Tax Avoidance through Cross-Border Mergers and Acquisitions*

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Abstract

We document a novel tax avoidance strategy: Cross-border, tax-haven mergers and acquisitions (M&A). Tax havens have $2.4 trillion in M&A deal value beyond what is predicted based on economic fundamentals. Cross-border, tax-haven M&As result in $24.7 billion in recurring annual tax avoidance, and cross-border, non-haven M&As result in an additional $31.3 billion in recurring annual tax avoidance. This is the first paper to document that tax havens affect real investment on a large scale, and not just capital flows on paper. Moreover, we create an algorithm, which is available to others, to derive the tax residence of any company given data on the firm's country of incorporation and headquarters.

Keywords: Tax avoidance, tax havens, mergers and acquisitions, gravity model, capital flows, foreign direct investment, taxation, multinational corporations.
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1 Introduction

We document a novel tax avoidance strategy: Cross-border, tax-haven mergers and acquisitions (M&A). Tax havens have $2.4 trillion in M&A deal value beyond what is predicted based on economic fundamentals. Tax-haven M&A results in $24.7 billion in recurring annual tax avoidance. In addition, tax avoidance from non-haven, cross-border M&A is $31.3 billion, bringing the total recurring annual tax avoidance from cross-border M&A to $56.0 billion. To our knowledge, our paper is the first to document that tax havens not only affect capital flows on paper, but also affect real investment on a large scale.

We create an algorithm based on novel, hand-collected data on tax residence laws to derive the tax residence of any company in 182 countries given data on the firm's country of incorporation and headquarters.

We find 13,804 cross-border, tax-haven M&As from 1990 to 2017. To start, we use descriptive statistics to highlight that cross-border M&A activity involving tax havens is abnormally large. We divide tax havens into large and small havens, thereby approximating whether a haven has a quantitatively important amount of economic activity beyond its haven activities. We classify Hong Kong, Ireland, the Netherlands, Singapore, and Switzerland as large havens, since their GDPs range from $330 to $830 billion in 2017. Small havens have significantly smaller economies. For instance, the 2017 GDP of Bermuda and the Cayman Islands is $6 and $4 billion, respectively. The distinction between large and small havens is independent of the importance of a country in our sample and the level of tax rates in a country. Given these stark differences in economic activity, this separation allows for a more meaningful interpretation of the results. If one considers intra-country M&A deal value as a proxy for the economic activity in a country, then one can standardize cross-border M&A deal value by dividing it by intra-country M&A deal value. The ratio of cross-border to intra-country M&A deal value is 2.94 (11.92) when the acquiror is in a large (small) haven. In contrast, the ratio is 0.47 when the acquiror is in a non-haven country. These ratios suggest that cross-border M&A activity involving tax havens is abnormally large.

We use a gravity model approach from the international trade literature to quantify the extent to which cross-border M&A activity associated with tax havens exceeds their economic fundamentals. We use the standard implementation of the gravity model, the Poisson pseudo-maximum likelihood estimation of Silva and Tenreyro (2006). The unit of observation is an acquiror- and target-country pair in a given year. The dependent variable is the logarithm of M&A deal value. Country pairs with a large (small) haven acquiror have 107% (483%) more deal value than predicted based on their economic fundamentals, and country pairs with a large (small) haven target have 62% (341%) more deal value. The corresponding total abnormal dollar values are $1,547.9 and $856.8 billion for large and small havens, respectively, resulting in a total of $2.4 trillion.[1] The important country figures are $286.1 billion in abnormal deal value for Bermuda, $171.7 billion for Luxembourg, $129.9-$715.4 billion for each of the five large havens, and $168.9 billion for the Cayman Islands.

Our methodology classifies 55.8% of the cross-border M&A involving tax havens as abnormal deal value. This average masks important cross-sectional variation. The tax haven with the lowest ratio of abnormal deal value to total cross-border deal value is Switzerland with 28.4%. The havens with the largest share of abnormal deal value are the Cayman Islands, the British Virgin Islands, the Netherlands Antilles, and Bermuda with 97.0%, 97.0%, 96.8%, and 96.2%, respectively.

One can distinguish the tax avoidance resulting from tax-haven M&A by deal type. Deals with a haven acquiror and a non-haven target are referred to as "asset building" deals. A firm in a tax haven has an incentive to acquire firms in non-havens to scale up the asset base exposed to the lower tax rate. In contrast, deals with a tax-haven target are referred to as "haven purchases." Buying tax-haven firms allows the acquiror to establish a presence in a haven. The scope for tax avoidance is higher for subsidiaries with real operations as opposed to shell companies, since this, for instance, facilitates the manipulation of transfer pricing if actual intra-firm trade is taking place between the haven and non-haven operations of a

[1] All M&A deal value numbers in this paper are in 2017 USD.

firm.

We estimate the tax avoidance from haven purchases using a firm-year panel dataset. The dependent variable is the cash effective tax rate. Since the regression equation includes year and firm fixed effects, our estimates of tax avoidance are identified by comparing the same firm over time. We estimate both the baseline effect of cross-border M&A activity on effective tax rates and the additional tax avoidance of haven purchases relative to "non-haven" purchases. For example, for a US firm with no prior cross-border M&A history dating back to 1990, buying an Irish firm worth 5% of their total assets would result in an expected decline in their cash effective tax rate of 3.73 percentage points. Aggregating accross all firms, we find that cross-border, *haven* purchases result in $20.2 billion in recurring annual tax avoidance for the acquiror. Cross-border, *non-haven* purchases also result in tax savings for the acquiror, since there is greater scope for tax avoidance in a more global firm. The aggregate annual tax avoidance from non-haven purchases is $31.3 billion. Asset building deals result in further tax avoidance of $4.5 billion per year. Therefore, tax-haven M&A results in $24.7 billion in annual tax avoidance, while the total recurring annual tax avoidance from cross-border M&A is $56.0 billion.

Cross-border, haven M&A constitutes 25.9% of all cross-border M&As by deal count, and 28.4% by value, but generates 44.1% of tax avoidance resulting from cross-border M&A.

For identification, we exploit variation in the incentives for US firms to engage in haven purchases. Before 2004, if a US firm wanted to move its tax residence out of the US, it could do so without any real operations in that country. Starting in 2004, firms had to demonstrate having substantial operations in the country to which they seek incorporation or they must merge with a sufficiently large foreign company. The law change made renouncing the US tax jurisdiction more difficult for US firms, since they would now have to acquire large or numerous foreign firms if they wanted to invert as a result of cross-border M&A.

We find an increase in M&A activity with US firms as buyers and large-haven firms as targets after 2004. There is no significant change in M&A activity for the combination of

US buyers and small haven targets after 2004. The reason is that large tax havens like Ireland and Singapore have numerous and large enough firms that, when acquired, allow US firms to invert to these jurisdictions after the law change. This is not the case for small havens like Bermuda or the Cayman Islands. This evidence supports our interpretation that cross-border M&A involving tax havens is pursued for tax avoidance motives.

We run additional tests to reinforce the notion that our results are not driven by factors other than tax avoidance, such as political or economic instability, concerns regarding kidnapping or privacy, or legal and regulatory constraints. A concern about the pursuit of anonymity and secrecy offered by tax havens is not applicable–tax avoidance is legal–so multinationals do not use the anonymity offered by tax havens for this purpose. Moreover, how would we have obtained the transaction-level data for this paper otherwise? Illegal tax evasion through tax havens using secrecy is not the focus of this paper. We also provide arguments for why fraud and theft from shareholders or executives seeking worse corporate governance in tax havens are implausible alternative explanations for our results. The results are also robust to controlling for capital account openness, economic integration agreements, tax information exchange arrangements, bilateral tax treaties, bilateral investment treaties, uncertainty, membership in the EU, Euro Area, and the WTO, and an alternative clustering of the standard errors.

