection. However, strategies aimed at reducing withholding taxes on royalties and interest have indirect implications for ownership structures, for example, if hybrid structures are used to achieve U.S. tax deferral on intercompany interest or royalty payments (see Section 1.3.3 and Appendix C).

Some repatriation strategies have additional implications for the *relative* tax rates of the owner and the daughter countries. Some strategies require that the owner entity is located in a country with a higher tax rate than its daughter entity (we denote such ownership link as 'H-L') while other strategies require the opposite ('L-H') configuration (examples are in Altshuler and Grubert (2002)).[8] Because of this ambiguity, these strategies have no clear-cut prediction about which of the two ownership link types should be more frequent in the data.

However, additional incentives to use the 'L-H' type ownership link may arise from strategies aimed at shifting income from high-tax to low-tax jurisdictions. This is because some income shifting strategies involve hybrid structures set up to defer U.S. taxes on passive income, such as interest payments or royalties. The structures – if used for the purpose of income shifting – suggest that owners in low-tax countries should own affiliates in high-tax countries, and thus, imply more frequent 'L-H' links (see the discussion of Subpart F of the U.S. tax code in Appendix A; see also Altshuler and Grubert (2005), Grubert (2012), U.S. Senate (2012)).[9]

Overall, our approach is to examine both types of connections ('H-L' and 'L-H') empirically, and to test whether specific strategies appear to dominate in practice. We also test whether the absolute value of the difference between two countries' tax rates predict the likelihood of an ownership link.

1.4 Expropriation risks

The next factor we examine concerns multinational firms' reliance on investment protection treaties as a way to limit political and expropriation risks in their host countries. Many less developed countries have entered into such agreements with developed countries in recent years. For example, there were 470 treaties in place in 1990 compared to 2,181 in 2002 (see Neumayer and Spess (2005) and Hallward-Dreimeier (2003)). These Bilateral Investment Treaties (BITs) guarantee certain standards of treatment and provide protection against various forms of expropriation to foreign

[8] These strategies are sometimes referred to as the triangular strategy and the blending strategy. For example, the idea of the blending strategy is that lightly taxed income generated by L is channeled up the ownership chain through H in the form of a dividend, and then passed on to the U.S. parent, also as a dividend. In the process, L's income is blended with the H's high-tax income pool, so that the resulting U.S. repatriation tax is lower than it would be if L paid the dividend directly to the parent.

[9] A hybrid structure typically includes an entity treated as a corporation by the foreign country but as a disregarded entity for U.S. tax purposes. As a disregarded entity is not taxed separately from its owner, its payments to the owner, and vice versa, are ignored by the IRS. (See Appendices B and C and Grubert and Mutti (2007) for more details). BEA tracks legal entities separately even if they are part of a hybrid structure and are, thus, consolidated for the U.S. tax purposes. However, the BEA data does not allow us to learn which entities are disregarded.

investors residing in the signatory countries.[10] If firms view these protections as valuable, they should take them into account when designing their ownership structures. Concretely, we expect that, other things equal, a firm investing in a foreign country should channel its investment through an entity located in a country that has an appropriate BIT. Similarly, we expect that subsidiaries located in countries with extensive BIT treaty networks should be used more frequently as owners of other entities within a group.

1.5 Limited liability and outside owners

Concerns about limited liability are central when firms decide which of their assets or activities should be separated vs. combined within legal entities. A setting in which limited liability has a direct implication for ownership structures involves international joint ventures. A U.S. firm can form an international joint venture by establishing a separate legal entity abroad with a foreign partner.[11] The resulting joint venture company is usually a corporation in which the firm and its partner hold equity stakes. A simple way in which the firm can limit its financial exposure towards the foreign partner is to enter into the joint venture agreement indirectly through one of its subsidiaries rather than directly through the parent. In addition, if the outside owner's claims are to be limited to assets of the joint venture, then the jointly owned entity (and possibly also its direct owner) should not hold equity in unrelated affiliates. This implies that joint ventures should be more likely indirectly owned and should be less likely to hold equity in other affiliates.

2 Data and descriptive statistics

2.1 Data and sample

Data on U.S. multinational firms come from the Bureau of Economic Analysis (BEA) *Benchmark Survey of U.S. Direct Investment Abroad*, a legally mandated survey conducted for the purpose of producing publicly available aggregate statistics on U.S. multinational operations. This survey includes financial data on both the domestic and foreign operations of U.S. multinationals. A U.S. firm is included in the BEA survey if it has at least a ten percent equity ownership interest

[10] Many treaties define expropriation broadly as including not only a government taking possession of a firm's assets, but also other government actions that negatively affect firm value, such as adverse changes in laws or tax rules. Most treaties establish clear procedures for dispute resolution. They usually allow foreign investors to bypass national legal systems and bring their cases to an international court, usually the International Centre for Settlement of Investment Disputes (ICSID), an affiliate agency of the World Bank.

[11] Desai, Foley, and Hines (2004a) analyze international joint ventures of U.S. multinational firms. Legal aspects of international joint ventures are described, for example, in Wolf (2000).

(direct or indirect) in at least one foreign affiliate. This cutoff corresponds to the internationally accepted definition of foreign direct investment, and it is used also to compute balance-of-payments statistics.

The survey forms required by the BEA vary depending on the year and the type of respondent. The benchmark survey forms we use include detailed ownership information and cover four years: 1994, 1999, 2004, and 2009. In these benchmark years, parents are required to complete extensive surveys for all affiliates with sales, assets, or net income (absolute value) in excess of a relatively low 'reporting threshold'.[12]

As our focus is on the ownership structure of firms' operations abroad, we limit our sample to firms with significant foreign operations. Specifically, we require each firm to have a majority-owned foreign affiliate in at least five countries, and for the combined sales of all of the firm's majority-owned foreign affiliates to account for at least 20% of the firm's worldwide sales.[13] A firm is included in our sample in every year in which it satisfies both conditions. These requirements result in an initial sample of 1,352 firms (2,299 firm-years). Most of our analysis focuses on understanding connections between foreign affiliates, and thus is based on a subset of 679 firms (1,139 firm-years) with at least one ownership chain, which we denote as complex (see definitions in Appendix C).[14]

We use country data on countries' Gross Domestic Product (GDP) and GDP per capita from the World Bank, and the property rights index from Andrei Shleifer's website (see also LaPorta et al. (1998)). Data on investment treaties and trade flows comes from the United Nations Conference on Trade and Development (UNCTAD) and the World Bank, data on trade agreements comes from the NSF-Kellogg Institute database (see also Baier and Bergstrand (2007)). We obtain tax information from Comtax, Worldscope, Deloitte & Touche Country Tax Guides, KPMG Taxation and Investment Guides, and Ernst & Young Worldwide Corporate Tax Guides. Data on foreign acquisitions comes from the Securities Data Corporation's (SDC) U.S. Merger and Acquisition Database.

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[12] The reporting threshold for affiliates was $3 million, $7 million, $10 million, and $30 million in 1994, 1999, 2004, and 2009, respectively. To contrast, in the intervening non-benchmark years 1995 through 1998, 2000 through 2003, 2005 through 2008, and 2010 through 2013, the reporting threshold was $20 million, $30 million, $40 million, and $60 million, respectively.

[13] These cutoffs roughly correspond to the 75th percentile for both number of countries and proportion of foreign sales amongst a larger sample that includes all U.S. firms reporting to the BEA.

[14] Both the flat and the complex structures could involve some ownership connections between subsidiaries located in the same country. Our focus is on explaining the cross-border ownership links, so the intra-country links are not considered. Note also that the BEA allows firms to combine entities located in the same country (and that are either part of the same integral business or operate in the same 4-digit industry code) into larger reporting units, so that we are unable to observe all intra-country links. In contrast, entities located in different countries may not, under any circumstances, file a combined BEA report.

2.2 Descriptive statistics

2.2.1 What do internal ownership structures look like?

Table 1 shows descriptive statistics for the sample firms, computed separately for those that have flat versus complex ownership structures. Close to 50% of the sample firms are flat. The average complex firm is larger and more diversified than a flat firm. It has worldwide assets of $26.3 billion (compared to $3.9 billion for flat firms) and 58 subsidiaries spanning 25 countries and 7 industries (these numbers are 18, 13, and 2 for flat firms).

The bottom segment of the table describes complex ownership structures (definitions are in Appendix C). The table reveals large variation in the degree of complexity within complex firms (i.e., the degree in which a structure deviates from the flat benchmark). An average complex firm organizes 42% subsidiaries (57% of foreign operating assets) into ownership chains, but these fractions are 93% and 100% at the 95th percentile. Most ownership chains are two-countries (layers) long, but five percent of firms have chains with more than five layers. On average, 18% of first-tier entities are owners, but these owners control more than half of operating assets of an average complex firms. On average, 60% of owners are classified as holding companies by the BEA, which means that most of their income is attributable to the operations of the subsidiaries they own (precise definition is in Appendix C). The remaining owners are primarily operating entities. An average owner has a direct equity stake in 2.9 affiliates, and this number is 3.5 affiliates for holding owners.

Panel B of Table 1 shows how the structures vary across basic firm characteristics and across time. The logit regression in the left panel estimates the likelihood that a firm is complex vs. flat. The two remaining regressions explore two different aspects of complexity – the length and the frequency of chains – within complex firms. The logit regression shows that complex firms are significantly larger and more diversified, and that they experience a higher growth rate in the number of foreign subsidiaries over the prior five years. Interestingly, the likelihood of being complex is *not* significantly related to a firm's age, the number of countries in which the firm operates, or the number of foreign acquisitions it conducted over the past five years (in proportion to all foreign affiliates).[15] The coefficients on the year dummies show that the proportion of complex firms declined significantly during our sample period, but that complex firms became increasingly more complex, based on both the length of chains and the frequency of chains (see also Fig. 3).

[15] An OLS estimation implies that 38% of the variation in the complexity indicator can be explained by the model.

Fig. 4 lists the top host countries of U.S. multinationals based on the affiliates' total assets. The top four countries are the United Kingdom, Netherlands, Canada, and Luxemburg. The fact that Netherlands and Luxemburg are on this list, in spite of their small economies, highlights the likely divergence between financial and real cross-border capital flows of U.S. firms. The top four host countries based on the fraction of equity holdings in affiliates as a proportion of total assets (i.e., the importance of "flow-through capital) are Luxemburg, Netherlands, Bermuda, and Portugal. The fact that two of these countries are tax havens (see Hines and Rice (1994) points to tax motives as a key driver behind complex structures.

2.2.2 What types of subsidiaries are placed in different positions within a structure?

Table 2 (and the remainder of our paper) focuses on complex firms and describes characteristics of subsidiaries by their positions within the structures. Out of the total of 47,967 subsidiaries, 29,687 are not part of any cross-border ownership chains. The remaining subsidiaries are split between owners and bottom subs (the numbers are 4,732 and 13,546, respectively). Compared to no-chain subsidiaries, owners (i.e., subsidiaries located at either the top or middle of chains) are substantially larger (based on operating assets or sales) and older, have a higher ratio of R&D to sales and a smaller ratio of PP&E to operating assets. Owner subsidiaries also have a higher fraction of intercompany sales on total sales, suggesting stronger business ties to other affiliates. The incidence of outside partners is lowest for owners and highest for entities at the bottom of chains (5% vs. 27%). Focusing on the host country attributes, compared to no-chain entities, owner subsidiaries tend to locate in countries with stronger property rights, in OECD and EU countries, and in more friendly tax environments (based a number of criteria). Panel B shows that these basic patterns are similar for both the holding owners and the operating owners.

3 Empirical tests

Our empirical tests take two forms. In the first subsection, we explore the factors that drive ownership structures by examining characteristics of owner subsidiaries within multinational firms. In the second subsection, we focus on characteristics of pairs of host countries that are connected to each other through ownership links.

3.1 Owner regressions

In Table 3, our main test in Panel A compares owner subsidiaries, such as A, B, G in Fig. 2, to a benchmark sample of non-chain subsidiaries, such as C, D, E. The dependent variable in Panel A

equals one for all owners and zero for non-chain subsidiaries. As a robustness test, we expand the benchmark sample to include bottom subsidiaries, such as F and H, with similar results.

