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Abstract

In hand-collected subsidiary data on 17,331 public firms from 52 countries, we identify expropriation-related motives for establishing tax haven subsidiaries. We document four results: First, increased transparency of haven activities, resulting from the passage of Tax Information Exchange Agreements (TIEAs), increases the value of affected firms by 2.5%. Second, the effect is stronger for firms with complex tax haven structures. Third, some firms respond to TIEAs by haven hopping, i.e., they move subsidiaries from affected to unaffected havens. Fourth, the value effect is larger among weakly governed firms. Thus, tax havens serve expropriation-related activities that extend beyond tax saving activities.

JEL Classification: G32, G38, H25, H26

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1. Introduction

A tax haven is a state or territory in which corporate and personal tax rates are so low that foreign companies—or individuals—have incentives to establish shell companies to shield their income from higher tax liabilities at home. The Organisation for Economic Co-operation and Development (OECD) estimates that between USD 5 trillion and USD 7 trillion were held offshore in 2007; a study by *PriceWaterhouseCoopers* reveals that between USD 21 trillion and USD 32 trillion were held offshore in 2012. The US organization *Citizens for Tax Justice* finds that three in four Fortune 500 firms are active in tax havens.

In early 2014, the press uncovered prominent tax schemes involving companies such as Apple and Starbucks. In November 2014, the *Luxembourg Tax Leak* brought to light the private arrangements of almost 400 large international companies with the Luxembourg tax authority to pay less than 1% in tax—the official Luxembourg corporate tax rate is 29%. While these schemes will likely be the subject of major policy debates in the EU in the coming years, the US has shown a strong interest in regulating the use of offshore tax havens ever since it first signed Tax Information Exchange Agreements (TIEAs) with tax havens some 15 years ago.¹

It is well recognized in the literature that tax havens are used to avoid taxes otherwise payable in countries with high tax rates.² In order to reduce their tax bills, firms may shift revenues from high-tax locations to tax haven subsidiaries that have no or little operational activities. Revenues can be shifted, for example, through registering patents or trademarks with tax haven subsidiaries

¹ The public debate largely focuses on the costs of tax havens for high-tax countries yet some studies show that low-tax regimes have positive spillovers on nearby high-tax regimes, e.g., on foreign direct investment, subsidiary investment, and growth (Dharmapala 2008, Desai, Foley, and Hines 2004, 2006A, Slemrod and Wilson 2006).

² E.g., Hines and Rice 1994, Graham and Tucker 2006, Dyreng and Lindsey 2009, and Dyreng et al. 2013. A literature review of research on motives and determinants of tax avoidance is provided by Hanlon and Heitzman (2010). Graham et al. (2014) provide evidence from a survey of tax executives.

and charging operational subsidiaries in high-tax locations a fee for use of these assets. On its own, such activity aimed at saving taxes has a positive effect on shareholder value.

In this paper, we document a second, negative effect: Beyond pure tax savings, managers or controlling owners use tax havens for self-serving activities that are not aligned with the interest of minority investors. Lacking transparency by their very nature, tax haven activities may allow controlling shareholders or managers to derive private benefits at the cost of non-controlling shareholders. For instance, managers may pile cash in tax havens to finance inefficient acquisitions (Hanlon, Lester, and Verdi 2015). Moreover, expropriation can involve tunneling or outright theft, e.g., through third-party transactions as has been documented in extreme environments that lack transparency and enforcement, such as Russia (Desai, Dyck, and Zingales 2007 and Mironov 2013). We show that such expropriation also occurs through the use of tax havens, even by firms headquartered in countries with strong governance standards.

One extreme but illustrative example of using tax havens to expropriate investors was uncovered in courts after the collapse of Enron in 2002. Enron CFO Andrew Fastow created a complex network of 881 offshore subsidiaries, of which 692 were located in the Cayman Islands, 119 in Turks and Caicos, 43 in Mauritius, and 8 in Bermuda. Not only did this network of subsidiaries allow Enron to avoid paying taxes, but the court case also revealed that Fastow and his friends transferred considerable resources to companies that they controlled outside of Enron. In particular, Fastow and his friends constructed Special Purpose Entities allowing them to transfer at least USD 42 million to their own accounts, which contributed significantly to Enron's downfall.³ In hindsight, the complex structure of these tax haven subsidiaries served a dual purpose, allowing Enron to save taxes and Fastow and his friends to enrich themselves at

³ Special Purpose Entities had names such as CHIWCO, LJM1, and LJM2. LJM are the initials of Fastow's wife and children.

the cost of the shareholders. In sum, the Enron case illustrates how tax haven subsidiaries can be used against shareholders' interests but also highlights the importance of complexity.

Our empirical strategy focuses on identifying shareholders' reaction to increased transparency of corporate tax haven activities. In order to measure corporate tax haven activities, we hand-collect data covering 17,331 publicly listed firms from 52 countries and their circa 232,000 domestic and foreign subsidiaries, some of which are headquartered in tax havens. We exploit the passage of Tax Information Exchange Agreements (TIEAs) between 2001 and 2011 as a shock to the transparency of tax haven activities. TIEAs are bilateral agreements between two countries allowing for exchange of information about corporations and individuals relevant in tax audits. We provide further details on how TIEAs may impact corporate behavior in Section 2.

The passage of TIEAs constitutes a natural experiment to test whether tax haven activities are driven by expropriation motives that extend beyond pure tax-saving motives. If managers use tax havens to hide, tunnel, or destroy resources, TIEAs will facilitate the detection of such activities. In this case, we conjecture that the passage of TIEAs will increase shareholder value. In this interpretation, TIEAs are a regulatory instrument that may improve the protection of minority investors and impact firm value.⁴ Of course, even though TIEAs do not directly affect corporate taxes, they may indirectly lead to a reassessment of a firm's tax base. This is the case when, for instance, they result in detection of transfer pricing schemes that are deemed too aggressive. Thus, under the tax-savings motive on its own, TIEAs have a negative impact on firm value.

TIEAs constitute an ideal experimental setting because they are bilateral: They affect some firms headquartered in one signatory country with operations in the other signatory country (the tax haven) while leaving other firms with operations in different tax havens or headquartered in

⁴ See, for instance, La Porta, Lopez-de-Silanes, Shleifer and Vishny (2002) and Doigde, Karolyi and Stulz (2007) on the role of country characteristics in determining firm characteristics and firm value.

different countries unaffected. More than 500 TIEAs were passed at different points in time over the past 15 years, affecting more than 300 publicly listed firms headquartered in different countries and at different points in time. Above all, counterfactuals – such as publicly traded companies that are headquartered in one signatory country but that do not have tax haven subsidiaries – are identified easily.⁵

We document four main results related to the expropriation motive of tax haven activities. First, using annual data, we show that implementing a TIEA increases average shareholder value, measured by Tobin's Q, by 2.5% on average. We re-confirm this result using daily abnormal stock returns around the signing of TIEAs, reducing the concern that the signing of TIEAs coincides with similar policy changes that may occur within the same year.⁶ In additional tests we show that the passage of TIEAs does not lead to significant increases in firm efficiency, measured by gross margin and profit margin, nor does the passage reduce treated firms' beta, a measure of firm risk. Thus, our result does not seem to be driven by an increase in operational activities, a reduction in managerial slack, or a reduction in firm risk.

Second, suggestive of expropriation, we document that the positive impact of TIEAs on shareholder value is stronger for firms with more complex structures of tax haven subsidiaries. We measure complexity by the number of subsidiaries in tax havens and the percentage of firm subsidiaries in tax havens. The Enron case highlights the importance of a complex structure for expropriation: Whereas non-controlling shareholders can obtain information about the existence

⁵ Few papers have exploited the passage of TIEAs. Johannesen and Zucman (2014) show that after the passage of TIEAs, bank deposits are shifted from affected to unaffected tax havens. German foreign direct investment and the number of German subsidiaries in tax havens declined after Germany passed TIEAs (Braun and Weichenrieder 2014). Bilicka and Fuest (2014) document that TIEAs are typically passed between countries and tax havens with stronger economic links, though we do not confirm this result when we measure economic links by the number of foreign subsidiaries in tax havens. Hanlon, Maydew, and Thornock (2015) document that TIEAs help reduce round-tripping tax evasion.

⁶ A further endogeneity concern arises from the fact that TIEAs may be passed between specific countries and tax havens at specific times, e.g., as a function of economic links. We measure economic links by the number of subsidiaries for any country-tax haven pair and find no evidence of TIEAs being passed with tax havens harboring particularly many or few affected subsidiaries. This alleviates such endogeneity concerns.

of a particular tax haven subsidiary, it is difficult to obtain information about that subsidiary's investment in other tax haven vehicles. TIEAs, however, allow for making information about ownership structures, investments, and trading patterns of tax haven subsidiaries and their subsidiaries available. If complex subsidiary structures are used to generate private benefits for controlling owners, TIEAs make such actions more costly.

Third, we find that one third of treated firms engage in *haven hopping*: They strategically move subsidiaries from tax havens that entered TIEAs to tax havens that did not. Haven hopping is suggestive of expropriation but hard to align with the tax savings motive, particularly because the positive impact of TIEAs on treated firms is not present among firms that engage in haven hopping. Of course, haven hopping may suggest that our estimate of the true effect of TIEAs on firm value is conservative, given that firms that move subsidiaries to tax havens that did not enter TIEAs do not become more transparent. Haven hopping also suggests that TIEAs benefit the least compliant tax havens though we do not investigate this side effect further in this paper.

Fourth, we show that the positive effect of TIEAs on firm value is larger for firms with lower institutional ownership, a proxy for the strength of monitoring and governance by non-controlling owners. This finding – that weakly governed firms benefit more from the introduction of TIEAs – is consistent with the notion that weakly governed firms might be more exposed to expropriation by controlling shareholders.

Taken together, we provide novel evidence that the use of corporate tax havens is partly driven by private motives of controlling owners or managers. Our estimate of the magnitude of the effect of TIEAs on firm value is likely conservative. First, as outlined above, TIEAs may – at in expectation – indirectly increase firms' tax base; this would partly offset the gains of increased

transparency. Second, some treated firms actively avoid TIEAs, e.g. by haven hopping; such firms do not benefit from the passage of TIEAs.

In addition to our main result on expropriation, our cross-country setting with 52 countries allows us to provide evidence that tax havens are, indeed, also used to save taxes. For instance, we find that the use of tax haven subsidiaries is more prominent among firms headquartered in countries with high tax rates, particularly income tax rates. Exploiting reductions in corporate tax rates over the past 7 years, we document that a 1 percentage point reduction in firms' home-country corporate tax rate is associated with a 1.2% increase in the value of firms without tax haven subsidiaries while firms with tax haven subsidiaries are unaffected. While these results are not surprising, they confirm and extend existing knowledge about the link between tax savings and corporate tax haven activity. This supplements previous evidence by Markle and Robinson (2012) who document a negative correlation between firms' tax rate in non-tax haven subsidiaries and the use of tax havens. In Germany, however, some foreign income is tax exempt, and indeed, manufacturing firms do not exhibit this negative relation (Gumpert, Hines, and Schnitzer 2011).

We are also able to contribute to the literature on the characteristics of firms that use tax haven subsidiaries. So far, such evidence was by-and-large based on US firms: Tax havens are used more by large firms, international firms, firms with extensive intra-firm trade and high R&D intensity, and less constrained firms (Desai, Foley, and Hines 2006B, Dyreng and Markle 2013). Internationally, Markle and Robinson (2012) document that tax haven firms are larger but, surprisingly, less R&D intensive. We find a positive relation between several measures of innovative activity (including R&D) and the use of tax havens. This relation is robust to adding additional controls, including country and industry fixed effects.

The paper closest to ours by Desai, Dyck, and Zingales (2007) shows that, in Russia, stronger tax enforcement reduces income diversion by insiders. Their model features a trade-off between tax enforcement's impact on taxes paid and the cost of income diversion to insiders.⁷ Empirically, they show that the Russian oil firm Sibneft earns positive abnormal returns around five tax enforcement events in Russia, indicating that tax enforcement can have a positive impact on firm value. Mironov (2013) supports these findings: In Russia, tax enforcement correlates positively with operating performance. We contribute to this literature by showing that the relationship between aggressive tax avoidance and expropriation extends far beyond countries that lack investor protection and have weak corporate governance.⁸

Another strand of the literature has studied the link between tax savings and leverage. Heider and Ljungqvist (2012) document an asymmetric relation between changes in state-level tax rates and leverage adjustments. Faulkender and Smith (2014) construct a new measure of firm-specific foreign tax rates to show that US firms with a higher such tax rates are more levered. In a carefully collected sample of 44 tax sheltering cases, Graham and Tucker (2006) show that firms engaged in tax sheltering have lower leverage than matched firms.⁹ Leverage, studied in this stream of the literature, and the use of corporate tax havens, studied in the paper at hand, can be regarded as substitute tax saving mechanisms.

Many papers have examined the relation between firm-specific accounting measures of tax avoidance and firm value. Representatively, Desai and Dharmapala (2005) show that tax avoidance (measured at the firm level by the book-tax gap) has no effect on firm value on

⁷ In the Appendix, we provide a theoretical model in the spirit of Desai, Dyck, and Zingales (2007).

⁸ Tax enforcement has also been linked to the cost of capital (Guedhami and Pittman 2008, El Ghoul, Guedhami, and Pittman 2011) and earnings quality (Hanlon, Hoopes, and Shroff 2014). Similarly to tax enforcement, the Public Company Accounting Oversight Board's (PCAOB's) Regulatory Regime has been shown to improve information quality, with positive implications for firm value and reporting credibility (Gipper, Leuz, and Maffett 2015, Shroff 2015).

⁹ Relatedly, a growing literature has documented that corporate inversions, particularly those into tax havens, are driven by tax motives (e.g. Babkin, Clover, and Levine 2015, Bailey and Liu 2014, Col, Liao, and Zeume 2016, Cortes, Gomes, and Gopalan 2014, and Desai and Hines 2002).

average but a positive effect among strongly governed firms. Hanlon and Heitzman (2010) summarize this literature in great detail and put it into perspective; they highlight that accounting-based measures of tax avoidance are not ideal for international studies because differences, for instance, in the book-tax gap can be due to differences in accounting rules or due to differences in expropriation of outside shareholders. Compared to a vast literature on accounting measures, we measure tax avoidance by identifying firms with tax haven subsidiaries.

In sum, we show that tax havens are used for expropriation activities that go beyond pure tax saving activities. Our evidence is based on passage of bilateral TIEAs, which provide a powerful source of exogenous variation in the transparency of tax havens. Additional evidence on haven hopping as well as the role played by complexity and firm governance support our preferred interpretation that our result is indicative of expropriation activities.

2. Theory, institutional background and identification strategy

2.1 Theoretical arguments

To illustrate our theoretical thinking and to guide our preferred interpretation of the empirical results, we offer—in the Appendix—a simple model that derives the main testable implications we investigate in this paper. In the simplest version of our model, establishing a tax haven subsidiary benefits a firm by saving it taxes but at the cost of establishing the subsidiary. It follows that tax haven subsidiaries are used more in countries with higher tax rates and that decreases in tax rates benefit all firms but less so if these firms have a tax haven subsidiary.¹⁰

We extend the model, allowing entrenched managers to divert a fraction of cash transferred to a tax haven. Such diversion comes at a cost that is increasing in corporate governance and decreasing in the complexity of tax haven subsidiary structure. We show that an improvement in

¹⁰ We provide empirical evidence supporting this simple relationship in Section 6 and Online Appendix 3 and 4.

external governance – such as the introduction bilateral *Tax Information Exchange Agreements (TIEAs)* between two countries—has two opposing effects on shareholder value. First, it may have a negative effect through reducing the amount of cash that can be transferred to a tax haven. Second, it may have a positive effect because it increases the cost of engaging in self serving activities, thereby reducing such activities.

The dual impact of *TIEAs* on shareholder value delivers the key results around which we design our empirical analysis: If tax havens are only used for tax savings – which would be in the interest of all owners – then a TIEA should weakly reduce shareholder value. Hence, if *TIEAs* empirically have a positive effect on shareholder it strongly supports the notion that tax havens are used by entrenched owners or managers for self serving activities that goes beyond pure tax saving. We test this prediction in Section 5.

Last but not least, the model allows us to examine the role of complexity of haven operations. For this, we allow complexity of tax haven structure to facilitate both (i) the ability to save taxes and (ii) the ability to exercise self-serving activities. However, the model shows that the interaction effects have different signs depending on which motive dominates. Again, we test these predictions in Section 5.

