

Internal Ownership Structures of U.S. Multinational Firms

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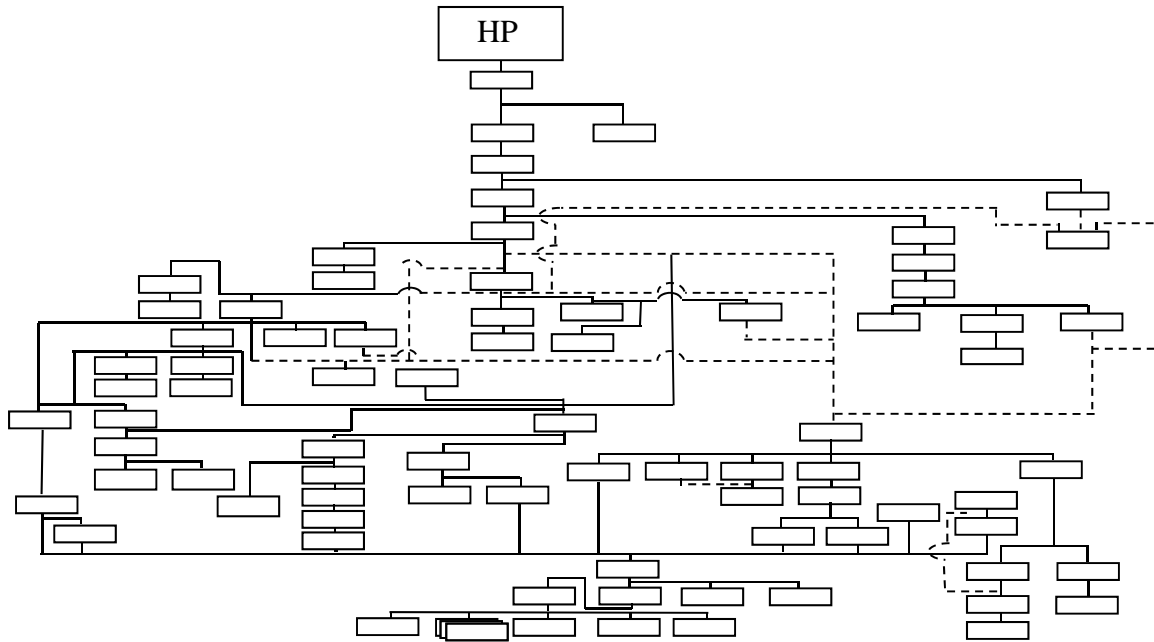
Abstract

This paper is a 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, the way these entities are arranged within the firms' ownership structures varies considerably from simple to highly complex. The structures receive public attention because of their role in tax planning, but no academic study to date investigates the trade-offs involved in designing them jointly, or documents what the structures look like for typical firms. This paper begins to fill this gap. After establishing a basic taxonomy and a 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 evidence of several distinct tax motives, but also uncover a number of non-tax factors, including internal financing costs and expropriation risks.

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U.S. firms hold substantial investments abroad: at the end of 2009, foreign subsidiaries of 850 large U.S. multinationals had aggregate assets of \$8.4 trillion. 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 U.S. multinationals adopt such flat ownership structures, others are substantially more complex. Foreign subsidiaries sometimes form long ownership chains spanning multiple countries so that the U.S. parent owns many of its affiliates indirectly. Moreover, joint ownership can link some chains to each other creating intricate structures like that of Hewlett Packard (HP) in Fig. 1 below.

Fig. 1: Ownership structure of HP 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, Luxembourg, Denmark, Israel, China, Japan, Taiwan, and Bermuda.



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

Multinationals account for a large fraction of the global 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 responses is important to understand the ultimate economic effects of these policies.

The use of ownership structures by U.S. firms to minimize taxes on profits earned abroad has been especially widely publicized (see U.S. Senate (2012) on Microsoft and U.S. Senate (2003) on Enron). The economic significance is large – 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). Academic literature also points to tax motives behind some internal ownership choices (Altshuler and Grubert (2002), Desai, Foley, and Hines (2003), Mintz and Weichenrieder (2010), 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 foreign 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 (2012), among others, speculates about the existence of non-tax factors). At a more basic level, little is known about what ownership structures look like for typical firms. For instance, how common are complex firms, such as HP? What other types of structures are used? What types of entities are placed in the different positions – such as top or bottom of ownership chains – within the structures? This paper makes a step towards filling this gap.

As, to our knowledge, this the first broad analysis of internal ownership structures of U.S. multinationals, we begin by establishing a simple taxonomy and a few basic facts about the structures. By internal ownership structure we mean, roughly speaking, the way a firm’s foreign subsidiaries are connected through ownership links. Our focus in this paper is on ownership connections that cross national borders.¹ The evidence is based on a sample of 1,354 major U.S. multinational firms and their 47,371 foreign entities in years 1994, 1999, 2004, and 2009; and the data come from the Bureau of Economic Analysis (BEA).²

¹ The Bureau of Economic Analysis (BEA), which is the source of our data, allows firms to consolidate entities in the same country into single BEA reporting units, so we do not observe within-country structures accurately. This data limitation is less constraining in our setting as our focus is on understanding cross-border ownership choices.

² BEA data is confidential but internal ownership structures can be analyzed using publically available datasets, such as Bureau Van Dijk (BvD). Though data on individual subsidiaries in BvD is less detailed, the structures themselves can be observed.

The first striking observation is that large U.S. firms choose to organize their foreign ownership in vastly different ways. Close to 51% of our sample firms are *flat* in the sense that they have no cross-border ownership connections among their foreign affiliates, while the remaining firms – which we denote as *complex* – establish some cross-border ownership links. 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 39% of their foreign subsidiaries (and 50% of foreign operating assets) into cross-border ownership chains, but the fractions can be as high as 90%.³ Similarly, such chains are typically two countries (layers) long, but are longer than four layers for the most complex firms.

Second, the degree of complexity shifted over time. While the proportion of complex firms in our sample declines steadily from 52% in 1994 to 45% in 2009, complex firms became increasingly more complex. For example, the fraction of operating assets organized in chains increased over time (from 40% to 60%), and the chains became longer. Third, using observable firm characteristics, such as size, age, industry, or diversification, we are able to explain up to 37% of the variation in complexity across firms. Thus, much of the variation is unexplained, and our main tests 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 owner-subs (i.e., subsidiaries that own equity in other subsidiaries outside their host country), and the characteristics of owner-daughter pairs (i.e., pairs in which two foreign affiliates form a direct ownership link across countries). The focus on owner-subs 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.⁴ Thus, the first set of tests are 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-sub within its structure. The second set of tests are regressions where the unit of

³ By a cross-border ownership chain (which we denote simply as *chain*) we mean a structure whereby a foreign subsidiary (an owner-sub) owns equity in another foreign subsidiary (its daughter-sub) outside its host country. An N-layered chain is a chain spanning N foreign countries (detailed definitions are in Appendix A).

⁴ In our sample, owner-subs account for 10% of complex firms' foreign subsidiaries, but they control (directly or indirectly) 50% of the firms' total foreign operating assets. Owners are often more than simply holding companies: 40% of them report that most of their consolidated income is attributable to their own operations rather than the operations of the subsidiaries they own.

observation is a country pair. These regressions analyze a firm's decision to form a direct ownership link between two subsidiaries located in different countries.

We find that tax considerations are important, but not the only, factors in structuring foreign ownership. There is strong evidence of several specific tax motives, including minimization of U.S. tax on income earned abroad, as well as income, withholding, and capital taxes imposed abroad. One tax aspect of the structures with a contentious legislative history (see Noren (2012)) is that ownership chains allow a firm's foreign affiliates to make certain cross-border payments – such as dividends, interest, and royalties – to each other without triggering an immediate U.S. tax (see Appendix B). Accordingly, chains make it less costly to re-allocate internal cash flows across countries, or to shift income to low tax countries (Altshuler and Grubert (2005), Grubert (2012), U.S. Senate (2012)). Consistent with these motives, we find that owner-subs are more likely to receive royalty and interest income than other affiliates (though the evidence on interest flows is indirect), and they are also more likely to engage in R&D.⁵ Mirroring these patterns, owner-subs face lower income tax rates than their daughter subsidiaries, suggesting incentives to shift income up ownership chains.