Note that 40% of owner subsidiaries included in Table 3 are classified as holding companies (1,902 holding owners out of 4,732 total owners) implying that most of their income is attributable to the operations of their daughter subsidiaries and they have little operations of their own (we define holding company in Appendix C). The remainder is termed 'operating owners'. As some of the theories we test in Table 3 have stronger implications for one type of owner than another, we report a separate regression including only operating owners (Panel B). The dependent variable in Panel B equals one for operating owners and zero for non-chain subsidiaries. In Panel C, we compare holding and operating owners to each other, with the dependent variable set to one for holding owners.

All regressions include firm fixed effects. We also estimate regressions with firm and country fixed effects (without country characteristics) and obtain similar coefficients on the subsidiary characteristics to those reported in Table 3.

3.1.1 Historical factors, profitability, and economic ties

The regressions in Table 3 show that both the historical-accident and the transaction costs hypotheses help explain ownership structures. First, owners are significantly older than the benchmark sample. For example, in Panel A increasing subsidiary age by one standard deviation, with all other variables at the mean, increases the likelihood of being an owner by 1.3 percentage points (z-stat of 6.5; 14% of all subsidiaries in Panel A are owners). Owner subsidiaries are also larger based on operating assets, suggesting more mature operations (z-stat of 13.0). The historical factors are more consistent with characteristics of operating owners than holding owners. For example, based on Panel C, holding owners are significantly younger than operating owners, suggesting that they are incorporated into the ownership structure at later stages of their firms' lives.

Consistent with the transaction costs hypotheses, owners are more profitable than the benchmark sample as measured by the proportion of assets financed by retained earnings (z-stat of 6.51). This prediction follows from an internal pecking order behavior whereby subsidiaries with excess cash flow provide capital to other parts of the firm. In addition, the likelihood of being an owner is negatively associated with sales growth, our proxy for the subsidiary's own opportunities to invest (z-stat of -3.54).

There is also strong evidence of the economic-ties hypothesis in Section 1.2. As operating owners have more significant operations of their own relative to holding owners, we expect stronger economic ties to matter more in this subsample of owners. Referring to Panel B, the likelihood of being an operating owner increases with the proportion of the subsidiary's inter-affiliate sales on total sales, and in the number of affiliated entities located in the same geographic region or operating in the same industry. All three effects are significant at the 1% level, and the marginal effects are 0.4, 0.2, and 0.2 percentage points (untabulated), respectively (9% of all subsidiaries in Panel B are operating owners).

3.1.2 Financing hubs

Table 3 reveals several features of owners consistent with them serving a financing or cash management role within their multinational groups. Importantly, we find that 60% of all owner subsidiaries are classified as holding companies by the BEA, which means that most of their income comes from the operations of their daughter companies rather than from operations of their own. If holding companies or owners in general are financing hubs, then we should see evidence of internal financing activities within this group of affiliates. We do not have detailed data on intra-company financing transactions, so the evidence is indirect. What we can measure is the proportion of subsidiary assets that consist of non-financial assets (i.e., inventory, trade receivables, PPE, and equity in affiliates) versus financial assets (i.e., remaining assets which would include cash and intercompany loans).

We find that owners hold larger financial assets relative to total assets than other affiliates (z-stat of 12.47 in Panel A), and that this proportion is especially high for holding owners (z-stat of 7.30 in Panel C). This suggests that owners hold cash and make loans to other affiliates. Besides reducing transaction costs, combining equity ownership with lending is tax efficient. This is because U.S. taxes on interest income received by owners from their subsidiaries can be deferred even if the payments cross national borders (while in general, such cross-border payments trigger an immediate U.S. tax; see discussion of hybrid entities in Appendix A).

In Section 1.2 we argue that financing hubs – because they, by definition, engage in financing activities – might benefit more strongly from high-quality institutions than other affiliates. In Table 3, we find that country governance, as measured by the OECD dummy, plays a role in the location choices of both types of owners, though the effect appears stronger for holding companies. However,

controlling for the OECD indicator, a finer measure of a country's property rights strength is not associated with the incidence of owners.

Finally, based on a number of criteria, owners, and especially holding owners, tend to locate in countries with better tax environments than other affiliates, consistent with their more significant role in tax planning. Perhaps also for tax reasons, owners tend to finance themselves more with retained earnings rather than debt, and this is, again, especially true for holding companies. We discuss these tax findings in more detail in Section 3.1.3 below.

3.1.3 Taxes

We examine a number of tax-related motives for the location of owners and find strong evidence that firms design their ownership structures to minimize taxes. First, owners are located in countries with lower statutory tax rates (z-stat of -7.77 in Panel A) and have lower entity-specific effective tax rates (z-stat of -4.60 in Panel A) compared to non-owners.[16] This is consistent with tax motives. For example, basic tax deferral strategies imply that subsidiaries that are located in lower-tax jurisdictions, and thus benefit more from deferral, should be more likely to postpone repatriation by financing (or acquiring) foreign affiliates.

Second, owners are significantly less likely to locate in countries with worldwide tax systems (z-stat of -5.84 in Panel A) or in countries that have controlled foreign corporation (CFC) legislation (z-stat of -2.29 in Panel A). Based on regressions in Panel A involving all owners, the marginal effect of having a worldwide tax system or having CFC legislation is -2.7 and -1.7 percentage points, respectively (14% of entities included in these regressions are owners).

Third, firms avoid placing owners in countries that impose capital or stamp duties on capital transactions (z-stat of -5.93 in Panel A). We find weak evidence that owners are more likely to locate in tax havens (z-stat of 2.16 but only in Panel B) or that owners tend to locate in countries with low average withholding tax rates on inbound dividends (z-stat of -1.83 but only in Panel B). With respect to withholding taxes, it is possible that operating owners are more likely to collect dividends from daughter subsidiaries, while holding companies are more likely to collect interest or royalty payments (making the inbound withholding tax rates on dividends less relevant for holding owners).

[16] Blouin, Krull, and Robinson (2012) note that the benefit of tax deferral is increasing in the repatriation tax rate, which is a function of the "blended" tax rate of each affiliate that characterizes its total pool of undistributed foreign retained earnings. The affiliate's foreign tax credit for purposes of computing its U.S. residual tax liability upon repatriation depends on the foreign statutory tax rates in effect at the time when income was earned in the foreign country, and any special foreign tax exemptions granted to the affiliate.

The fourth noteworthy and possibly also tax related pattern is that owners are more likely to engage in R&D (z-stat of 3.59 in Panel A) and collect royalty payment from affiliates (z-stat of 6.21 in Panel A) than are non-chain subsidiaries.[17] One explanation might be that owner friendly and R&D friendly tax policies tend to coexist within the same countries, or that owner friendly policies, indirectly, also attract R&D.[18] A simple reason might be that R&D projects, if successful, generate steady streams of cash flows, and the ability to redistribute this cash flow amongst the group in a tax efficient manner is valuable to the firm. Another not mutually exclusive explanation is firms' use of tax planning strategies in which owners license (and potentially develop) the firm's intellectual property to daughter companies treated as hybrid entities for U.S. tax purposes (see Darby (2007), U.S. Senate (2012), and Grubert (2012)).[19]

Fifth, we find some evidence that the existence of anti-abuse regulation discourages the location of owners. The coefficient on CFC legislation is negative and significant (z-stat of 2.29 in Panel A) while the coefficient on thin cap legislation is insignificant. As owners tend to have lower leverage than other subsidiaries, owners may not find thin cap legislation constraining.

Finally, controlling for other country characteristics, owners tend locate in countries with *less* extensive tax treaty networks. This is interesting as it points to the potentially conflicting effects of tax treaties on firms. On the one hand, tax treaties benefit firms by limiting double taxation (among other things). On the other hand, they often contain agreements that facilitate sharing of tax related information between governments, which may deter some firms. This interpretation is consistent with findings in Blonigen and Davies (2004) who examine the impact of tax treaties on FDI. They conclude that there is "little evidence that bilateral tax treaties increase FDI activity, contrary to OECD-stated goals for such treaties" (p. 601).[20]

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[17] Because holding companies are defined based on the significance of their own operations, some of the operating measures could have a mechanical relation to the likelihood of being a holding owner. For that reason, we exclude them from Panel C.

[18] A prominent owner country in our sample that has tax friendly environment for both holding companies and for R&D is Ireland. As a robustness test, we re-run the regressions excluding entities located in Ireland and find similar results to those reported in the table.

[19] R&D expenditures, as reported by a foreign affiliate to the BEA, do not include payments that an affiliate might make to its U.S. parent under a cost sharing agreement. Under these agreements, the affiliate finances a contractual portion of the annual R&D expenditures incurred in the U.S.

[20] It is also possible that our tax treaty measure is negatively correlated with a country's overall tax-friendliness, and that it is this underlying attitude rather that the treaty network itself that drives the negative coefficient. We examine this further in Section 3.2.

3.1.4 Expropriation risks

The tests in Table 3 suggest that expropriation risk considerations play an important role in designing ownership structures. We show that subsidiaries located in countries with more extensive investment treaty networks (measured using the number of BITs in effect) are significantly more likely to be owners. For example, in Panel A, the corresponding z-stat is 3.42 and the marginal effect is 1.5 percentage points.[21] The finding points to the flexibility with which multinationals can take advantage of attractive treaties without changing the location of their real activities (and by adapting their ownership structures instead). In general, this may be difficult because governments sometimes deny treaty benefits to foreign investors that have no "substantial business activities" in their home countries (UNCTAD, 2005, p. 21).[22] However, a firm that already has operations in multiple countries can choose as a direct investor any of its existing affiliates, and thereby, qualify for treaty benefits. This highlights the challenges faced by governments trying to design the investment and tax treaties with specific policy objectives in mind.

3.1.5 Outside ownership

In our sample, 84% of subsidiaries are wholly owned by the parent. Based on Table 2, outside ownership is concentrated among subsidiaries on the bottom of ownership chains (in this sample, the mean outside-ownership dummy is 27%), and it is least common among owner subsidiaries (the mean dummy is 5% for owners, compared to 13% for non-chain subsidiaries). Multivariate tests yield results consistent with these patterns. For example, in Panel A of Table 3, 14% of all sample subsidiaries are owners, and allowing for outside ownership, with all other variables at the mean, decreases the likelihood of being an owner by 2.1 percentage points (z-stat of 3.1). Similarly, in unreported regressions, we find that outside ownership significantly increases the likelihood that a bottom entity is indirectly owned by the U.S. parent (controlling for subsidiary characteristics and firm fixed effects). These patterns are consistent with ownership structures being designed, in part, to

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[21] The empirical evidence on the impact of BITs on the actual investment flows is mixed. For example, Neumayer and Spess (2005) document a positive association between the number of BITs signed by a developing country and the size of FDI flows to that country. In contrast, Hallward-Driemeir (2003) and Tobin and Rose-Ackerman (2004) report either no effect or a negative effect of BITs on FDI flows. A recent study by Aisbett (2009) argues that the finding in Neymayer and Spess may be due to an endogeneity bias (BITs tend to be signed during periods of increasing FDI flows), and that after accounting for the bias, there is no evidence that BITs increase FDI.

[22] The denial-of-benefits clauses included in some BIT agreements are meant to discourage firms from setting up ownership structures solely to obtain treaty benefits (the so-called *treaty shopping*). Treaty shopping is also relevant in the context of tax treaties. For instance U.S. income tax treaties have long included a "limitation on benefits" (LOBs) article analogous to that described above. See Fleming (2012) for a detailed discussion underlying the U.S. rationale for the LOB article.

limit firms' legal exposure towards outside owners. However, given that most entities – even those on the bottom of chains – are ultimately wholly owned by the U.S. parent, outside ownership cannot explain most of the structures we see.[23]

3.2 Country pair regressions

The country pair regressions examine direct ownership connections between two affiliates located in different countries. The goal is to test the subset of hypotheses in Section 1 that make predictions about characteristics of *country pairs*. We take the location of each firm's affiliates as given and ask what characteristics of a country pair – such as the countries' geographic closeness, economic ties, or treaties in place – affect the likelihood that two affiliates located in these countries have an ownership link.[24]

3.2.1 The setup

The unit of observation in these regressions is a country pair. The sample consists of all pairs that *could be* formed within a multinational group, given the affiliates in our sample of 1,139 firm-years with ownership chains (i.e., a country pair is included if there is at least one firm-year with affiliates in each country). The left-hand side variable measures the frequency with which an ownership link involving a country pair occurs in the data.