2.2 TIEAs and their effect on corporations

TIEAs are bilateral agreements between territories aimed at promoting the exchange of tax-relevant information in civil and criminal tax investigations. Regarding firms, such tax-relevant information comprises bank details and ownership details of companies, funds, and trusts. Similarly, TIEAs allow for the exchange of tax information on individuals' accounts. It is important to emphasize that TIEAs do not change tax laws of signatory countries. Thus, if firms'

tax policy follows the rules in both signatory countries, TIEAs do not require any change in firms' tax policies.¹¹

TIEAs have been criticized for being overly complicated to use, a feature that may explain the low number of successful information requests.¹² However, TIEAs may still have an impact on tax haven activities for at least four reasons. First, even a small increase in the probability of detection constitutes an additional cost to insiders engaged in self-serving activities because information obtained through TIEAs can be used in civil and criminal tax investigations. Second, information obtained by tax authorities may be distributed to corporate boards even in cases where tax authorities do not find substantial evidence of tax fraud. Thus, TIEAs increase the likelihood of boards having more clarity about corporate structures and activities in tax havens, especially in cases where tax haven structures are more complex. Notice that minority owners may know that a firm has a subsidiary in a given tax haven yet the introduction of *TIEAs* increases the likelihood of obtaining more information about investments, ownership, and trades of the tax haven subsidiary. Ultimately, managers may be fired based on suspicion or even rumors. Third, in the future, TIEAs may be augmented to automatic information transmission, covering information on all subsidiaries of firms engaged in tax havens covered by the TIEA. Thus, TIEAs can be seen as a first step towards automatic information transmission, and shareholders may expect to obtain more clarity about tax haven activities in the near future. Fourth, practitioners do take TIEAs seriously and advise corporations to avoid countries that have signed TIEAs.¹³

¹¹ See oecd.org/tax/exchange-of-tax-information/taxinformationexchangeagreementstieas.htm and <https://www.gov.uk/government/publications/tax-information-exchange-agreements-overview> for more information.

¹² Among such criticism, Hanlon, Maydew, and Thornock (2015) list that (i) information is only exchanged upon request rather than automatically, (ii) bank secrecy laws remain unaffected from the passage of TIEAs, and (iii) exchanged information is limited to information collected by signatory countries. It is important to emphasize that almost all TIEAs cover tax haven activities by both individuals and firms.

¹³ Hanlon, Maydew and Thornock (2015) cite Barber (2007) for the following advice: “. . . you should not do business with a

Ultimately, it remains an empirical question whether TIEAs affect corporate tax haven activities or not. For instance, Hanlon et al. (2015) show that TIEAs affect tax shielding behavior. In this paper, we provide strong evidence that TIEAs can have a significant positive impact on shareholder value.

2.3 Empirical Strategy

Since 2000, over 500 TIEAs have been signed. While most of these agreements were signed after 2008, our focus is on the number of firms directly affected by TIEAs over time. Firms are directly affected by a TIEA through being headquartered in one signatory country and having a subsidiary in the other signatory country. Figure 1 shows that the number of treated firms increased substantially in 2001 and 2002, as well as in the years following 2008. This time series variation in the number of affected firms is important for our identification strategy as it rules out alternative explanations such as the financial crisis that may affect tax haven firms differentially.

--- FIGURE 1 ABOUT HERE ---

As we are interested in implications of tax enforcement for publicly listed firms, we focus on TIEAs that involve one sovereign non-haven territory.¹⁴ Some countries are not among the signatory countries, e.g., Brazil and Russia.¹⁵ Online Appendix 1 lists TIEAs involving exactly one tax haven country (or non-sovereign nation) and one non-tax haven country (Source: OECD *Harmful Tax Practices*), and affecting at least one sample firm. Listed are 362 agreements between non-tax haven signatories (Panel A) and tax haven signatories (Panel B). Some sample firms may be affected by more than one TIEA: we focus on the first treatment.

TIEA tax haven . . . this device has undermined once good tax havens” (p.127).

¹⁴ For instance, at least one third of TIEAs are between two tax havens or between tax havens and economically small non-sovereign territories, such as between the Faroe Islands and Greenland.

¹⁵ These countries would provide some interesting cross-country predictions: In Russia, for instance, tax avoidance or tax fraud do not require complex tax haven constructs but can be achieved through outright theft (Desai, Dyck, and Zingales 2007; Mironov 2013). Thus, a TIEA signed by Russia might have no impact on Russian tax haven firms.

We estimate the effect of tax enforcement on firm value using a difference-in-difference approach that follows Bertrand and Mullainathan (2003). Specifically, we estimate

$$y_{isct} = \alpha_i + \alpha_{st} + \beta_1 TREATED_{isct} + \mathbf{X}'_{it} \boldsymbol{\gamma} + \varepsilon_{isct} \quad (1)$$

for firm i , time t , sector s , and headquarter country c . y_{isct} is the dependent variable of interest (e.g., Tobin's Q), $TREATED_{isct}$ is a dummy that equals one if a firm has been affected by a TIEA signed between its headquarter country and a tax haven in which that firm has a subsidiary, and ε_{isct} is an error term. α_i and α_{st} are firm and year times industry fixed effects, respectively, and controls in vector \mathbf{X}_{it} comprise size, age, and size squared. Standard errors are clustered at the country and year level (2-way clustering), though results are robust to alternative specifications.

In a variation, we run (1) on treated firms and matched control firms; we additionally include post-treatment dummies for control firms. Because treatment is staggered over time (see Figure 1), alternative events affecting treated firms at the same time—such as the financial crisis—are less likely to drive our results. However, in an unreported robustness test, we also run our main specification on all firms including year times country fixed effects. In a further variation of (1) above, y_{isct} denotes daily returns and $TREATED_{isct}$ denotes days around the signing of TIEAs.¹⁶

Econometrically, the nature of TIEAs—they are bilateral and staggered over time—alleviates some common event study concerns. First, the signing of TIEAs is a bilateral action resulting from a political process that is generally exogenous to those firm-level variables important for this study. Additionally, in Online Appendix 2, we confirm that the passage of TIEAs between country pairs is not easily explained by economic links between non-haven countries and tax havens. We run probit regressions explaining the passage of TIEAs between pairs of tax haven territories and non-tax haven countries. The left-hand-side variable is a dummy variable equal to

¹⁶ We control for day and firm fixed effects using a Stata program provided by Guimaraes and Portugal (2010).

one if a pair consisting of a non-haven country and a tax haven territory has passed a TIEA by 2013 and zero otherwise. The key right-hand-side control is the economic link between respective pairs, measured by the number of foreign subsidiaries held between country pairs. Such economic links do not significantly explain the passage of TIEAs, alleviating the concern that TIEAs are explained by economic links.

Second, even if the passage of TIEAs is not explained by economic links, the passage may be driven by general changes in the regulatory environment in firms' home countries, i.e., by time trends. For instance, the passage of TIEAs may be part of a one-off regulatory effort to increase tax enforcement. Our difference-in-difference methodology takes such potentially omitted variables into account: We compare treated firms to control firms headquartered in the same country before and after the passage of TIEAs, and TIEAs are passed at different points in time.

Third, some concerns about the exogeneity of the passage of TIEAs remain when considering other unobservable or non-measurable determinants of the passage of TIEAs. For instance, the signing of a TIEA may be driven by the fact that public firms headquartered in one signatory country use specific tax havens for very aggressive tax avoidance. For instance, the US regulator may be aware that US firms use their Cayman Island subsidiaries for very aggressive tax avoidance and therefore decide to sign an agreement. However, we argue that such considerations typically work against us finding a positive effect of TIEAs on firm value: If investors could predict country-tax haven pairs that enter TIEAs, the effect of TIEAs would be priced before the signing is announced. Additionally, the illustrative consideration outlined above would suggest that the signing of a TIEA between the US and the Cayman Islands increases the cost of using the Cayman Islands to reduce corporate taxes. All else being equal, this cost would destroy shareholder value.

Fourth, one may be concerned that the positive shareholder reaction around the passage of TIEAs reflects that tax havens avoided *something worse* from happening, such as economic sanctions against the haven and/or firms engaged in the haven. To alleviate this concern, we study firm value over the five years prior to the signing of TIEAs; firm value over these five years is flat and the value reaction around signing dates does not constitute a reversal. Moreover, focusing on each haven's first signing of a TIEA, we compare the share price reaction of firms exposed to TIEAs to that of firms exposed to the signatory tax haven but not headquartered in the other signatory country. If TIEAs signaled that a haven avoided *something worse*, this condition should affect all firms with exposure to that haven, regardless of headquarter country. However, we find that only firms directly affected through the bilateral nature of TIEAs have a positive share price reaction around the first passage of a TIEA by a haven.

3. Data

3.1 Subsidiary data

We hand-collect firm-level subsidiary data from Dun and Bradstreet's *Who Owns Whom 2013/2014* book series. This source lists public and private firms, the subsidiaries they hold to 50% or more, and subsidiaries of subsidiaries. The data also include subsidiaries' headquarter countries, including tax havens.¹⁷ Starting with the *WorldScope* universe of publicly listed, active firms, we match subsidiary information for 17,331 publicly listed firms from 52 countries. In total, these firms have 231,850 subsidiaries at home and abroad. For part of our analysis, we supplement the *2013/14* data with *2008/2009* and *1998/1999* data.

¹⁷ Similarly, Capital IQ and Orbis provide subsidiary information. However, comparing data on 20 randomly selected large multinational firms in Dun & Bradstreet to data in Capital IQ and Orbis, we find that these sources report fewer and sometimes no tax haven subsidiaries in many cases. Missing subsidiaries tend to be subsidiaries headquartered in non-sovereign territories, but these are crucial for our analysis. Additionally, our source enjoys advantages in terms of sample period: Capital IQ does not provide historical subsidiary data; Orbis data dates back to 2005. Some of our analysis requires pre-2005 data.

Three remarks on this ownership data are in order. First, the data do not provide information on the relative size of subsidiaries. We therefore restrict our analysis to dummy variables indicating whether a firm is exposed to a certain tax haven or not. Second, the data do not include third party transactions, ownership stakes of less than 50%, and other types of engagement in tax havens. It is possible that such engagements may be a vehicle through which resources can be tunneled to third parties.¹⁸ For this reason, we are likely to understate the effective importance of entrenchment. Finally, the data do not distinguish operational subsidiaries from pure tax vehicles. However, as we will see in the following subsection, comparing the ratio of foreign subsidiaries to population (and country size) for tax havens to the corresponding ratios for non-tax havens provides strong support that most—if not all—tax haven subsidiaries are not operational.

3.2 Tax havens

The key element of tax havens for our purpose is that they offer income and/or corporate tax rates so low that individuals and/or corporations from abroad are incentivized to engage in tax avoidance (e.g. Dharmapala and Hines 2006). Lists of countries and territories that constitute tax havens are abundant.¹⁹ Table 1 summarizes four such lists and adds an additional list of low tax countries that entered TIEAs at some point in time.

--- TABLE 1 ABOUT HERE ---

¹⁸ Chernykh and Mityakov (2014), for example, document that 9.9% of Russian banks' foreign flows go through offshore accounts. Such foreign account transactions are not captured by our data. Indeed, only two of our 103 Russian sample firms have subsidiaries in territories considered a tax haven by some list (Luxembourg and Cyprus).

¹⁹ No universally agreed upon definition of a tax haven exists. A popular, short definition characterizes a tax haven as "*a country or territory where certain taxes are levied at a low rate or not at all*". A slightly more elaborate definition is given by Geoffrey Powell (former economic adviser to Jersey): "What ... identifies an area as a tax haven is the existence of a composite *tax structure established deliberately to take advantage of, and exploit, a worldwide demand for opportunities to engage in tax avoidance.*"

First, countries and non-sovereign states that have not substantially implemented internationally agreed tax standards constitute the OECD Grey List (see *List 1*). While this list is time-varying, we use the Grey List as of August 17, 2009. By that list, 34 territories are described as tax havens. These territories are predominantly located in Europe and the Caribbean, though some are located in Africa, the Middle East, and the Pacific. Larger independent countries such as Hong Kong and Ireland are not classified as tax havens though Singapore is. Second, while never enacted, the “Stop Tax Haven Abuse Act” (US Congress; S.1533) is widely cited as a source of tax haven territories. The Act lists 30 territories including Hong Kong and Singapore (see *List 2*). Third is the original OECD Tax Haven list, which includes 42 territories (see *List 3*). Fourth, Hines and Rice (1994) provide a more practical list based on true rather than official corporate tax rates (see *List 4*). Luxembourg, for instance, is part of List 4 but not included in Lists 1-3. Indeed, Luxembourg has an official corporate tax rate of 29%. Yet companies can enter private agreements on low taxes (1% and less) and Advanced Tax Agreements with the Luxembourg tax authorities. Fifth, as we use TIEAs as an experiment, we provide a list of all low-tax regimes that entered such agreements according to the OECD (see *OECD Harmful Tax Practices*).²⁰ While most of our descriptive analysis is based on *List 1*, all results are robust to using other lists. Our analysis on entrenchment uses the list of havens that entered TIEAs.

In order to further investigate the caveat that subsidiaries in tax havens may serve operational purposes rather than pure tax saving purposes, we extend Table 1 by geographic data and foreign subsidiary counts for tax havens and, for comparison, to the United States. We find that, relative

²⁰ The 2013/2014 version of *Who Owns Whom* no longer lists certain territories such as the Isle of Man and the US Virgin Islands as separate headquarter countries. This may lead to an understatement of the use of tax haven subsidiaries in our descriptive analysis. However, earlier editions of *Who Owns Whom* do list such territories, alleviating the concern that some of our tests on entrenchment understate the true effect.

to population and area, foreign subsidiaries are substantially more common in tax havens. In the United States, on average, one finds 1 foreign subsidiary per 9,946 inhabitants or per 307 square kilometers. Among sovereign tax havens, one finds 1 subsidiary per 5,567 inhabitants or per 19 square kilometers. Among smaller non-sovereign tax havens, 1 subsidiary exists per 671 inhabitants or per 2 square kilometers. In the extreme, in the British Virgin Islands and the Cayman Islands, a single foreign subsidiary exists per 19 and 50 inhabitants, respectively, or per less than 0.1 square kilometers.

3.3 Country characteristics

Part of our analysis is a description of the use of tax havens by country characteristics. We measure economic development, entrenchment, and taxes faced at home.

Economic development is the natural logarithm of GDP per capita in USD in 2013 (data obtained from the World Bank). Entrenchment is hard to measure, yet the quality of the institutional environment provides an indirect proxy. First, we use *ICRG (Property Rights Protection)*, which captures political, economic, and financial risk in 2013 and is obtained from the International Country Risk Guide. The measure ranges from 1 to 6 and increases in protection of property rights. Second, *Corruption Level* is based on Transparency International's Corruption Perception Index as of 2013, an index that measures corruption levels on a scale from 1 (high corruption) to 10 (low corruption).

Two direct measures of the benefits of saving taxes are the maximum tax brackets of *Corporate Tax Rate* and the *Income Tax Rate* in 2013, obtained from government agencies and audit firms. *Tax Evasion* is obtained from the Global Competitiveness Report conducted by the World Economic Forum. Countries' tax evasion is rated on a scale from 1 (strongly disagree) to 7 (strongly agree) to the statement "Tax evasion is minimal."

3.4 Firm-level variables

Here, we describe key dependent variables that capture firm value. We postpone a description of other variables to a later stage. Following Demsetz and Lehn (1985) and Morck, Shleifer, and Vishny (1988), we use Tobin's Q to measure firm value. *Tobin's Q* is obtained from Osiris as $(\text{Enterprise Value} + \text{Total Liabilities}) / (\text{Total Shareholder Equity (Book Value)} + \text{Total Liabilities})$ though all results are robust to similar definitions of Tobin's Q. In additional tests, we construct cumulative abnormal returns around the passage of Tax Information Exchange Agreements using a 1-factor CAPM estimated for a rolling estimation period starting 292 days before and ending 40 days before event days. We use respective local market indices as a benchmark. All firm-level variables are winsorized at the 1st and 99th percentile, though results are robust to other specifications.

4. Country- and firm-level correlations

We now link the use of tax havens to country- and firm-level characteristics.

4.1 Country characteristics

Table 2 provides summary statistics by country. Countries are sorted by percentage of publicly listed firms that have at least one subsidiary headquartered in a tax haven as defined by the OECD Grey List (*List 1*).