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 (bilateral investment treaties (BITs)) designed to protect foreign investors against various forms of expropriation. Consistent with these motives, we find that 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 systematic patterns emerge from our tests. First, two subsidiaries within a given structure are substantially more likely to form an ownership link when they are located in countries with stronger economic and cultural ties (e.g., common language, religion, or colonial history). 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 indirectly owned by their U.S. parent, and they are unlikely themselves to be owners. Both findings are consistent with the structures being used to limit financial exposure towards foreign

⁵ 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)). These policies, in addition to the U.S. tax rules, reinforce incentives to place R&D within chains.

partners. Third, owner-subsubs 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 entities, thus 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. Importantly, 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)). Complementing this literature, we examine the role of taxes in explaining firms' *internal* rather than external financing choices.

The paper also relates to the literature on Foreign Direct Investments (FDI).⁶ 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. For example, in our sample, Netherlands and Luxembourg are ranked as the 2nd and the 4rd largest host countries of U.S. multinationals (based on total assets invested there by our sample firms in 2009), but more than 50% of these investments are “flow-through”, i.e., represent equity holdings in affiliates outside those countries. This highlights the importance of separating the real and the financial (or indirect) flows in both the aggregate FDI statistics and in economic research on FDI.⁷

Finally, a large literature in economics and management science is concerned with *organizational* structures of firms.⁸ 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

⁶ This research can be traced back many decades (see, for example, Mundell (1957)). Bhagwati et al. (1987) examines the effects of trade policy on FDI, while Wilson (1999), Davies and Ellis (2007), Blonigen and Davies (2004) focus on tax policy.

⁷ 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, UNCTAD (2012) reports that the top FDI importer countries based on aggregate FDI inflows are Hong Kong, Belgium, and Luxembourg. Recognizing this, European Commission required in 2007 that EU countries supplement their 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). The U.S. Bureau of Economic Analysis and the Germany's Bundesbank also collect data on their multinationals' real activities.

⁸ Examples include Jennergren (1981), Radner (1993), Bolton and Dewatripont (1994), Garicano (2000), Rajan and Zingales (2001), and Harris and Raviv (2002).

and reporting hierarchies 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. Researchers have analyzed, for example, 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 and 2004b) and Desai, Foley, and Forbes (2008)). In addition, Desai, Foley, and Hines (2006) examine the use of tax havens and Altshuler and Grubert (2002) show how tiered ownership can minimize U.S. repatriation taxes. Desai, Foley, and Hines (2003) show that investment in indirectly-owned foreign subsidiaries is more sensitive to host country tax rates, where U.S. repatriation taxes are more easily deferred. Finally, Huizinga and Voget (2009) show that in cross-border mergers, the choice of which of the merging firms becomes parent vs. subsidiary depends on their host countries’ approach to taxation of foreign dividends.

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 Sections 3 and 4, and Section 5 concludes.

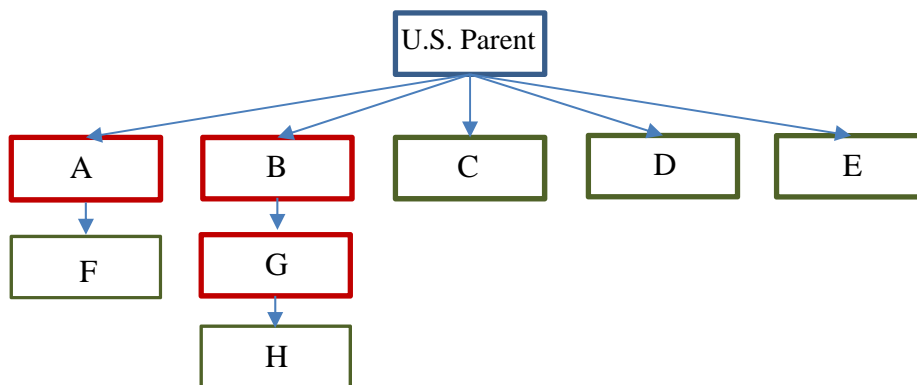
1 Determinants of internal ownership structures

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 based on both theory and discussions with practitioners involved in designing the structures – 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. In the figure, each subsidiary is located in a different country; Appendix A shows how these definitions are adapted to account for multiple entities within a country. 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 robustness tests, the benchmark can also include bottom subsidiaries, such as F and H.) The second set of predictions concerns the attributes of country pairs that are connected to each other through direct ownership links (such as pairs A-F, B-G, and G-H) as compared to any other country pair that could have formed a direct ownership link but does 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 summarized in Fig. 3. The terminology is defined 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 new affiliate can be owned either directly by the parent or by any other affiliate in the group with equal probability. Accidental patterns can also arise from acquisitions of firms with pre-existing foreign ownership structures. This could occur if the acquired firm’s structure is random from the perspective of the acquirer but is not subsequently unwound.

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. Similarly, entities that have been acquired should be more likely to have (inherited) ownership links.

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. 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 other affiliates, they are naturally more likely to become owners.⁹ 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' choices 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. A more detailed discussion of taxation of multinational firms is in Appendix B.

1.3.1 Cross-country differences in taxing income earned abroad

Differences in countries' basic approach to taxing income earned abroad 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 a territorial tax system. In this

⁹ 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.

case, the dividends paid from the daughter subsidiary to the owner are typically not subject to a residual tax in the country of the owner subsidiary.

Fig. 3: 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	--	<ul style="list-style-type: none"> • Owners are older, more mature • More likely acquired vs. organically grown
Transaction costs	<ul style="list-style-type: none"> • Ownership links are more likely between subsidiaries located in countries with stronger economic ties, proxied by: <ul style="list-style-type: none"> – Geographic distance – Cultural ties: same language, religion, colonial link – Bilateral trade flows, trade agreements 	<ul style="list-style-type: none"> • Owners are historically more profitable, with fewer investment opportunities • Owners have stronger economic ties to other affiliates <ul style="list-style-type: none"> – 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 <ul style="list-style-type: none"> – Locate in countries with better institutions
Taxes	<ul style="list-style-type: none"> • Ownership links are more likely between subsidiaries located in countries <ul style="list-style-type: none"> – With low withholding tax rates on dividends paid from the daughter to the owner country (inbound) – With a tax treaty in place – Characterized as tax havens 	<ul style="list-style-type: none"> • Owners are more profitable • Face lower effective (statutory) tax rates • Locate in countries: <ul style="list-style-type: none"> – with low withholding tax rates on inbound dividends – with a territorial tax system, no capital or stamp duties, no anti-abuse legislation, extensive tax treaty network, and in tax havens
Expropriation risks	<ul style="list-style-type: none"> • Connected subsidiaries are more likely located in countries with an investment treaty in place 	<ul style="list-style-type: none"> • Owners locate in countries with extensive investment treaty network
Outside owners	--	<ul style="list-style-type: none"> • Owners have lower likelihood of outside ownership

Second, a country’s approach to limiting tax avoidance could play an incremental role in where firms locate owners. Important in our setting is controlled foreign corporation (CFC) legislation which subjects passive income received by a foreign subsidiary – 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 CFC legislation as constraining, they may locate their owner subsidiaries disproportionately in countries in which these rules are non-existent.

1.3.2 *The U.S. tax system – ‘Worldwide with deferral’*

When the foreign subsidiaries of a multinational group are ultimately owned by a U.S. parent, the U.S. tax system introduces additional tax motives behind ownership choices. The U.S. worldwide tax system with deferral imposes a U.S. tax on income earned abroad, but only upon repatriation, and allows the U.S. parent to claim a tax credit for foreign taxes paid on the repatriated income. Anti-abuse legislation in the U.S. tax code, called Subpart F, taxes passive income received by a foreign subsidiary – such as dividends, interest, and royalties – immediately rather than upon repatriation. See Appendix B for a more complete discussion.

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, subsidiaries with fewer growth options, 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)).

Some repatriation strategies described in the academic literature have implications for the *relative* tax rates of the owner and the daughter countries. While some require that the owner-sub is located in a country with a higher tax rate than its daughter-sub (we denote such ownership link as ‘H-L’), others require the opposite (‘L-H’) configuration.¹⁰ Because of this ambiguity, repatriation strategies have no clear-cut prediction about which of the two ownership link types should be more frequent in the data.