The construction of this variable is best explained using a simple example involving a single firm (we aggregate across firms by summing up individual firm frequencies). The firm has subsidiaries in three different countries A, B, and C and the number of subsidiaries in each country is N_A, N_B, and N_C. In this single-firm example, the regression would have 6 observations (=3·2) capturing all possible country pair combinations: AB, AC, BA, BC, CA and CB. The country pair AB denotes a case in which a subsidiary located in country A owns a subsidiary located in country B. The regression estimates the likelihood that a given connection, such as AB, occurs in the data (*actual frequency*) controlling for the number of times the combination could possibly occur (*possible frequency*).

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[23] These results complement and extend those of Desai et al. (2004a) that examines conditions under which multinational firms use joint ownership of foreign entities.

[24] Dyreng, Lindsey, Markle, and Shackelford (2011) also examine the incidence of country pairs within multinational firms, but they do not focus on ownership structures and, thus, do not measure ownership links.

Taking the AB connection as an example, our main approach assumes that *any* subsidiary located in country A can own *any* subsidiary located in country B. Thus the number of possible ownership connections generating the AB link is $N_A \cdot N_B$. To obtain the actual frequency of AB, we count *all* links of this type occurring in data. Thus for example, if a subsidiary in country B is owned by two different subsidiaries in country A we count it as two separate occurrences of the AB link.[25]

We estimate the regressions using a Tobit model to account for the high frequency of zero in the dependent variable. In one specification, the dependent variable is the natural logarithm of one plus the actual frequency with which the country pair occurs in the data, with the natural logarithm of one plus the possible frequency included as a control variable. In a separate specification, the frequencies are replaced by total assets of daughter subsidiaries counted in each link that are held by their corresponding owners.[26] The explanatory variables measure the characteristics of the country pairs, and we control for country characteristics using two sets of country fixed effects, one for the owner country and one for the daughter country.

3.2.2 The sample and descriptive statistics on country pairs

The sample for the country pair regressions consists of 21,790 possible country pairs (65,074 country pair-years) with complete country data that occur together at least once within the same firm (in the sense that a firm has subsidiaries in both countries in the same year). This final sample represents 160 individual countries with an average possible number of pairings for each country of 117. Of those, 1,399 country pairs (2,997 country pair-years) have a non-zero value for the number of actual links. Table 4 shows that the average number of actual links in the 2,997 subsample is 3.6 with a median of 1.0. The frequency is highly skewed with the most popular country pair – Netherlands as owner and Germany as daughter - occurring 97 times in a single year. Table 4 also includes descriptive statistics for the independent variables used in the country pair regressions, and the variable definitions are in Appendix D.

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[25] As a robustness test, we construct the actual and possible country pairs by considering whether *any* subsidiary located in country B is owned by *any* subsidiary located in country A. This method aggregates ownership links that involve multiple owners of the same daughter subsidiary (thus in the example above, we would count only one occurrence of the AB link instead of two). In contrast to the first approach – the alternative method assumes that having more than one subsidiary in country A does not automatically increase the likelihood that a country A subsidiary becomes an owner. This approach also takes into account that some firms may consolidate BEA reporting within a country. Overall, our results are robust to different ways of constructing actual and possible country pairs.

[26] Our results are robust to using total equity of daughter subsidiaries, and to using (the log of one plus) the ratio of actual frequency (or assets) to possible frequency (or assets) as dependent variables.

For a subset of 192 country pairs, Table 5 shows the frequency with which each of the owner-daughter connections occurs in the sample (Panel A), and it also shows the combined assets of the subsidiaries associated with each owner-daughter connection (Panel B). The owner and daughter countries for Table 5 are selected as follows. From each of five geographic regions, we select up to three countries that most frequently host owner subsidiaries and up to three countries that most frequently host daughter subsidiaries.[27] More specifically, frequent owner and daughter countries have the largest proportion of owner or daughter subsidiaries to all subsidiaries located in the country and host at least 10 subsidiaries of U.S. multinational firms. The table shows the number of ownership links and the associated assets for each of the owner-daughter country pairs.

The total number of individual ownership links included in the table is 2,389, and total subsidiary assets involved in these links are $775 billion (15 percent of all ownership links and 18 percent of all assets associated with ownership links in our sample). The most frequent owner country is Netherlands, capturing 1,185 out of the 2,389 ownership links and accounting for $366 billion of assets. The top owner countries from each of the remaining four regions are Caymans/British Virgin Islands, Mauritius, Israel, and Hong Kong with frequencies of 92, 18, 6, and 112, respectively. Although owners in Africa and the Middle East are rare (only 24), daughters are more common – 255 in total. The most frequent daughter country from each region is Brazil, France, South Africa, Israel and China with frequencies of 159, 420, 110, and 257, respectively.

3.2.3 Country pair regressions: results

The regressions in Table 6 test the subset of the hypotheses in Section 1 that make predictions about characteristics of *country pairs*. Most importantly, the regressions examine economic ties between subsidiaries (Section 1.2) and tax and investment agreements between countries (Sections 1.3 and 1.4) as explanations for ownership links.

The economic ties hypothesis is strongly supported by the data. We instrument for economic interactions between subsidiaries using measures of cultural and historical connections between their host countries. Specifically, we use dummy variables for common language, a common colonizer, and common religion as well as a measure of geographic distance between countries (see definitions in Appendix D). Based on all four measures, we find that subsidiaries located in countries with

[27] The five regions correspond to those that the BEA uses to report international statistics: Latin America/Atlantic, Europe, Middle East, Africa, and Asia/South Pacific. Canada represents its own region in the BEA data so we include Canada in Table 5 as a top owner country and a top daughter country.

stronger economic ties are more likely to have ownership links. Focusing on the left panel of Table 6, the likelihood of an ownership link is higher when the host countries are geographically closer (z-stat of -16.11), have common official language (z-stat of 4.00), common religion (z-stat 1.80), and a common colonizer (z-stat of 3.28). All results are similar when the dependent variable is constructed using subsidiary assets (the right panel).

In addition, we explore two direct measures of economic closeness between countries: bilateral trade flows between two countries relative to their total trade flows, and a dummy variable equal to one if the countries have a preferential trade agreement (PTA). We find that the trade flows are positively associated with the likelihood of an ownership link (z-stat in the left panel is 6.29), consistent with the importance of economic ties. There is no significant relation between ownership and the existence of a PTA.

Our tax variables in Table 6 capture key aspects of multinational tax planning described in Section 1.3, including withholding taxes, tax deferral and repatriation, and tax treaties. We include separately withholding tax rates on dividends flowing from the owner country to the daughter country and vice versa, and we find that only the relevant withholding tax rate – i.e., that on dividends flowing from the daughter to the owner country – is significantly and negatively associated with the existence of an ownership link (z-stat in the left panel is -4.32). The coefficient on the withholding tax rate on dividends flowing in the opposite direction is negative but not statistically significant.[28]

Turning to the tax deferral strategies, we include the ratio of the income tax rates of the owner country to that of the daughter country to test whether particular strategies – that is, strategies involving a low-tax subsidiary owning a high-tax subsidiary or vice versa – are especially frequent (see Section 1.3). We find that the coefficient on the ratio is negative and statistically significant (z-stat in the left panel of -2.51), suggesting that owners in low-tax countries are more likely to make equity investments in daughters in high-tax countries.[29]

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[28] In unreported regressions, we include average withholding rates on interest and royalties (both inbound and outbound), motivated by the tax planning strategies discussed in Grubert (2012). In contrast to dividend payments where only inbound rates are significant, both outbound and inbound rates on royalties and interest are significantly negative in the owner regression.

[29] In unreported tests we replace the relative rate with the absolute difference in tax rates between the owner and daughter country. We do not find a statistically significant coefficient on this alternate tax variable.

This result provides some evidence that specific tax strategies requiring an 'L-H' type link dominate in practice. Interestingly, this configuration 'complements' the role of owners as either lenders or holders of intellectual property (the owner regression in Table 3 shows that owners have a greater proportion of financial assets, conduct more R&D, and more frequently receive royalties from affiliates). Concretely, the L-H configuration allows the owner to report interest or royalty income in a low-tax country, and the daughter to deduct interest or royalty income in a high-tax country. This is initial empirical evidence consistent with firms using internal ownership structures to reduce foreign effective tax rates by structuring intercompany payments to flow from bottom to top within ownership chains.

The final two tax related findings are that, controlling for other factors, two host countries are more likely to form an ownership link if they have a tax treaty in place and if they are both located in tax havens. The first result suggests that tax treaties have significant net benefits for firms in addition to lowering their withholding tax rates. This finding seems at odds with the earlier result in Table 3 that showed a *lower* frequency of owners in countries with more extensive tax treaty networks. One explanation for the contradictory findings might be that the extent of a country's tax treaty network proxies for its more general approach to taxation. For example, tax havens have typically less extensive tax treaty networks and are also favorable locations for owners.

Finally, we find that the existence of a bilateral investment treaty (BIT) between two countries makes it more likely that the two countries are connected with an ownership link. The coefficient on the BIT dummy is positive in both regressions and it has a z-stat of 1.83 in the count regression in the left panel and of 3.96 in the asset regression in the right panel. The stronger result in the asset regression is consistent with BITs being especially important for subsidiaries with significant assets (i.e., when expropriation risk is high).

The control variables in Table 6 include measures of relative GDP, GDPPC, and property rights associated with the country pair, as well as dummy variables for whether the pair is part of the OECD and the EU. Consistent with the owner regressions, the coefficients on these controls suggest that property rights and institutional quality are important factors in ownership structure choices.

4 Conclusions

This paper analyses internal ownership structures of U.S. multinational firms. Our first goal is to document the basic characteristics of the structures. We find, for example, that seemingly similar

firms can take vastly different approaches to internal ownership, with close to 50% of firms in our sample having simple flat structures while other firms being highly complex. Much of the variation in complexity cannot be explained by basic firm attributes such as size, industry, or diversification, thus, raising questions about how internal ownership decisions are made. Our second goal is to take a step towards understanding these choices by looking inside the black box of complex firms. We examine the different potential trade-offs tradeoffs jointly. The tests provide strong evidence of several distinct tax motives behind the structures – e.g., incentives to reduce foreign income taxes and withholding taxes, and to defer repatriation of profits to the U.S. – as well as a number of non-tax factors, such as financing costs, expropriation risks, and legal liability towards outside partners.

This paper provides the first comprehensive picture of how internal ownership of U.S. multinationals is organized, but a number of intriguing questions remain unanswered. For example, it is not clear why ownership structures differ so strongly among seemingly similar firms. If the structures serve, to a large degree, to minimize taxes, it is puzzling why some firms show no obvious evidence of multinational tax planning.

At a different level, the paper highlights a strong divergence between the real and financial cross-border investment flows of U.S. firms. The distinction is difficult to capture accurately in aggregate FDI statistics because of challenges with measuring indirect investments. This raises questions about how exploring such flows might affect our understanding of what drives FDI and how different policies affect cross-border investments. Finally, it is possible that ownership and reporting hierarchies relate to each other within multination firms. If so, examining these interactions might contribute to our understanding of firms' internal organizations more broadly. For example, internal ownership might be used to incentivize or monitor managers, and thus, legal and tax factors could have an indirect impact on reporting structures. In sum, understanding internal ownership choices of multinational firms is important from a number of policy, tax, and academic perspectives, and the area provides a fruitful ground for future research.