--- TABLE 2 ABOUT HERE ---

Table 2 reveals that besides Singapore—where 100% of sample firms are classified as tax haven firms (because Singapore is classified a tax haven by the OECD Grey List)—the use of tax haven subsidiaries by public traded firms is most frequent in Switzerland, Norway, Malaysia, and the Netherlands: More than one in five firms headquartered in these countries have at least

one tax haven subsidiary. Some countries do not have any firm with tax haven subsidiary, most notably Argentina, Greece, and Russia. Notice, however, that one in six Greek firms make use of tax haven subsidiaries by Lists 2 and 3. 11.4% of US firms use tax haven subsidiaries; few Chinese firms (1.2%) use tax haven subsidiaries though this figure increases to 12.1% when using List 4, which includes Hong Kong and Macau. The average country has between 7.2% and 20.3% tax haven firms (by the TIEA List and List 4, respectively).

Figure 2 illustrates correlations between the use of tax haven subsidiaries at the country level and country-level variables. The *y*-axis denotes the percentage of publicly listed firms that have at least one tax haven subsidiary using the OECD Grey List as of August 17, 2009. Hong Kong, Singapore, and Ireland are omitted because these jurisdictions constitute tax havens by at least one of the tax haven definitions. The *x*-axis denotes country-level characteristics.

--- FIGURE 2 ABOUT HERE ---

We show that the use of tax haven subsidiaries is more prevalent in countries with stronger property rights protection and lower corruption levels. While not causal, it is costlier to divert resources from shareholders in countries with strong property right protection and little corruption. The opaque nature of tax haven subsidiaries facilitates stealing when stealing is costly at home. Moreover, when corruption is prevalent and shareholder protection is absent, managers do not need a tax haven to divert resources from shareholders (see evidence from Russia in Desai, Dyck, and Zingales 2007 or Mironov 2013).

In Online Appendix 3, we extend this analysis to tax rates, tax evasion, and economic development. Indeed, the use of tax havens is more common in countries with higher tax rates. This result indicates that tax haven subsidiaries may have a higher marginal benefit in high tax environments, as suggested by our model. We also find that tax haven subsidiaries are used more

in countries with low tax evasion scores. Again, where avoiding taxes directly in the home country is easy, a tax haven subsidiary is of less use.

Moreover, we find in Online Appendix 3 that the use of tax havens is more prevalent in countries that are economically more advanced as measured by the natural logarithm of GDP per capita. Thus, our simple correlations with country variables may be flawed by not controlling for economic development. We address this concern in Online Appendix 4 by running a probit regression where the dependent variable is the percentage of firms that use tax haven subsidiaries. In addition to the country characteristics discussed above, we control for economic development. We find that the use of tax havens correlates with protection of property rights, low corruption levels, tax rates, and low tax evasion after controlling for economic development. Moreover, protection of property rights and low corruption levels are robust to additionally controlling for overall taxes. A related concern is that our correlations are driven by outliers—such as countries with few observations in our dataset. Panel B of Online Appendix 4 confirms our results, weighing observations by the number of sample firms.

Overall, Figure 2, supported by Online Appendices 3 and 4, provides our first indicative evidence for underlying motives for the use of tax haven subsidiaries. The correlations support the notion that tax haven activities serve a goal that is aligned with the private interests of controlling owners beyond the pure tax-saving motive. More broadly, these results align with the notion that country characteristics determine firm characteristics.

4.2 Firm characteristics

Before we focus on establishing a causal link between the use of tax havens and firm value, we introduce firm-level data. Firm-level summary statistics are presented in Table 3. While our source of subsidiary data comprises 17,331, we restrict the sample to those 10,513 publicly listed

firms for which we can construct Tobin's Q.²¹ All accounting measures are constructed at the firm-year level and then summarized by firm over the 2004–2013 period to obtain one observation per firm.²² Panel A shows summary statistics for each variable and splits firms into firms with and without tax haven subsidiaries. While we use the definition of the OECD Grey List, our results are robust to using any other list. Panel B focuses on the subset of firms with at least one foreign subsidiary.

--- TABLE 3 ABOUT HERE ---

Roughly one in six sample firms (17.2%) have at least one tax haven subsidiary. Firms with tax haven subsidiaries tend to be larger, older, and grow more slowly, but are more profitable (measured by profit margin and ROA). Overall, they have a lower Tobin's Q.

Moreover, tax haven firms are 2.3% points more levered. The marginal benefit of saving taxes through tax haven subsidiaries may be larger for highly levered firms, given that additional leverage may come with substantial additional expected costs of distress.²³ Firms with tax haven subsidiaries also face higher effective tax rates: Again, this finding most likely does not mean that tax haven subsidiaries increase effective tax rate; rather, it could indicate that some firms are unable to reduce taxes at home, increasing the benefits from using tax haven subsidiaries. Firms with tax haven subsidiaries hold less cash, though this result is turned around in the multivariate setting. Moreover, tax haven firms pay higher dividends, which, however, could be correlated with size, age, and leverage.

²¹ This reduction in sample size is due to limited availability of accounting data for international firms. Specifically, while the market value of assets is by-and-large available, international accounting data lacks coverage of the book value of equity and liabilities.

²² Our univariate split and multivariate results are robust to using 2013 data (where sales growth is constructed from 2012–2013 data).

²³ At first sight, this result may appear at odds with Graham and Tucker (2006) who, after matching their sample of 44 firms, document that tax sheltering is associated with a decrease in leverage. However, we remark that Table 3 merely provides a univariate split of all sample firms without matching by firm characteristics.

In line with the idea that it is easier to transfer revenues through intangible assets such as patents registered in low tax countries, tax haven firms are firms with a higher fraction of intangible assets, patents, and trademarks, and are more likely to have trademarks or patents.

Panel B repeats the previous analysis on firms with at least one foreign subsidiary and confirms most of the univariate results above. Additionally, Panel B introduces a measure of the cost of repatriating foreign revenue. Many jurisdictions (such as the US) impose repatriation taxes on revenues shifted from abroad to the home country; such repatriation taxes typically increase in the difference between (low) taxes paid abroad and (high) taxes paid at home. We document that tax haven firms are firms that face lower average taxes abroad than non-tax haven firms; also, their average foreign taxes are significantly lower than their home taxes.

In order to more formally study characteristics of firms that use tax haven subsidiaries, we employ firm-level probit regressions with industry and country fixed effects and control for various firm characteristics in Online Appendix 3. The dependent variable is an indicator variable equal to one if a firm has at least one subsidiary in a tax haven on the OECD Grey List. Controlling for a range of characteristics at once, the results for size, leverage, and being a dividend payer are statistically significant, while having more cash over assets becomes positively associated with having a tax haven subsidiary. Adding the difference between taxes paid abroad and taxes paid at home as an additional control provides further evidence for the repatriation argument discussed above. Panel B further investigates whether the transferability of assets, measured by intangible assets, R&D, and the use of patents and trademarks, explains the use of tax havens. Indeed, after controlling for all of the factors outlined in Panel A, firms with assets that allow for easier transfer of revenues are more likely to have tax haven subsidiaries.

Panels C and D of Online Appendix 3 further split our sample into US and non-US firms: all previous results are by and large confirmed.

Overall, this sub-section provides correlations between firm characteristics and the use of tax haven subsidiaries. While these correlations confirm the tax-savings motive, this analysis also highlights that tax haven firms are different, suggesting the importance of matching by firm characteristics in later analysis.

5. Evidence from Tax Information Exchange Agreements

In this section, we exploit the passage of Tax Information Exchange Agreements (TIEAs) to test if entrenched owners' self-serving motives partially explain corporations' use of tax havens.

5.1 The impact of TIEAs on firm value

In Panel A of Table 4, we study the effect of TIEAs on firm value using OLS regressions for a panel of firms from 1996 to 2013 following Equation (1). Column (1) uses the full sample of firms. In columns (2) and (3), one non-treated (control) firm is matched to each treated firm five years prior to the year a TIEA is signed. In columns (4) and (5), 10 firms are matched to treated firms. Firms are matched by country, industry, log of assets, and log of age with replacement.

--- TABLE 4 ABOUT HERE ---

We find that the passage of TIEAs does indeed lead to an increase in firm value. In the full sample, Tobin's Q increases by 2.5% after treatment. The effect is still significant and similar in magnitude for samples of 1 control firm (2.6%) and 10 control firms (2.3%). In Column (1), the counterfactual constitutes all non-treated firms as well as treated firms prior to the passage of a TIEA. In columns (2) and (4), treated firms before the passage and control firms from the same headquarter country both before and after the passage of TIEAs act as control group. In Columns

(3) and (5), we add a dummy for non-treated firms after the TIEA. This measure allows us to rule out headquarter country-specific shocks that correlate with the passage of TIEAs—such as changes in tax enforcement—as explaining our results. The coefficient on control firms after the passage of TIEAs is very close to zero and statistically insignificant, suggesting that no such shocks are at play. We conclude that TIEAs only affect treated firms and that this result is not driven by country-specific characteristics.

In order to ensure that our results are not driven by specific countries, we remove countries individually from our analysis; our results are robust. Scandinavian countries were particularly prone to sign TIEAs but our results hold for the subset of Scandinavian countries and non-Scandinavian countries, respectively. Moreover, all results are robust to removing financial firms and to using alternative lists of tax haven territories to define tax haven firms. Our results on entrenchment are also robust to removing each event year individually from our analysis.

Of course, one immediate concern is that the parallel trend assumption is violated: Firms with subsidiaries in treated havens may become more valuable year after year regardless of the passage of TIEAs. We therefore analyze firm value year by year around the passage of TIEAs in Figure 3. The x -axis denotes years around the passage of TIEAs. The y -axis shows the coefficient from an interaction between year-to-event dummies and a treatment indicator variable. The increase in firm value occurs abruptly between year -1 and year +1 around the treatment date, alleviating the concern that the parallel trend assumption is violated.

--- FIGURE 3 ABOUT HERE ---

To further alleviate the concern of time trends, we study daily abnormal returns around the signing of TIEAs. Such event study using daily data also reduces the concern that an annual measure such as Tobin's Q captures some policy changes that occur on an annual basis, as well

as the concern that Tobin's Q may increase mechanically due to change in accounting practices associated with the passage of TIEAs. While it is impossible to nail down precisely the first announcement of most TIEAs by the press, anecdotal evidence suggests that TIEAs are not discussed in public long before they are signed. Indeed, for a randomly selected sample of 10 TIEAs that we search in Factiva, we find that These agreements are mentioned no more than five days before or after the signature date. Figure 4 shows cumulative returns around the passage of TIEAs and re-confirms the positive effect on affected firms' value, alleviating concerns about Tobin's Q.

--- FIGURE 4 ABOUT HERE ---

Figure 4 documents an increase in firm value of 4-5%. However, this magnitude has to be interpreted with caution. First, raw returns also reflect risk (indeed, tax haven firms tend to have a higher beta). Second, TIEAs may have been signed during bull markets on average. In order to control for risk and general market movement, we study daily returns and abnormal returns in a multivariate framework (Table 4, Panel B). We study a range of event windows around the signature date to account for the fact that TIEAs may be announced shortly before or after the signature day. We confirm our previous results: Firms affected by TIEAs have positive daily returns around the signature date, also after controlling for market risk. The magnitude of the effect is slightly lower than that for Tobin's Q regressions once we control for market risk and focus on the days around passage; however, it should be noted that we may underestimate the true effect somewhat as some TIEAs may have been announced outside of those event windows that we estimate. The event study methodology employed here follows Schipper and Thompson (1983), but our results are robust to running seemingly unrelated regressions to calculate cumulative abnormal returns on portfolios with treated and non-treated firms (e.g., Karpoff and

Malatesta 1995). Our results are also robust when restricting the sample to treated and control firms on days around the signing of TIEAs.

Our estimate of the effect of TIEAs on firm value is likely conservative. First, some control firms may be indirectly affected by TIEAs through third party transactions with tax havens. As discussed in the data section, we only observe subsidiaries held to 50% or more but no third party transactions. Second, and relevant for any event study, as more and more TIEAs are signed, shareholders may revise upwards their beliefs about the introduction of future TIEAs. Third, as we will show below, some treated firms actively avoid TIEAs. The treatment effect is higher for firms that do not avoid TIEAs through haven hopping.

In sum, we show in this subsection that a positive shock to the transparency of tax haven activities increases shareholder value of firms with subsidiaries in affected tax havens. This evidence is consistent with the notion that entrenched owners use tax havens for self serving activities beyond pure tax saving as outlined in our theoretical model in the Appendix.

5.2 Channels

In this subsection, we investigate channels through which *TIEAs* affect shareholder value. Specifically, we study whether TIEAs have a larger effect on firms with larger exposure to tax havens, whether firms actively avoid TIEAs by shifting operations to other tax havens, and whether TIEAs lead to operational gains.

5.2.1 Complexity of firms' structure within tax havens

We begin by studying whether the impact of TIEAs on firm value interacts with the complexity of firms' tax haven operations. Potential predictions are discussed in the Section 2 and formally derived in the Appendix. The model shows that complexity enhance the effects of

TIEA on shareholder value for both the tax saving and the entrenchment effect; however, the tax motive predicts a negative interaction effect whereas the entrenchment motive predicts a positive interaction effect.

In Panel A of Table 5, we start by documenting that firms with subsidiaries in tax havens are more complex than firms without tax haven subsidiaries on average. We provide a range of measures of complexity, including the number of subsidiaries and the number of hierarchical levels. Indeed, firms with at least one tax haven subsidiary have significantly more subsidiaries and have a significantly more complex subsidiary structure measured by the number of hierarchical levels; as shown in multivariate regressions in Panel B, this still holds after controlling for country and industry fixed effects and various firm characteristics including size.

--- Table 5 ABOUT HERE ---

In Panel C, we link the complexity of firms' tax haven operations to the magnitude of the treatment effect. A complex structure within a given tax haven should make it harder for minority investors and outsiders to monitor and control the actions pursued by insiders. We test this idea using two measures of firms' complexity within tax havens, the logarithm of the number of subsidiaries in tax havens (Columns (1)-(5)) and the fraction of a firm's subsidiaries that are headquartered in tax havens (Columns (6)-(10)). Interacting treatment with complexity, we find that TIEAs have a significantly more positive effect on firms with complex tax haven structures. We repeat this analysis for matched samples and re-confirm this result. The interaction term is significant at 1 percent level and robust across different specifications.

In sum, TIEAs have a significantly larger *positive* shareholder effect on firms with complex tax haven structures. This finding provides further support for that entrenched owners use tax havens for self serving activities beyond pure tax saving. Indeed, if tax havens were only used to

save corporate taxes, our model would suggest a larger *negative* effect of TIEAs on firms with complex tax haven structures, the exact opposite of our findings.

5.2.2 Haven hopping

One alternative response to TIEAs is to engage in *haven hopping*: Managers might strategically close tax haven subsidiaries in treated tax havens and open new tax haven subsidiaries in unaffected tax havens.

We investigate this possibility in Table 6. Panel A follows firms through the first wave of TIEAs from 1998 to 2008 and the second wave from 2008 to 2013, respectively. At the beginning of each sample period, we categorize firms as (i) having no tax haven subsidiary, (ii) having a tax haven subsidiary in at least one tax haven that subsequently signs a TIEA, and (iii) having tax haven subsidiaries but exclusively in tax havens that never sign TIEAs. We then establish whether firms change categories over the sample period.

--- Table 6 ABOUT HERE ---

Most importantly, one third of firms that have a subsidiary in a subsequently affected haven at the beginning of the sample period close that subsidiary and move exclusively to non-affected tax havens (33% from 1998 to 2008, and 31% from 2008 to 2013). At the same time, only 10% and 7% of firms with tax haven subsidiaries move into affected tax havens from 1998 to 2008 and from 2008 to 2013, respectively. Moreover, most firms that do not have tax haven subsidiaries at the beginning of our sample period do not move into tax havens; however, among those firms that do open such subsidiaries, most open them in unaffected tax havens.

If such strategic haven hopping was sought by managers to continue self-serving activities and if shareholders predicted the continuation of such activities, the value of firms engaged in

haven hopping should respond less positively to the passage of TIEAs. It is difficult to obtain announcement dates of firms' decisions to engage in havens hopping. Nevertheless, in Panel B, we investigate whether the change in treated firms' value is partly explained by haven hopping. We follow our main specification (Table 4) but additionally interact treated firms with a dummy that equals one if a firm subsequently engages in haven hopping. While statistically just around the 10% level, we find that treated firms that engage in haven hopping are less positively affected by the passage of TIEAs than are firms that do not engage in haven hopping. Thus, the positive impact of TIEAs on average shareholder value is driven by companies that do not engage in haven hopping.