However, incentives to use the ‘L-H’ type ownership link may also arise from strategies aimed at shifting income from high-tax to low-tax jurisdictions. This is because ownership chains allow firms to make inter-affiliate interest and royalty payments (within chains) across countries without triggering immediate U.S. tax.¹¹ The ownership structures – if used for the purpose of income shifting – suggest that owner-subs in low-tax countries should own daughter-subs in high-tax

¹⁰ These strategies are sometimes referred to as the triangular strategy and the blending strategy and are discussed in detail in Altshuler and Grubert (2002).

¹¹ These strategies typically involve entities that are treated as partnerships or so-called disregarded entities by the U.S. tax authorities but are treated as corporations by their host countries (see Appendices B and C). Importantly, the BEA tracks foreign entities without regard to how they are treated by the IRS (see also Grubert and Mutti (2009)). This means that entities that are disregarded or treated as partnerships by the IRS are separate BEA reporting units (even if they are not separate reporting units for the U.S. tax purposes).

countries, and thus, imply more frequent ‘L-H’ links (see the discussion of Subpart F in Appendix B; see also Altshuler and Grubert (2005), Grubert (2012), U.S. Senate (2012)).

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.

1.3.3 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.¹²

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.

1.4 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

¹² Unlike withholding taxes on dividends, those levied on royalties and interest payments generally apply independently of whether the transacting affiliates have a direct ownership link. However, strategies aimed at reducing withholding taxes on royalties and interest have indirect implications for ownership structures if ownership chains are used to defer U.S. taxes on inter-affiliate interest or royalty payments (see Section 1.3.2 and Appendices B and C).

investors residing in the signatory countries.¹³ 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 – i.e., ownership links between entities – 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.¹⁴ 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 stylized facts

2.1 Data and sample selection

Our primary data source is the Bureau of Economic Analysis (BEA) *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 and operating data on the domestic and foreign operations of U.S. multinationals, as well as detailed

¹³ Many treaties define expropriation broadly as including not only a government taking possession of firms' assets, but also other 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, an affiliate of the World Bank.

¹⁴ 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).

ownership information. A U.S. firm is included in the BEA survey if it has at least a ten percent equity ownership interest (direct or indirect) in at least one foreign affiliate. This cutoff corresponds to the internationally accepted definition of foreign direct investment (as opposed to portfolio 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 size of the respondent. In ‘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’.¹⁵ We use information collected in four benchmark survey years: 1994, 1999, 2004, and 2009.

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 these affiliates to account for at least 20% of the firm’s worldwide sales.¹⁶ A firm is included in our sample in every year in which it satisfies both conditions. These requirements result in an initial sample of 1,354 firms (2,301 firm-years). Our main tests focus on understanding connections between foreign affiliates, and thus are based on a subset of 668 firms (1,114 firm-years) with at least one ownership chain, which we denote as complex (definitions are in Appendix A).¹⁷

2.2 Stylized facts about ownership structures

Table 1 shows descriptive statistics for the sample firms, computed separately for those that have simple (flat) versus complex ownership structures. A complex ownership structure is one that contains at least one cross-border ownership chain. Approximately 51% of the sample firms are flat. The average complex firm is larger and more diversified than a flat firm. It has worldwide assets of \$26.6 billion (compared to \$4.0 billion for flat firms) and 58 subsidiaries spanning 25 countries and 7 industries (these numbers are 18, 13, and 2 for flat firms).

¹⁵ The reporting threshold for affiliates is \$3 million, \$7 million, \$10 million, and \$30 million in benchmark survey years 1994, 1999, 2004, and 2009, respectively. To contrast, the reporting threshold is \$20 million, \$30 million, \$40 million, and \$60 million in the intervening non-benchmark periods 1995 – 1998, 2000 – 2003, 2005 – 2008, and 2010 – 2013.

¹⁶ These cutoffs correspond roughly to the 75th percentile for both number of countries and proportion of foreign sales amongst a larger sample that includes all U.S. multinational firms reporting to the BEA.

¹⁷ 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.

The bottom segment of Table 1 describes complex ownership structures (definitions are in Appendix A). 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 39% of its subsidiaries (50% of foreign operating assets) into ownership chains, but these fractions are at least 82% and 97% for five percent of complex firms. Most ownership chains are two-countries (layers) long, but at least five percent of firms have chains with more than five layers. On average, 14% of first-tier entities are owners, but these owners control more than half of the operating assets of an average complex firm. On average, 39% of owner-subs are classified as holding companies by the BEA, which means that most of their consolidated income is attributable to the operations of the daughter-subs in which they hold a direct or indirect equity interest (precise definition is in Appendix A). The remaining owners are primarily operating entities. An average owner-sub has a direct equity stake in 2.1 affiliates, and this number is 1.6 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 (both in terms of countries and industries). They also exhibit a higher historical growth rate in the number of foreign entities and a higher proportion of entities added to the group through acquisitions. Interestingly, the likelihood of being complex is *not* significantly related to how long a firm has been operating abroad. The coefficients on the year dummies show that the proportion of complex firms declined 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. 4).

Fig. 5 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 Luxembourg. The fact that Netherlands and Luxembourg are on this list, in spite of their small economies, highlights the divergence between financial and real cross-border investments 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 Luxembourg, Netherlands, Bermuda, and Netherlands Antilles. The fact that three of these countries are tax havens (based on the definition used by Hines and Rice (1994)) points to tax motives as a key driver behind complex structures.

3 Owner regressions

Our empirical tests take two forms. In this section, we explore the factors that drive ownership structures by examining characteristics of owner subsidiaries within complex multinational firms. In Section 4, we focus on characteristics of pairs of host countries across which two subsidiaries form an ownership link.

3.1 *The setup*

Our main test in this section compares owner subsidiaries, such as A, B, G in Fig. 2, to a benchmark sample of non-chain subsidiaries, such as C, D, E within a complex firm. The example in Fig. 2 depicts a firm with one entity per country, so all owner entities in the figure are also cross-border owners; Appendix A explains how cross-border owners are identified when a firm reports multiple entities in a single country.

Table 2 shows descriptive statistics for the 4,742 owners and the 29,076 non-chain entities used in the regressions (see also Table A in the Supplementary Appendix). Variable definitions are in Appendix D. We report multivariate results in Table 3. In Panel A of Table 3, the dependent variable equals one for owners and zero for the benchmark 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 (1,905 holding owners out of 4,742 owners) implying that most of their consolidated income comes from operations of their daughter subsidiaries, and that they have little operations of their own (the precise definition of a holding company is in Appendix A). The remaining owner-subs are termed ‘operating owners’. As some of the theories examined in Table 3 have stronger implications for one type of owner-sub 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. Operating characteristics are excluded from the explanatory variables in Panel C because the classification of operating vs. holding owners is based on their operations, thus making the coefficients on these variables difficult to interpret.

All regressions include firm fixed effects and are estimated using OLS. 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. Finally, we estimate logit regressions without firm fixed effects, again with similar results.¹⁸

3.2 Regression results

3.2.1 Historical accident, 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 and larger – based on operating assets – than the benchmark sample (t-statistics of 5.23 and 11.21), suggesting more mature operations. They are also more likely added to the group through acquisitions (t-statistic of 2.14), which suggests that some ownership links might be inherited from acquired firms with existing foreign ownership structures. However, given that only approximately 4% of entities in our sample (and 7% of all owners) have been added to the group through acquisitions, these inherited ownership connections cannot explain most of the structures we observe.

Consistent with the transaction costs hypothesis, owners are more profitable than the benchmark sample as measured by the proportion of assets financed by retained earnings (t-statistic of 5.38). 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-sub is negatively associated with sales growth, our proxy for the subsidiary's own opportunities to invest (t-stat of -3.70).

There is also strong evidence of the economic-ties prediction discussed in Section 1.2. As operating owners have more significant operations of their own relative to holding owners, we expect 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 statistically significant with t-statistics from 2.46 to 6.07.¹⁹

3.2.2 Financing hubs

Table 3 reveals several features of owners consistent with them serving a financing or cash management role within multinational groups. Importantly, 40% of all owner subsidiaries in the

¹⁸ Because including fixed effects in logit regressions can produce inconsistent estimates (e.g., Heckman (1981)), these regression are not reported. However, the results from these regressions are again similar to those reported in Table 3.