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Appendix A: Taxonomy of Internal Ownership Structures

By an internal ownership structure we mean, broadly speaking, the way in which *foreign affiliates* of a multinational firm are connected to each other via ownership links. Fig. A shows a simple example of a structure in which each affiliate is located in a different country. The definitions below are based on this example. Fig. B on the next page illustrates how these definitions are adapted to account for structures with multiple subsidiaries in the same country.

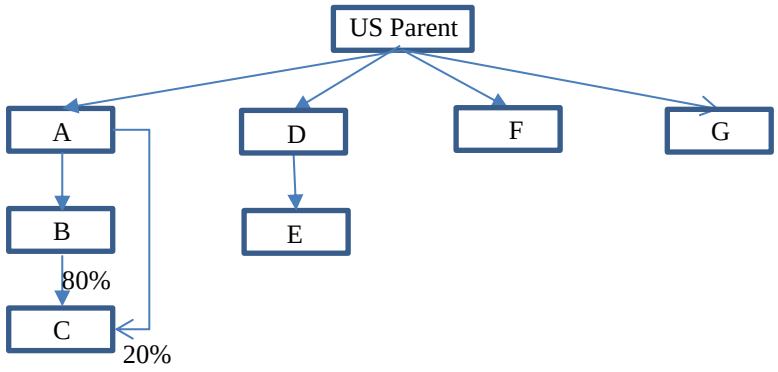

Fig. A: Example of an internal ownership structure with one subsidiary per country. In the figure, each of the seven foreign entities is located in a different country and is ultimately wholly-owned by the parent.

Referring to Figure A:

- *Affiliate / subsidiary / entity*: Used interchangeably to describe a foreign entity in which the parent owns equity (direct or indirect).[30]
- *Owner subsidiary*: An entity that owns equity in another affiliate (*A*, *B*, *D*).
- *Daughter subsidiary*: An entity in which an owner subsidiary owns equity directly (*B* and *C* are daughters of *A* while *E* is a daughter of *D*).
- *Bottom subsidiary*: An entity that does not own equity in another affiliate (*C*, *E*, *F*, *G*).
- *Ownership chain.* An ownership "path" connecting a bottom subsidiary with the U.S. parent that contains at least one owner subsidiary. For example, entities *C-B-A* form a three-layered chain while entities *C-A* and *E-D* form two-layered chains. We do not consider subsidiaries *F* and *G* as part of an ownership chain because they are owned directly by the parent and are not themselves owner subsidiaries.
- *First-tier subsidiary*: A subsidiary in which the parent owns equity directly (*A*, *D*, *F*, *G*).

[30] In the context of foreign direct investment relationships, the term "affiliate" or "associate" is used to describe an entity in which a parent company owns at least a 10 percent but not more than a 50 percent direct or indirect equity interest, while the term "subsidiary" is used to describe an entity in which the parent company owns greater than a 50 percent direct or indirect equity interest (OECD, 2008). We do not make this distinction in our paper and refer to any entity in which the parent company owns an equity interest as either an affiliate or a subsidiary. Note that the Bureau of Economic Analysis (BEA) does not collect data for entities in which the parent company owns less than a 10 percent direct or indirect equity interest as these are deemed to be portfolio investments.

- *Holding company:* An owner subsidiary whose industry classification is that of a holding company. Roughly speaking, the income of a holding company is primarily attributable to owning equity in another affiliate and it has little operations of its own.[31]
- *Complex structure*: An internal ownership structure containing at least one ownership chain.

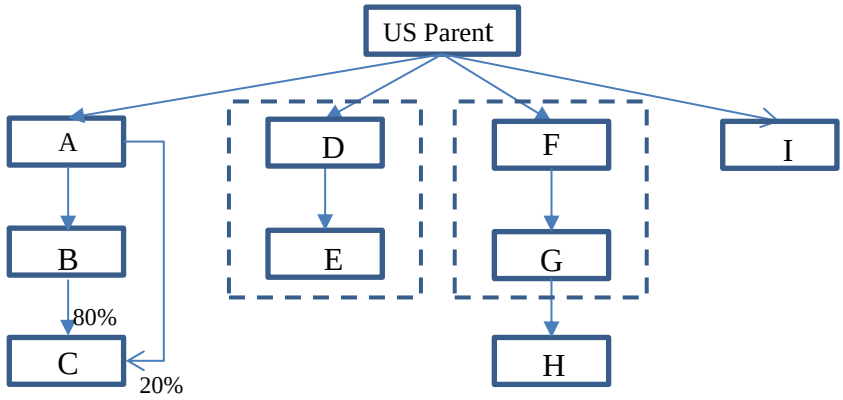

Fig. B: Example of an internal ownership structure with multiple subsidiaries per country. In the figure, entities D and E are located in the same country, and so are subsidiaries E and F. Each of the remaining five entities is located in a different foreign country. All entities are ultimately wholly-owned by the parent.

In contrast to Fig. A, the structure in Fig. B contains ownership chains that are partially or wholly contained within one country. The BEA data does not allow us to observe such within-country chains accurately because firms may, at their discretion, choose to consolidate entities located in the same country into single BEA reporting units. As our theories seek to explain ownership chains that cross national boundaries, this feature of the data is not a significant constraint, but it requires that we adapt our basic definitions to accommodate structures like those in Fig. B. We do this simply by collapsing ownership chains occurring within the same country into a single "layer". For example, we treat entities H, G, and F in Fig. B as a two-layered chain (rather than three-layered) chain, and in owner regressions, we consider only the bottom entity (G) as an owner subsidiary. Consistently, entities E-D drop from owner regressions in the reported tests but are included in the benchmark sample in a robustness test, without significantly changing the results.

[31] More specifically, the BEA's international surveys industries (ISI) classifications are based on the 1997 North American Industry Classification System (NAICS) and 1987 Standard Industrial Classification (SIC). The NAICS-based ISI code for holding companies is 5512 (holding companies, except bank holding companies) and the SIC-based ISI code is 671 (holding companies). BEA defines a holding company as a business "engaged in holding the securities or financial assets of companies and enterprises for the purpose of owning a controlling interest in them or influencing their management decisions. Businesses in this industry do not manage the day-to-day operations of the firms whose securities they hold. (…) A business that engages in holding company activities but generates more than 50 percent of its total income from other activities is not a holding company." (BEA (2007), p. 46).

Appendix B

Basic principles of taxation of foreign income

Multinational firms are taxed in multiple countries and can be therefore subject to double taxation. For example, when a legal entity is owned by a parent company located abroad, the entity's income is taxed by its host country, but it can be taxed again in the home country of the parent. Although the parent's home country offers unilateral relief from double taxation, bilateral tax treaties are necessary to resolve double taxation problems that cannot be resolved unilaterally.

Depending on the approach to taxation of foreign income, countries' tax systems can be broadly categorized as worldwide or territorial. Under a worldwide system, a country taxes its residents on their worldwide income but typically provides relief from double taxation by allowing a tax credit (against domestic tax) for foreign taxes paid. Domestic tax on foreign income is imposed either when the income is earned or when it is distributed to a parent company. Alternatively, a tax system may exempt foreign dividends from taxation altogether, referred to as a participation exemption. An extensive participation exemption system is the key characteristic of a territorial system. Pure worldwide or territorial systems are rare (see Clausing and Shaviro (2011)).[32]

An important feature of all tax systems is *anti-abuse* rules designed to limit tax avoidance.[33] For example, resident companies may have incentives to shift income to low-tax host countries of their foreign affiliates, which is especially relevant for mobile income such as royalties or interest. Countries enact two key pieces of legislation that allow them to limit potentially abusive forms of tax avoidance. First, controlled foreign company (CFC) legislation allows a country to tax certain foreign income of a resident company immediately, regardless of when it is repatriated (or whether it would otherwise fall under a participation exemption). Second, thin capitalization legislation allows a country to limit interest deductions, and thus, reduce income shifting through the use of debt (see Buettner, Overesch, Schreiber, and Wamser (2012)).

Taxes other than income taxes

Dividends, interest, and royalty payments made to residents of a foreign country are often subject to a withholding tax in the country of the payer. For example, suppose that a subsidiary located in country A makes a dividend payment of $100 to its parent company in country B, and the relevant withholding tax rate is 20%. In this case, the subsidiary owes a tax of $20 in country A. Withholding tax rates vary depending on the country pair and the type of payment, and they can be as high as 35%. Bilateral tax treaties often reduce or eliminate withholding taxes for specific country pairs and for specific types of income.

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[32] For example, it is not clear how to characterize a country that offers a participation exemption to dividends received from only a subset of foreign countries. We follow Markle (2012) in defining worldwide versus territorial.

[33] Definitions of abuse differ across countries. In the U.S., the economic substance doctrine, developed by the courts, generally considers a transaction to be abusive when it has no significant economic effect on the taxpayer, other than a reduction of federal income taxes. In such cases, the tax benefit from the transaction can be denied. The economic substance doctrine was codified into Section 7701(o) to the Internal Revenue Code in 2010.

In addition to dividends, capital contributions made by one affiliate to another can be subject to a capital duty, and some countries impose a stamp duty on transfer of shares or bonds. Again, the tax rates and base vary considerably across countries, and many countries do not impose such duties.

The U.S. tax system and tax deferral

The U.S. tax system can be described as worldwide with deferral. It includes no participation exemption for foreign dividends, but it allows a foreign tax credit (FTC) for foreign taxes paid to eliminate double-taxation. Suppose, for example, that a U.S. firm repatriates a certain amount of foreign income in a given year, and that the income has been taxed abroad at an average rate of 25%. At the time of repatriation, the U.S. taxes the foreign income at the rate of 10%, which corresponds to the difference between the U.S. income tax rate of 35% and the average foreign tax rate. Alternatively, suppose that the average foreign tax rate is 40% rather than 25% (this can occur especially if the foreign earnings were subject to both income and withholding taxes). In this case, the firm owes no U.S. taxes at repatriation, and it accumulates an *excess* foreign tax credit at the rate of 5%. The excess credit can be carried forward up to five years, and during that period, it can be used to offset U.S. taxes due at any future repatriations.

The anti-abuse CFC legislation in the U.S. is referred to as subpart F. It subjects certain foreign passive income, in particular cross-border dividends, interest, and royalties, to immediate U.S. taxation. Concretely, if a foreign affiliate of a U.S. multinational receives a dividend payment (or other type of passive income) from another affiliate located in a third country, then this dividend is taxed immediately by the U.S regardless of repatriation.

Since ownership chains can generate cross-border dividends between foreign affiliates, they can expose a firm to subpart F. However, subpart F rules can be avoided in a fairly simple manner. This is because the rules apply only to payments occurring between two foreign corporations, and foreign affiliates of a U.S. firm can be classified as either corporations, partnerships, or disregarded entities for U.S. tax purposes (see JCT, 1997).[34] Any dividends, royalties, or interest payments occurring between a partnership or disregarded entity and a corporation are not subject to subpart F (because they are considered to occur within a single consolidated entity). See Appendix B for examples of how entities treated differently in the foreign jurisdictions than they are treated for U.S. tax purposes (so-called "hybrid entities") are used to minimize taxes.

[34] The entity classification rules are in Section 7701 of the Internal Revenue Code. The U.S. Treasury and the IRS changed these rules in 1997 by issuing the so-called check-the-box (CTB) regulation. Before CTB, an entity was classified as partnership vs. corporation based on four characteristics, including limited liability, free transferability of interests, and continuity of life. After CTB, eligible entities can elect to be taxed as partnerships (or as disregarded entities if they have a single member) or as corporations. See Appendix C for an example of a deferral structure used by Enron Corporation pre-CTB and by Microsoft post-CTB.