Cross-border, tax-haven M&A results in $24.7 billion in tax avoidance. We analyze the flip side of this tax avoidance–the losses that accrue to the acquiror country in haven purchases and the target country in asset-building deals. Tax avoidance from non-haven purchases are excluded from this analysis, since it is not clear to which country the taxes lost should be applied. The US suffers 31% of the total dollar losses ($7,562 million). In addition, the UK, Germany, France, and Japan are responsible for 28% of the total dollar losses. The US losses from tax-haven M&A correspond to 2.03% of its total corporate income tax revenue. In Figure 1, we plot the ratio of tax avoidance from haven M&A as a share of the corporate income tax revenue of a country using a map of the world.

Lastly, we discuss policy options for non-havens interested in limiting the tax avoidance from cross-border (tax haven) M&A. One options is for individual countries to define tax residence based on the location of headquarters, instead of, as is often the case, based on the location of incorporation. This would make the avoidance strategies documented in this paper more costly. In addition, tax audits and enforcement actions targeted at the largest firms/M&As might be a worthwhile option when aiming to increase tax revenue–especially for small- to medium-sized countries, where individual transactions constitute a significant share of the total tax avoidance from cross-border, tax-haven M&A.

Our paper contributes to four literatures. First, we contribute to the literature on tax avoidance by documenting a novel tax avoidance strategy–cross-border, tax-haven mergers and acquisitions, which result in $24.7 billion in recurring annual tax avoidance. Cross-border, non-haven M&As result in an additional $31.3 billion in recurring annual tax avoidance. Forms of tax avoidance documented in the literature include the manipulation of transfer prices and strategic location choices for capital (Desai et al., 2004; Huizinga et al., 2008), goods and services (Barrios et al., 2012; Bartelsman and Beetsma, 2003), intellectual property within firms (Dischinger and Riedel, 2011; Karkinsky and Riedel, 2012); intra-firm trade through tax havens for non-operational reasons (Grubert and Slemrod, 1998); and the location choice of subsidiaries (Babkin et al., 2017) and headquarters (Huizinga and Voget, 2009; Voget, 2011) for tax purposes.

Another contribution to the tax avoidance literature, and also the tax literature more broadly, is that we create an algorithm based on novel, hand-collected data on tax residence laws to derive the tax residence of any company in 182 countries given data on the firm's country of incorporation and headquarters. As a result, our data is of superior quality compared to the many papers which take location data from sources such as SDC Platinum or Orbis at face value. This results in a systematic measurement error, since the most aggressive tax avoiders are also the firms for which the tax residence is most likely to differ from the location reported in standard databases. We illustrate the quality of our data by

rerunning our gravity model results using the original, uncorrected SDC data. Our data yields $421.8 billion more cross-border, tax haven M&A deal value and $411.1 billion more abnormal deal value than the SDC location data. Importantly, the errors in the SDC data vary greatly across countries. For instance, SDC overcounts the cross-border M&A deal value for Switzerland, while it has fairly accurate data for Luxembourg. In contrast, SDC undercounts cross-border M&A deal value by 30% for Ireland, 20% for Singapore, 89% for the Cayman Islands, and 93% for the Netherlands Antilles. These numbers highlight the importance of having accurate tax residence data for conducting research on tax avoidance in particular and also research on taxation in general.

Second, we contribute to a nascent literature on "abnormally" high capital flows associated with havens by documenting that havens attract M&A deal value of $2.4 trillion beyond what is predicted based on their economic fundamentals. To our knowledge, our paper is the first to document that tax havens not only affect capital flows on paper, but also affect real investment on a large scale, since firms spend large amounts buying other firms, thereby reallocating who owns and employs capital and labor inputs. In contrast to our paper, which uses a global sample of firms and and focuses on real investment in tax havens, Suárez Serrato (2019) studies the real effect of limiting profit shifting to Puerto Rico on US firms. Our paper complements Coppola et al. (2020), who restate bilateral investment positions that are misrepresented because of a combination of two factors. First, multinationals often raise financing through foreign subsidiaries—in particular through shell companies in tax havens. Second, many standard databases record the "nationality" of these foreign subsidiaries instead of the "nationality" of the parent company. Therefore, while both Coppola et al. (2020) and our paper provide corrections for misclassifications in standard databases, the two papers address clearly distinct data issues. Moreover, Bertaut et al. (2018) and Damgaard et al. (2019) also document large distortions in official statistics for capital flows.

Third, we contribute to the literature on the determinants of cross-border M&A by documenting that tax-avoidance through tax havens is a significant determinant of cross-

border M&A–tax havens have $2.4 trillion in M&A deal value beyond what is predicted based on economic fundamentals. Importantly, cross-border, haven M&A comprises 25.9% of total cross-border M&A by deal count and 28.4% by deal value. This literature has documented other motivations such as the quality of investor protection (Rossi and Volpin, 2004), financial conditions (Di Giovanni, 2005), valuation differences and geographic proximity (Erel et al., 2012), cultural similarity (Ahern et al., 2015), repatriation taxes on dividends from foreign subsidiaries (Feld et al., 2016), the acquiror's ability to manage the target's tax exposure (Belz et al., 2016), and the level of taxation in the target country (Arulampalam et al., 2019). With the exception of Di Giovanni (2005), the cross-border M&A literature removes countries such as Bermuda and the Cayman Islands from their samples. As such, a significant amount of deal value is missing from most of these studies.

Fourth, we contribute to the literature on tax havens by documenting that tax havens are used for tax avoidance via cross-border M&A, resulting in $24.7 billion in recurring annual tax avoidance. Moreover, tax havens have $2.4 trillion in M&A deal value beyond what is predicted based on economic fundamentals. We also document that tax havens not only affect capital flows on paper, but also affect real investment on a large scale. Papers in this literature examined what constitutes a tax haven (Hines and Rice, 1994) and identified the tax avoidance methods involving havens (Desai and Hines, 2002; Desai et al., 2006). Other recent work has documented regulatory actions against bank secrecy and the resulting reallocation to the least compliant tax havens (Johannesen and Zucman, 2014), derived the concentration of offshore tax evasion among the very wealthy (Alstadsæter et al., 2019), determined the valuation consequences of illegal tax evasion (O'Donovan et al., 2019) and expropriation (Bennedsen and Zeume, 2017), quantified the amount of household wealth owned by each country in tax havens (Alstadsæter et al., 2018), investigated the valuation effects of buying tax-haven targets (Col and Errunza, 2015), and studied naked, M&A, and spin-off inversions, of which only 38% are into tax havens (Col et al., 2017). Lastly, Suárez Serrato (2019) studies the real effect on US firms of limiting profit shifting to Puerto

Rico, while our paper has a global sample of firms and focuses on real investment in tax havens.

2 How can Tax-Haven M&A Result in Tax Avoidance?

Tax-haven M&A can enable tax avoidance in two distinct ways depending on whether the acquiror or the target are in a tax haven. When the acquiror is in a tax haven, we refer to these deals as "asset building." A firm in a tax haven has an incentive to acquire firms in non-havens to scale up their asset base exposed to the lower tax rate. This is because, from a tax perspective, non-haven firms are worth more as subsidiaries of tax-haven firms than as standalone companies.

In contrast, when the target in an M&A deal is in a tax haven, we refer to these deals as "haven purchases." Firms in non-havens have an incentive to buy tax-haven firms to establish a presence in a tax haven. This facilitates other tax-avoidance strategies. One strategy involves relocating the firm's tax residence to the tax haven. For example, in 2013, Actavis (a US company) acquired Warner Chilcott (an Irish company). This allowed Actavis to relocate their tax residence to Ireland. As a result, they anticipated a drop in their effective tax rate from 28% to 17% following the acquisition.[2] Even if the haven purchase does not result in the relocation of a firm's tax residence, it nevertheless increases its scope for tax avoidance. For instance, Apple and Google, two US-resident companies, shift a significant amount of their profits through their tax-haven subsidiaries (Tørsløv et al., 2020). Regardless of the strategy used, we expect firms that made haven purchases in the past to experience lower subsequent effective tax rates.