In sum, we show that some managers react to TIEAs by moving subsidiaries to other non-treated tax havens and that doing so is against the interests of shareholders. Taken together, this finding constitutes strong evidence that some firms strategically avoid tax havens that signed TIEAs. The fact that such strategic moves are not associated with an increase in firm value provide further evidence for that tax havens are used by entrenched owners for self serving activities.

5.2.3 Operations

We now investigate whether operational explanations exist for our main result that TIEAs have a positive effect on shareholder value. For instance, one could think that TIEAs improve monitoring, which in turn reduces managerial slack. Table 7 follows the methodology outlined in Equation (1) but tests for the effect of TIEAs on profit margin and gross margin. Moreover, we

test for further drivers of Tobin's Q: specifically, we analyze the effective tax rate and risk (measured by beta), as well as leverage.²⁴

--- Table 7 ABOUT HERE ---

Overall, our results indicate that treated firms do not increase their profit margin or gross margin. While the gross margin does go up (at 10% significance level), this result does not hold when matching treated firms to control firms.

TIEAs might have an indirect impact on effective tax rates either because firms reduce activity in the grey area between legal and illegal tax avoidance or because home country tax authorities use TIEAs to adjust the home country tax base; however, both these channels would predict a decrease in Tobin's Q. Our analysis suggests that effective tax rates are unaffected by TIEAs.

Part of the increase in firm value may stem from a reduction in investors' uncertainty. While the discount rate applied by investors is hard to measure, one of its components is firms' exposure to the market. We find no significant effect of TIEAs on firms' beta.

Finally, if tax haven operations were a substitute tax-savings mechanism for leverage, firms might respond to TIEAs by leveraging up. We do not observe an increase in leverage after the passage of TIEAs.

This subsection provides evidence that the increase in firm value associated with the passage of TIEAs is not driven by operational efficiency gains or reductions in uncertainty on their own.

5.3 Cross-sectional results

²⁴ Our test of drivers of the result on Tobin's Q will be incomplete as some drivers of Tobin's Q are harder to observe. For instance, with a model where firm value is determined by a growing annuity in mind, Tobin's Q is also affected by survival (reflected in the number of annuity payments).

Having established that the use of tax haven subsidiaries is at least partly driven by self-serving activities, we now turn our attention to characteristics of firms that benefit more from the passage of TIEAs. In Table 8, we re-run our main specification and interact treatment with a range of cross-sectional firm characteristics.

--- Table 8 ABOUT HERE ---

First, some firms are less monitored prior to the passage of TIEAs; outside shareholders of such firms may benefit even more from additional monitoring imposed by the passage of TIEAs. Indeed, we document that our result is driven by firms with lower institutional ownership (Panel A; Institutional Ownership is obtained from Capital IQ). This finding is in line with the notion that institutional investors, to some extent, act as monitors. Confirming this, we also find that firms that are less levered and more fast-growing (measured by cash flow growth) are more positively affected by the passage of TIEAs. This result accords with the view of leverage as a monitoring device and with anecdotal evidence that internal control systems do not catch up in fast-growing firms.

Second, we focus on intangible assets in Panel B. We established above that firms with intangible assets are more likely to use tax haven subsidiaries. Arguably, these firms benefit from the fact that they do not have to shift physical assets to tax havens in order to claim lower tax rates. Of course, while these firms may find it less costly to save taxes by shifting revenues, the unobservable nature of assets being shifted also makes such activities less transparent. The passage of TIEAs does not challenge tax savings; however, it challenges potential entrenchment involved in shifting revenues from intangible assets into tax havens. Indeed, we document that firms with patents and trademarks—measured by numbers and indicator variables—are more positively affected by the passage of TIEAs.

6. Causal relationship between home-country corporate tax rates and firm value

Our focus so far has been on providing evidence for that tax havens are used for entrenchment purposes that go beyond minimizing corporate taxes. It is important to emphasize that saving taxes still is the key motive for establishing tax haven subsidiaries. We have already documented that the use of tax havens correlates with country-level tax rates and that firms with tax haven subsidiaries are firms that face relatively low taxes abroad, i.e., that face relatively high repatriation taxes. We now seek to provide causal evidence on the tax savings motive. We exploit the fact that some countries reduced their maximum corporate tax bracket over the period 2008–2013.

Illustratively, Figure 5 plots changes in corporate tax rates between 2008 and 2013 against changes in firm value and changes in the use of tax haven subsidiaries, respectively. Changes in the corporate tax rate are obtained from KPMG' *Corporate and Indirect Tax Rate Survey 2014*; a negative value denotes a reduction in corporate tax rates over the five-year period. On the left, the y-axis denotes changes in the difference in Tobin's Q from 2008 to 2013 for a balanced panel of roughly 4,000 firms that we could track over that time period.²⁵ Specifically, firms are identified as tax haven firms in 2008. We then take the difference between Tobin's Q of firms with tax haven subsidiaries in 2008 and firms without tax haven subsidiaries in 2008 and deduct it from the respective difference in Tobin's Q in 2013. A negative value denotes that firms with a tax haven subsidiary have become relatively less valuable over the five-year period. In line with our prediction, we find that the difference in firm value between tax haven and non-tax haven firms becomes more negative in countries that reduce corporate tax rates more substantially: Tax reductions benefit firms but less so when firms use tax havens.

²⁵ We restrict our sample to countries in which we can track at least 5 firms with accounting data from 2008 to 2013.

--- Figure 5 ABOUT HERE ---

In order to test this more formally at the firm level, Table 9 investigates the effect of changes in the corporate tax rate on firm value in a panel of publicly listed firms from 2008 to 2013. The left-hand side is *Tobin's Q*. The key control variable is *Change in Tax Rate*, the cumulative percentage change in corporate tax rates over the previous years. *Tax Haven Subsidiary* is an indicator variable equal to one if a firm has at least one subsidiary in a tax haven (as defined by the OECD Grey List). Columns (1) and (2) use the full sample, while Columns (3) and (4) use matched sample as before. All regressions follow equation (1) above.

--- TABLE 9 ABOUT HERE ---

Indeed, while a reduction in corporate tax rates leads to an increase in firm value, this result only holds for the subset of firms that do not have tax haven subsidiaries.²⁶ In the matched sample, a 1 percentage point decrease in the corporate tax rate is associated with a 1.2% increase in value of firms without tax haven subsidiaries but no increase in the value of tax haven firms.

An alternative reason why firms with tax haven subsidiary are less sensitive to changes in their home country tax rate is that they are likely more exposed to foreign tax rates. In a first robustness test, we repeat the analysis of Table 9 on the subset of multinational firms, i.e. firms with at least one foreign subsidiary. In a second robustness test, we additionally match by the foreign tax rate faced by multinational firms with and without tax haven subsidiary before home country tax rate changes occur. We confirm our results.

When faced with a reduction in corporate tax rates, the marginal benefit of having a tax haven subsidiary may decrease. In the right panel of Figure 5, the y-axis denotes the difference between

²⁶ A negative *Change in Tax Rate* coefficient indicates that an increase in the tax rate leads to a reduction in firm value. Yet, knowing that the sample by and large contains tax reductions, we chose to interpret the coefficients in terms of tax reductions. All results are robust to removing countries that did not change their corporate tax rate.

the percentage of firms with tax haven subsidiaries in 2013 and the percentage of firms with tax haven subsidiaries in 2008. We focus on firms that we can track from 2008 to 2013 though we do not require that accounting data is available. A positive value means that the fraction of firms with tax haven subsidiaries has increased over the five-year period. In line with the idea that tax haven subsidiaries become more valuable when corporate tax rates are relatively higher, the percentage of firms with tax haven subsidiary increases less over the five-year sample period in countries that reduce corporate tax rates.

In sum, this section tests the relationship between use of tax havens and impact of corporate tax reductions on shareholder value. In line with our model in the appendix and the notion that tax havens are used for tax saving purposes, we show causal evidence that the tax-saving motive is an important component in understanding why firms establish tax haven subsidiaries.

7. Conclusion

Tax haven subsidiaries can be used to reduce corporate taxes and to shield cash from outsiders such as minority shareholders. Consistent with entrenched owners' self-serving motives, we document that the passage of TIEAs between countries and tax havens increases average shareholder value by 2.5%. While outright theft is hard to observe, this increase in firm value is unlikely to be driven by a reduction in managerial slack or by a reduction in uncertainty. Suggesting entrenchment, the documented positive effect of TIEAs on firm value is more pronounced in firms with strong exposure to tax havens and not present among firms that avoid TIEAs by engaging in *haven hopping*. Last but not least, firms that are more likely to suffer from agency problems, such as weakly governed firms, are more positively affected by the passage of TIEAs. In sum, we establish that investors endorse regulatory initiatives that have the potential of illuminating corporate activities in tax havens. At the same time, in keeping with the tax

motive, we find that a 1 percentage point reduction in home-country corporate tax rates is associated with a 1.2% increase in value of firms without tax haven subsidiaries, while firms with tax haven subsidiaries are unaffected.

The amount of cash held offshore by multinational corporations has grown significantly over the past years, reaching tens of trillions of US dollars. Our paper provides new insights into drivers of corporate decisions to move activities to tax havens. We also provide relevant implications to policy makers. Specifically, the OECD's emphasis on providing more transparency on offshore tax havens benefits shareholders. From shareholders' perspectives, our results support plans to further extend the current set of TIEAs to incorporate as many countries and tax havens as possible.

Appendix: A simple model

In this section, we illustrate how tax saving and expropriation motives for establishing a tax haven structure interact. The model builds on earlier work by Shleifer and Wolfenzon (2002), Desai, Dyck and Zingales (2007), and Doidge, Karolyi and Stulz (2007). It provides a theoretical underpinning of the main empirical results of this paper.

A.1 The tax motive

We consider a firm headquartered in a non-tax haven called Home country. The firm has a revenue of I and will have to pay a fraction t in taxes if this revenue stays in Home country. The firm has the opportunity to establish a tax haven structure at cost β . A tax haven subsidiary allows the firm to transfer a fraction $\varphi = f(I+k)$ of the revenue to a tax haven where the tax rate is zero. φ is a function of two components: f is the fraction of cash flow that can be transferred to a standard tax haven structure (e.g. one subsidiary in a given tax haven) and k is the complexity of the firm structure within a given tax haven. We do not distinguish between legal and illegal transfers here: In principle, φ measures what is feasible to transfer given the current regulation and current level of monitoring by tax authorities. Thus, an increase in tax authorities' oversight ability will reduce f . More complex structures may allow firms to transfer more cashflows to a tax haven. We also do not take a stand on why transferred funds increase in k though potential explanations include that more complex structures allow firms to legally transfer more

funds²⁷ and that more complex structure make oversight more difficult, thereby providing incentives for firms to be more aggressive in transferring funds to tax havens. For simplicity, we make the very strong assumptions that t, f, k and β are all exogenously given in the following.

Let V be the security value of the firm. The owners of the firm will establish a tax haven structure if and only if

$$\Delta V \equiv (1 - \varphi)(1 - t) + \varphi - \beta - (1 - t) \geq 0$$

Or

$$\varphi t \geq \beta$$

A tax haven structure is established whenever the taxes saved are higher than the cost of establishing the subsidiary. Notice all owners will have the same interest even if they are entitled to different shares of the cash flow. We therefore get:

Result 1: *Firms headquartered in countries with higher tax rates have greater incentive to establish a tax haven structure.*

Result 1 is illustrated in Online Appendix Table 1: We identify a clear positive correlation between tax rates and the use of tax havens.

We now compare the impact of a change in tax rates on shareholder value for firms with and without tax haven subsidiaries. Assume that a change in corporate taxes does not change firms' tax haven activity.²⁸ Then we have:

Result 2: *A decrease in corporate tax rate, t , will have a larger positive effect on the value of firms without tax haven subsidiaries than on the value of firms with tax haven subsidiaries.*

To save on notation, we prove the result by looking at the effect of an *increase* in tax rates. Let V^{NTH} (V^{TH}) be the value of the firm without (with) a tax haven structure:

$$V^{NTH} \equiv 1 - t$$

$$V^{TH} \equiv (1 - \varphi)(1 - t) + \varphi.$$

²⁷ The Irish sandwich, for instance, requires two subsidiaries outside the headquarter country. The Dutch sandwich adds a third foreign subsidiary in the Netherlands.

²⁸ Allowing firms to withdraw from tax havens after a decrease in corporate taxes in home countries does not change Result 2: A marginal tax change will not impact the behavior for all firms which had a strictly positive gain from being in a tax haven before the change. Hence, a firm that decides to stop using a tax haven will have a smaller benefit from a tax reduction in the homeland than a firm that did not use tax havens prior to the tax reduction.

Result 2 then follows from:

$$\frac{dV^{NTH}}{dt} \equiv -1 < -1 + \varphi = \frac{dV^{TH}}{dt}.$$

Similarly, a decrease in corporate tax rates should have a larger (and positive) effect on measures of shareholder value for firms that do not have tax haven operations than for firms that do. In Section 6, we confirm this result by showing that a tax reduction has greater impact on firms without tax haven structures than on firms with tax haven structures.

A.2 The expropriation motive

We now add an expropriation motive for tax haven activities. Our aim is to analyze the combined impact of tax and expropriation motives on shareholder value. To do this, we introduce controlling and non-controlling owners into our simple model. By *controlling owner*, we mean an individual or a group of individuals that make central decisions in the firm, including the decision to set up tax haven activities. We assume that controlling owners include managers of the firm or that managers fully internalize the preferences of controlling owners.

We extend the simple model above with the assumption that controlling owners are able to divert cash flows moved to the tax haven for their private use. This is a simplified way of modeling controlling owners' self-serving activities. This simplifying assumption may cover a variety of activities such as tunneling of cash flows to third parties (including themselves), financing pet projects, or piling up cash that could have been paid out as dividend in stead. The ability of a controlling owner to engage in self-serving activities creates a wedge between the interest of controlling owners and non-controlling owners who invest in the firm.

We introduce the following notation. Let λ be the controlling owner's cash flow stake. Notice λ can be close to zero, e.g. where the controlling owner is a professional manager. $(1 - \lambda)$ is thus the share of cash flows that goes to minority investors or non-controlling owners. As we are making empirical tests using Tobin's Q and abnormal returns as shareholder value, we define shareholder value from the interest of investors without the private benefit that goes to controlling owners.

We assume that the controlling owner diverts cash flow d in the tax haven at a cost of $\frac{\gamma}{2k}d^2$. The marginal cost of diversion has two components. It is increasing in γ , which is determined by the quality of corporate governance in the tax haven, the legal protection of minority investors, and the ability of third parties such as auditors, institutional investors, or tax authorities in home country.

In addition, the cost of diversion is decreasing in k , which is the complexity of a firm's tax haven activities. Minority investors and third parties have more difficulty monitoring the activities of controlling shareholders when the subsidiary structure is complex.

The controlling owner's value from investing in a firm that has tax haven operations, V_{th}^{co} , is given by :

$$V_{th}^{co} = \lambda[(1-\varphi)(1-t)] + \lambda(\varphi-d) + d - \frac{\gamma}{2k}d^2.$$

The optimal level of diversion is $d^* = \frac{(1-\lambda)k}{\gamma}$. The controlling owner diverts *less* when the expected cost of diverting is higher and he internalizes a larger share of the cash flows. The controlling owner diverts *more* when tax haven activities are more complex. To save on notation, we assume that the cash flow transferred to the tax haven is always bigger than the optimal diversion, i.e., $\varphi > d^*$.

Define the net rent to the controlling owner of the entrenchment activities as

$$NR_d^{co}(k, \gamma, \lambda) \equiv d^*(1-\lambda) - \frac{\gamma}{2k}d^{*2} \geq 0$$

which is non-negative by revealed preferences.

The incentive for a minority owner to set up a tax haven structure is

$$\begin{aligned} \Delta V^{mi} &\equiv V_{th}^{mi} - V_{nth}^{mi} = (1-\lambda)[(1-\varphi)(1-t)] + (1-\lambda)(\varphi - d^*) - (1-\lambda)(1-t) \geq (1-\lambda)\beta \\ &\Leftrightarrow \varphi t \geq d^* + \beta. \end{aligned}$$

Minority shareholders want the firm to engage in tax haven activities if the amount saved in taxes is larger than the sum of the amount diverted by controlling owners and the cost of establishing a tax haven structure.