Appendix C: Tax benefits of an internal ownership structure involving chains

Example 1: Avoiding U.S. repatriation tax - intercompany dividend payments

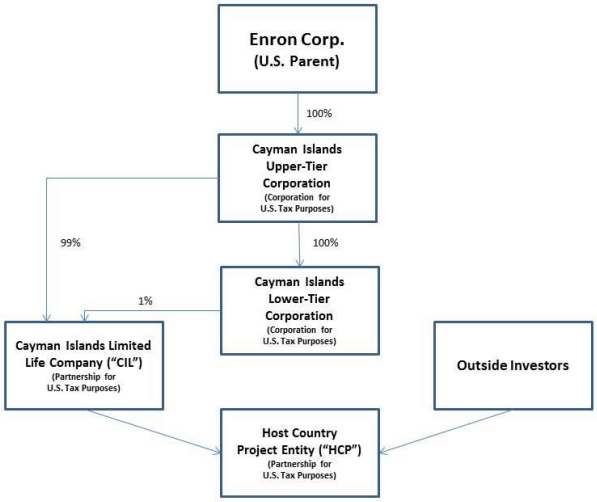


Fig. A: Reproduced from U.S. Senate (2003)

Example 1, based on U.S. Senate (2003, 373-382), illustrates the structure used by Enron for its foreign infrastructure development business from 1991 through 2000. In Fig. A, Enron sets up a Host Country Project (HCP) entity in the country in which it conducts an infrastructure project. It also creates an ownership chain connecting HCP to the U.S. parent that involves three separate entities in Cayman Islands. Enron wants to distribute income from HCP up the ownership chain without generating U.S. tax under Subpart F.

In general, a distribution of income from one foreign entity of a U.S. firm to another is subject to Subpart F (i.e., is taxed immediately by the U.S) if the entities are located in two different countries. However, Subpart F can be avoided if the entity making the distribution is treated as a partnership for U.S. tax purposes. The Enron structure follows this approach. The two bottom entities in the structure, HCP and CIL, are corporations in their host countries but treated as partnerships for U.S. tax purposes. The use of the upper- and lower-tier Cayman entities as owners of CIL insures that CIL is treated as a partnership for U.S. tax purposes.

As a result of this structure, HCP can distribute income to the upper-tier corporation without invoking subpart F on the intercompany dividends payments. The only dividends subject to U.S. tax are those from the lower-tier to the upper-tier entity. However, given that the lower-tier entity owns only 1% of CIL, these distributions are likely small. Note that, although CIL is located in the same country as its owners (i.e., Cayman Islands), the same-country exception to Subpart F does not apply to distributions from CIL because the entity is not engaged in active business (instead, it owns another operating entity (HCP) located in a different country). Thus, it was necessary to set CIL up as a partnership to avoid Subpart F.

The passage of the so-called check-the-box (CTB) regulations in 1997 made it easier to achieve partnership classification for U.S. tax purposes by allowing a single-member Limited Liability

Company (LLC) to be treated as a disregarded entity. Prior to 1997, there was an uncertainty about the tax treatment of single-member LLC, and some tax experts recommended forming multiple-member LLCs to ensure partnership status (see, Hayes (1997)). U.S. Senate (2003) notes that with the introduction of these new rules, Enron could have achieved U.S. tax deferral without the lower-tier entity or CIL, but that the use of CIL was still desirable for non-tax reasons. Finally, controlled foreign corporation 'look-thru rules', introduced in 2006, allowed U.S. multinationals to avoid current taxation of passive income under subpart F without the need to use disregarded entities.

Example 2: Avoiding U.S. repatriation tax and foreign income tax - intercompany royalty payments

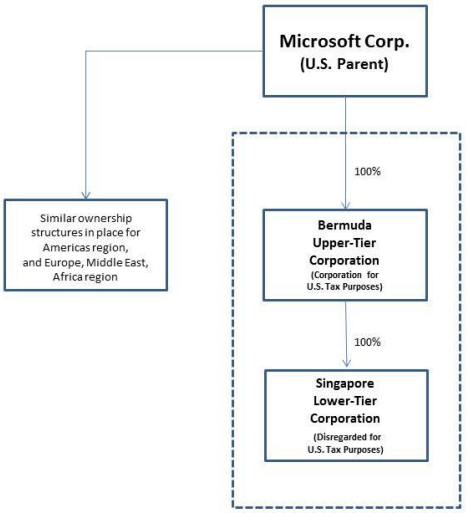


Fig. B: Created by authors based on description from U.S. Senate (2012)

Example 2, based on U.S. Senate (2012, 19-23), describes elements of the structure used by Microsoft for its retail software business in 2011. Microsoft organizes its retail software business into three regional centers, and for brevity, Fig. B shows only the structure related to the Asia region. As depicted above, Microsoft creates an ownership chain involving at least two separate entities, one in Bermuda and one in Singapore. The two subsidiaries are treated as a single entity for U.S. tax purposes, denoted by the dashed line (i.e., the Bermuda entity is disregarded). As a result payments between Bermuda and Singapore are ignored by the U.S. tax authorities.

The upper-tier entity in Bermuda has no employees but holds the economic rights to Microsoft's intellectual property. It sublicenses those rights to the Singapore entity, which manufactures and sells Microsoft products to distributors in the region. As a result of this structure, Microsoft reported in 2011 a profit of $592 million in Singapore at an effective tax rate of 10.6% and a $1.8 billion profit in Bermuda at an effective tax rate of 0.3%. Thus Microsoft reduced its foreign income tax bill (by shifting income from Singapore to Bermuda) *and* maintain deferral of U.S. tax on the profits earned by the Bermuda subsidiary from software sales in the Asia-Pacific region.

Appendix D: Variable definitions

Subsidiary descriptive statistics and regressions

Subsidiary characteristics (from BEA data unless otherwise noted)

Total assets	Total subsidiary assets (for descriptive purposes only).
Operating assets	Total subsidiary assets minus investment in affiliated entities (enters the regression logged).
Total sales	Total subsidiary sales (for descriptive purposes only).
Subsidiary age	The number of years since the year the affiliate first began filing a BEA survey or 1982, whichever comes later (enters the regression logged).
Retained earnings/Total assets	Total subsidiary retained earnings/Total subsidiary assets.
3-yr avg. sales growth	The average sales growth over the prior three years for the subsidiary's country-industry, using the BEA's 12 industry groups used in reporting national statistics.
R&D expenditures	Dummy variable equal to one if the subsidiary has R&D expenditures.
Royalties received	Dummy variable equal to one if the subsidiary receives royalties from affiliated entities.
Financial assets/Operating assets	Total subsidiary assets excluding property, plant & equipment, inventory, trade receivables, and investment in affiliates /Total subsidiary operating assets.
Total liabilities/Total equity	Total subsidiary liabilities/Total subsidiary equity.
Effective tax rate -historical	Estimate of the foreign rate of tax paid on the subsidiary's total pool of undistributed foreign earnings (see Blouin, Krull, and Robinson (2012))
Outside ownership	Dummy variable equal to one if the subsidiary has an unaffiliated owner.
# Same firm subs in region	The number of subsidiaries of the same firm that operate in the same region. The measure uses seven BEA regions that largely correspond to continents (enters the regression logged).
# Same firm subs in industry	The number of subsidiaries of the same firm that operate in the same 2-digit industry code (enters the regression logged).
% Intercompany sales	The proportion of total subsidiary sales to affiliates on total subsidiary sales.

Country characteristics

GDP	Real Gross Domestic Product (GDP) of the host country (enters the regression logged); World Bank.
GDPPC	Real GDP per capita of the host country (enters the regression logged); World Bank.
Property rights index	Property rights index of the host country; Andrei Shleifer's website. Ranges from 0 to 7 and higher values imply stronger property rights.
Statutory tax rate	Corporate tax rates are constructed using the methodology in Antràs, Desai, and Foley (2008). The tax rates are imputed from the BEA data using the median tax rate paid by affiliates with positive net income by country-year.
OECD member	Dummy variable equal to one if the host country is a member of the OECD, and has been since at least 1990; OECD website.
EU member	Dummy variable equal to one if the host country is a member of the EU; EU website.
Tax haven	Dummy variable equal to one if the host country is a tax haven; Hines and Rice (1994). Tax havens are: Hong Kong, Ireland, Lebanon, Liberia, Panama, Singapore, Switzerland, Andorra, Anguilla, Antigua and Barbuda, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Caymans Islands, Channel Islands (Jersey, Guernsey, Alderney), Cyprus, Dominica, Gibraltar, Grenada, Isle of Man, Liechtenstein, Luxembourg, Macao, Maldives, Malta, Marshall Islands, Monaco,

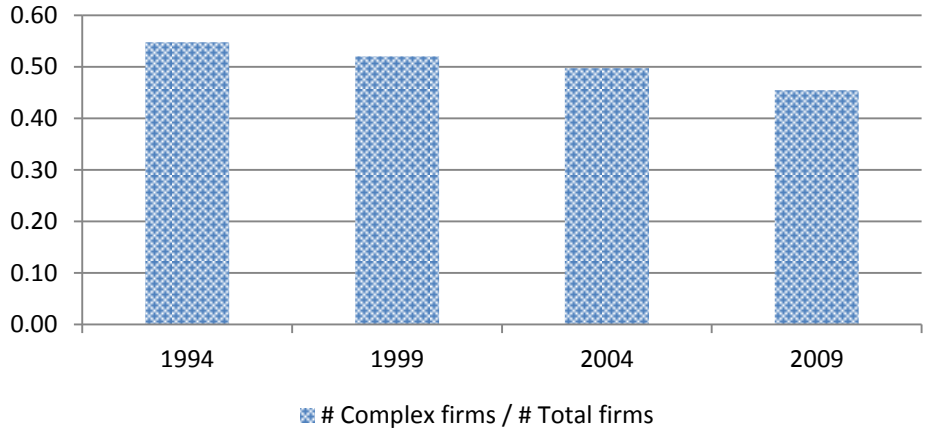
	Netherlands Antilles, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and Grenadines, and Vanuatu.
Investment treaty network	The total number of bilateral investment treaties (BITs) the country has in effect plus the number of bilateral relationships from free trade agreements (FTAs) with investment clauses (enters the regression logged). Only FTAs with investment clauses containing the word "arbitration" are included; UNCTAD and World Bank.
Tax treaty network	The total number of bilateral tax treaties the country has in effect (enters the regression logged); OECD.
Avg. withholding rate (inbound)	The average withholding tax rate on dividends flowing to the host country from all other countries; Comtax. Rates reflect treaty reductions.
Worldwide taxation	Dummy variable equal to one if the country features a worldwide tax system with no participation exemption for foreign dividend income; Deloitte & Touche Country Tax Guides.
CFC legislation	Dummy variable equal to one if the country has controlled foreign corporation legislation; Comtax and Deloitte & Touche (D&T) Country Tax Guides.
Thin cap legislation	Dummy variable equal to one if the country has thin capitalization legislation; Comtax and (D&T) Country Tax Guides.
Capital or stamp duty	Dummy variable equal to one if the country imposes a capital or stamp duty; Comtax and D&T Country Tax Guides.