While the role M&A plays in asset building is apparent, the necessity of haven purchases to achieve lower effective tax rates may seem less obvious. For US companies, however, haven purchases are often used to facilitate an inversion into a tax haven. An M&A transaction can enable the company to exceed either the threshold level of substantial operations abroad

[2]The Wall Street Journal (2013): "Actavis to Buy Warner Chilcott in $5 Billion Deal," May 20, https://www.wsj.com/articles/SB10001424127887324102604578494731073630120 (accessed November 17, 2019).

or the minimum amount of foreign ownership after the merger (Marples and Gravelle, 2014).

For most other countries, tax residence is determined by the jurisdiction where management and control takes place (PwC, 2017). This is interpreted as the location where the executives of the company meet, which is typically where the headquarters is located. Thus, relocating a firm's tax residence to a tax haven typically involves relocating their headquarters to that country. Buying an existing firm with operations and headquarters in the tax haven is a common way that companies achieve this.

In our data, haven purchases that do not involve inversions are significantly more numerous than those that do. There are many different tax-avoidance strategies that companies employ using tax-haven subsidiaries. Moreover, the scope for tax avoidance is higher for subsidiaries with real operations as opposed to mere shell companies, since this, for instance, facilitates the manipulation of transfer pricing if actual intra-firm trade is taking place between the haven and non-haven operations of a firm. This creates the incentive for firms to make haven purchases to reduce their tax rate.

3 Data

The notion of tax residence is important in this paper. If a company is headquartered and incorporated in the same nation, then it is a tax resident in that nation. Otherwise, the definition of tax residence is more complicated. Of particular importance is whether a country considers the headquarters or the jurisdiction of incorporation when determining tax residence. In addition, what happens when a company can be claimed as a tax resident by two different countries? To determine the appropriate laws for tax residency in such cases, we research the tax residence laws for all countries in our sample using PwC's Worldwide Tax Summaries (2017). We also manually search 10-k and 20-f filings to ascertain residence tie-breaking provisions in practice. From this, we create an algorithm that assigns a tax residence to every firm in our sample given data on the firm's incorporation and headquarters. For countries that were not in the PwC database or for which information on tax residence

was not given, we assume that the tax residence is the country of headquarters. Refer to Appendix A for the details on this procedure. The care we take in ensuring that the tax residence is classified correctly separates our work from related research in the literature, which takes location data from sources such as SDC Platinum or Orbis at face value, and marks a significant contribution of our paper to the tax avoidance literature and the tax literature in general. Taking the location data from widely used commercial databases without applying our algorithm results in a systematic measurement error, since the most aggressive tax avoiders are also the firms for which the tax residence is most likely to differ from the location reported in these databases.

We obtain M&A data from SDC Platinum. The sample includes deals that were announced between 1990 and 2017 and subsequently completed. To ensure that we only capture deals where one company buys another, we exclude self-tenders, repurchases, recapitalizations, spin-offs, split-offs, equity issuances, and block purchases. As in Meier and Servaes (2019), we further exclude deals that involve a mutual company, government entity, or supranational organization (e.g., the World Bank). In addition, we exclude deals where the buyer or seller nation is listed as "Multi-National." This typically occurs when the acquiror or target company is listed as "Investor Group." We use the GDP price index from the Bureau of Economic Analysis to convert deal value to 2017 USD, and remove observations with missing deal value or deal value below $1 million. The sample includes deals where an entire firm is acquired, as well as deals where assets, a subsidiary, or a division of another firm are acquired. Examples of the latter types include deals where a pharmaceutical company buys the generic drug division of another company, or where a retailer buys 100 stores from another retailer. For acquisitions of entire firms, we further require that at least 50% of the target's shares are acquired as part of the transaction. Lastly, we remove countries with less than $50 million in aggregate deal value on the acquiror or target side. This reduces the size of the gravity model dataset, and ensures that observations involving countries such as North Korea and Azerbaijan do not influence the estimates. The final dataset has 179,435

deals from 182 countries, 53,311 of which are cross-border.[3]

Unless otherwise stated, in all results of this paper, the acquiror refers to what SDC considers as the acquiror's ultimate parent, and the target refers to the direct target. For example, if Disney Parks, Experiences and Products, a subsidiary of Disney and the owner of the Walt Disney World, purchased Universal Parks and Resorts, then we would consider Disney as the acquiror and Universal Parks and Resorts as the target. Had we instead considered the target to be the target's ultimate parent, then the target in this deal would be Comcast. Since Disney is not buying Comcast, but a subsidiary of a subsidiary (NBCUniversal) of Comcast, the appropriate target should be the direct target, which is Universal Parks and Resorts.

If the smaller company in an M&A transaction is listed as the acquiror, then SDC will mark the deal as a reverse acquisition. Reverse acquisitions are typically done when a firm wants the smaller company to be the parent of the combined firm. This is often the case when the smaller firm is in a tax-favored location. If a deal is considered a reverse acquisition in the SEC filings, then the combined firm's financial performance will be compared to that of the larger firm for periods preceding the acquisition. For deals flagged as reverse acquisitions in SDC, we classify the acquiror as the target and the target as the acquiror. In this way, the acquiror is always the economic acquiror (the larger company), as opposed to the legal or accounting acquiror. Lastly, we use the terms nation and country broadly to include both sovereign nations and dependent territories and regions. In short, if SDC considers a geographical entity a country, then we consider it a country as well.

We use the CEPII GeoDist Database for country-pair data, which includes geographic distance, a same-country dummy, a previous colonial-relationship dummy, and a common official language dummy. Country-level data is obtained from a variety of sources. GDP and GDP per capita are from the World Development Indicators (WDI) of the World Bank. When GDP and GDP per capita are missing, we replace them with estimates from the United

[3]The intra-country deals are included for comparison purposes only, and are not included in any of the regressions.

Nations (UN). We fill in these variables for additional countries using methods described in Appendix B. Ireland is a special case, since its GDP is highly volatile and does not reflect domestic economic activity due to tax avoidance by US multinationals, in particular by high-tech companies such as Alphabet (the Google parent company), Apple, Microsoft, and Facebook (Lane, 2017). For instance, due to a one-off internal reorganization of Apple's tax avoidance operations, Ireland's GDP grew by more than a quarter in 2015. As a result, the Irish Central Bank and and the Central Statistics Office Ireland developed alternative macroeconomic indicators to GDP to more accurately measure the development of the Irish economy. We use GNI instead of GDP for Ireland, since Ireland's GNI is less affected by the aforementioned tax avoidance techniques of US multinationals. Lastly, we obtain international trade data from the UN, legal origin data used in La Porta et al. (2008) from La Porta's website, a measure of control of corruption from the World Governance Indicators (WGI), and corporate tax revenue data from Tørsløv et al. (2020).

We start with the list of tax havens from Dharmapala and Hines (2009), and then add the Netherlands given its importance as documented in prior studies (Damgaard et al., 2019; Tørsløv et al., 2020). Next, we divide the tax havens into large and small havens, thereby approximating whether a haven has a quantitatively important amount of economic activity beyond its haven activities. We classify Hong Kong, Ireland, Singapore, and Switzerland as large havens, since their GDPs range from $330 to $830 billion in 2017. In contrast, small havens have significantly smaller economies. For instance, the 2017 GDP of Bermuda and the Cayman Islands is $6 and $4 billion, respectively. Among the 182 countries included in the M&A dataset, the total GDP for the five large havens is $2,446 billion, and the total GDP for the 34 small havens is $437 billion as of 2017. Thus, the five large havens account for 84.9% of the total tax-haven GDP. The distinction between large and small havens is therefore independent of the importance of a country in our sample and the level of tax rates in a country. Given these stark differences in economic activity among the tax havens, separating them in this way allows for a more meaningful interpretation of the results–particularly for

the gravity model.