¹⁹ This finding complements the “gravity” literature in international trade as well as research on cross-border M&A (see, for example, Erel, Liao, and Weisbach (2012) and Ahern, Daminelli, and Fracassi (2012)).

sample are classified as holding companies by the BEA. 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-affiliate financing transactions, so the evidence is indirect. What we can measure is the proportion of subsidiary operating assets (total assets excluding equity in affiliates) that are non-financial (inventory, trade receivables, PPE) versus financial (remaining operating assets, including cash and inter-affiliate loans).

We find that owner-subs have a larger proportion of financial assets than other affiliates (t-statistic of 13.18 in Panel A), suggesting that they are more likely to hold cash and make loans to other affiliates than the benchmark sample. Besides reducing transaction costs, combining equity ownership with lending is tax efficient. This is because U.S. tax on interest income received by owners from other subsidiaries in their ownership chain can be deferred (while in general, such cross-border payments trigger an immediate U.S. tax; see discussion in Appendices B and C).

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, and that the effect is significantly 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 owner-subs.

3.2.3 Taxes

The regressions in Table 3 examine a number of tax-related motives for the location of owner-subs and provide evidence that firms design their ownership structures to minimize taxes. First, owners are located in countries with lower statutory tax rates (t-statistic of -8.81 in Panel A) and have lower entity-specific effective tax rates (t-statistic of -6.94 in Panel A) compared to non-owners.²⁰ 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.

²⁰ Blouin, Krull, and Robinson (2012) note that the benefit of tax deferral is increasing in the entity-specific repatriation tax rate, which is a function of the “blended” tax rate of an affiliate’s total pool of undistributed foreign retained earnings. The affiliate’s foreign tax credit for purposes of computing its U.S. repatriation tax liability depends on the foreign statutory tax rates in effect at the time when the income was earned in the host country, and any special foreign tax exemptions granted to the affiliate.

Second, owner-subs are significantly less likely to locate in countries with worldwide tax systems or controlled foreign corporation (CFC) legislation. Both tax system features mean that any income earned abroad by an owner's foreign subsidiaries is more likely subject to tax in the owner's country. The respective t-statistics in Panel A are -2.74 and -5.45, and the marginal effects are -1.6% and -3.4% (14% of entities included in these regressions are owner-subs).

The third noteworthy and likely tax related pattern is that owner-subs are more likely to engage in R&D and collect royalty payments from affiliates. The coefficient on the royalty dummy is highly economically and statistically significant, implying a marginal effect of 16.8% with a t-statistic of 6.25. 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.²¹ 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 within the group tax efficiently is valuable to the firm.

However, a non-mutually exclusive explanation is tax planning strategies in which owner-subs license (and potentially develop) the firm's intellectual property to daughter-subs (see Darby (2007), U.S. Senate (2012), and Grubert (2012)).²² The ownership link between the payer and the receiver of royalties is necessary to make the inter-affiliate payment 'disappear' for U.S. tax purposes, which in turn ensures that the royalty income is not subject to an immediate U.S. tax under Subpart F (see Appendix B). With this structure in place, firms can re-allocate funds across countries tax efficiently, and can also shift income from high-tax to low-tax countries (see Microsoft example in Appendix C).

Other findings in this paper are also consistent with the use of these strategies. For example, in the previous section we show that interest income might also be more important for owner-subs, consistent with firms structuring ownership to avoid Subpart F taxation of interest income. Moreover, results reported in Table 6 (discussed in Section 4) show that ownership chains tend to connect lower-tax owners with higher-tax daughters, implying incentives to shift income up the chains, and thus, upward royalty and interest flows within chains.

²¹ 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 our regressions excluding entities located in Ireland and find similar results to those reported in Table 3.

²² It is important to note that our data does not allow us to observe where the royalty payments are coming from. All we can say is that owner-subs are significantly more likely to receive royalty income than the benchmark non-chain subsidiaries. Based on unreported regressions, this is also the case when the benchmark sample is extended to include bottom subsidiaries.

Finally, firms avoid placing owners in countries that impose capital or stamp duties on capital transactions (t-statistics of -7.76 and marginal effect of 4.7% in Panel A). There is also evidence that owners are more likely to locate in tax havens or in countries with low average withholding tax rates on inbound dividends.

Overall, the regressions point to a number of distinct tax motives – including deferral of U.S. tax on income earned abroad, and minimization of income, withholding, and capital taxes imposed abroad – that appear to play a significant role in how firms structure ownership of their foreign operations.

3.2.4 *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 t-statistic is 4.08 and the marginal effect is 1.7%.²³ 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).²⁴ 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 points to challenges faced by governments trying to use the investment and tax treaties to affect real outcomes.

3.2.5 *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 0.26), and it is least common among owner subsidiaries (the

²³ 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 inflows. 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 after accounting for the endogeneity bias (BITs tend to be signed during periods of increasing FDI flows), there is no evidence that BITs increase FDI.

²⁴ 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.

mean dummy is 0.05 for owners, compared to 0.13 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 the existence of outside ownership decreases the likelihood of being an owner-sub by 2.5% (t-statistic of -3.46). 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 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.²⁵

4 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.²⁶

4.1 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. Specifically, a country pair is included if there is at least one firm-year in our sample with an affiliate in each of the two countries in the pair. The left-hand side variable measures the frequency with which an ownership link involving the 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 ($=3 \cdot 2$)

²⁵ These results complement and extend those of Desai, Foley, and Hines (2004a) that examines conditions under which multinational firms use joint ownership of foreign entities.

²⁶ 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.

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*).

Taking the AB connection as an example, our main approach assumes that *any* subsidiary in country A can own *any* subsidiary 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 the data. Thus for example, if a daughter subsidiary in country B is owned by two different owner subsidiaries in country A, we count it as two separate occurrences of the AB link.²⁷

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.²⁸ 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.

4.2 *The sample and descriptive statistics*

The sample for the country pair regressions consists of 21,790 possible country pairs (65,074 country pair-years) with complete country data. 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 data for the independent variables used in the country pair regressions. Variable definitions are in Appendix D.

²⁷ As a robustness test, we 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. Our results are robust to this alternate way of constructing actual and possible pairs.

²⁸ 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 common 192 country pairs, Table 5 shows the frequency with which each of the owner-daughter connections occurs in the sample, and Table B in the Supplementary Appendix shows the combined assets of the subsidiaries associated with each owner-daughter connection. The owner and daughter countries in Table 5 are selected as follows. From each of the 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.²⁹ 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 (see Supplementary Appendix Table B) 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.

4.3 Regression 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 proxy 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

²⁹ Concretely, the countries must (1) have the largest in the region proportion of owner or daughter subsidiaries to all subsidiaries located in the country and (2) host at least 10 subsidiaries. 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.³⁰

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.³¹

³⁰ In unreported tests, we include average withholding rates on interest and royalty payments (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.

³¹ 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-sub 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 consistent with firms reducing foreign taxes by channeling inter-affiliate payments 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 result in Table 3 that showed a *lower* (though insignificantly so) 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 general approach to taxation, which may be reflected in Table 3. 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.

5 Conclusions and avenues for future research

This paper analyses internal ownership structures of U.S. multinational firms’ foreign operations. Our first goal is to document the basic properties of the common structures used by large

firms and how the structures evolved from the mid-1990s to present. We find, for example, that large U.S. firms can take vastly different approaches to internal ownership, with close to 51% of firms in our sample having simple flat structures while other firms are highly complex, and that much of this variation cannot be explained by basic firm attributes such as size, industry, or diversification. Our second goal is to take a step towards understanding the forces driving internal ownership choices by looking inside the black box of complex firms. We examine the different potential trade-offs jointly and find strong evidence of several distinct tax motives – e.g., incentives to reduce U.S. tax on income earned abroad, as well as minimize income, withholding and capital taxes imposed abroad. We also uncover a number of non-tax factors, such as minimization of transaction 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 questions remain unanswered. For example, it is not clear why basic approaches to internal ownership differ among large 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. It is also unclear whether complexity in itself is costly for firms. For example, though the structures allow firms to save taxes, complex firms might be more difficult to monitor by the board or creditors, or to adapt to changing legal and business conditions.