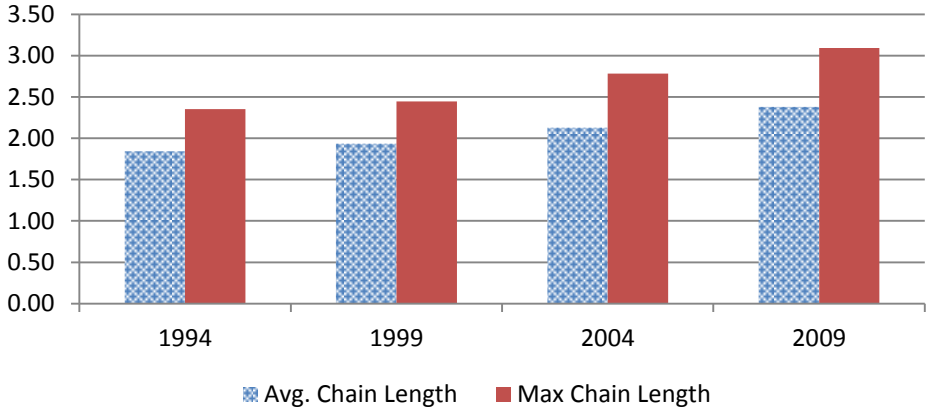
Country pair descriptive statistics and regressions

Actual frequency	Number of times a country pair A-B appears in our sample as a host country of an owner subsidiary (A) and a host country of its daughter subsidiary (B) (enters the regression logged). See Section 3.2.1.
Actual assets	Total assets associated with a country pair A-B computed as assets of all subsidiaries in country B held by subsidiaries in country A (enters the regression logged). See Section 3.2.1.
Possible frequency	Number of ownership connections that *could be* formed for a country pair A-B using subsidiaries located in the two countries (enters the regression logged). This is computed by multiplying, for each firm, the number of entities located in country A by the number of entities in country B, and then summing up this figure across all firms. See Section 3.2.1.
Possible assets	Total assets associated with ownership connections that *could be* formed for a count pair A-B using subsidiaries located in two countries (enters the regression logged). This amount is computed by multiplying, for each firm, total assets of entities located in country A by total assets of entities in country B, and then summing up this figure across all firms. See Section 3.2.1.
Common language	Dummy variable equal to one if both countries in the pair have the same official language; CEPII.
Distance	Geodesic weighted distance (km) between countries in the pair (enters the regression logged); CEPII.
Colonial link	Dummy variable equal one if the countries in the pair ever had a colonial link; CEPII.
Relative GDP	GDP in possible owner country/(GDP in possible owner country + GDP in possible daughter country).
Pair with high GDP	Dummy variable equal one if GDP in both countries in the pair are in the top quartile of the distribution of GDP.
Relative GDPPC	GDPPC in possible owner country/(GDPPC in possible owner country + GDPPC in possible daughter country).
Pair with high GDPPC	Dummy variable equal one if GDPPC in both countries in the pair are in the top quartile of the distribution of GDPPC.

Relative property rights	Property rights index in possible owner country/(Property rights index in possible owner country + Property rights index in possible daughter country); high Property rights index implies strong property rights. See definition of Property rights index above.
Pair with high property rights	Dummy variable equal one if Property rights index in both countries in the pair are in the top quartile of the distribution of Property rights index.
Pair in OECD	Dummy variable equal to one if both countries in the pair are OECD members since least 1990.
Pair in EU	Dummy variable equal to one if both countries in the pair are EU members.
Pair in tax havens	Dummy variable equal to one if both countries in the pair are tax havens.
Trade flows (bilateral to total)	Bilateral trade flows between the countries in the pair relative to their total trade flows. This quantity is computed in three steps: (1) First, we take the ratio of total exports from the possible owner country to the possible daughter country divided by total exports of the possible owner country, and we do the same for imports; (2) Second, we take the ratio of total exports of the possible daughter country to the possible owner country divided by total exports of the possible daughter country, and we do the same for imports; (3) We average the four ratios. The trade flow data comes from UNCTAD.
Trade agreement	Dummy variable equal to one if the countries in the pair have any of the following types of agreements in effect: customs union agreement, economic union agreement, free trade area agreement, non-reciprocal preferential trade agreement, preferential trade agreement; Jeff Bergstrand's website.
BIT dummy	Dummy variable equal to one if the countries in the pair have a bilateral investment treaty or a free trade agreement with an investment clause that contains the word "arbitration" in effect.
Tax treaty	Dummy variable equal to one if the countries in the pair have a bilateral tax treaty in effect.
Withholding rate B to A	Withholding tax rate on dividend payments made from the possible daughter country to the possible owner country; Comtax. Rates reflect treaty reductions.
Withholding rate A to B	Withholding tax rate on dividend payments made from the possible owner country to the possible daughter country; Comtax. Rates reflect treaty reductions.
Relative tax rate	Statutory tax rate in possible owner country/(Statutory tax rate in possible owner country + Statutory tax rate in possible daughter country).

Fig. 3. Complexity over time: The figure shows characteristics of internal ownership structures by year. The total sample consists of 1,352 firms (2,299 firm-years) and the sub-sample of complex firms consists of 679 firms (1,139 firm-years). The sample period includes 1994, 1999, 2004, and 2009. A *Complex firm* is a firm with at least one *Ownership chain*, which is a path within an ownership structure connecting a bottom subsidiary (i.e., a subsidiary that does not hold equity in another subsidiary) to the parent and that, contains at least one *Owner*. *Chain length* refers to the number of subsidiaries forming an ownership chain. *Operating assets* are total subsidiary assets minus equity in affiliates. *Chain operating assets* are operating assets within ownership chains. *Owners* are subsidiaries that hold equity in other subsidiaries. *Holdcos* are *Owners* classified as holding companies. See more detailed definitions in Appendix A.





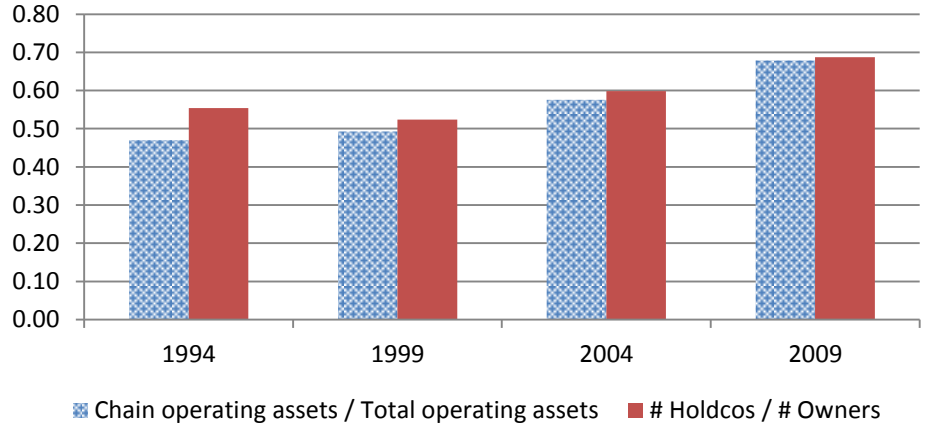


Fig. 4. Top owner countries: The figure includes the top 40 host countries of U.S. multinational subsidiaries during our sample period. The solid bar represents total assets in each country *relative to the United Kingdom*, the largest host country in terms of total assets. The shaded bar represents the proportion of total assets in each country that consists of equity investments in affiliates.

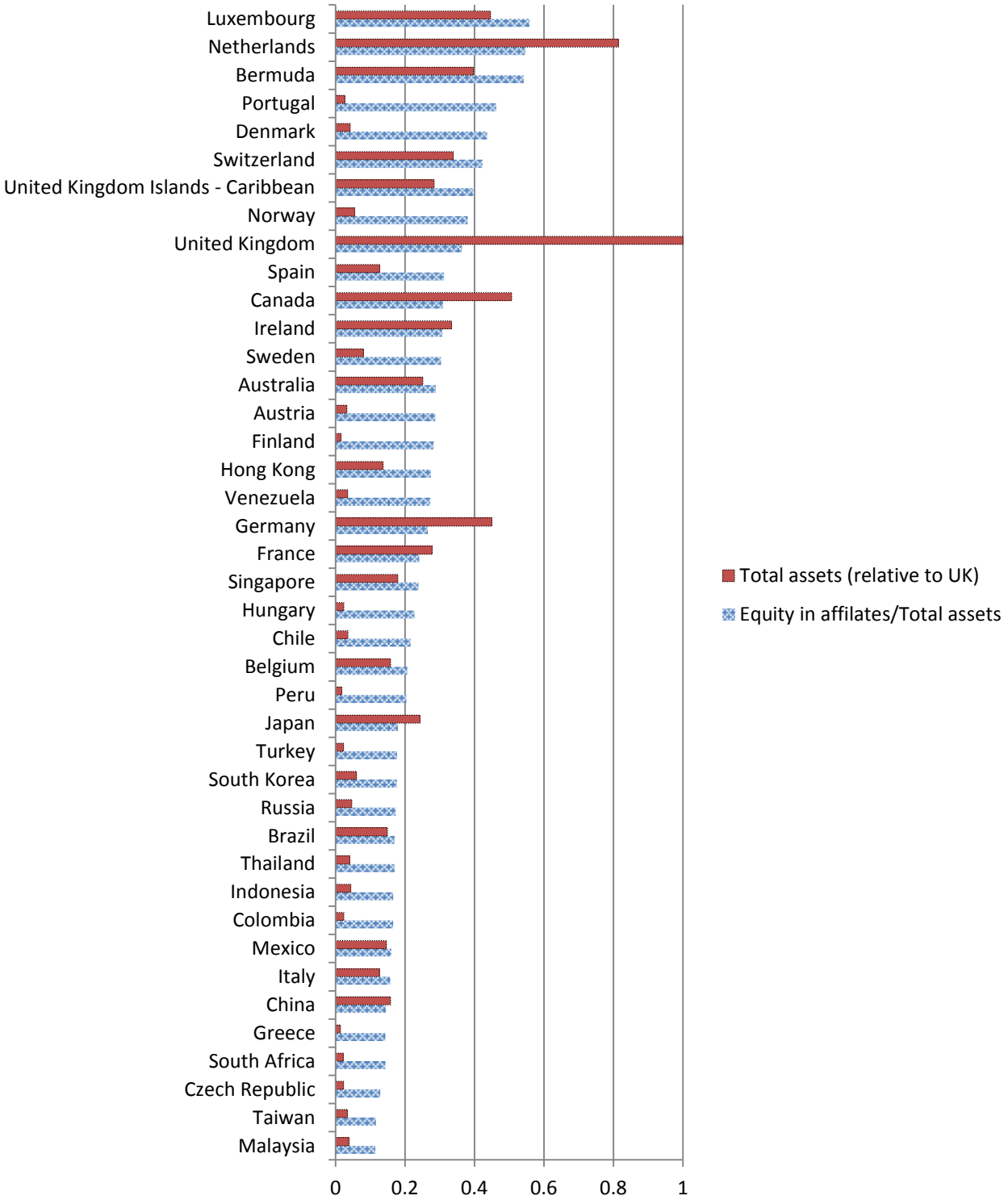


Table 1 Panel A: Descriptive data for simple and complex firms. The total sample consists of 1,352 firms (2,299 firm-years) and the sub-sample of complex firms consist sof 679 firms (1,139 firm-years). The sample period includes 1994, 1999, 2004, and 2009. A *Complex firm* is a firm with at least one *Ownership chain*, which is a path within an ownership structure connecting a bottom subsidiary (i.e., a subsidiary that does not hold equity in another subsidiary) to the parent and that, contains at least one *Owner*. *Chain length* refers to the number of subsidiaries forming an ownership chain. See more detailed definitions in Appendix A. *Operating assets* are total subsidiary assets minus equity in affiliates. *Chain operating assets* and # *Chain subs* are operating assets and number of subsidiaries, respectively, within ownership chains. *5-yr growth rate in # subs* is the percent change in the number of subsidiaries over the previous five years. *# Foreign acquisitions / # Subs* is the number of foreign acquisitions per SDC over the previous five years divided by the number of subsidiaries in the current period. *Owners* are subsidiaries that hold equity in another subsidiary. # of *Daughter subs per owner* is the number of subsidiaries in which the owner has a direct equity interest. *Holdcos* are *Owners* classified as holding companies (defined in Appendix A). Dollar amounts are in millions. In order to avoid disclosure of information on individual companies, medians are reported as the mean of the five middle values.