Firm-level financial statement data is from Compustat North America (henceforth Compustat) and Compustat Global. Since identifying information in these databases is current, whereby only the latest data is available and back-filled in all prior years, we obtain the historical firm name, nation of headquarters, and nation of incorporation for North American firms from the Names File of Compustat Snapshot (henceforth Snapshot). A global version of Snapshot does not exist, so we use the current identifying information from Compustat Global for firms without data in Snapshot. A gvkey (the unique firm identifier in all Compustat databases) is assigned to each deal in SDC as follows: first, we try to merge SDC with Compustat by cusip, and then with Compustat Global by sedol. Next, we perform a name match, first with Snapshot, and then with Compustat Global. After all perfect matches are made, we manually match names for deals over $1 billion with the highest matched score using the reclink command in Stata. Finally, we use Michael Ewen's data from Ewens et al. (2019) to link the remaining unmatched deals, which builds on the earlier mapping by Phillips and Zhdanov (2013). We keep only the "primary" instance of dual-listed firms. We consider a firm the "primary" dual-listed firm if it has a higher market capitalization, or, if the market capitalizations are similar, a longer history. Firms in the utilities (SIC 4900-4999) and defense (SIC 3760-3769, 3795, and 3480-3489) industries are excluded from all firm-level analyses since many countries have nationality-based ownership restrictions for these industries. Additionally, we winsorize all firm-level variables at the 1% level. For the cash effective tax rate (ETR) in the haven purchases regressions, we use taxes paid over pre-tax income. Following the literature, we drop observations with non-positive pre-tax income and further winsorize the effective tax rate to ensure that it is between 0 and 1 (Dyreng et al., 2008; Klassen and Laplante, 2012; Dyreng et al., 2019). In addition, to mitigate the volatility inherent in annual measures of the cash ETR, we measure it over two years (Hanlon and Heitzman, 2010). To overcome the serial correlation induced by overlapping time periods, we cluster the standard errors at the firm level.

4 Descriptive Statistics and Haven/Non-Haven Specialization

In Table 3, Panel A, we report the total deal value based on the location of the acquiror and target, and whether the deal is cross-border or intra-country. If one considers intra-country M&A deal value as a proxy for the economic activity in a country, then one can standardize cross-border M&A deal value by dividing it by intra-country M&A deal value. The data indicates that the ratio of cross-border to domestic deals is higher in tax havens than in non-havens. The ratio of cross-border to intra-country M&A deal value when the acquiror is in a non-haven is 0.47. This ratio jumps to 2.94 and 11.92 if the acquiror is in a large-haven or a small-haven, respectively. Similarly, the ratios when the target is in a non-haven, large haven, and small haven are 0.51, 2.04, and 6.67, respectively. Overall, tax havens appear to have unusually high cross-border M&A volume relative to their intra-country deal volume.

In Table 3, Panel B, we report the total number of deals based on the location of the acquiror and target, and whether the deal is cross-border or intra-country. We again compute the ratio of cross-border to domestic deals. The same pattern as in Panel A emerges—tax havens have unusually high volumes of cross-border M&A transactions when compared to their volume of intra-country transactions.

In Panels C and D of Table 3, we report the mean and median M&A deal value by acquiror or target side and whether the transaction is a cross-border or intra-country transaction. Note that by construction, the values for the acquiror and target splits are identical for intra-country deals. Independent of the metric or the particular sample split used, cross-border deals are consistently larger than intra-country deals. The average cross-border deal on the acquiror side is $284 million for non-havens, $299 million for large havens, and $286 million for small havens.

Surprisingly, intra-country deals for small havens are larger than non-haven and large-haven intra-country deals. Since this pattern holds for both the mean and median deal value,

it cannot be driven by outliers. While an investigation of intra-country deals is beyond the scope of this paper, this finding raises the question of whether the characteristics of tax havens also lead to some unusually high intra-country M&A activity for these jurisdictions.

Another pattern in the data is that some tax havens specialize in particular non-haven countries. We report important haven/non-haven pairs in Table 4. We define a pair as important if the deal value is significant relative to the total deal value of the tax haven or the non-haven. For example, the US is the most important non-haven country for Bermuda, with $170.3 billion in deal value between these countries. On the other hand, while Latin American countries are not some of the most important non-haven countries for Switzerland, Switzerland is by far the most significant tax haven for this region. The haven-non-haven pair with the highest aggregate deal value is the US and Ireland, with $371.1 billion in deal value. The most significant non-haven for the British Crown Dependencies of Guernsey and the Isle of Man is, perhaps not surprisingly, the UK. Similarly, the most significant tax-haven for Western Europe is the Netherlands, and the most important non-havens for Luxembourg are in Western Europe. For Asia-Pacific countries such as China, Australia, and Japan, the two closest tax havens–Singapore and Hong Kong–are quantitatively important. What is somewhat surprising is that the most significant non-haven country for the Cayman Islands is China. Lastly, the most important countries for Cyprus are the culturally and historically related countries of Russia, Ukraine, and Greece. These examples illustrate that geography, culture, and political ties are significant determinants of tax-haven M&A.

5 Gravity Model

5.1 Empirical Strategy

As the summary statistics show, there seem to be considerably more cross-border M&As associated with tax havens than what can be explained by the size of their economies. To formally test this, we estimate the following gravity specification:

$$\ln(Y_{ij,t}) = \boldsymbol{\kappa_t} + \beta_1 SM_i + \beta_2 LG_i + \beta_3 SM_j + \beta_4 LG_j + \boldsymbol{\theta'} \boldsymbol{X_{ij,t}} + \epsilon_{ij,t}, \tag{1}$$

where i indexes the acquiror countries, j the target countries, t the year, and $i \neq j$. The variables are as follows:

- $Y_{ij,t}$: aggregate M&A deal value with the acquiror in country i and the target in country j in year t
- $\boldsymbol{\kappa_t}$: year fixed-effects
- SM_k: dummy that equals 1 if country k is a small tax haven
- LG_k: dummy that equals 1 if country k is a large tax haven
- $\boldsymbol{X_{ij,t}}$: controls

Since gravity models are multiplicative, we take the log of all variables except dummies. The controls are chosen based on factors or proxies known in the literature to affect the volume of cross-border M&A (Ahern et al., 2015; Di Giovanni, 2005; Erel et al., 2012; Rossi and Volpin, 2004). However, we do not control for any tax-related variables, even though these are important in determining cross-border M&A as shown in the literature (Belz et al., 2016; Feld et al., 2016; Arulampalam et al., 2019). This is because we want to capture all tax-related motivations to engage in cross-border M&A through our tax-haven dummies. These dummies will pick up factors related to observable as well as unobservable characteristics, such as the ability of a firm to negotiate a lower corporate income tax rate in the tax haven, as is done in countries like Ireland, where many US companies are paying taxes at a much lower rate than the 12.5% statutory corporate income tax rate.

The model is estimated using Poisson pseudo-maximum likelihood following Silva and Tenreyro (2006). This procedure eliminates the bias caused by estimating a log-linearized model with heteroskedastic errors. In addition, it provides a way to deal with the many zeros in the dependent variable, as most country-pairs have no M&A volume in a given year.

The variables of interest are the tax-haven dummies. Since the payoffs to asset building increase linearly with the size of the firms acquired, tax-haven firms have an incentive to continually scale up. Thus, we expect β_1 and β_2 to be positive. Moreover, given the tax benefits associated with haven purchases, a firm is more likely to be acquired if it is in a tax haven than a non-haven, all else equal. Therefore, tax havens should see more M&A deal value on the target side. This implies that β_3 and β_4 should be positive as well. Lastly, these estimates are conservative. Absent the abnormally high M&A volume associated with tax havens, the GDP of these countries would be lower. Since GDP and GDP per capita are some of the predictors of M&A flows, we underestimate the share of total M&A deal value associated with tax avoidance.

5.2 Results

We present two gravity models, a baseline model with a limited number of variables and an additional model with more controls resulting in fewer observations. The first model is presented in Table 5.