The incentives for the controlling owner to set up a tax haven structure is given by

$$\begin{aligned} \Delta V^{co} &\equiv V_{th}^{co} - V_{nth}^{co} = \lambda(1-\varphi)(1-t) + \lambda\varphi + NR_d^{co}(k, \gamma, \lambda) - \lambda(1-t) \geq \lambda\beta \\ &\Leftrightarrow \varphi t \geq \beta - NR_d^{co}(k, \gamma, \lambda)/\lambda. \end{aligned}$$

The controlling owner engages in tax haven activities if the amount saved in taxes is larger than the cost of establishing a tax haven minus the net rent from entrenchment divided by the controlling owner's share of cash flows. Notice that when the controlling owner internalizes a sufficiently small share of the cash flow, he always prefers establishing a tax haven structure even if it is not in the interest of the minority owners. Since $NR_d^{co}(k, \gamma, \lambda)$ is positive, we get:

Result 3: *The controlling owner has larger incentives to engage in tax haven activities than the minority investors.*

Empirically, this result says that while both controlling and non-controlling owners may have an interest in setting up a taxhaven structure, controlling owners have a stronger incentive given their payoff from diverting common resources from minority owners. Thus, even if minority shareholders are in favor of a tax haven structure, they may also be in favor of sharper regulation of the use of taxhavens. One type of such regulation is embodied in Tax Information Exchange Agreements (TIEAs).

TIEAs empower tax authorities in the Home country to receive better information about firms' tax haven activities. In our simple world, a TIEA triggers two effects. The first is a reduction in f , the amount of cash transferred to a tax haven. As discussed in Section 2, a debate exists on whether TIEAs can or cannot affect firms' tax bill. We therefore allow for the case where TIEAs may have no effect on f at all.

The ability to receive more information about the financial flows of a firm's tax haven operations may also generate additional information about the firm's activities in the tax haven and to what extent these activities are aligned with the common interest for all shareholders. Through improved transparency, tax authorities, institutional investors, and other types of minority owners may receive better information about the firm's engagement in a given tax haven including information about cash holding, ownership structures, investment in and business with third parties. Tax authorities are concerned about the legality of the transactions and financial flows. However, shareholders may fire managers, change their investment engagement, or raise public debates in the media based on evidence and suspicions that support the notion that managers are not maximizing shareholder value, even when these activities are perfectly legal. Thus the second effect of TIEAs is to increase the transparency of the tax haven activities and, by doing so, increase the cost of diversion, γ .

Assume shareholder value is measured from the security value of the non-controlling owners. And define zero entrenchment activities as the situation where d^* is zero before and after the TIEA. Finally, to save notation, we assume that a TIEA does not affect the incentives to have tax haven subsidiaries or not.

Result 4: *Assume that a TIEA is signed and it implies a reduction in f and an increase in γ . Then*

(a) *TIEA has two opposing effects on shareholder value:*

1. *The reduction in f decreases shareholder value.*
2. *The increase in γ increases shareholder value.*

(b) *The negative impact from a change in f on shareholder value is decreasing in the complexity k of the taxhaven structure.*

(c) *The positive impact on shareholder value of an increase in γ increases in the complexity k of tax haven activities.*

Proof:

Shareholder value is measured as the security value of the firm excluding the rent of entrenchment for the controlling owner.

$$V_{th}^{mi} = (1 - \lambda)[(1 - \varphi)(1 - t) + (\varphi - d^*)]$$

a (1) $\frac{\partial V_{th}^{mi}}{\partial f} = (1 - \lambda)t(1 + k)$ which is positive. Thus a reduction in f reduces shareholder value.

a (2) $\frac{\partial V_{th}^{mi}}{\partial \gamma} = -(1 - \lambda)\frac{\partial d^*}{\partial \gamma} = \frac{d^{*2}}{k}$ which is positive.

(b) $\frac{\partial V_{th}^{mi}}{\partial f \partial k} = (1 - \lambda)t$. Thus the negative impact on shareholder value of f is decreasing in k .

(c) $\frac{\partial V_{th}^{mi}}{\partial \gamma \partial k} = \left(\frac{1 - \lambda}{\gamma}\right)^2$ which is positive.

q.e.d.

Result 4 yields a number of testable implications. The first part tells us that if tax havens are only used for tax savings in the interest of all owners, then a TIEA should weakly reduce shareholder value. From this, it follows that if the impact of TIEAs on shareholder value is positive, controlling owners or managers must have self-serving interests behind using tax haven subsidiaries. We test this prediction in Section 5.

Parts (b) and (c) tell us that the effect of TIEAs is stronger for complex firms: First, the reduction in shareholder value from reduced ability to benefit from aggressive tax avoidance is more pronounced for complex firms. Second, the positive effect of improvements in external governance (such as through TIEAs) on value is more pronounced for firms with complex firm structures in tax havens. Our empirical analysis shows that the positive effect of TIEAs on shareholder value is larger for more complex tax haven activities. This supports the notion of controlling owners engaging in self-serving activities beyond the interests of minority shareholders.

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Table 1: Tax haven list

This table lists countries and non-sovereign territories that are classified as tax havens by at least one of five sources: first, by the OECD Grey List (*List 1*; as of August 17, 2009); second, by the “Stop Tax Haven Abuse Act” (*List 2*; S.1533; not enacted); third, by the original OECD Tax Haven List (*List 3*); fourth, by Hines and Rice (1994) (*List 4*); fifth, by entering a Tax Information Exchange Agreement (*TIEA*; OECD Harmful Tax Practices). *Sovereign* is a dummy variable equal to one if a tax haven is a sovereign country and zero otherwise. *Population (in 000s)* denotes the population in 2013 (World Factbook). *Area (km²)* denotes the land area in square kilometers (World Factbook). *Pop Dens (ppl/km²)* is *population* divided by *area*. *#Foreign Subs* is the number of subsidiaries headquartered in the respective territory in 2013 that are ultimately owned (>50%) by a foreign public or private parent firm (Dun & Bradstreet’s *Who Owns Whom 2013/2014*). *Pop/ForSub* and *km²/ForSub* denote *population* and *area per foreign subsidiary*, respectively.

Country Name	Region	List 1	List 2	List 3	List 4	TIEA	Sovereign	Pop (000s)	Area (km ²)	Pop Dens (ppl/km ²)	#Foreign Subs	Pop/ForSub	km ² /ForSub
Andorra	Europe	1	0	1	1	1	1	85	455	187	6	14,180	76
Anguilla	Caribbean	1	1	1	1	1	0	13	91	148	20	673	5
Antigua&Barb.	Caribbean	1	1	1	1	1	1	89	440	202	16	5,567	28
Aruba	Caribbean	1	1	1	1	1	0	102	180	569	41	2,497	4
Bahamas	Caribbean	1	1	1	1	1	1	319	9,992	32	219	1,457	46
Bahrain	MiddleEast	1	1	1	1	1	1	1,318	760	1,734	173	7,617	4
Barbados	Caribbean	0	1	1	1	1	1	283	430	659	182	1,556	2
Belize	CentralAm.	1	1	1	1	1	1	334	22,810	15	32	10,447	713
Bermuda	Pacific	0	1	1	1	1	0	65	50	1,296	844	77	0
BritishVirginIsl.	Caribbean	1	1	1	1	1	0	28	153	182	1,486	19	0
CaymanIslands	Caribbean	1	1	1	1	1	0	58	240	240	1,152	50	0
ChannellIslands	Europe	1	1	1	1	1	0	164	190	862	2	81,929	95
CookIslands	Pacific	1	1	1	1	1	0	14	240	59	20	708	12
CostaRica	CentralAm.	1	1	1	0	1	1	4,805	51,060	94	295	16,289	173
Cyprus	Europe	0	1	1	1	0	1	839	9,240	91	1,698	494	5
Dominica	Caribbean	1	1	1	1	1	1	72	285	251	10	7,168	29
Gibraltar	Europe	1	1	1	1	1	1	30	7	4,412	354	85	0
Grenada	Caribbean	1	1	1	1	1	1	105	340	310	18	5,860	19
Guatemala	CentralAm.	0	0	0	0	1	1	15,807	108,889	145	243	65,048	448
HongKong	EastAsia	0	1	1	1	0	1	6,131	1,042	5,884	12,387	495	0
Ireland	Europe	0	0	0	1	0	1	4,587	68,890	67	8,988	510	8
IsleofMan	Europe	0	1	1	1	1	0	84	570	148			
Jordan	MiddleEast	1	0	0	1	0	1	6,318	88,780	71	106	59,604	838
Lebanon	MiddleEast	1	0	0	1	0	1	4,425	10,230	433	133	33,270	77
Liberia	WestAfrica	1	1	1	1	1	1	4,190	96,320	44	38	110,275	2,535
Liechtenstein	Europe	1	1	1	1	1	1	37	160	229	144	255	1
Luxembourg	Europe	0	0	0	1	0	1	531	2,590	205	5,154	103	1
Macao	EastAsia	0	0	0	1	1	0	608	28	21,696	205	2,963	0
Maldives	IndianOcean	1	0	1	1	0	1	338	300	1,128	20	16,922	15
Malta	Europe	0	1	1	1	0	1	419	320	1,311	585	717	1
MarshallIsl.	Pacific	1	0	1	1	1	1	53	180	292	13	4,043	14
Mauritius	IndianOcean	0	0	1	0	1	1	1,291	2,030	636	345	3,743	6
Monaco	Europe	1	0	1	1	1	1	38	2	18,790	183	205	0
Montserrat	Caribbean	1	0	1	1	1	0	5	102	51	5	1,033	20
Nauru	Pacific	1	1	1	0	0	1	9	21	449			
Niue	Pacific	1	0	1	0	0	1	1	260	5			
Panama	CentralAm.	1	1	1	1	1	1	3,802	74,340	51	611	6,223	122
Samoa	Pacific	1	1	1	1	1	1	189	2,830	67	231	818	12
SanMarino	Europe	0	0	1	1	1	1	31	60	521	7	4,464	9

Seychelles	IndianOcean	0	0	1	1	1	1	88	460	192	17	5,194	27
Singapore	EastAsia	1	1	1	1	0	1	5,399	700	7,713	12,195	443	0
St.Kitts&Nevis	Caribbean	1	1	1	1	1	1	305	999	305	14	21,769	71
St.Lucia	Caribbean	1	1	1	1	1	1	181	610	297	35	5,168	17
St.Vinc.&Gren.	Caribbean	1	1	1	1	1	1	109	389	281	9	12,153	43
Tonga	Pacific	1	0	1	0	0	1	105	720	146	4	26,235	180
Turks&Caicos	Caribbean	1	1	1	1	1	0	31	616	51	11	2,860	56
USVirginIsl.	Caribbean	0	0	1	1	0	0	105	343	307			
Uruguay	SouthAm.	0	0	0	0	1	1	3,324	176,215	19	422	7,878	418
Vanuatu	Pacific	1	0	1	1	1	1	247	12,190	20	20	12,363	610
Sovereign (mean/sum/<u>median</u>)		57%	70%	57%	84%	81%		1,790	20,145	1,278	44,907	<u>5,567</u>	<u>19</u>
Non-Sovereign (mn/sum/<u>med</u>)		75%	67%	75%	92%	100%		106	234	2,134	8,013	<u>671</u>	<u>2</u>
For Comparison													
USA	NorthAm.	0	0	0	0	0	1	318,968	9,857,306	32	32,071	9,946	307

Table 2: Country-level summary statistics and the use of tax haven subsidiaries around the world

This table provides country-level summary statistics. The sample consists of 52 countries for which at least one publicly listed firm with non-missing size and industry affiliation in Datastream/Worldscope could be matched to Dun & Bradstreet's *Who Owns Whom 2013/2014*. # *Parent Firms* denotes the number of publicly listed firms headquartered in the respective country. # *Subsidiary Firms* denotes the number of subsidiaries owned to 50% or more by the parent firms. *List 1* through to *List 4* and *TIEA* denote the % of parent firms that have at least one subsidiary in a tax haven where tax havens are countries or non-sovereign territories on respective lists (see Table 1 for definitions of lists); this percentage is 100% if the country is defined as a tax haven by the respective list. *Log (GDP pc)* is the natural logarithm of GDP per capita in USD in 2013 (Source: World Bank). *Corporate Tax Rate* is the maximum corporate tax bracket and *Income Tax Rate* is the maximum income tax bracket in 2013, obtained through various sources (largely government agencies and audit firms). *Tax Evasion* is obtained from the Global Competitiveness Report conducted by the World Economic Forum: Countries' tax evasion is rated on a scale from 1 (strongly disagree) to 7 (strongly agree) to the statement "Tax evasion is minimal." *ICRG (Property Rights Protection)* captures political, economic, and financial risk in 2013 and is obtained from the International Country Risk Guide; the measure ranges from 1 to 6 and increases in protection. *Corruption Level* is based on Transparency International's Corruption Perception Index as of 2013 (Source: Transparency International), an index that measures corruption levels on a scale from 1 (high corruption) to 10 (low corruption). Countries are sorted by the % of public firms that have at least one subsidiary headquartered in a tax haven by List 1 (OECD Grey List, August 2009).

Country	# Parent Firms	#Subsidiary Firms	% of Firms with Tax Haven Subsidiary (100% if country is TH by respective list)					Log (GDP pc)	Corporate Tax Rate	Income Tax Rate	Tax Evasion	ICRG	Corruption Index
			List 1	List 2	List 3	List 4	TIEA						
Singapore	400	4,883	100.00%	100.00%	100.00%	100.00%	4.25%	11.27	19.0%	20.0%	5.05	3.00	9.20
Switzerland	148	6,106	39.86%	45.95%	45.95%	50.00%	29.73%	10.90	25.0%	13.2%	4.49	7.00	9.00
Norway	120	2,623	22.50%	25.00%	25.00%	26.67%	3.33%	11.07	28.0%	47.8%	3.96	7.00	7.90
Malaysia	664	4,345	21.84%	24.85%	24.85%	24.85%	2.11%	10.05	25.0%	26.0%	4.34	4.00	5.10
Netherlands	76	3,201	19.74%	30.26%	30.26%	36.84%	22.37%	10.75	25.0%	52.0%	3.40	7.00	8.90
Japan	2,382	32,983	17.46%	25.90%	25.94%	26.15%	2.81%	10.51	38.0%	50.0%	4.41	7.00	7.30
Chile	35	188	17.14%	20.00%	20.00%	14.29%	17.14%	10.02	20.0%	40.0%	4.20	6.00	6.90
Portugal	18	724	16.67%	22.22%	22.22%	33.33%	27.78%	10.15	25.0%	54.0%	2.18	7.00	6.10
France	367	12,482	16.35%	20.16%	21.25%	27.79%	17.71%	10.59	33.3%	45.0%	3.86	7.00	6.90
Denmark	77	1,414	15.58%	20.78%	20.78%	25.97%	7.79%	10.67	25.0%	51.7%	3.70	7.00	9.30
Finland	92	2,437	15.22%	21.74%	21.74%	27.17%	5.43%	10.60	20.0%	51.0%	3.53	7.00	9.00
Austria	47	2,324	14.89%	23.40%	23.40%	27.66%	10.64%	10.70	25.0%	50.0%	3.60	7.00	8.10
SaudiArabia	27	96	14.81%	14.81%	18.52%	14.81%	14.81%	10.85	20.0%			1.00	3.50
Bangladesh	7	9	14.29%	28.57%	28.57%	28.57%	0.00%	8.06		25.0%		5.00	2.10
Spain	93	3,038	13.98%	15.05%	17.20%	23.66%	15.05%	10.37	30.0%	52.0%	1.91	7.00	6.50
UK	1,162	33,021	13.60%	18.59%	18.76%	26.33%	10.50%	10.50	24.0%	45.0%	4.67	7.00	7.70
India	983	4,136	12.82%	15.46%	16.38%	15.97%	3.15%	8.60	30.0%	33.0%	2.16	4.00	3.40
Germany	471	12,137	11.68%	15.50%	15.50%	18.26%	6.58%	10.68	29.8%	45.0%	3.41	7.00	7.90
Philippines	87	773	11.49%	14.94%	14.94%	14.94%	10.34%	8.79	30.0%	32.0%	1.83	6.00	2.30
USA	3,572	54,577	11.42%	15.37%	15.57%	18.03%	8.62%	10.88	39.0%	39.6%	4.47	7.00	7.30
Venezuela	9	45	11.11%	11.11%	11.11%	11.11%	11.11%	9.82	34.0%	34.0%	1.56	5.00	1.90
Pakistan	18	30	11.11%	16.67%	16.67%	16.67%	5.56%	8.43	35.0%	35.0%		5.00	2.50
Colombia	9	22	11.11%	11.11%	11.11%	11.11%	11.11%	9.46	33.0%	33.0%	2.11	4.00	3.80
HongKong	347	2,105	10.66%	100.00%	100.00%	100.00%	9.51%	10.88	16.5%	15.0%			
Belgium	77	1,536	10.39%	14.29%	14.29%	32.47%	25.97%	10.62	34.0%	55.0%	2.27	7.00	7.30
Indonesia	124	528	9.68%	12.90%	12.90%	12.90%	0.81%	9.17	25.0%	30.0%	2.53	1.00	2.60