Another interesting set of questions concerns the potential interactions between the legal structures we document and the firms' organizational structures. For example, it is possible that internal ownership imposes constraints on a firm's governance, or that it is used to incentivize managers. In either case, the legal or tax factors that drive internal ownership could have an indirect impact on firms' organizations and governance.

The final research area this paper relates to is the literature on FDI. This literature studies real cross-border investments, but the striking divergence between the real and the financial flows apparent in our data suggests that accounting for indirect (or financial) flows is important in both the measurement and the study of FDI. In sum, understanding internal ownership choices of multinational firms seems important from a number of policy, tax, and academic perspectives, and the area provides a fruitful ground for future research.

6 References

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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.

Case 1: A multinational group with one entity per country

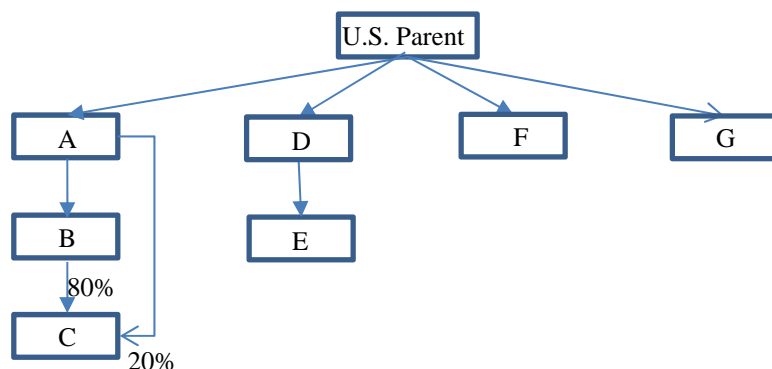


Fig. A: Example of an internal ownership structure with one subsidiary per country. In the figure, each of the seven foreign entities is located in a different country and is ultimately wholly-owned by the U.S. parent.

- *Affiliate / subsidiary / entity*: Used interchangeably to describe a foreign entity in which the U.S. parent owns equity (direct or indirect).³²
- *Owner subsidiary (owner-sub, or owner)*: An entity that owns equity in another affiliate outside its host country (A, B, D).
- *Daughter subsidiary (daughter-sub, or daughter)*: A daughter subsidiary of a given owner-sub is an entity in which the owner-sub owns equity directly (B and C are daughters of A, E is a daughter of D, and C is a daughter of B).
- *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 to be 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).

³² 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 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 classified as a holding company by the BEA’s industry classification. Roughly speaking, the income of a holding company is primarily attributable to owning equity in another affiliate rather than to operations of its own.³³
- *Complex structure*: An internal ownership structure containing at least one ownership chain.

Case 2: A multinational group with multiple entities in some countries

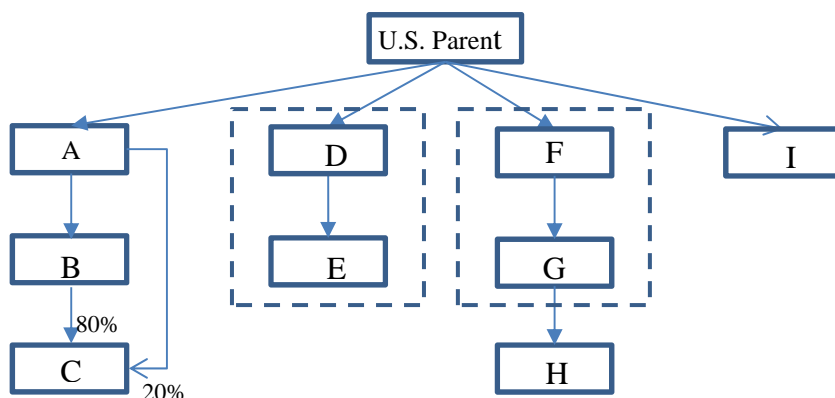


Fig. B: Example of an internal ownership structure with multiple subsidiaries in some countries. In the figure, foreign entities D and E are located in the same country, and so are foreign entities E and F. Each of the remaining five foreign entities is located in a different foreign country. All entities are ultimately wholly-owned by the U.S. 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, consolidate entities located in the same country into single BEA reporting units providing the entities are either part of the same integral business or operate in the same 4-digit industry code. This paper focuses on explaining ownership chains that cross national boundaries, so this feature of the data is not a significant constraint. However, 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 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. Similarly, in our country pair regressions, D-E and F-G are not considered because the ownership links do not cross national borders.

³³ More specifically, the BEA’s international surveys industries (ISI) classifications are based on the 1997 and subsequent versions of the North American Industry Classification System (NAICS) and the 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: Overview of taxation of multinational firms

Basic principles of taxing income earned abroad

Multinational firms may be taxed in multiple countries and can therefore be subject to double taxation. For example, when a foreign affiliate earns income abroad, it is taxed by its host country, but it can be taxed again in the home country of its parent. Most countries offer relief from double taxation unilaterally, and bilateral tax treaties resolve additional double taxation problems.

Depending on their approach to double taxation, countries' tax systems can be broadly categorized as worldwide or territorial. Under a worldwide system, a country taxes resident companies on their worldwide income but provides relief from double taxation by allowing a tax credit (against domestic tax) for foreign taxes paid. Domestic tax on income earned abroad is imposed either when the income is earned or when it is distributed to a parent company. In contrast, under a territorial system relief from double taxation is provided through an extensive *participation exemption*, which exempts income earned abroad from domestic taxation altogether. Accordingly, dividends received from foreign affiliates are not subject to a residual tax in the host country of the parent.

Importantly, both types of tax systems contain 'anti-abuse' rules designed to limit tax avoidance.³⁴ In our setting, controlled foreign corporation (CFC) legislation is particularly important as it subjects certain (generally passive) income of a foreign corporation to immediate taxation in the country of its parent, regardless of whether it is repatriated, or whether it would otherwise fall under a participation exemption. These rules blur the distinction between worldwide and territorial systems, and pure systems of either type are rare (see Clausing and Shaviro (2011)).³⁵

U.S. system of taxing income earned abroad

The U.S. tax system can be described as worldwide with deferral. Income earned by an incorporated entity operating abroad is generally not subject to U.S. tax until repatriated, a concept known as deferral. The U.S. provides relief from double taxation through its foreign tax credit system. Suppose a U.S. firm repatriates income earned by a foreign subsidiary, and that the income was taxed abroad at 25%. The U.S. effectively imposes a repatriation tax on the foreign dividend at the rate of 10%, which corresponds to the difference between the U.S. income tax rate of 35% and the foreign tax rate. Alternatively, suppose that the foreign tax rate is 40% rather than 25%. This can occur especially if the income earned abroad is subject to both foreign income tax and withholding tax (see discussion of withholding taxes in Section 1.3.3). In this case, the firm owes no U.S.

³⁴ 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.

³⁵ 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.

repatriation tax, and it accumulates an *excess* foreign tax credit at the rate of 5%. The excess credit can offset U.S. tax due on future repatriations for up to five years.

Anti-abuse legislation in the U.S

The anti-abuse CFC legislation in the U.S. is referred to as Subpart F. These rules subject certain passive income, such as dividends, interest, and royalties received by a U.S. controlled foreign corporation, 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 potentially subject to immediate U.S. tax regardless of repatriation.³⁶ Since ownership chains can generate cross-border inter-affiliate dividends, they can expose a U.S. firm to Subpart F. However, Subpart F rules with respect to inter-affiliate payments can be avoided in a fairly simple manner, as we explain below.

Legislation in this area is rather fluid, changing twice during our sample period. For much of the period, the tax treatment of inter-affiliate payments depends on the affiliates' classification under Section 7701 of the Internal Revenue Code (IRS). Specifically, the U.S. tax law classifies an entity as either a partnership or a corporation, based on its characteristics such as limited liability, free transferability of interests, and continuity of life. The classification of a daughter-sub as a partnership means that the subsidiary can be "consolidated" with its owner-sub for U.S. tax purposes. As a consequence, payments between the owner-sub and the daughter-sub are ignored by the U.S. tax authorities (see examples in Appendix C).