The results indicate a positive and statistically significant effect for the tax-haven dummies in all three specifications. The coefficients are economically large. Small havens have 483%-2,062% more M&A deal value on the acquiror side than would be predicted based on economic, cultural, and geographic factors, and large havens have 107%-288% more.[4] The corresponding figures on the target side are 341%-1,274% for small havens and 62%-173% for large havens. The difference between the small- and large-haven coefficients is statistically significant at the 5% level for both the acquiror and target dummies in all specifications. In addition, the difference between the acquiror and target dummies is positive in all specifications for both large and small havens, although the difference is never statistically significant. This difference likely reflects the fact that, while asset building savings increase linearly with the size of the acquired firms, the tax savings from haven purchases increase at a decreasing

[4]Going from a non-haven to a haven acquiror is expected to increase the M&A deal value by $(e^{\beta} - 1) \times 100\%$, where β is either the small- or large-haven coefficient.

rate.[5] As for the control variables, they have the expected sign. Larger economies have significantly more M&A volume; a 1% increase in GDP for either the acquiror or target country results in about a 1% increase in M&A deal value. Countries that are geographically closer or share a common language have more M&A volume between them. In addition, countries with colonial ties tend to have more M&A deal value, as this likely proxies for similar culture and legal systems. Lastly, richer countries, as indicated by GDP per capita, tend to have more M&A deal value. Large havens in particular tend to have high levels of GDP per capita, so the inclusion of these variables attenuates the point estimate of the large-haven dummy. However, the large-haven dummy remains positive and statistically significant.

Next, we estimate the dollar amount of M&A deal value in tax havens beyond what would be predicted had these countries not been tax havens. We refer to this as *abnormal deal value*, and estimate it for a particular country pair and year as follows:

$$\alpha_{ij,t} = Y_{ij,t} - e^{\widehat{\ln(Y_{ij,t})} - \beta_1 SM_i - \beta_2 LG_i - \beta_3 SM_j - \beta_4 LG_j}, \tag{2}$$

where all variables are as defined in equation 1. In addition, we require that at least one of the countries is a haven. Summing over all applicable country pairs and years, and using the specification in column 3 of Table 5, we obtain a total abnormal deal value associated with havens of $2,405 billion. Next, we disaggregate this total by haven using the following formula:

$$\sum_i \sum_j \sum_t \alpha_{ij,t} = \sum_{h \in H} \alpha_h, \tag{3}$$

where H is the set of all havens and α_h is the total abnormal deal value for haven h. We

[5]The concave nature of the tax savings from haven purchases arises since there are significant savings that can result from establishing a presence in a tax haven. However, once the firm has sufficient operations in a haven necessary to shift profits or rellocate their tax residence, the scope for further savings from haven purchases is low.

define α_h as follows:

$$\alpha_h = \sum_t \left(\sum_{i \notin H} \alpha_{ih,t} + \sum_{j \notin H} \alpha_{hj,t} + \frac{1}{2} \left(\sum_{i \in H} \alpha_{ih,t} + \sum_{j \in H} \alpha_{hj,t} \right) \right). \tag{4}$$

There are many ways to disaggregate the total abnormal deal value by country. Clearly, the total abnormal deal value for haven h should include all deals with a non-haven acquiror and h as the target (the first term of the sum). In addition, it should include the abnormal deal value of all deals with h as the acquiror and a non-haven target (second term). However, what should be done about cross-border deals with h on one side of the deal and another haven on the other?[6] We cannot just take the sum, since this term would appear for both haven h and the other haven, resulting in double counting, which would invalidate equation 3. Thus, we adopt perhaps the simplest and most intuitive approach and take one half of the abnormal deal value associated with these deals (third and fourth terms). The proof of equation 3 is in Appendix C.

α_h for the top tax havens is reported in column 1 of Table 6. There is \$715.4 billion in abnormal deal value for the Netherlands, \$297.1 billion for Ireland, \$286.1 billion for Bermuda, \$247.8 billion for Switzerland, \$171.7 billion for Luxembourg, \$168.9 billion for the Cayman Islands, \$157.7 billion for Hong Kong, and \$129.9 billion for Singapore. The remaining small havens have lower abnormal deal values. The total abnormal deal value for small and large havens is \$856.8 billion and \$1,547.9 billion, respectively.

For comparison, column 2 of Table 6 reports the total cross-border M&A deal value for each haven. As with the abnormal deal value, the total cross-border deal value for haven h is equal to the total deal value when the acquiror is in h and the target is in a non-haven, plus the total deal value when the target is in h and the acquiror is in a non-haven, plus 1/2 of the total deal value when one side of the deal is in h and the other is in another haven. Column 3 reports the ratio of abnormal deal value to total deal value. Our

[6] Of the \$4.3 trillion in total cross-border, haven M&A deal value, there is \$0.2 trillion in deal value when both sides are in a haven.

methodology classifies 55.8% of the cross-border M&A deal value involving tax havens as abnormal. This average masks important cross-sectional variation. Of the top havens listed in the table, the haven with the lowest share of abnormal deal value is Switzerland with 28.4%. The Netherlands, Ireland, and Luxembourg have shares of 56.8%, 59.6%, and 67.3%, respectively. The two Asian havens, Hong Kong and Singapore, have similar shares of 49.0% and 50.1%, respectively. The top havens with the largest share of abnormal deal value are the Cayman Islands, the British Virgin Islands, the Netherlands Antilles, and Bermuda with 97.0%, 97.0%, 96.8%, and 96.2%, respectively. The pattern that emerges from this is that the percentage of abnormal to total M&A deal value is negatively correlated with the size of a haven's GDP.

The second gravity model is presented in Table 7. The additional variables are not available for as many countries, so the resulting sample size is smaller. The same controls from the last column of Table 5 are included in this table, but the coefficients are omitted. The first specification includes a measure of control of corruption from WGI. It varies from -1.7 to 2.5, so we add 2 to the variable before taking the log. The results indicate that acquirors tend to come from countries with low levels of corruption. The magnitude and significance on the target side is not as strong. Having a UK legal origin is important in attracting M&A flows. The addition of these variables does not significantly impact the haven dummies, which remain positive and significant. Lastly, the higher M&A volume through tax havens is not explained by trade.

The above findings contribute to a nascent literature on "abnormally" high capital flows associated with havens by documenting that havens attract M&A deal value of $2.4 trillion beyond what is predicted based on their economic fundamentals. To our knowledge, our paper is the first to document that tax havens not only affect capital flows on paper, but also affect real investment on a large scale, since firms spend large amounts buying other firms, thereby reallocating who owns and employs capital and labor inputs. Moreover, cross-border, haven M&A makes up 25.9% of overall cross-border M&A by deal count and 28.4% by deal

value. These numbers emphasize how important tax-haven M&A is as a part of cross-border M&A. To the best of our knowledge, the literature on the determinants of cross-border M&A ignores the role of tax avoidance as a determinant of cross-border M&A and the role of tax havens in cross-border M&A more broadly. In addition, with the exception of Di Giovanni (2005), the literature on the determinants of cross-border M&A removes countries such as Bermuda and the Cayman Islands from their samples. As such, a significant amount of deal value is missing from most of these studies. One of our goals is to redress this imbalance in coverage.

6 Tax Avoidance

6.1 Haven Purchases

6.1.1 Empirical Strategy

Next, we will quantify the recurring, annual tax avoidance associated with haven purchases, whereby a firm buys another firm resident in a tax haven. After the completion of a haven purchase, an acquiror has a greater opportunity to avoid taxes, as discussed in Section 2. To formally test the hypothesis that haven purchases result in lower future tax rates, we estimate the following model:

$$ETR_{i,t} = \boldsymbol{\kappa_t} + \boldsymbol{\delta_i} + \beta_1 SM_{i,t-2} + \beta_2 LG_{i,t-2} + \beta_3 ANY_{i,t-2} + \boldsymbol{\theta'} \boldsymbol{X_{i,t-2}} + \epsilon_{i,t}, \tag{5}$$

where i indexes firms and t indexes years. The variables are defined as follows:

- $ETR_{i,t}$: cash effective tax rate: taxes paid from years t-1 to t divided by pre-tax income from years t-1 to t
- $\boldsymbol{\kappa_t}$: year fixed-effects
- $\boldsymbol{\delta_i}$: firm fixed-effects
- $SM_{i,t}$: one of two measures tracking deals where firm i completed a small-haven acqui-

sition up to time t

- $LG_{i,t}$: one of two measures tracking deals where firm i completed a large-haven acquisition up to time t
- $ANY_{i,t}$: one of two measures tracking deals where firm i made an acquisition up to time t
- $\boldsymbol{X_{i,t}}$: firm controls

The model is estimated using OLS with a global sample of firms. We focus on completion dates for M&A transactions instead of announcement dates as in the gravity model since any change in taxes paid will not occur until after the deal is completed. The variables of interest are the measures of small- and large-haven purchases.