Australia	1,217	11,124	8.79%	10.85%	10.85%	11.67%	1.31%	10.72	30.0%	45.0%	4.58	7.00	8.70
Italy	126	3,013	8.73%	11.11%	11.11%	26.19%	19.84%	10.44	31.4%	43.0%	1.77	7.00	4.80
Mexico	12	319	8.33%	8.33%	8.33%	8.33%	16.67%	9.76	30.0%	30.0%	2.46	4.00	3.60
Sweden	286	7,020	7.69%	14.34%	14.69%	16.08%	5.94%	10.68	22.0%	57.0%	3.39	7.00	9.30
Korea	759	3,486	7.38%	14.23%	14.23%	14.76%	1.05%	10.43	22.0%	41.8%			
NewZealand	68	396	7.35%	8.82%	8.82%	8.82%	0.00%	10.42	28.0%	33.0%	5.00	7.00	9.30
Thailand	260	1,141	7.31%	8.85%	8.85%	8.85%	0.38%	9.56	20.0%	35.0%	3.41	5.00	3.50
Egypt	16	32	6.25%	6.25%	6.25%	6.25%	6.25%	9.29	20.0%	20.0%	3.57	2.00	2.80
Brazil	33	300	6.06%	6.06%	6.06%	12.12%	12.12%	9.62	34.0%	27.5%	2.14	6.00	3.50
Ireland	37	786	5.41%	8.11%	8.11%	100.00%	8.11%	10.71	25.0%	41.0%	3.55	7.00	7.70
Israel	205	1,464	5.37%	7.32%	7.32%	9.27%	3.41%	10.40	26.5%	52.0%	3.69	7.00	6.00
Vietnam	21	48	4.76%	4.76%	4.76%	4.76%	0.00%	8.57	25.0%	35.0%		1.00	2.70
Canada	776	3,980	4.12%	7.22%	7.22%	9.28%	4.90%	10.67	31.0%	50.0%	3.77	7.00	8.70
SouthAfrica	256	2,252	3.13%	5.08%	5.47%	7.03%	2.34%	9.43	28.0%	40.0%	2.40	7.00	4.90
Turkey	69	373	1.45%	1.45%	1.45%	2.90%	1.45%	9.85	20.0%	35.0%	2.07	3.00	4.60
China	1,100	6,106	1.18%	12.00%	12.00%	12.09%	0.27%	9.38	25.0%	45.0%			
Poland	380	1,839	0.53%	0.79%	0.79%	1.84%	0.79%	10.06	19.0%	32.0%	2.19	7.00	4.60
Argentina	23	105	0.00%	0.00%	0.00%	0.00%	0.00%	10.02	35.0%	35.0%	2.41	6.00	2.90
CzechRep.	14	63	0.00%	0.00%	0.00%	0.00%	0.00%	10.22	19.0%	15.0%	2.54	7.00	5.20
Greece	99	1,004	0.00%	16.16%	16.16%	19.19%	5.05%	10.13	33.0%	42.0%	2.36	7.00	4.70
Hungary	15	215	0.00%	6.67%	6.67%	6.67%	0.00%	10.05	19.0%	16.0%	1.97	7.00	5.10
Kazakhstan	1	2	0.00%	0.00%	0.00%	0.00%	0.00%	10.04	17.5%	10.0%		2.00	2.20
Nigeria	10	15	0.00%	0.00%	0.00%	0.00%	0.00%	8.66	30.0%	24.0%		1.00	2.70
Peru	1	3	0.00%	0.00%	0.00%	0.00%	0.00%	9.36	30.0%	30.0%	2.66	3.00	3.60
Russia	103	900	0.00%	1.94%	1.94%	1.94%	0.00%	10.10	20.0%	13.0%	1.43	5.00	2.10
Ukraine	32	101	0.00%	0.00%	0.00%	0.00%	0.00%	9.07	25.0%	15.0%		2.00	2.50
Sum / Country													
Mean	17,331	231,850	11.14%	16.25%	16.42%	20.26%	7.20%	10.04	26.55%	36.01%	3.12	5.43	5.47

Table 3: Firm-level summary statistics

This table presents firm-level summary statistics and characteristics of firms with tax haven subsidiaries in 2013. Panels A and B report the number of sample firms, the mean, the mean if such firm has at least one tax haven subsidiary or no tax haven subsidiary (using the OECD Grey List to identify tax havens; see Table 1), and the difference in means with significance at 1%, 5%, and 10% levels, denoted by ***, **, and *, respectively. Panel A considers all firms, while Panel B focuses on firms with at least one foreign subsidiary. *TH Subsidiary (Dummy)* is a dummy variable equal to one if a firm has a tax haven subsidiary in 2013. *TH Subsidiary w/Acc Info* is constructed the same way but restricted to firms with non-missing total assets and non-missing data required to construct Tobin's Q. All other accounting measures are restricted to firms for whom *Tobin's Q* is available. Means of accounting variables are constructed from one observation per firm; firm-level observations are means over up to the last 10 years (2004–2013). *Tobin's Q* is obtained from Osiris as (Total Equity+Total Liabilities)/(Total Shareholder Equity (Book Value) + Total Liabilities). *Sales Growth* is the average year-by-year growth in sales. *ROA(%)* is Profit & Loss before Tax / Total Assets in %. *Cash Flows over Sales* is Operating Cash Flow over Total Sales in %. *Profit Margin* and *Gross Margin* are Profit&Loss before Tax and Gross Profit over Operating Revenue, respectively. *Effective Tax Rate* is Income Taxes / Earnings before Interest, Tax, Depreciation, and Amortization in %. *Leverage* is Total Liabilities and Debt / Total Assets. *Dividend Payer Dummy* is a dummy equal to 1 if a firm pays a non-zero dividend. *Dividend Payout* is the fraction of income paid out in dividends, assuming that firms with missing dividend information do not pay a dividend. *Intangible Assets* and *R&D* are intangible assets and R&D as a fraction of total assets. *# Trademarks* and *# Patents* denote the number of registered trademarks and patents in 2013. *ID Trademark* and *ID Patent* are dummy variables equal to one if a firm has a trademark and patent, respectively. *ln(Assets)* is the natural logarithm of total assets; *Age* is time between foundation and 2013. *Mean Foreign Tax* is the average maximum corporate tax rate faced by foreign subsidiaries weighing each subsidiary equally. *Dif(Foreign-Home Tax)* is the *Mean Foreign Tax* less the maximum tax rate at home. Accounting data and trademarks & patent data are obtained from Osiris and Orbis. Tax data is obtained from various sources including government agencies and KPMG. All accounting measures are winsorized at 1% and 99% levels. The significance of the difference in means at 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively

Variable	Panel A: All sample firms						Panel B: Firms with ≥ 1 foreign subsidiary					
	#Firms	Mean	Does firm have TH Sub?			Difference	#Firms	Mean	Does firm have TH Sub?			Difference
			yes	no					Yes	No		
TH Subsidiary (Dummy)	17,331	13.25%					7,578	40.25%				
TH Subsidiary w/Acc Info	10,513	17.23%					5,272	31.85%				
Tobin's Q	10,513	1.64	1.48	1.67	(0.18)	***	5,272	1.63	1.49	1.70	(0.21)	***
Sales Growth	9,722	11.9%	8.7%	12.6%	-3.9%	***	5,010	11.0%	8.8%	12.1%	-3.3%	***
ROA(%)	9,221	4.3%	5.3%	4.1%	1.2%	***	4,793	4.8%	5.4%	4.5%	0.9%	***
Cash Flows over Sales	9,450	8.8%	10.7%	8.4%	2.4%	***	4,924	8.4%	10.8%	7.2%	3.6%	***
Profit Margin	9,964	4.6%	6.6%	4.2%	2.4%	***	5,121	4.7%	6.6%	3.7%	2.9%	***
Gross Margin	9,861	42.2%	41.8%	42.3%	-0.6%		5,081	42.5%	41.9%	42.8%	-0.9%	
Effective Tax Rate	8,051	21.4%	23.1%	21.0%	2.0%	***	4,045	23.3%	23.7%	23.1%	0.6%	
Leverage	9,940	47.3%	49.2%	46.9%	2.3%	***	5,079	48.5%	49.6%	48.0%	1.5%	**
Cash over Total Assets	10,308	17.3%	15.7%	17.7%	-1.9%	***	5,190	16.8%	15.3%	17.5%	-2.2%	***
Dividend Payer Dummy	10,513	49.8%	65.2%	46.6%	18.6%	***	5,272	55.5%	66.1%	50.5%	15.5%	***
Dividend Payout	10,513	12.7%	15.0%	12.2%	2.9%	***	5,272	12.6%	14.4%	11.7%	2.7%	***
Intangible Assets	9,889	10.9%	13.0%	10.5%	2.5%	***	5,038	13.8%	13.8%	13.8%	0.0%	
R&D	10,513	1.5%	1.7%	1.5%	0.3%	**	5,272	2.1%	1.9%	2.2%	-0.4%	**
#Trademarks	10,513	7.0	14.2	5.5	8.7	***	5,272	11.6	15.3	9.9	5.4	***
ID Trademark	10,513	39.9%	52.2%	37.3%	14.9%	***	5,272	56.4%	56.0%	56.6%	-0.6%	
#Patents	10,513	64.7	170.4	42.7	127.7	***	5,272	115.7	183.7	83.8	99.9	***
ID Patent	10,513	41.0%	49.9%	39.1%	10.8%	***	5,272	53.9%	53.5%	54.1%	-0.6%	
ln(Assets)	10,513	11.9	13.1	11.7	1.4	***	5,272	38.5	43.5	36.2	7.2	***
Age	10,513	33.6	41.6	32.0	9.7	***	5,272	12.6	13.3	12.2	1.0	***
Mean Foreign Tax							5,206	26.5%	24.3%	27.5%	-3.3%	***
Dif (Foreign-Home Tax)							5,205	-4.8%	-6.4%	-4.1%	-2.4%	***

Table 4: Tax Information Exchange Agreements and firm value

This table studies the effect of Tax Information Exchange Agreements (TIEAs) on firm value using OLS regressions. Panel A uses annual data from 1996-2013 and measures firm value by Tobin's Q. Panel B uses daily data from 2003 to 2013 and measures firm value by stock returns. Subsidiary data is obtained from Dun & Bradstreet's *Who Owns Whom 2008/2009* and *1998/1999*. In Panel A, the left-hand side variable is the natural logarithm of Tobin's Q, calculated as before. The key control *Treated after* is an indicator variable equal to one in the years after a firm has been directly affected by a TIEA for the first time. A firm is directly affected (*treated*) if it is headquartered in a country that signs a TIEA and has a subsidiary in the other signatory country or non-sovereign territory (a tax haven). Column (1) uses the full sample of firms. In columns (2) and (3), one non-treated (control) firm is matched to each treated firm five years prior to the year a TIEA is signed. In columns (4) and (5), up to 10 firms are matched to treated firms. *Control after* is an indicator variable equal to one in the years after a firm is control firm to a firm affected by a TIEA for the first time. Firms are matched with replacement by country and industry and additionally by the natural logarithm of assets and the natural logarithm of their age, measured as the number of years since the founding year. All regressions control for the natural logarithm of assets, the natural logarithm of assets squared, firm fixed effects, and year times industry fixed effects. *Treated=Control* provides the p-value from testing that the coefficient on *Treated after* equals that on *Control after*. T-statistics for tests of significance of coefficients based on robust standard errors clustered at the country and year level (2-way clustering) are reported below coefficients. In Panel B, the dependent variable is firms' raw return (Columns (1)–(4)), and alpha calculated using a 1-factor CAPM estimated for a rolling estimation period starting 292 days before the respective day and ending 40 days before the respective day using the local market index as benchmark (Columns (5)–(8)). *Treated* is a dummy equal to one if a firm is directly affected by a TIEA for the first time (through being headquartered in one signatory country and having at least one subsidiary in the other signatory country) during respective *treatment periods*. A *treatment period* of $[-t,t]$ denotes that a firm is treated within the next or has been treated within the previous t days because its headquarter country signs a TIEA with a relevant tax haven. All regressions include firm and day fixed effects. Dependent variables are multiplied by 100. *Treated* measures the average daily effect during the treatment period; *Economic Effect* documents the overall economic effect during the treatment period ($=\textit{Treated}$ coefficient * number of days in the *treatment period*). All continuous variables are winsorized at 1% and 99% levels. T-statistics for tests of significance of coefficients based on robust standard errors clustered at the firm and day level (2-way clustering) are reported below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Panel A: Tobin's Q

	(1) ALL Ln(Tobin's Q)	(2) 1 Match Ln(Tobin's Q)	(3) 1 Match Ln(Tobin's Q)	(4) 10 Match Ln(Tobin's Q)	(5) 10 Matches Ln(Tobin's Q)
Treated after	0.025*** (3.22)	0.020** (2.78)	0.026** (2.68)	0.021** (2.32)	0.023*** (2.87)
Control after			-0.009 (-0.77)		-0.005 (-0.42)
Ln(Assets)	0.098*** (3.82)	0.045 (1.30)	0.047 (1.33)	0.127*** (10.57)	0.128*** (10.53)
Ln(Assets) Sqr	-0.003*** (-4.12)	-0.002* (-1.93)	-0.002* (-1.95)	-0.006*** (-9.81)	-0.006*** (-9.89)
Ln(Age)	-0.103 (-1.32)	0.020 (0.31)	0.019 (0.30)	-0.006 (-0.10)	-0.007 (-0.11)
Firm FE	Y	Y	Y	Y	Y
Year * Ind FE	Y	Y	Y	Y	Y
Observations	85141	4899	4899	14613	14613
Adj. R2	0.712	0.769	0.769	0.745	0.745
Treated=Control			0.091		0.071

Panel B: Daily stock returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Raw Return	Raw Return	Raw Return	Raw Return	Alpha	Alpha	Alpha	Alpha
Treatment period	[-15;15]	[-10;10]	[-5;5]	[-1;3]	[-15;15]	[-10;10]	[-5;5]	[-1;3]
Treated	0.068*** (3.41)	0.136*** (3.43)	0.165** (2.26)	0.187*** (3.01)	0.067*** (3.35)	0.138*** (2.68)	0.171** (2.51)	0.161*** (3.95)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,522,997	20,522,997	20,522,997	20,522,997	20,106,275	20,106,275	20,106,275	20,106,275
R2	0.021	0.012	0.012	0.012	0.020	0.007	0.011	0.011
Economic Effect	2.11%	2.86%	1.82%	0.94%	2.08%	2.90%	1.88%	0.81%

Table 5: Tax Information Exchange Agreements and firm complexity

This table investigates differences in firm structure between firms with and without tax haven subsidiary (Panels A and B) and tests whether firms with more complex haven operations are differentially affected by Tax Information Exchange Agreements (TIEAs). Subsidiary data is obtained from Dun & Bradstreet's *Who Owns Whom 2013/2014* (Panels A–C) and supplemented by *Who Owns Whom 2008/2009* and 1998/1999 (Panel C). In Panel A, the first measure of complexity is *Number of Subsidiaries*, the number of subsidiaries and subsidiaries of subsidiaries owned to 50% or more. $>x$ *Subsidiaries* is a dummy equal to one if a firm has strictly more than x subsidiaries. Mean and Median depth indicate the mean and median hierarchical level at which to find a firm's subsidiaries, respectively. $\geq y$ *Layers* is a dummy variable equal to one if a firm has at least y hierarchical layers. By that definition, a firm with at least one subsidiary that owns a subsidiary in turn is a firm with at least 2 layers, i.e., ≥ 2 *Layers*=1. Panel A follows Table 3 (Panels A and B) in splitting the sample into firms with and firms without tax haven subsidiary. Panel B provides results of OLS and probit regressions where the dependent variable is one of the complexity measure and the key control is a dummy equal to one if a firm has a tax haven subsidiary and zero otherwise. Besides including industry and country fixed effects, firm-level controls outlined in Table 3 are included. Panel C repeats the main analysis (Table 4) but treatment is additionally interacted with the complexity of firms' tax haven operations. Complexity of tax haven operations is measured by the natural logarithm of the number of tax haven subsidiaries (Columns 1–5) and the percentage of a firm's subsidiaries that are headquartered in tax havens (Columns 6–10). For matched subsamples, firms are matched with replacement by country and industry and additionally by the natural logarithm of assets and the natural logarithm of age, measured as the number of years since the founding year. All regressions control for the natural logarithm of assets, the natural logarithm of assets squared, firm fixed effects, and year times industry fixed effects. All continuous variables are winsorized at 1% and 99% level. T-statistics for tests of significance of coefficients based on robust standard errors clustered at the country and year level (2-way clustering) are reported below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Panel A: Firm-level summary statistics for complexity measures