The U.S. Treasury and the IRS simplified these rules by issuing the so-called check-the-box (CTB) regulations effective on January 1, 1997.³⁷ The CTB regulations created a new entity classification called a disregarded entity, essentially making it easier for firms to achieve partnership tax treatment. If a firm elects disregarded entity status for a foreign entity, the entity is treated as a branch or division of its direct owner. This results in the same tax treatment of inter-affiliate payments as the partnership status in the earlier period.

Finally, in 2006 the Congress enacted the so-called "Look-Through-Rule" (section 954(c)(6) of the IRC) that allows firms to avoid Subpart F taxation of passive income without the use of ownership chains that contain either partnerships or disregarded entities. The provision is temporary and was set to expire at the end of 2008 but was subsequently extended, most recently through December 2013 (Noren, 2012).

³⁶ Subpart F generally does not apply to income received by an affiliate from an affiliate in the same country, known as the same-country exception. Moreover, passive income subject to Subpart F may also arise when a foreign subsidiary passively invests its retained earnings in capital markets, generating portfolio income. The passive income need not be received from another affiliate.

³⁷ Due to the differences among the various national legal systems, the initial rules were difficult to implement. See Appendix C for a discussion of the deferral structure used by Enron pre-CTB and by Microsoft post-CTB.

Appendix C: Tax benefits of ownership chains

Example 1: Minimizing U.S. repatriation tax - inter-affiliate dividend payments

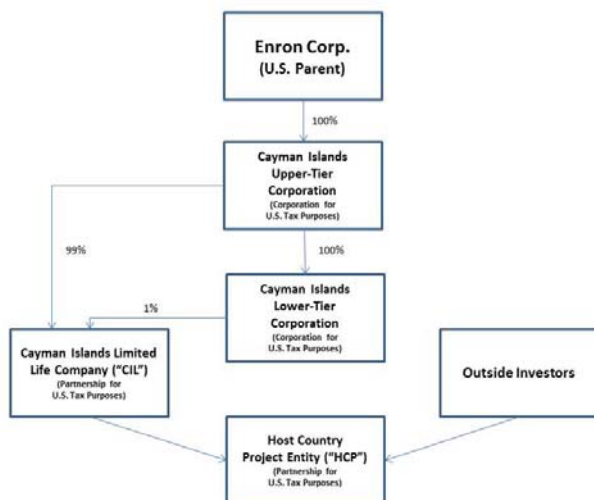


Fig. C: Reproduced from U.S. Senate (2003)

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. C, Enron sets up a Host Country Project (HCP) entity in the country in which it has an infrastructure project. It also creates an ownership chain connecting HCP to the U.S. parent that involves three entities in Cayman Islands. The goal is to distribute income from HCP up the chain (but not all the way to the U.S. parent) 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, during this time period, Subpart F could be avoided if the entity paying the dividend 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 fact that both are owned by two separate entities insures the partnership status.

As a result of this structure, HCP can distribute income to the upper-tier corporation without triggering U.S. taxes on the inter-affiliate dividends payments under Subpart F. 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. Thus, it was necessary to set up CIL 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 LLCs, 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.

Example 2: Minimizing U.S. repatriation tax and foreign income tax - inter-affiliate royalty payments

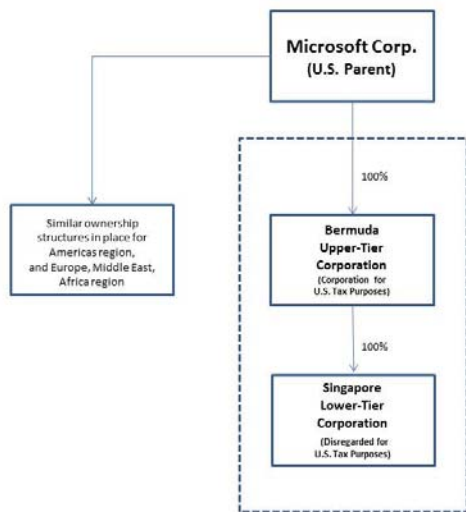


Fig. D: Created by authors based on description from U.S. Senate (2012)

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. D 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 Microsoft products and sells them 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 the firm was able to reduce its foreign income tax bill (by shifting income from Singapore to Bermuda) *and* defer U.S. tax on profits earned in Bermuda from software sales in Asia.

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.
Acquired	Dummy variable equal to one if the subsidiary entered the multinational group as part of an acquisition.
# 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).
% Inter-affiliate 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 (see La Porta, Lopez-de-Silanes, Shleifer, and Vishney (1998)). Ranges from 0 to 7 and higher values imply stronger property rights.
Statutory tax rate	Our panel of statutory corporate tax rates is 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.
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 4.1.
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 4.1.
Possible frequency	Number of ownership connections that <i>could be</i> 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 4.1.
Possible assets	Total assets associated with ownership connections that <i>could be</i> formed for a country 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 4.1.
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	$GDP \text{ in possible owner country} / (GDP \text{ in possible owner country} + GDP \text{ in possible daughter country})$.
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	$GDPPC \text{ in possible owner country} / (GDPPC \text{ in possible owner country} + GDPPC \text{ in possible daughter country})$.
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	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 (see Baier and Bergstrand (2007)).
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	Dummy variable equal to one if the countries in the pair have a bilateral tax treaty in effect.
Withholding tax 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 tax 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. 4. Complexity over time: The figure shows characteristics of internal ownership structures by year. The total sample consists of 1,354 firms (2,301 firm-years) and the sub-sample of complex firms consists of 668 firms (1,114 firm-years). The sample period includes 1994, 1999, 2004, and 2009. A *Complex firm* is a firm with at least one ownership chain. The definitions of *Ownership Chain*, *Owner*, and *Holding Company* are in Appendix A. *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.