The first of the two measures of past small-haven acquisitions is

$$SM_{i,t} = \ln(\text{Net Sm Haven M\&A Value/TA})(i,t).$$

The "Net" refers to the fact that this variable takes the cumulative M&A deal value where firm i is the acquiror's ultimate parent minus the cumulative deal value where firm i is the target's ultimate parent. We replace this difference with 0 if it is negative for the small-haven, large-haven, and non-haven variables. We then create the total M&A variable by taking the sum of these variables.[7] We use net instead of gross cumulative M&A deal value since the ability to avoid taxes is related to the stock of tax haven operations rather than the volume of tax-haven acquisitions. Specifically, if firm A buys assets in Ireland and then sells them to firm B, only firm B can expect tax savings as a result. The increase in the stock of M&A deal value for firm A is netted out after selling the assets to firm B. "Sm Haven" means that this variable only tracks M&A deals where the target is in a small tax haven.

[7] A negative value for the small-haven ratio, for instance, occurs when the cumulative M&A deal value when the firm is the buyer in small-haven purchases is lower than the cumulative M&A deal value when the firm is the seller in small-haven purchases. The percentage of firm-years with negative small-haven, large-haven, and non-haven ratios are 0.04%, 0.27%, and 2.84%, respectively.

We scale this quantity by total assets, which, along with the M&A deal value, is inflation adjusted to 2017 US dollars. We then winsorize this ratio to ensure that it is between 0 and 1.[8] By dividing M&A deal value by total assets, we are better able to measure the importance of a given deal to a firm. For instance, the impact of a $1 billion haven purchase for a $4 billion company is substantial, as this could allow the firm to invert to the tax haven if it is a US-resident firm. However, the ability of a $1 billion haven purchase to result in tax avoidance is much more limited if the companies is worth hundreds of billions of dollars. The t reflects the fact that deals are accumulated based on completion dates from 1990 up to and including time t. Lastly, we take the log of this ratio given that the ability to use cross-border M&A to lower taxes is concave in the ratio.[9] For instance, going from 0% to 5% in the ratio of small-haven cumulative deal value to total assets could allow a firm to shift a substantial amount of profits to the tax haven. However, going from 40% to 45% would likely have a much smaller impact. The concavity of the natural log accounts for this. We will refer to this variable as the "continuous measure" of past small haven purchases. The continuous measure of $LG_{i,t}$ is similarly defined. $ANY_{i,t}$ does not condition on the location of the target, so it captures both haven and non-haven purchases.

The second measures of $SM_{i,t}$, $LG_{i,t}$, and $ANY_{i,t}$ are dummies that equal 1 if the corresponding continuous measures are positive. Although the dummies do not have several of the aforementioned advantages of the continuous measures, we analyze the model with dummies since this allows for an easy interpretation of the recurring annual tax avoidance from tax haven, cross-border M&A. Lastly, we include the following standard controls in all the haven purchases regressions: book assets, book leverage, profitability. In addition, we control for cash over total assets given evidence in Hanlon et al. (2015) and Edwards et al. (2016).

Note that the variable construction based on "net" M&A deal value, where deal value

[8]Due to previously mentioned adjustments, this variable is already bounded below by 0, so the winsorization only affects the right side of the distribution. The percentage of firm years with small-haven, large-haven, and total ratios above 1 are 0.01%, 0.02%, and 0.34%, respectively.

[9]We add 0.01 to the ratio prior to taking the log.

when the firm is the target's ultimate parent is subtracted from the deal value when the firm is the acquirer's ultimate parent, avoids double counting tax avoidance. Imagine that a US tax-resident firm is purchasing an Irish firm to move its tax residence to Ireland. If this firm then sells its Irish assets to another US tax resident firm, it could be that the seller in this transaction loses its Irish tax residence and has to revert to US tax residence, while the buyer in this transactions changes its tax residence from the US to Ireland. As a result, at the aggregate level, the tax savings of one firm could be canceled out by the increases in taxation for the other firm. By considering the "net" M&A deal value, we take into account that the tax rates of sellers in M&A transactions can increase.

6.1.2 Regression Results

Next, we discuss the results from the estimation of recurring annual tax avoidance associated with haven purchases. Since the regression equation includes year and firm fixed effects, our estimates of recurring annual tax avoidance from haven purchases are identified by comparing the same firm over time. First, we will discuss the results for the continuous measures of past M&A activity reported in Panel A of Table 8. Both measures of haven purchases are negative and statistically significant at the 1% level. Interestingly, the coefficient for the continuous measure of $ANY_{i,t}$ is also negative and statistically significant, suggesting that "non-haven purchases" also result in tax avoidance. This arises from the fact that there is greater scope for tax avoidance in a firm with a more global presence. The results indicate that if the ratio of net M&A deal value, where the target is in a non-haven, over total assets increases from 0.01 to 0.06, then the firm can expect a reduction in its cash ETR of 1.46 percentage points per year. This is equivalent to the expected reduction in taxes that would occur if a firm with no prior cross-border M&A history (at least back to 1990) bought a firm in a non-haven worth 5% of their total assets.[10] Acquisitions involving targets in tax

[10]We add 0.01 to the ratio of M&A deal value to total assets prior to taking the log. Thus, a firm with no prior M&A activity would have a ratio of 0.01. Buying a firm worth 5% of their book assets would increase the ratio to 0.06. Therefore, $-0.81 \times (ln(0.06) - ln(0.01)) \approx 1.46\%$.

havens result in further tax avoidance. If a company with no cross-border M&A history made a small-haven (respectively, large-haven) purchase worth 5% of their total assets, then its cash ETR would be 3.36 (respectively, 2.27) percentage points lower than if the target was located in a non-haven. That is, for a firm with no cross-border M&A history (including haven and non-haven), buying a small-haven (respectively, large haven) company worth 5% of their total assets results in a cash ETR drop of 4.82 (respectively, 3.73) percentage points. The estimated reductions in the cash ETR are large in economic terms, both in absolute terms and relative to the mean and median cash ETR of 25.2% and 21.6%, respectively.

Using dummies for past M&A activity as in Panel B of Table 8 yields similar conclusions. All three measures of prior M&A activity are negative and statistically significant at the 1% level. The dummies are capturing whether a firm has a positive value for each measure of cross-border (haven) M&A, so a firm can only capture each reduction in the cash ETR once. For a firm with no prior cross-border M&A deals, buying a non-haven firm in a cross-border M&A results in an expected decline of the firm's cash ETR of 1.83 percentage points. Had this firm instead bought a small-haven (respectively, large-haven) target, then there would be additional tax avoidance of 4.37 (respectively, 2.77) percentage points in the cash ETR. Thus, if the firm had no prior cross-border M&A deals, then buying a small-haven (respectively, large-haven) firm would result in a 6.21 (respectively, 4.61) percentage point drop in the cash ETR. Again, the estimated reductions in the cash ETR are large in economic terms, both in absolute terms and relative to the mean and median cash ETR of 25.2% and 21.6%, respectively.