Variable	All Sample Firms						Firms with ≥ 1 Foreign Subsidiary					
	#Firms	Mean	Does firm have TH Sub?				#Firms	Mean	Does firm have TH Sub?			
			yes	no	Difference	***			Yes	No	Difference	
Number Subsidiaries	10,513	16.44	47.91	9.89	38.02	***	5,272	27.3	51.2	16.2	35.0	***
>1 Subsidiary	10,513	78.4%	95.8%	74.8%	21.0%	***	5,272	90.9%	96.6%	88.2%	8.4%	***
>3 Subsidiaries	10,513	56.5%	86.8%	50.2%	36.6%	***	5,272	75.9%	89.1%	69.7%	19.3%	***
>5 Subsidiaries	10,513	44.0%	78.9%	36.8%	42.1%	***	5,272	64.6%	81.7%	56.5%	25.2%	***
>10 Subsidiaries	10,513	28.9%	63.6%	21.7%	41.9%	***	5,272	46.7%	67.2%	37.1%	30.1%	***
>20 Subsidiaries	10,513	17.0%	47.2%	10.7%	36.5%	***	5,272	29.8%	50.5%	20.1%	30.4%	***
Mean Depth	10,513	1.31	1.72	1.23	0.49	***	5,272	1.51	1.76	1.39	0.37	***
Median Depth	10,513	1.25	1.58	1.18	0.40	***	5,272	1.41	1.62	1.31	0.30	***
≥ 2 Layers	10,513	44.3%	78.4%	37.2%	41.2%	***	5,272	65.2%	81.5%	57.6%	23.8%	***
≥ 3 Layers	10,513	20.8%	49.2%	14.9%	34.3%	***	5,272	35.7%	52.4%	27.9%	24.6%	***
≥ 4 Layers	10,513	10.9%	31.6%	6.6%	25.0%	***	5,272	19.9%	34.1%	13.3%	20.7%	***

Panel B: Complexity and the use of tax haven subsidiaries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Ln(#Subs) OLS	>1 Sub (Dummy) Probit	>3 Subs (Dummy) Probit	>5Subs (Dummy) Probit	>10Subs (Dummy) Probit	>20Subs (Dummy) Probit	Ln(Mean Depth) OLS	Ln(Median Depth) OLS	≥2Layers (Dummy) Probit	≥3Layers (Dummy) Probit	≥4Layers (Dummy) Probit
Tax Haven Firm (Dummy)	0.913*** (24.42)	0.951*** (10.01)	1.023*** (14.26)	1.066*** (15.91)	1.055*** (16.69)	1.138*** (16.39)	0.129*** (14.72)	0.104*** (10.57)	1.020*** (15.28)	0.938*** (13.91)	1.027*** (13.37)
Log (Assets)	0.240*** (24.64)	0.173*** (11.66)	0.271*** (16.57)	0.315*** (16.64)	0.351*** (15.60)	0.412*** (16.28)	0.033*** (17.67)	0.029*** (14.48)	0.276*** (15.72)	0.329*** (16.24)	0.336*** (13.77)
Return on Assets	0.219* (1.94)	0.419* (1.75)	0.596*** (2.66)	0.813*** (3.37)	0.311 (1.14)	0.271 (0.76)	0.058*** (2.58)	0.062** (2.49)	0.483** (2.10)	0.240 (0.85)	0.221 (0.63)
Eff. Tax Rate	0.189** (2.13)	0.235 (1.30)	0.447*** (2.73)	0.619*** (3.72)	0.684*** (3.82)	0.705*** (3.28)	0.030* (1.69)	0.023 (1.17)	0.561*** (3.42)	0.743*** (3.81)	0.711*** (2.84)
Leverage	0.320*** (5.99)	0.266** (2.54)	0.352*** (3.56)	0.491*** (4.70)	0.653*** (5.52)	0.784*** (5.44)	0.073*** (6.77)	0.070*** (5.81)	0.495*** (4.76)	0.566*** (4.61)	0.550*** (3.54)
Cash / Total Assets	-0.459*** (-5.03)	-0.345* (-1.89)	-0.549*** (-3.22)	-0.682*** (-3.75)	-0.981*** (-4.56)	-0.870*** (-3.13)	-0.040** (-2.21)	-0.045** (-2.23)	-0.252 (-1.37)	-0.736*** (-3.11)	-0.466 (-1.51)
Div Payer (Dummy)	0.203*** (5.72)	0.242*** (3.64)	0.265*** (4.34)	0.278*** (4.48)	0.355*** (5.28)	0.333*** (4.00)	0.003 (0.50)	-0.006 (-0.80)	0.170*** (2.77)	0.159** (2.16)	0.178* (1.95)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5628	5534	5613	5613	5595	5571	5627	5627	5605	5598	5494
Adj./Pseudo R2	0.544	0.189	0.266	0.325	0.380	0.457	0.401	0.288	0.300	0.392	0.433

Panel C: Tax Information Exchange Agreements and complexity of tax haven structure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Complexity Measure: Log(Number Tax Haven Subsidiaries)					Complexity Measure: %Tax Haven Subsidiaries				
Sample	ALL	1 Match	1 Match	10 Match	10 Matches	ALL	1 Match	1 Match	10 Match	10 Matches
Dependent Var	Ln Tobin's Q	Ln Tobin's Q	Ln Tobin's Q	Ln Tobin's Q	Ln Tobin's Q	Ln Tobin's Q	Ln Tobin's Q	Ln Tobin's Q	Ln Tobin's Q	Ln Tobin's Q
Treated after	-0.009 (-0.43)	-0.011 (-0.57)	-0.017 (-0.80)	-0.017 (-0.86)	-0.011 (-0.59)	-0.013 (-0.88)	-0.017 (-1.22)	-0.011 (-0.82)	-0.013 (-0.97)	-0.012 (-0.97)
Treated after *	0.024** (2.78)	0.024*** (3.11)	0.028*** (3.35)	0.027*** (3.32)	0.029*** (4.77)	0.690*** (3.77)	0.784*** (4.43)	0.860*** (4.32)	0.713*** (3.95)	0.908*** (5.07)
Control after			0.009 (0.51)		-0.007 (-1.10)			-0.009 (-0.73)		-0.006 (-0.99)
Control after *			-0.007 (-0.82)		-0.004 (-0.52)			-0.074 (-1.05)		-0.204* (-2.09)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year * Ind FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	65983	3578	3578	9790	9790	65971	3566	0.772	9778	0.747
Adjusted R2	0.713	0.770	0.770	0.746	0.746	0.713	0.772	0.937	0.747	0.601
Treated=Control			0.025		0.002			0.002		0.000

Table 6: Tax Information Exchange Agreements and haven hopping

This table investigates whether firms moved their subsidiaries out of tax havens subsequent to tax havens entering Tax Information Exchange Agreements (TIEAs; Panel A) and whether doing so mitigates the effect of TIEAs on firm value (Panel B). Panel A is a conversion matrix tracking firms between (i) 1998 and 2008 and (ii) 2008 and 2013, respectively. Subsidiary data is obtained from Dun & Bradstreet's *Who Owns Whom 2013/2014, 2008/2009, and 1998/1999*. The sample is a balanced panel of firms with subsidiary data for 1998 and 2008, as well as 2008 and 2013, respectively. In part (i) of Panel A, each row gives the number of firms in 1998 and each column gives the number of firms in 2008. Shown are the number of firms without tax haven subsidiary, with tax haven subsidiaries in a tax haven that signed a TIEA between 1998 and 2008, with only tax haven subsidiary in tax havens that did not sign a TIEA between 1998 and 2008, and the number of sample firms. Numbers and percentages denote the number of firms and the percentage of the group moving from a category in 1998 to a category in 2008. For instance, out of 2,350 sample firms, 2,274 firms (97%) did not have a tax haven subsidiary in 1998, and 2,091 of these 2,274 firms (92%) did not have a tax haven subsidiary in 2008 either. Part (ii) of Panel A reports the same for firms in 2008 and 2013. Part (i) ignores firms affected by TIEAs after 2008; Part (ii) ignores firms affected by TIEAs prior to 2008. Panel B repeats our main analysis (Table 4), but treatment is additionally interacted with being a *haven hopper*. The left-hand-side variable is Tobin's Q. The left-hand-side variable is the natural logarithm of Tobin's Q, calculated as (Total Equity+Total Liabilities)/(Total Shareholder Equity (Book Value) + Total Liabilities). *Treated after* is an indicator variable equal to one in the years after a firm has been directly affected by a TIEA. A firm is directly affected (*treated*) if it is headquartered in a country that signs a TIEA and has a subsidiary in the other signatory country or non-sovereign nation (a tax haven). *Haven Hopper* is a dummy variable equal to one if a firm is treated by a TIEA and subsequently moves out of tax havens that entered TIEAs and into tax havens that did not enter TIEAs. All continuous variables are winsorized at 1% and 99% levels. T-statistics for tests of significance of coefficients based on robust standard errors clustered at the country and year level (2-way clustering) are reported below coefficients.

Panel A: Haven hopping

(i) Haven hopping between 1998 and 2008

	2008	None	Affected TH Sub	Only Other TH Sub	Sum 1998	
1998						
None		2,091 [92%]	4 [0%]	179 [8%]	2,274	[97%]
Affected TH Sub		0 [0%]	10 [67%]	5 [33%]	15	[1%]
Only Other TH Sub		0 [0%]	6 [10%]	55 [90%]	61	[3%]
Sum 2008		2,091 [89%]	20 [1%]	239 [10%]	2,350	[100%]

(ii) Haven hopping between 2008 and 2013

	2013	None	Affected TH Sub	Only Other TH Sub	Sum 2008	
2008						
None		3,360 [95%]	23 [1%]	139 [4%]	3,522	[90%]
Affected TH Sub		0 [0%]	83 [69%]	37 [31%]	120	[3%]
Only Other TH Sub		0 [0%]	18 [7%]	251 [93%]	269	[7%]
Sum 2013		3,360 [86%]	124 [3%]	427 [11%]	3,911	[100%]

Panel B: Haven hopping and firm value

	(1)	(2)	(3)	(4)	(5)
	ALL	1 Match	1 Match	10 Match	10 Matches
	Ln(Tobin's	Ln(Tobin's	Ln(Tobin's	Ln(Tobin's	Ln(Tobin's
	Q)	Q)	Q)	Q)	Q)
Treated after	0.026*** (3.33)	0.021** (2.24)	0.027* (1.78)	0.022** (2.46)	0.024*** (3.08)
Treated after * Haven Hopper	-0.015 (-1.63)	-0.024* (-1.87)	-0.022* (-1.97)	-0.020* (-1.84)	-0.019 (-1.63)
Control after			-0.008 (-0.36)		-0.005 (-0.41)
Ln(Assets)	0.098*** (3.82)	-0.124 (-1.22)	-0.124 (-1.22)	0.127*** (10.63)	0.128*** (10.58)
Ln(Assets) Sqr	-0.003*** (-4.12)	0.002 (0.77)	0.002 (0.77)	-0.006*** (-9.85)	-0.006*** (-9.92)
Ln(Age)	-0.103 (-1.32)	0.027 (0.46)	0.026 (0.45)	-0.006 (-0.09)	-0.007 (-0.11)
Firm FE	Y	Y	Y	Y	Y
Year * Ind FE	Y	Y	Y	Y	Y
N	85141	4899	4899	14613	14613
Adjusted R2	0.712	0.769	0.769	0.745	0.745

Table 7: Tax Information Exchange Agreements and determinants of firm value

This table studies the effect of Tax Information Exchange Agreements (TIEAs) on various contributors to firm value using OLS regressions for a panel of firms from 1995 to 2013. The analysis follows exactly Table 6 but the left-hand side is *Profit Margin* (Profit&Loss before Tax / Operating Revenue in %), *Gross Margin* (Gross Profit / Operating Revenue in %), *Effective Tax Rate* (Income Taxes / Earnings before Interest, Tax, Depreciation and Amortization in %), *Beta* (estimated in a 1-factor model of monthly excess stock returns on the headquarter country's main market index's excess return over 24 months), and *Leverage* (Total Liabilities and Debt / Total Assets). Odd-numbered columns report results for the whole sample; even-numbered columns report results for a sample of treated and control firms. Control firms are matched by country and industry and then additionally by the natural logarithm of assets and the natural logarithm of their age, measured as the number of years since the founding year. All regressions control for the natural logarithm of assets, the natural logarithm of assets squared, firm fixed effects, and year times industry fixed effects. *Treated=Control* provides the p-value from testing that the coefficient on *Treated after* equals that on *Control after*. All continuous variables are winsorized at 1% and 99% levels. T-statistics for tests of significance of coefficients based on robust standard errors clustered at the country and year level (2-way clustering) are reported below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Dependent Variable	Profit Margin (%)		Gross Margin (%)		Effective Tax Rate		Beta		Leverage	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	ALL	Match 1	ALL	Match 1	ALL	Match 1	ALL	Match 1	ALL	Match 1
Treated after	-0.827 (-1.41)	-0.185 (-0.37)	0.672* (1.86)	0.767 (0.92)	-0.006 (-0.41)	-0.001 (-0.04)	0.003 (0.05)	-0.042 (-1.20)	0.002 (0.08)	-0.001 (-0.18)
Control after		-1.061 (-1.68)		-0.346 (-0.48)		0.004 (0.29)		0.003 (0.08)		0.005 (0.74)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year * Ctr FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	71810	4664	72119	4649	80226	4732	38940	2193	83512	4884
Adjusted R2	0.484	0.464	0.843	0.883	0.309	0.357	0.339	0.379	0.678	0.788
Treated=Control		0.411		0.474		0.809		0.506		0.615

Table 8: Tax Information Exchange Agreements and firm value: Cross-sectional results

This table follows Table 4 in studying the effect of Tax Information Exchange Agreements (TIEAs) on firm value using OLS regressions. The left-hand-side variable is the natural logarithm of Tobin's Q. Set-up and controls follow Table 4, but the treatment dummy is additionally interacted with firm characteristics. These interaction terms are generally continuous measures with the exception of institutional ownership dummies (equal to one if a firm has above-median institutional ownership by country and industry; Panel A Columns (1)-(2)), patent dummies (equal to one if a firm has at least one patent; Panel B Columns (3)-(4)), and trademark dummies (equal to one if a firm has at least one trademark; Panel B Columns (7)-(8)). Variable construction follows Table 3.