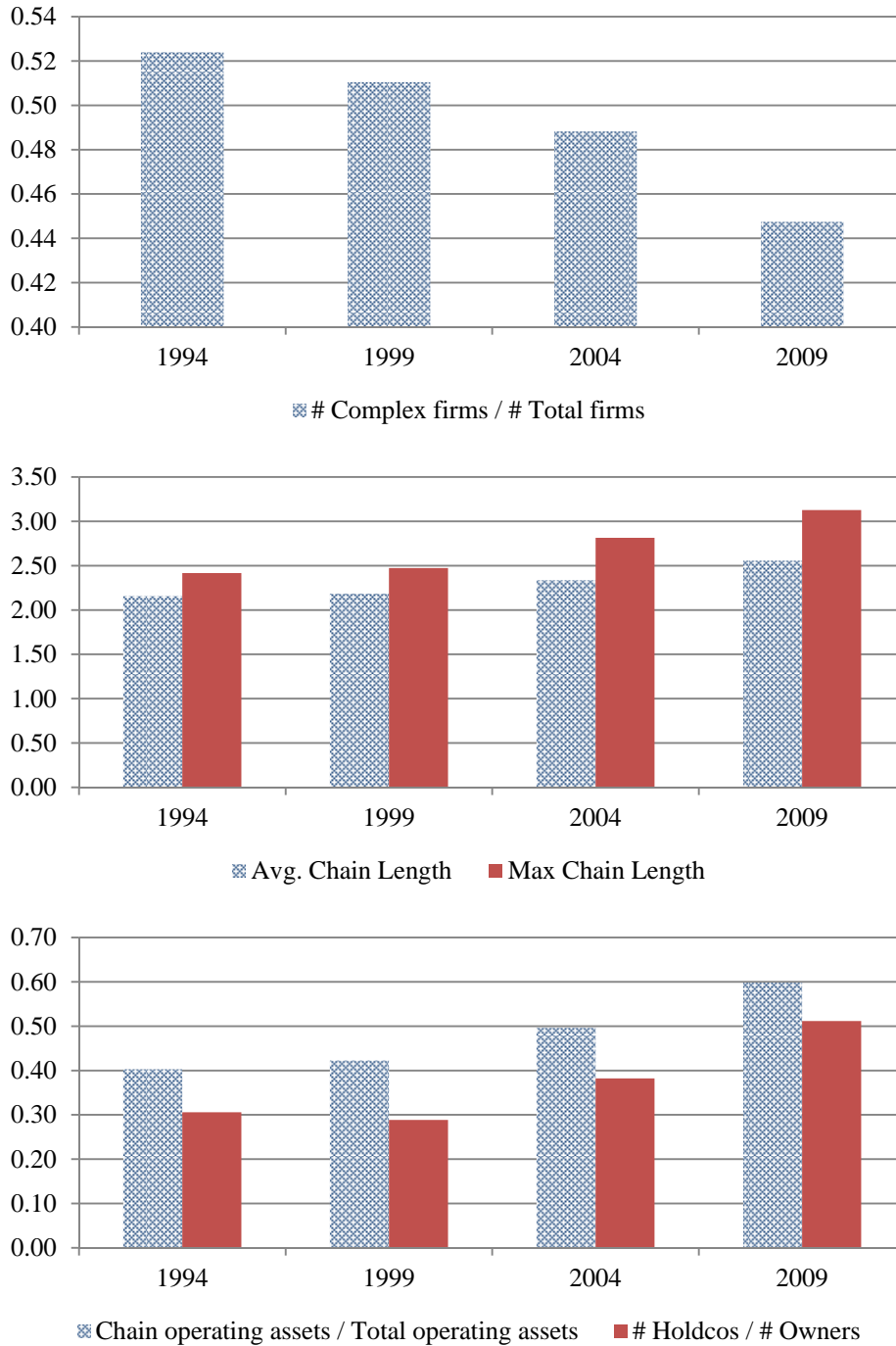


Fig. 5. Top owner countries: The figure includes the top 25 host countries of U.S. multinational subsidiaries in our sample in benchmark-survey year 2009. The shaded bar represents total assets in each country *relative to the United Kingdom*, the largest host country in terms of total assets. The solid bar represents the proportion of total assets in each country that consists of equity investments in affiliates.

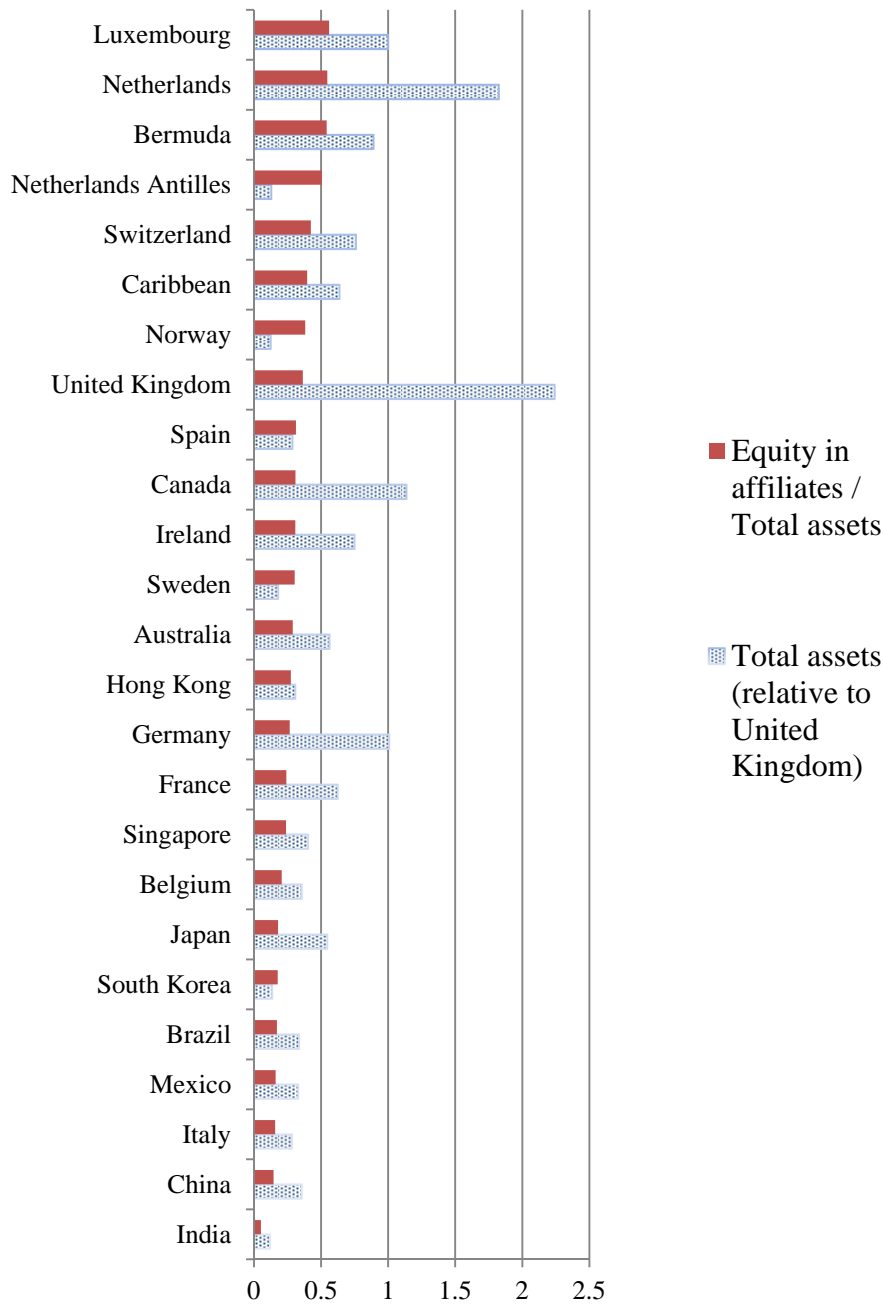


Table 1 Panel A: Descriptive data for simple and complex firms. The total sample consists of 1,354 firms (2,301 firm-years) and the sub-sample of complex firms consists of 668 firms (1,114 firm-years). The sample period includes 1994, 1999, 2004, and 2009. A *Complex firm* is a firm with at least one ownership chain. Definitions of *Ownership chain*, *Owner*, *Holding Company*, and *Daughter* are in Appendix A. *Chain length* refers to the number of layers forming an ownership chain. *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. *# Subs acquired / # Subs* is the proportion of existing foreign subsidiaries in the multinational group that entered the group through acquisition. 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=1,187		N=1,114		
<i>Characteristics of U.S. Multinational Firm Operations (N=2,301)</i>	Mean	Med	Mean	Med	
Worldwide assets	4,006	551	26,607	3,626	
Foreign sales / Worldwide sales	0.44	0.40	0.49	0.47	
Worldwide return on assets	0.01	0.02	0.01	0.02	
Years abroad	11.88	11.00	15.00	14.50	
# Countries	13.43	10.00	24.95	20.00	
# Industries	2.32	2.00	6.69	5.00	
# Subs	17.85	12.00	58.01	34.00	
# Subs acquired / # Subs	0.03	0.00	0.05	0.01	
5-yr growth rate in # subs	1.16	0.33	1.31	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		
<i>Characteristics of Complex Firm Structures (N=1,114)</i>	Mean	Med	Std	P95	P99
Chain operating assets / Total operating assets	0.50	0.50	0.28	0.97	1.00
# Chain subs / # Subs	0.39	0.35	0.24	0.82	1.00
Avg. chain length	2.34	2.00	0.60	3.58	4.55
Max chain length	2.77	2.00	1.18	5.00	7.00
# First tier owners / # First tier subs	0.14	0.19	0.17	0.50	1.00
# Owners	5.11	3.00	8.56	18.00	46.00
Avg. # daughter subs per owner	2.11	1.67	1.85	5.10	9.00
Max # daughter subs per owner	6.52	4.00	9.16	20.00	37.00
# Holdcos	2.29	1.00	4.82	8.00	26.00
Avg. # daughter subs per holdco (N=861)	1.62	1.11	1.78	5.00	8.00
Max # daughter subs per holdco (N=861)	5.11	3.00	7.36	16.00	32.00
# Holdcos / # Owners	0.39	0.33	0.37	1.00	1.00

Table 1 Panel B: Complexity regressions. The total sample consists of 1,354 firms (2,301 firm-years) and the sub-sample of complex firms consists of 668 firms (1,114 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 BEA benchmark survey periods (e.g., 1994 and 1999).