6.1.3 Aggregate Tax Avoidance

Next, we will aggregate the recurring annual tax avoidance from haven purchases for all firms using the following formula:

$$\text{Aggregate Tax Avoidance} = \sum_{i \in \Omega} P_{i,T} \times \Delta\tau_{i,T} \tag{6}$$

where i indexes firms, Ω is the set of all publicly-listed firms with non-negative pre-tax income in year T that are alive as of 2018 or went private between 1990-2018, and T is the most recent year in which financials are reported in Compustat or Compustat Global, but no later than 2018. The variables are defined as follows:

- $P_{i,T}$: pre-tax income for firm i in year T, adjusted to 2017 dollars using the earnings growth from Robert Shiller's website (2020)
- $\Delta\tau_{i,T}$: change in cash ETR from haven purchases for firm i in year T

We define a firm as alive if total book assets are not missing in 2018. A firm went private between 1990-2018 if the reason for deletion in Compustat is given as "Now a private company." Our goal with this sample selection is to aggregate all firms that exist as stand-alone entities as of 2018. In addition, we only include the tax savings of a firm if they have non-negative pre-tax income. The tax avoidance from cross-border M&A is calculated as follows:

$$\Delta\tau_{i,T} = ETR_{i,T}\left(SM_{i,T}, LG_{i,T}, ANY_{i,T}, \boldsymbol{X_{i,T}}\right) - ETR_{i,T}\left(0, 0, 0, \boldsymbol{X_{i,T}}\right), \tag{7}$$

where these variables are as defined in equation 5 using the continuous measures of M&A activity. Thus, $\Delta\tau_{i,T}$ represents the difference in the cash effective tax rate between the case where the firm has its current level of prior M&A activity and the counterfactual case where all three measures of prior M&A activity are 0. Thus, we can write this as

$$\Delta\tau_{i,T} = \beta_1 SM_{i,T} + \beta_2 LG_{i,T} + \beta_3 ANY_{i,T}. \tag{8}$$

Replacing the coefficients with their respective estimates from Panel A of Table 8 yields

$$\Delta\tau_{i,T} = -1.88 \times SM_{i,T} - 1.27 \times LG_{i,T} - 0.81 \times ANY_{i,T}. \tag{9}$$

Substituting this in equation 6 yields aggregate tax avoidance of \$51.5 billion. This represents the total recurring annual tax avoidance from cross-border M&A that accrues to the acquiring firms. This consists of \$31.3 billion of tax avoidance from non-haven purchases and \$20.2 billion of tax avoidance from haven purchases.[11]

[11]Disaggregating the aggregate savings by the location of the target requires us to specify the order of

6.2 Asset Building

6.2.1 Aggregate Tax Avoidance

In this section, we will calculate the aggregate recurring annual tax avoidance from asset building deals, which accrue to the target firm in deals where the acquiror is in a tax haven and the target is not resident in a tax haven, using the following formula:

$$\text{Aggregate Tax Avoidance} = \sum_{k \in K} PM_{k,t(k)} \times V_k \times \Delta\tau_{h(k)} \tag{10}$$

where k indexes M&A deals, K is the set of all cross-border deals where the acquiror is in a tax haven and the target is not in a tax haven, and $t(k)$ is the year in which deal k took place. The variables are defined as follows:

- $PM_{k,t(k)}$: pre-tax income divided by market assets for the target in year $t(k)$ for deal k. If missing, a country/industry average in year $t(k)$ is used.
- V_k: deal value for deal k, adjusted to 2017 dollars using the earnings growth from Robert Shiller's website (2020)
- $\Delta\tau_{h(k)}$: target tax rate change, where $h(k) \in \{SM, LG\}$ denotes the location of the acquiror

The details for how $PM_{k,t(k)}$ is calculated when it is missing are described in Appendix D. Tax avoidance from asset building arises from the fact that the target pays a lower tax rate on average as a subsidiary of the acquiror than as a stand-alone company. It is empirically difficult to measure the drop in cash ETR for the target since we do not observe its financials after the acquisition. In addition, the target is private in the vast majority of cases, so we also do not observe financials before the acquisition. As such, we estimate $\Delta\tau_{h(k)}$ by using the tax rate reduction corresponding to a prior haven purchase using coefficients from Panel B of Table 8. This is a conservative estimate of the drop in taxes that the target experiences

M&A deals if haven and non-haven purchases occur in the same firm-year. In such cases, we make the assumption that haven purchases come first.

now that its part of a company that is tax resident in a tax haven. This is because not all companies that buy tax haven firms actually move their tax residence to the tax haven, which yields the largest reduction the in effective tax rate. Most firms that engage in tax-haven M&A "only" achieve tax avoidance through other avoidance strategies such as profit shifting. This assumption yields two possible values for $\Delta\tau_{h(k)}$ depending on the location of the acquiror, as given below

$$\Delta\tau_{h(k)} = \begin{cases} -6.21\%, \text{ if } h(k) = SM \\ -4.61\%, \text{ if } h(k) = LG. \end{cases} \tag{11}$$

The results indicate that the aggregate recurring annual tax avoidance from asset building deals is $4.5 billion.

6.3 Discussion of Tax Avoidance Results

We find that cross-border, haven purchases result in $20.2 billion in recurring annual tax avoidance for the acquiror, and cross-border, non-haven purchases result in $31.3 billion in recurring annual tax avoidance for the acquiror. In addition, asset building deals result in $4.5 billion in annual tax avoidance. Thus, tax-haven M&A results in $24.7 billion in annual tax avoidance, while the total recurring annual tax avoidance from cross-border M&A is $56.0 billion. Estimates of worldwide corporate income tax avoidance vary from $212 billion (Tørsløv et al., 2020) to $600 billion (Crivelli et al., 2015).

Cross-border, haven M&A is 25.9% by deal count and 28.4% by deal value of all cross-border M&As, but generates 44.1% of tax avoidance resulting from cross-border M&A. Therefore, per M&A transaction or per dollar spent on M&A, cross-border, tax haven M&A results in more tax avoidance than non-haven, cross-border M&A.

One potential source of confusion related to the gravity model and tax avoidance results should be clarified. In the gravity model, we estimate that tax havens have $2.4 trillion in M&A deal value beyond what is predicted based on economic fundamentals. In the

estimation of the tax avoidance from cross-border haven M&A, we estimate the tax avoidance from all cross-border, tax haven M&A, and not just the the portion of cross-border, haven M&A that is "abnormal."[12] The reason for this is that all cross-border, tax haven M&As results in tax avoidance, not just the "abnormal" ones. Moreover, while we can estimate the aggregate number of "abnormal" M&A volume by country, we cannot pinpoint which individual M&A transactions are the "normal" and the "abnormal" ones, respectively. If tax havens ceased to be tax havens but were non-havens instead, the tax savings for firms would decrease,[13] while these countries' cross-border M&A volumes would be expected to fall by the amount of the abnormal M&A volume.

6.4 Which Countries Lose?

Cross-border, tax-haven M&A results in $24.7 billion in recurring annual tax avoidance. We now analyze the flip side of this tax avoidance–the losses that accrue to the acquiror country in haven purchases and the target country in asset-building deals. Tax avoidance from non-haven purchases are excluded from this analysis, since it is not clear to which country the tax losses should be applied. Imagine a British firm buys a German one–is the German or British government (or both) losing tax revenue? The tax avoidance we are estimating is the sum of an even larger reduction in tax revenue for high-tax jurisdictions and a small increase in taxes paid in low tax jurisdictions. Because firms usually do not disclose the amount of taxes paid to different jurisdictions, we cannot separately estimate the tax losses for non-haven countries and the increases in tax revenue for haven countries (including license fees in countries such as, for instance, Bermuda). As a consequence, we underestimate the losses of tax revenues for high tax jurisdictions. Tørsløv et al. (2020), however, estimate that for each $1 in corporate tax revenue avoided in high-tax countries, about 20 cents in tax revenues are generated in tax havens.

We report the top 30 non-haven countries in terms of taxes lost through these M&A deals

[12] The total deal value for cross-border, tax-haven M&A is $4.3 trillion.