	Simple firms: No ownership chains		Complex firms: With ownership chains	
	N=1,160		N=1,139	
Characteristics of U.S. Multinational Firm Operations (N=2,299)	Mean	Med	Mean	Med
Worldwide assets	3,870	529	26,300	3,661
Foreign sales / Worldwide sales	0.44	0.40	0.49	0.48
Worldwide return on assets	0.01	0.02	0.01	0.02
Years abroad	11.75	11.00	15.06	15.00
# Countries	13.26	10.00	24.88	20.00
# Industries	2.27	2.00	6.65	5.00
# Subs	17.48	12.00	57.53	34.00
# Foreign acquisitions / # Subs	0.09	0.00	0.08	0.04
5-yr growth rate in # subs	1.17	0.33	1.29	0.31
Extractive	0.03		0.04	
Food	0.01		0.03	
Chemical	0.44		0.46	
Manufacturing	0.28		0.30	
Wholesale trade	0.04		0.04	
Financial	0.02		0.04	
Services	0.13		0.07	
Other	0.04		0.03	

Characteristics of Complex Firm Structures (N=1,139)	Mean	Med	Std	P95	P99
Chain operating assets / Total operating assets	0.57	0.60	0.30	1.00	1.00
# Chain subs / # Subs	0.42	0.38	0.27	0.93	1.00
Avg. chain length	2.12	2.00	0.69	2.33	3.42
Max chain length	2.73	2.00	1.19	3.00	5.00
# First tier owners / # First tier subs	0.18	0.11	0.20	0.50	1.00
# Owners	5.00	2.00	8.50	18.00	46.00
Avg. # daughter subs per owner	2.90	2.33	2.20	7.00	11.40
Max # daughter subs per owner	6.37	4.00	9.11	20.00	37.00
# Holdcos	3.54	2.00	5.60	12.00	32.00
Avg.# daughter subs per holdco	3.50	3.00	2.59	8.67	12.00
Max # Daughter Subs per holdco	6.10	4.00	7.66	18.00	34.00
# Holdcos / # Owners	0.60	0.53	0.28	1.00	1.00

Table 1 Panel B: Complexity regressions. The total sample consists of 1,352 firms (2,299 firm-years) and the sub-sample of complex firms consists of 679 firms (1,139 firm-years). The sample period includes 1994, 1999, 2004, and 2009. Panel A includes all firm-years while Panels B and C include only complex firm-years. Some observations are missing because *5-yr growth rate in # subs* requires that a firm appear in the sample for two consecutive periods (e.g., 1994 and 1999).

	A: Complex indicator		B: Length = Avg. chain length		C: Width = First tier owners/ Total First Tier Subs	
	coef.	z-stat	coef.	t-stat	coef.	t-stat
Log(Worldwide assets)	0.37	6.48	0.01	0.29	0.00	0.68
Foreign sales / Worldwide sales	2.26	5.46	0.04	0.27	0.04	0.91
Worldwide return on assets	-0.08	-0.11	0.26	0.93	0.15	1.49
Log(Years abroad)	0.14	0.89	-0.04	-0.65	-0.04	-2.07
Log(# Countries)	0.10	0.67	0.20	3.78	-0.09	-6.68
Log(# Industries)	1.55	12.04	-0.01	-0.20	-0.01	-0.96
5-yr growth rate in # subs	0.04	2.49	0.00	0.87	0.00	1.43
# Foreign acquisitions / # Subs	-0.49	-1.03	-0.04	-0.18	-0.05	-0.77
1999	-0.23	-1.25	0.00	0.10	-0.00	-0.09
2004	-0.26	-1.34	0.30	5.10	0.03	2.17
2009	-0.94	-2.76	0.44	5.07	0.06	2.47
Extractive	0.71	1.20	0.27	1.58	0.02	0.50
Food	0.53	0.77	0.28	1.10	0.02	0.64
Chemical	0.87	1.61	0.30	1.94	0.01	0.33
Manufacturing	0.43	0.93	0.22	1.51	0.02	0.54
Wholesale trade	0.59	1.05	0.20	1.22	0.01	0.17
Financial	-0.83	-1.32	-0.20	-1.14	-0.04	-0.78
Services	0.41	0.80	0.14	0.83	-0.01	-0.23
Intercept	-8.81	-9.83	1.03	2.82	0.43	5.46
R-squared	0.35		0.15		0.16	
N	1810		949		949	

Table 2 Panel A: Descriptive data for subsidiary-years by location within ownership structure. This panel shows descriptive data for 47,965 subsidiaries based on their position within an ownership structure. An *Ownership chain* is a path within an ownership structure connecting a bottom subsidiary (i.e., a subsidiary that does not hold equity in another subsidiary) to the parent and that, contains at least one *Owner*. *Chain subs* are part of ownership chains. Variable definitions are in Appendix D. Dollar amounts are in millions, unless otherwise noted. In order to avoid disclosure of information on individual companies, medians are reported as the mean of the five middle values.

	Non-chain Subs		Chain Subs			
			Owners		Bottom	
	Mean	Med	Mean	Med	Mean	Med
Subsidiary Characteristics						
Total assets	118.05	14.28	778.13	257.01	207.93	38.61
Operating assets	106.86	13.97	393.97	92.12	187.56	37.88
Total sales	60.72	11.49	160.05	12.51	114.26	33.46
Subsidiary age	6.44	5.00	8.71	6.00	7.08	5.00
3-yr avg. sales growth	0.07	0.06	0.05	0.03	0.07	0.06
Retained earnings/Total assets	0.20	0.11	0.28	0.17	0.20	0.10
R&D expenditures	0.09	0.00	0.16	0.00	0.15	0.00
Royalties received	0.01	0.00	0.05	0.00	0.02	0.00
Financial assets/Operating assets	0.56	0.58	0.74	0.88	0.54	0.53
Total liabilities/Total equity	1.79	0.55	1.45	0.45	2.25	0.88
Effective tax rate - historical	0.11	0.00	0.09	0.00	0.13	0.00
Outside ownership	0.13	0.00	0.05	0.00	0.27	0.00
# Same firm subs in region	62.55	28.00	72.02	40.00	78.14	42.00
# Same firm subs in industry	62.34	35.00	42.22	22.00	56.21	36.00
% Intercompany sales	0.08	0.00	0.13	0.00	0.13	0.00
Country Characteristics						
GDP ($ Billion)	727.20	323.87	690.84	402.92	868.08	402.92
GDPPC ($ Thousand)	16.48	18.79	25.51	24.75	18.12	21.19
Property rights	5.67	7.00	6.54	7.00	5.92	7.00
Statutory tax rate	0.23	0.24	0.18	0.17	0.23	0.25
OECD member	0.49	0.00	0.79	1.00	0.63	1.00
EU member	0.31	0.00	0.58	1.00	0.43	0.00
Tax haven	0.14	0.00	0.28	0.00	0.12	0.00
Investment treaty network	46.38	37.00	63.80	70.00	55.32	56.00
Tax treaty network	54.99	55.00	67.49	74.00	63.01	65.00
Avg. withholding rate (inbound)	0.03	0.03	0.03	0.03	0.03	0.03
Worldwide taxation	0.44	0.00	0.22	0.00	0.36	0.00
CFC legislation	0.54	1.00	0.42	0.00	0.58	1.00
Thin cap legislation	0.58	1.00	0.71	1.00	0.65	1.00
Capital or stamp duty	0.20	0.00	0.08	0.00	0.19	0.00
N	29,687		4,732		13,546	

Table 2 Panel B: Descriptive data for subsidiary-years by location within ownership structure. The panel shows descriptive data for 4,732 owner subsidiaries (i.e., subsidiaries that hold equity in another subsidiary). The owner subsidiaries are split into holding owner and operating owner sub-samples (we define holding company in Appendix A). Variable definitions are in Appendix D. Dollar amounts are in millions, unless otherwise noted. In order to avoid disclosure of information on individual companies, medians are reported as the mean of the five middle values.

	Holding owners		Operating owners	
	Mean	Med	Mean	Med
Subsidiary Characteristics				
Total assets	983.07	367.30	640.40	194.45
Operating assets	314.79	38.74	447.18	135.29
Total sales	144.85	0.00	267.52	99.95
Subsidiary age	6.32	5.00	10.31	9.00
3-yr avg. sales growth	0.05	0.01	0.06	0.05
Retained earnings/Total assets	0.28	0.15	0.28	0.19
R&D expenditures	0.00	0.00	0.28	0.00
Royalties received	0.02	0.00	0.07	0.00
Financial assets/Operating assets	0.85	1.00	0.67	0.75
Total liabilities/Total equity	0.84	0.06	1.84	0.75
Effective tax rate - historical	0.03	0.00	0.14	0.00
Outside ownership	0.03	0.00	0.07	0.00
# Same firm subs in region	80.90	43.00	66.05	37.00
# Same firm subs in industry	32.88	13.00	48.49	28.00
% Intercompany sales	0.00	0.00	0.22	0.02
Country Characteristics				
GDP ($ Billion)	582.92	385.76	763.38	402.92
GDPPC ($ Thousand)	28.23	26.25	23.68	24.10
Property rights	6.71	7.00	6.43	7.00
Statutory tax rate	0.14	0.14	0.21	0.22
OECD member	0.80	1.00	0.77	1.00
EU member	0.65	1.00	0.54	1.00
Tax haven	0.35	0.00	0.24	0.00
Investment treaty network	67.41	71.00	61.37	69.00
Tax treaty network	67.73	78.00	67.32	71.50
Avg. withholding rate (inbound)	0.03	0.03	0.03	0.03
Worldwide taxation	0.18	0.00	0.24	0.00
CFC legislation	0.32	0.00	0.49	1.00
Thin cap legislation	0.72	1.00	0.73	1.00
Capital or stamp duty	0.06	0.00	0.11	0.00
N		1,902		2,830

Table 3: Logistic regressions estimating the likelihood that a subsidiary is an owner. An owner is a subsidiary that owns equity in other affiliates. An operating owner is an owner that is not classified as a holding company by the BEA (we define holding company in Appendix A). The benchmark sample is non-chain subsidiaries, i.e., entities that are not part of an ownership chain. Standard errors are clustered by firm. Variable definitions are in Appendix D. We report marginal effects (me) for Panel A. The marginal effects show the change in the likelihood of being an owner that is associated with a one-standard deviation increase in the independent variable (or an increase from zero to one for dummy variables) at the mean of all variables.

	A: All owners vs. Non-chain subs			B: Operating owners vs. Non-chain subs		C: Holding vs. operating owners	
	coef.	z-stat	me	coef.	z-stat	coef.	z-stat
Subsidiary characteristics							
Log (Operating Assets)	0.27	13.01	0.040	0.30	11.45	-0.43	-8.58
Log (Subsidiary age)	0.35	6.52	0.013	0.28	5.97	-0.37	-4.98
3-yr avg. sales growth	-0.93	-3.54	-0.006	-0.27	-1.05		
Retained earnings/Total assets	0.68	6.51	0.009	0.41	3.96		
R&D expenditures	0.37	3.59	0.022	0.66	7.01		
Royalties received	0.93	6.21	0.091	0.59	3.95		
Financial assets/Operating assets	1.80	12.47	0.028	0.62	5.20	3.12	7.30
Total liabilities/Total equity	-0.07	-6.46	-0.013	-0.04	-3.96	-0.12	-5.22
Effective tax rate - historical	-0.69	-4.60	-0.009	-0.18	-1.49	-4.00	-6.22
Outside ownership	-0.39	-3.10	-0.021	-0.19	-1.65	-0.51	-1.89
# Same firm subs in region	0.34	5.54	0.005	0.18	3.28	-0.08	-0.68
# Same firm subs in industry	-0.20	-5.09	-0.020	0.08	1.95		
% Intercompany sales	-0.44	-3.81	-0.006	0.57	5.23		
Country Characteristics							
Log (GDP)	0.03	0.69	-0.000	0.02	0.36	0.11	1.10
Log (GDPPC)	0.38	7.67	0.026	0.11	2.51	0.24	1.52
Property rights	-0.00	-0.05	-0.001	-0.00	-0.03	0.10	1.07
Statutory tax rate	-2.91	-7.77	-0.019	-1.58	-4.69	-4.11	-2.53
OECD member	0.44	3.72	0.035	0.38	3.01	0.77	1.91
EU member	0.54	6.91	0.036	0.31	4.05	0.19	1.08
Tax haven	0.12	1.00	0.014	0.26	2.16	0.06	0.22
Log (Investment treaty network)	0.17	3.42	0.015	0.12	2.30	0.18	1.78
Log (Tax treaty network)	-0.12	-2.20	-0.013	-0.06	-1.25	-0.32	-2.30
Avg. withholding rate (inbound)	-4.26	-0.97	-0.005	-7.02	-1.83	6.47	0.59
Worldwide taxation	-0.49	-5.84	-0.027	-0.35	-3.85	-0.03	-0.13
CFC legislation	-0.19	-2.29	-0.017	-0.14	-1.82	-0.08	-0.35
Thin cap legislation	0.01	0.07	0.001	-0.00	-0.01	-0.14	-0.62
Capital or stamp duty	-0.60	-5.93	-0.030	-0.38	-4.50	-0.63	-2.29
Year fixed effect	Y			Y		Y	
Firm fixed effect	Y			Y		Y	
N owner	4,732			2,830		1,902	
N benchmark	29,687			29,687		2,830	

Table 4: Descriptive data for country pairs. The table shows descriptive data for country pairs used in regressions reported in Table 6. A country pair AB denotes a host country of a potential owner subsidiary (A) and a host country of its potential daughter subsidiary (B). The sample includes all country pairs that occur at least once as host countries of subsidiaries of the same firm (i.e., can potentially have an ownership link). In the left panel are 65,074 country pair observations that could potentially form an ownership link, while in the right panel are 2,997 country pair observations with at least one actual ownership link. Details are in Section 3.2.1. Variable definitions are in Appendix D. Dollar amounts are in millions, unless otherwise noted.