	A: Complex firm indicator		B: Length = Avg. chain length		C: Frequency = # First tier owners / # First tier subs	
	coef.	z-stat	coef.	t-stat	coef.	t-stat
Log(Worldwide assets)	0.267	4.99	0.034	1.90	0.001	0.28
Foreign sales / Worldwide sales	1.943	4.73	0.097	0.77	0.003	0.12
Worldwide return on assets	-0.113	-0.16	0.331	1.40	0.065	0.97
Log(Years abroad)	0.099	0.64	0.019	0.44	-0.033	-1.91
Log(# Countries)	0.279	2.01	0.156	3.56	-0.067	-5.99
Log(# Industries)	1.507	12.33	0.082	2.27	-0.021	-2.35
5-yr growth rate in # subs	0.041	2.48	0.002	0.41	0.001	0.40
# Subs acquired / # Subs	2.515	3.21	0.327	1.72	-0.002	-0.03
1999	-0.228	-1.28	-0.060	-1.63	-0.002	-0.22
2004	-0.212	-1.10	0.162	3.47	0.019	1.54
2009	-0.765	-2.31	0.303	4.29	0.040	1.98
Extractive	1.124	1.85	0.117	1.26	0.014	0.35
Food	0.969	1.36	0.119	0.64	0.009	0.31
Chemical	1.175	2.05	0.108	1.28	0.001	0.06
Manufacturing	0.798	1.57	0.050	0.69	0.000	0.02
Wholesale trade	0.835	1.36	0.043	0.46	-0.014	-0.42
Financial	-0.194	-0.30	-0.271	-2.73	-0.052	-1.51
Services	0.743	1.35	0.037	0.39	-0.022	-0.72
Intercept	-8.161	-9.33	0.887	3.01	0.421	6.23
Pseudo R-squared	0.33					
OLS R-squared	0.37		0.20		0.19	
N	1812		925		925	

Table 2: Descriptive data for subsidiaries by location within ownership structure. This panel shows descriptive data for 47,371 subsidiaries based on their position within an ownership structure. *Chain subs* are entities that are part of ownership chains. Definitions of *Ownership Chains*, *Owners*, and *Bottom Subsidiaries* are 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.

	Non-chain Subs		Chain Subs			
	Mean	Med	Owners		Bottom	
			Mean	Med	Mean	Med
<i>Subsidiary Characteristics</i>						
Total assets	117.63	14.08	777.34	257.01	207.27	38.55
Operating assets	106.36	13.76	393.77	92.12	186.94	37.83
Total sales	60.29	11.35	159.87	12.51	113.99	33.41
Subsidiary age	6.41	5.00	8.71	6.00	7.07	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	0.10	0.00	0.17	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	0.55	0.54
Total liabilities/Total equity	1.79	0.55	1.44	0.41	2.24	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	0.26	0.00
Acquire	0.03	0.00	0.07	0.00	0.07	0.00
# Same firm subs in region	63.67	29.00	72.07	40.00	78.25	42.00
# Same firm subs in industry	63.27	35.00	42.28	22.00	56.28	36.00
% Inter-affiliate sales	0.08	0.00	0.13	0.00	0.13	0.00
<i>Country Characteristics</i>						
GDP (\$ Billion)	723.01	307.55	689.32	403.11	865.08	403.92
GDPPC (\$ Thousand)	16.42	18.78	25.44	24.75	18.08	20.77
Property rights index	5.66	7.00	6.53	7.00	5.91	7.00
Statutory tax rate	0.23	0.24	0.18	0.17	0.23	0.25
OECD member	0.49	0.00	0.78	1.00	0.63	1.00
EU member	0.30	0.00	0.58	1.00	0.43	0.00
Tax haven	0.14	0.00	0.29	0.00	0.12	0.00
Investment treaty network	46.18	37.00	63.62	70.00	55.21	56.00
Tax treaty network	54.77	55.00	67.30	74.00	62.91	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
Capital or stamp duty	0.19	0.00	0.09	0.00	0.19	0.00
N	29,076		4,742		13,553	

Table 3: OLS regressions estimating the likelihood that a subsidiary is an owner. The sample consists of 4,742 owner entities and 29,076 non-chain benchmark entities that are part of the 1,114 complex firm-years in our sample. The definitions of *Owners*, *Non-chain entities*, and *Holding vs. Operating Owners* are in Appendix A. In Panel A, the dependent variable equals to one for owners and zero for non-chain entities. In Panel B, the dependent variable equals one for operating owners and zero for non-chain entities. In Panel C, the dependent variable is one for holding owners and zero for operating owners. Variable definitions are in Appendix D. Standard errors are clustered by firm.

	A: All owners vs. Non-chain subs		B: Operating owners vs. Non-chain subs		C: Holding vs. operating owners	
	coef.	t-stat	coef.	t-stat	coef.	t-stat
<i>Subsidiary characteristics</i>						
Log (Operating Assets)	.021	11.21	.022	13.53		
Log (Subsidiary age)	.022	5.23	.021	6.64		
3-yr avg. sales growth	-.071	-3.70	-.014	-0.93		
Retained earnings/Total assets	.060	5.38	.028	3.14		
R&D expenditures	.019	1.46	.067	5.10		
Royalties received	.168	6.25	.187	6.99		
Financial assets/Operating assets	.193	13.18	.059	5.24		
Total liabilities/Total equity	-.005	-7.37	-.003	-5.01		
Effective tax rate - historical	-.081	-6.94	-.039	-4.17		
Outside ownership	-.025	-3.46	-.010	-1.69		
Acquired	.034	2.14	.018	1.41		
# Same firm subs in region	.023	4.48	.014	3.41		
# Same firm subs in industry	-.019	-5.22	.007	2.46		
% Inter-affiliate sales	-.035	-2.74	.071	6.07		
<i>Country Characteristics</i>						
Log (GDP)	-.001	-0.21	.001	0.41	-.008	-0.68
Log (GDPPC)	.014	4.31	.008	3.46	.038	1.78
Property rights index	.002	1.28	.000	0.27	.006	0.58
Statutory tax rate	-.283	-8.81	-.117	-5.10	-1.11	-7.17
OECD member	.052	6.45	.029	4.20	.109	2.49
EU member	.036	4.31	.022	3.51	.043	1.80
Tax haven	.023	2.02	.024	2.61	-.066	-1.61
Log (Investment treaty network)	.017	4.08	.012	3.21	.025	1.64
Log (Tax treaty network)	-.004	-1.48	-.003	-1.35	-.030	-1.53
Avg. withholding rate (inbound)	-.545	-2.71	-.419	-2.39	.097	0.07
Worldwide taxation	-.016	-2.74	-.017	-3.17	-.003	-0.12
CFC legislation	-.034	-5.45	-.016	-3.23	-.036	-1.10
Capital or stamp duty	-.047	-7.76	-.032	-5.98	-.059	-1.65
Year fixed effect	Y		Y		Y	
Firm fixed effect	Y		Y		Y	
R-squared	0.31		0.25		.31	
N owner	4,742		2,837		1,905	
N benchmark	29,076		29,076		2,837	

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 4.1. 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: 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 frequent host countries of owner subsidiaries and 16 frequent host countries of daughter subsidiaries. The frequent host countries are selected by region; details are in Section 4.2. “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.

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 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 4.1. 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	

Supplementary Appendix

Table A: Descriptive data for subsidiaries by type of owner. The panel shows descriptive data for 4,742 owner subsidiaries split into holding owner and operating owner sub-samples. Definitions of *Owners* and *Holding Owners* are 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
<i>Subsidiary Characteristics</i>				
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
Acquired				
# 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
% Inter-affiliate sales	0.00	0.00	0.22	0.02
<i>Country Characteristics</i>				
GDP (\$ Billion)	582.92	385.76	763.38	402.92
GDPPC (\$ Thousand)	28.23	26.25	23.68	24.10
Property rights index	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
Capital or stamp duty	0.06	0.00	0.11	0.00
N		1,905		2,837

Table B: Country pairs with direct ownership links (actual assets in \$millions): The table shows actual assets associated with the direct ownership connections reported in Table 5. These are assets in subsidiaries in the daughter country held by subsidiaries in the owner country. “na” means ‘not applicable’. “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 4.2.

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