Panel A: Ownership, leverage, growth, and Beta

Interaction with...	Institutional Ownership Dummy		Leverage Continuous		Cash Flow Growth Continuous		Beta	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ALL	Match 1	ALL	Match 1	ALL	Match 1	ALL	Match 1
Treated after	0.069*** (3.12)	0.057** (2.96)	0.243*** (2.90)	0.241*** (3.74)	0.031*** (3.42)	0.030*** (3.18)	-0.036*** (-3.23)	-0.032** (-2.61)
Treated after * Interaction	-0.053** (-2.42)	-0.038* (-1.81)	-0.364** (-2.42)	-0.370*** (-3.35)	0.039*** (3.98)	0.046*** (5.55)	0.051*** (5.50)	0.049*** (3.55)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Year * Ind FE	Y	Y	Y	Y	Y	Y	Y	Y
N	38802	3574	83512	4884	69156	4316	45029	2502
Adjusted R2	0.711	0.762	0.716	0.777	0.731	0.789	0.740	0.794

Panel B: Patents and trademarks

Interaction with...	Ln(Patents) Continuous		Patent Dummy		Ln(Trademarks) Continuous		Trademark Dummy	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ALL	Match 1	ALL	Match 1	ALL	Match 1	ALL	Match 1
Treated after	-0.013 (-0.54)	-0.017 (-0.76)	-0.024 (-1.20)	-0.016 (-0.79)	0.001 (0.03)	-0.001 (-0.09)	-0.017 (-1.10)	-0.015 (-0.84)
Treated after * Interaction	0.011*** (2.85)	0.010*** (3.48)	0.065*** (2.90)	0.050** (2.43)	0.008** (2.29)	0.007*** (3.01)	0.045*** (2.87)	0.043** (2.11)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Year * Ind FE	Y	Y	Y	Y	Y	Y	Y	Y
N	82349	4786	82349	4786	82349	4786	82349	4786
Adjusted R2	0.715	0.774	0.715	0.773	0.715	0.773	0.715	0.773

Table 9: Corporate tax rates and firm value

This table investigates the effect of changes in the corporate tax rate on firm value in a panel of publicly listed firms from 2008 to 2013. The left-hand side is *Tobin's Q*, obtained from Osiris as (Total Equity+Total Liabilities)/(Total Shareholder Equity (Book Value) + Total Liabilities). The key control variable is *Change in Tax Rate*, the cumulative percentage change in corporate taxes over the previous years, obtained from KPMG's *Corporate and Indirect Tax Rate Survey 2014*. Tax Haven Subsidiary is an indicator variable equal to one if a firm has at least one subsidiary in a tax haven (as defined by the OECD Grey List) using Dun & Bradstreet's *Who Owns Whom 2008/2009*. Columns (1) and (2) use the full sample while Columns (3) and (4) use a sample of firms with tax haven subsidiary and control firms matched by industry, headquarter country, the natural logarithm of assets, and the natural logarithm of firms' ages (measured by years since founding). All regressions control for the natural logarithm of assets, the natural logarithm of assets squared, firm fixed effects, and time fixed effects. All continuous variables are winsorized at 1% and 99% levels. T-statistics for tests of significance of coefficients based on robust standard errors clustered at the country and year level (2-way clustering) are reported below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

	(1)	(2)	(3)	(4)
DV:	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
Sample:	All	All	Matched	Matched
Change in Tax Rate	-0.858 (-1.52)	-0.872 (-1.55)	-0.871** (-2.31)	-1.217*** (-3.14)
Change in Tax Rate * Tax Haven Subsidiary		0.696* (1.79)		1.027** (2.68)
Ln(Assets)	0.071** (2.15)	0.071** (2.15)	0.211*** (8.74)	0.211*** (8.68)
Ln(Assets) sqr	-0.004*** (-3.11)	-0.004*** (-3.12)	-0.009*** (-5.23)	-0.009*** (-5.22)
Firm FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	37414	37414	5587	5587
Adj. R2	0.813	0.813	0.851	0.851

Figure 1: Firms treated by Tax Information Exchange Agreements (TIEAs) over time

This figure shows the number of firms affected (*treated*) by Tax Information Exchange Agreements (TIEAs) between two countries or non-sovereign nations over time. A firm is *treated* if it is headquartered in a country that signs a TIEA and has a subsidiary in the other signatory country (a tax haven). Some firms are affected by more than one TIEA: these are counted as treated the moment they are affected for the first time. Source: OECD *Harmful Tax Practices* and authors' calculations.

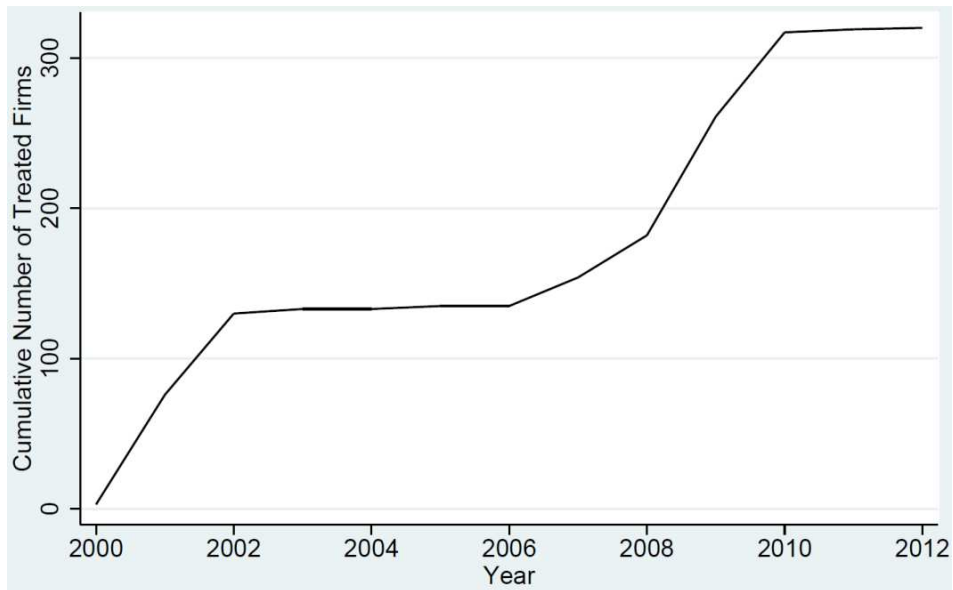
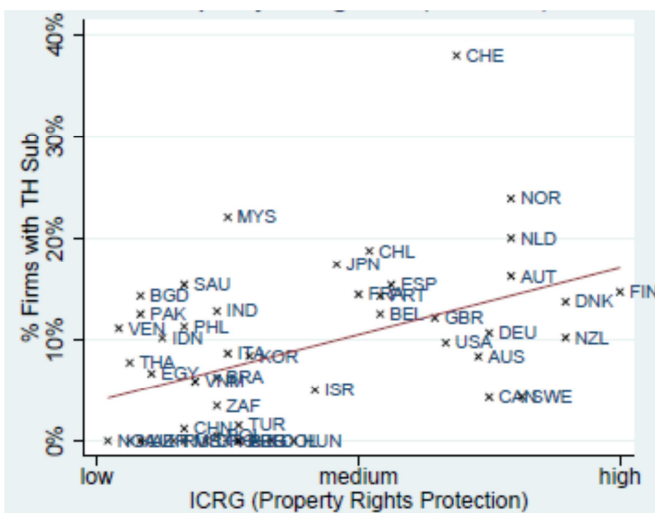


Figure 2: The use of tax haven subsidiaries and country characteristics

This figure illustrates the use of tax haven subsidiaries at the country level. The y-axis denotes the percentage of publicly listed firms that have at least one tax haven subsidiary. Subsidiary data is collected from Dun & Bradstreet's *Who Owns Whom 2013/2014* book series. Tax havens are sovereign countries or non-sovereign nations that appear on the OECD Grey List (as of August 17, 2009); Hong Kong, Singapore and Ireland are omitted because they constitute tax havens by that list or other official tax haven lists. The x-axis denotes country-level characteristics. *ICRG (Property Rights Protection)* captures political, economic, and financial risk in 2013 and is obtained from the International Country Risk Guide; the measure ranges from 1 to 6 and increases in protection. *Corruption Level* is based on Transparency International's Corruption Perception Index as of 2013 (Source: Transparency International), an index that measures corruption levels on a scale from 1 (high corruption) to 10 (low corruption). Each country observation is represented by an "X"; the line of best fit for equally weighted observations is shown.

Panel A: Property rights protection



Panel B: Corruption level

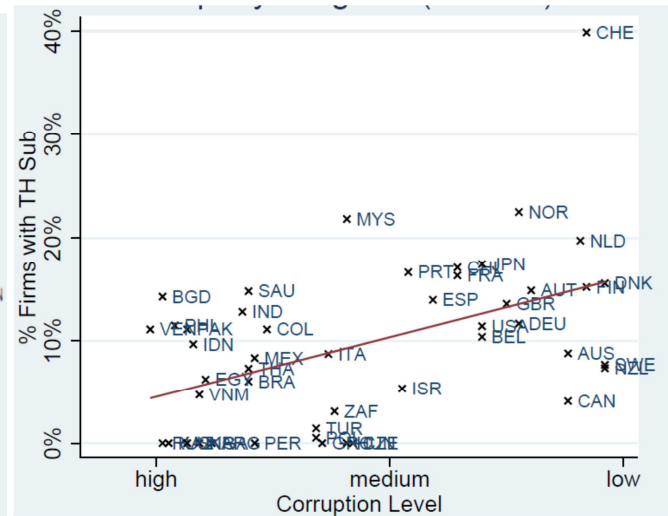


Figure 3: Firm value around the passage of Tax Information Exchange Agreements (TIEAs)

This figure shows the evolution of firm value of treated firms relative to control firms around the passage of Tax Information Exchange Agreements (TIEAs). The x -axis denotes years around the passage of TIEAs. The y -axis shows the interaction between year-to-event dummies and an indicator variable that equals one if a firm is directly affected by a TIEA. Interaction terms are obtained from an OLS regression on a sample of treated and control firms with the natural logarithm of Tobin's Q on the left-hand side and controls for size and size squared as well as year and industry fixed effects on the right. Control firms are matched to treated firms 5 years before treatment by headquarter country and industry, as well as by the natural logarithm of assets and the natural logarithm of assets squared.

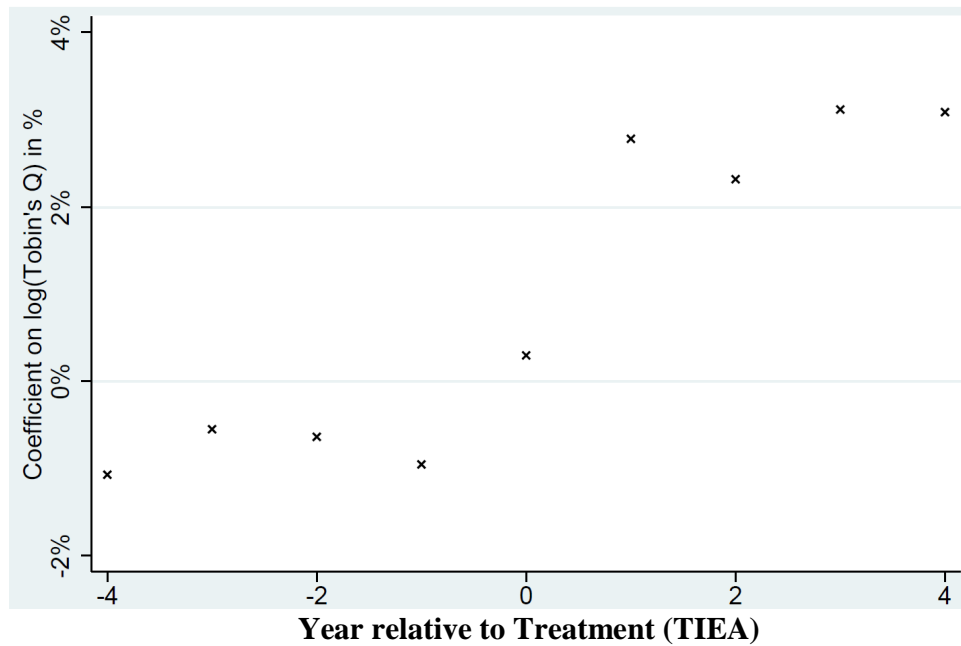


Figure 4: Daily returns of affected firms around the passage of Tax Information Exchange Agreements (TIEAs)

This figure plots cumulative returns of firms affected by Tax Information Exchange Agreements (TIEAs) over the 100 days surrounding the signing of a TIEA. A firm is directly affected (*treated*) if it is headquartered in a country that signs a TIEA and has a subsidiary in the other signatory country (a tax haven). Some firms are affected by more than one TIEA: they are counted as treated the moment they are affected for the first time. Event dates are spread over 10 years (2002 to 2011). Returns are obtained from Datastream/Worldscope and cumulated; cumulative returns are standardized to equal zero a day before the signature date.

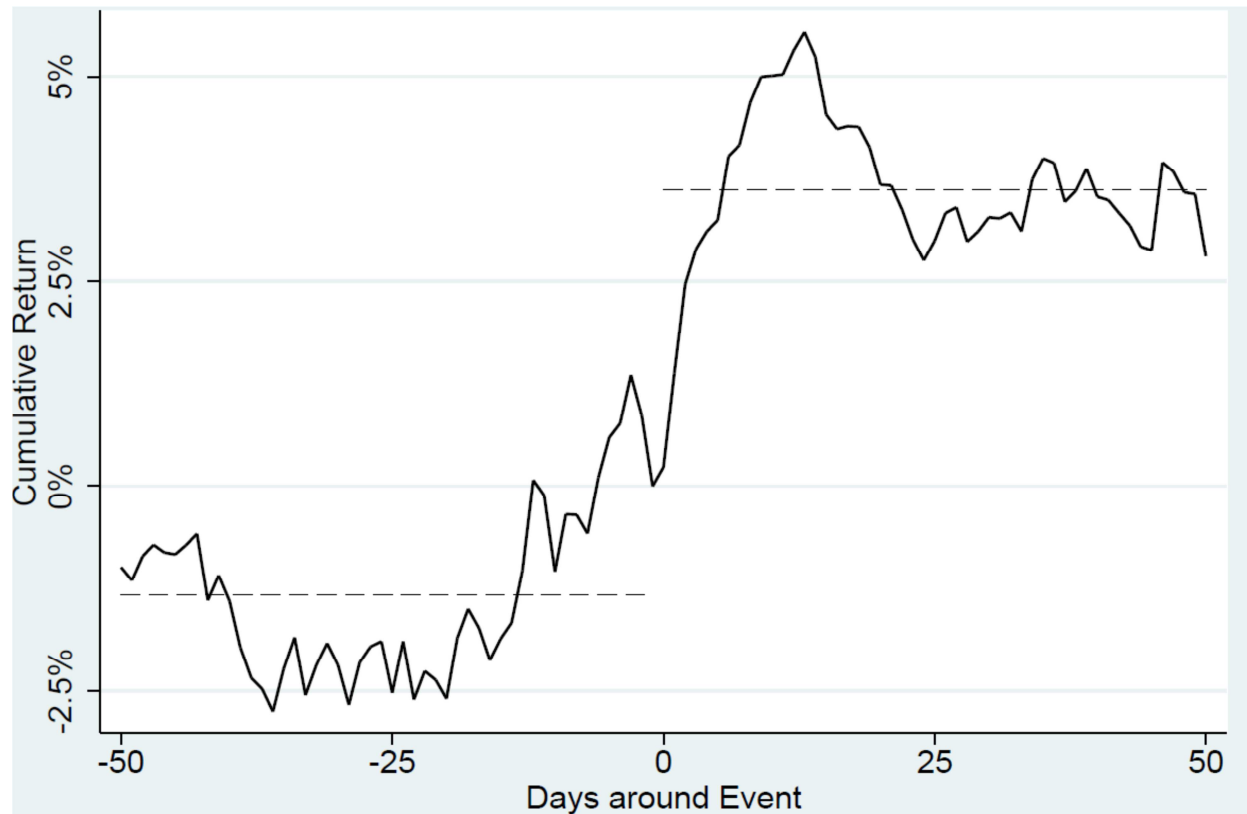


Figure 5: Value and use of tax haven subsidiaries around changes in corporate tax rates

This figure plots changes in the corporate tax rate between 2008 and 2013 against changes in firm value and changes in the use of tax haven subsidiaries, respectively. Changes in the corporate tax rate are obtained from KPMG' *Corporate and indirect Tax Rate Survey 2014*; a negative value denotes a reduction in corporate tax rates over the five-year period. On the left, the y-axis denotes changes in the difference in Tobin's Q from 2008 to 2013. Specifically, the difference between Tobin's Q of firms with tax haven subsidiaries in 2008 and firms without tax haven subsidiaries in 2008 is deducted from the respective difference in 2013. A negative value denotes that firms with tax haven subsidiary have become relatively less valuable over the five-year period. Subsidiary data is collected from Dun & Bradstreet's *Who Owns Whom 2013/2014* book series. Tax havens are sovereign countries or non-sovereign nations that appear on the OECD Grey List (as of August 17, 2009). *Tobin's Q* is obtained from Osiris as $(\text{Enterprise Value} + \text{Total Liabilities}) / (\text{Total Shareholder Equity (Book Value)} + \text{Total Liabilities})$. On the right, the y-axis denotes the difference between the percentage of firms with tax haven subsidiaries in 2013 and the percentage of firms with tax haven subsidiaries in 2008. A positive value means that the fraction of firms with tax haven subsidiaries has increased over the five-year period. Each country observation is represented by an "X"; the line of best fit for equally weighted observations is shown.