	Pairs with possible ownership links			Pairs with actual ownership links		
	Mean	Med	Std	Mean	Med	Std
Actual frequency	0.17	0.00	1.61	3.62	1.00	6.60
Actual assets	64.70	0.00	1290.00	1162.86	539.00	1791.77
Log(1+Actual frequency)	0.05	0.00	0.29	1.19	0.69	0.68
Log(1+Actual assets)	0.53	0.00	2.48	11.57	11.51	2.42
Log(1+Possible frequency)	3.10	2.83	1.80	6.15	6.29	1.50
Log(1+Possible assets)	24.98	25.27	4.87	31.66	31.91	3.19
Same religion	0.08	0.00	0.27	0.14	0.00	0.34
Common language	0.16	0.00	0.36	0.24	0.00	0.42
Log (Distance)	8.74	8.97	0.81	8.15	8.45	1.11
Colonial link	0.02	0.00	0.13	0.06	0.00	0.25
Pair in OECD	0.03	0.00	0.17	0.31	0.00	0.46
Pair in EU	0.02	0.00	0.15	0.18	0.00	0.38
Relative GDP (A/(A+B))	0.50	0.50	0.38	0.53	0.57	0.35
Pair with high GDP	0.38	0.00	0.49	0.74	1.00	0.44
Relative GDPPC (A/(A+B))	0.50	0.50	0.33	0.66	0.66	0.24
Pair with high GDPPC	0.07	0.00	0.26	0.42	0.00	0.49
Relative property rights (A/(A+B))	0.50	0.50	0.19	0.56	0.50	0.13
Pair with high property rights	0.10	0.00	0.30	0.41	0.00	0.49
Trade flows (bilateral to total)	0.00	0.00	0.00	0.01	0.00	0.01
Trade agreement dummy	0.41	0.00	0.49	0.69	1.00	0.46
BIT dummy	0.18	0.00	0.38	0.34	0.00	0.47
Tax treaty dummy	0.20	0.00	0.40	0.60	1.00	0.49
Withholding tax rate B to A	0.04	0.00	0.08	0.05	0.00	0.07
Withholding tax rate A to B	0.04	0.00	0.08	0.05	0.00	0.08
Relative tax rate (A/(A+B))	0.50	0.50	0.32	0.42	0.45	0.29
Pair in tax havens	0.02	0.00	0.14	0.06	0.00	0.24
N	65,074			2,997		

Table 5 Panel A: Country pairs with direct ownership links (actual frequency): The table shows the actual frequency of direct ownership connections in our sample between subsidiaries located in 12 host countries of owner subsidiaries and 16 host countries of daughter subsidiaries. "na" means not applicable as our focus is on ownership links between two different countries. The last column shows the number of direct ownership links between the U.S. parent and each daughter country for comparison. Details are in Section 3.2.2.

Owner (top) / daughter (side)	Canada	Caymans/British Virgin Islands	Panama	Bermuda	Netherlands	Germany	United Kingdom	Mauritius	Israel	Hong Kong	Singapore	China	Sum	U.S. parent (direct ownership)
Canada	na	0	1	7	75	8	17	0	1	1	1	1	**112**	1,766
Brazil	30	19	10	13	64	10	11	0	0	1	1	0	**159**	1,049
Mexico	7	7	6	6	54	6	7	0	0	1	3	0	**97**	1,483
Bermuda	8	0	0	na	18	1	4	0	1	2	3	0	**37**	581
France	14	3	2	10	221	81	85	0	1	0	3	0	**420**	1,330
Italy	11	3	1	5	213	45	76	0	0	0	0	0	**354**	909
Germany	20	5	3	8	223	na	105	0	3	0	2	0	**369**	1,566
South Africa	2	4	3	8	59	6	26	0	0	0	2	0	**110**	383
Nigeria	0	4	0	19	3	1	2	0	0	0	0	0	**29**	147
Egypt	0	9	4	5	14	3	4	0	0	0	2	1	**42**	146
Israel	0	3	0	1	25	0	3	0	na	0	2	0	**34**	909
United Arab Emirates	1	0	0	0	9	1	9	0	0	0	1	1	**22**	212
Saudi Arabia	0	0	0	5	6	0	3	1	0	2	1	0	**18**	185
China	5	22	0	11	55	15	11	16	0	89	33	0	**257**	1,202
Japan	12	11	2	11	75	17	22	0	0	7	13	0	**170**	1,360
Australia	16	2	3	17	71	2	32	1	0	9	6	0	**159**	1,122
Sum	**126**	**92**	**35**	**126**	**1,185**	**196**	**417**	**18**	**6**	**112**	**73**	**3**	**2,389**	**13,585**

Table 5 Panel B: Country pairs with direct ownership links (actual assets in $millions): The table shows actual assets associated with the direct ownership connections from Panel A. These are assets in subsidiaries in the daughter country held by subsidiaries in the owner country. "na" means 'not applicable' as our focus is on ownership links between two different countries. "ND" means "not disclosed" because the amount of assets associated with the ownership connection is suppressed to avoid disclosure of data of individual companies. The last column shows the amount of assets owned directly by the U.S. parent in each daughter country for comparison. Details are in Section 3.2.2.

Owner (top) / daughter (side)	Canada	Caymans/British Virgin Islands	Panama	Bermuda	Netherlands	Germany	United Kingdom	Mauritius	Israel	Hong Kong	Singapore	China	Sum	U.S. parent (direct ownership)
Canada	na	0	ND	8,496	46,799	721	552	0	ND	ND	ND	ND	**57,034**	753,430
Brazil	12,336	5,950	688	2,874	12,416	713	2,026	0	0	ND	ND	0	**37,106**	184,654
Mexico	131	490	129	780	12,726	232	156	0	0	ND	19	0	**ND**	161,651
Bermuda	4,615	0	0	na	30,977	ND	858	0	ND	ND	704	0	**37,655**	505,053
France	978	3,521	ND	8,647	59,524	5,255	13,619	0	ND	0	337	0	**92,847**	314,464
Italy	1,054	176	ND	1,315	26,033	2,569	11,282	0	0	0	0	0	**ND**	498,725
Germany	3,879	2,150	691	875	100,820	na	41,855	0	495	0	ND	0	**ND**	145,169
South Africa	ND	134	47	505	4,275	404	1,089	0	0	0	ND	0	**7,416**	31,957
Nigeria	0	266	0	11,821	389	ND	ND	0	0	0	0	0	**12,498**	11,492
Egypt	0	276	229	81	417	11	35	0	0	0	ND	ND	**1,129**	19,530
Israel	0	1,076	0	ND	2,392	0	66	0	na	0	ND	0	**3,865**	13,737
United Arab Emirates	ND	0	0	0	586	ND	1,197	0	0	0	ND	ND	**2,096**	23,084
Saudi Arabia	0	0	0	162	275	0	23	ND	0	ND	ND	0	**1,450**	24,551
China	1,440	1,053	0	2,038	9,770	388	1,045	3,009	0	17,828	3,442	0	**40,014**	96,564
Japan	19,413	37,094	ND	54,315	32,395	4,337	15,014	0	0	395	26,184	0	**ND**	898,708
Australia	5,924	ND	54	6,464	26,634	ND	22,973	ND	0	302	19,086	0	**82,392**	313,930
Sum	**49,835**	**52,808**	**5,577**	**ND**	**366,430**	**14,761**	**ND**	**3,269**	**642**	**20,119**	**51,618**	**67**	**775,382**	**3,996,692**

Table 6: Tobit regressions estimating the likelihood that a country pair forms an ownership link. A country pair AB denotes a host country of a potential owner subsidiary (A) and a host country of its potential daughter subsidiary (B). The sample includes all country pairs that occur at least once as host countries of subsidiaries of the same firm (i.e., can potentially have an ownership link). In the left panel, the dependent variable is the natural logarithm of the number of actual ownership links associated with the country pair (actual frequency). In the right panel, the dependent variable is the natural logarithm of the assets associated with each ownership link (actual assets). These are assets of the daughter subsidiaries in country B owned by subsidiaries in country A (zero if there is no ownership link for that country pair). The regressions control for the natural logarithm of the possible frequency of ownership links (left panel) or of the corresponding assets (right panel). Details are in Section 3.2.1. Variable definitions are in Appendix D. Standard errors are clustered by country pair. We report marginal effects at the means of all independent variables for the probability of being uncensored (puc) and for the expected value conditional on being uncensored (cev). As an example, a one unit increase in *Same religion* implies a 0.51% increase in the probability that we observe at least one ownership link between two countries. Also, a one unit increase in *Same religion* implies a .93% increase in the number of observed ownership links between two countries, for the 2,997 uncensored observations.

	Actual frequency				Actual assets	
	coef.	z-stat	puc	cev	coef.	z-stat
Log(1+Possible frequency / assets)	0.47	18.71	.0207	.0385	1.47	12.63
Same religion	0.11	1.80	.0051	.0093	2.07	3.13
Common Language	0.19	4.00	.0085	.0157	1.69	3.36
Log (Distance)	-0.42	-16.11	-.0187	-.0347	-4.37	-15.06
Colonial link	0.26	3.28	.0130	.0234	2.42	2.61
Pair in OECD	0.50	5.31	.0263	.0447	4.53	4.47
Pair in EU	0.09	1.49	.0043	.0079	0.64	0.90
Relative GDP (A/(A+B))	0.25	1.82	.0110	.0205	2.84	1.93
Pair with high GDP	0.03	0.24	.0014	.0026	0.56	0.40
Relative GDPPC (A/(A+B))	0.61	2.18	.0270	.0502	3.45	1.14
Pair with high GDPPC	0.21	3.09	.0098	.0176	2.83	3.77
Relative property rights (A/(A+B))	4.03	2.58	.1774	.3298	38.18	2.20
Pair with high property rights	0.05	0.70	.0023	.0042	0.18	0.24
Trade flows (bilateral to total)	12.85	6.29	.5649	.9170	66.18	2.91
Trade agreement dummy	-0.01	-0.27	-.0005	-.0010	-0.05	-0.10
BIT dummy	0.08	1.83	.0037	.0068	1.89	3.96
Tax treaty dummy	0.22	5.03	.0098	.0178	2.81	6.05
Withholding tax rate B to A	-1.27	-4.32	-.0560	-.1042	-13.08	-4.03
Withholding tax rate A to B	-0.38	-1.51	-.0169	-.0315	-1.93	-0.72
Relative tax rate (A/(A+B))	-0.25	-2.51	-.0111	-.0206	-2.17	-1.99
Pair in tax havens	0.27	3.07	.0128	.0231	2.41	2.65
Constant	-2.23	-2.51			-35.71	-3.38
Year fixed effect	Y				Y	
Owner country fixed effect	Y				Y	
Daughter country fixed effect	Y				Y	
N	65,074				65,074	