[13] They would not disappear completely, since cross-border, non-haven M&A results in tax savings, too.

in Table C4. The top two countries in terms of taxes lost from tax-haven, cross-border M&A are the United States and the United Kingdom, with losses of $7,562 million and $2,680 million, respectively. Germany, France, and Japan are the next countries, with losses of $1,625 million, $1,362 million, and $1,317 million, respectively. The US suffers 31% of the total dollar losses. The top 5 countries are responsible for 59%.

In Figure 1, we plot the ratio of tax avoidance from haven M&A as a share of the corporate income tax revenue of a country using a map of the world. The country with the highest ratio of taxes lost from M&A to corporate tax revenue is Kuwait, with a ratio of 16.11%. Among the major economies, the United Kingdom has the highest ratio of 3.57%. The US is seventh overall with a ratio of 2.03%. Asian countries such as Japan, China, India, South Korea, and Indonesia have relatively low ratios.

7 Identification and Robustness

The findings so far suggest that cross-border M&A involving tax havens is pursued for tax avoidance purposes. In this section, we entertain alternative explanations that cross-border M&A involving tax havens is occurring for reasons other than tax avoidance. It should however be noted that the number of possible alternative explanations for our results being driven by anything other than tax avoidance is limited, since such alternative explanations would have to be able to explain why, for instance, Bermuda and the United States have seen cross-border M&A deal value of $170.3 billion from 1990 to 2017 for reasons other than tax avoidance, which seems unlikely. Nevertheless, we take multiple approaches to address remaining concerns that cross-border M&A involving tax-havens is motivated by other economic forces. We also provide evidence that the results in this paper survive a battery of robustness tests.

7.1 US Tax Law Change in 2004

To address alternative explanations, we use a change in US tax law that occurred as part of the American Jobs Creation Act (AJCA) of 2004. Prior to 2004, a US firm could undertake

a "naked" inversion whereby it reincorporates in a foreign jurisdiction without having any significant operations there. Starting in 2004, a firm can move its incorporation outside of the US if (1) it has "substantial operations" in the country in which it seeks incorporation, or (2) in the case of a merger with a foreign firm, the US shareholders make up less than 80% of the combined firm (Marples and Gravelle, 2014). Initially, the IRS did not provide a precise definition of what qualified as "substantial operations." However, in 2006, regulation was passed that defined the substantial operations threshold–the substantial operations threshold is met if the firm has 10% of its employees, tangible assets, and sales in the foreign country in which it seeks incorporation (VanderWolk, 2010). Despite initial uncertainty surrounding the meaning of "substantial operations," it is clear that, post 2004, "The act effectively ended shifts to tax havens where no real business activity took place" (Marples and Gravelle, 2014). The existence of the substantial operations threshold made inversions more difficult for US firms, since US firms now have to acquire larger or additional foreign firms if they want to invert as a result of cross-border M&A. Since large tax havens such as Ireland and Singapore have a reasonably large number of firms that are large enough that, if acquired by a US firm, would allow the firm to pass the significant operations threshold, we predict that M&A volume with a US acquiror and a large-haven target increases after the law change. The prediction for small havens, with their much smaller economies, is unclear. On the one hand, it could be that the few large firms in small havens are acquired by US firms, which would imply a positive effect for small havens. On the other hand, it could be that small-haven firms are not sufficiently large or numerous for US firms to pass the threshold, so that there is a decline in M&A volume for small havens due to a substitution effect at their expense in favor of large havens. We test the hypothesis using a triple differences-in-differences research design, as shown below:

$$\ln(Y_{ij,t}) = \boldsymbol{\kappa_t} + \beta_1 US_i \times LG_j \times Y04_t + \beta_2 US_i \times SM_j \times Y04_t + \boldsymbol{\delta'} \boldsymbol{D_{ij,t}} + \boldsymbol{\theta'} \boldsymbol{X_{ij,t}} + \epsilon_{ij,t}, \quad (12)$$

where i indexes the acquiror countries, j the target countries, t the years, and $i \neq j$. The variables are defined as follows:

- $Y_{ij,t}$: aggregate M&A deal value with the acquiror in country i and the target in country j in year t
- $\boldsymbol{\kappa_t}$: year fixed-effects
- US_i: dummy that equals 1 if country i is the United States
- LG_j: dummy that equals 1 if country j is a large tax haven
- SM_j: dummy that equals 1 if country j is a small tax haven
- $Y04_t$: dummy that equals 1 if $t \geq 2004$
- $\boldsymbol{D_{ij,t}}$: all other main effects and double interactions involving US_i, LG_j, SM_j, and $Y04_t$ (except $LG_j \times SM_j$)
- $\boldsymbol{X_{ij,t}}$: time-varying controls

As in Section 5.1, we estimate the model using Poisson pseudo-maximum likelihood. The hypothesis implies that the triple interaction with the large-haven dummy is positive. We have no clear prediction for the sign of the small-haven triple interaction. Since the law was made effective on October 22, 2004, we define years in our data as beginning on October 22. That way, the $Y04_t$ dummy takes on the value 1 when the law is in effect.

The results are reported in column 1 of Table 9. The large-haven triple interaction is positive and significant, confirming our hypothesis. The small haven triple interaction is insignificant. This result documents that a tax-law change in how easy it is for US firms to use cross-border, tax-haven M&A to invert out of the US results in a change in deal value consistent with tax avoidance motives driving cross-border, tax-haven M&A.

The AJCA also granted US multinationals access to a temporarily lower tax on repatriated earnings. Specifically, firms could access the lower tax rate "for either the taxpayer's last taxable year which begins before October 22, 2004, or the taxpayer's first taxable year

which begins during the one-year period beginning on October 22, 2004."[14] Thus, firms could potentially repatriate earnings at the reduced rate up to and including October 20, 2006. Given that foreign cash holdings can influence cross-border M&A (Edwards et al., 2016; Hanlon et al., 2015), we rerun the model excluding years 2004 and 2005 to rule out any impact the repatriation holiday might have on the results. Since each year begins on October 22, we compare the post period beginning on October 22, 2006, to the pre-period ending on October 21, 2004. As indicated in column 2 of Table 9, the results are robust to the exclusion of these years.

7.2 Further Alternative Explanations and Robustness

Secrecy and Anonymity Offered by Tax Havens

Alternative explanations for our results with regards to the pursuit of anonymity and secrecy offered by tax havens are not applicable. While some might consider tax avoidance unethical, and many companies might not be following the spirit of tax laws, firms are following the letter of the law, making tax avoidance legal. If multinationals engaging in cross-border, tax-haven M&A were using the secrecy of tax havens for illegal purposes, how would we have obtained the transaction-level data for this paper? Hiding assets with the help of the anonymity provided by tax havens only applies to the illegal practices of tax evasion, by, for instance, under reporting profits. Tax evasion through tax havens is beyond the scope of this paper and does not apply to cross-border M&A of multinational corporations.

Fraud and Theft from Shareholders

Instead of defrauding the government, executives could defraud or steal from (minority) shareholders using the secrecy provided by tax havens. But if executives desiring to defraud shareholders was the main motive in cross-border, tax haven M&A, the implied fraud and theft would be on such a massive scale—tax havens have $2.4 trillion in M&A deal value beyond what is predicted based on their economic fundamentals—that tax-haven M&A fraud

[14] U.S. Department of the Treasury (2005): "Domestic Reinvestment Plans and other Guidance under Section 965," January 13 https://www.treasury.gov/press-center/press-releases/Documents/repatriationnoticen200510.pdf (accessed November 13, 2020).

and theft would either regularly make the headlines in the news, which is not the case, or there would be massive undiscovered amounts of fraud, which seems highly implausible.

Corporate Governance

One could be concerned that executives use tax-haven M&A to enjoy the "quiet life," undisturbed by shareholders (see Bertrand and Mullainathan, 2003), by exploiting the generally worse shareholder protection laws in tax havens compared to those of major economies such as the US or the UK. This is implausible. First, if executives wanted to enjoy a "quiet life" through bad corporate governance that shields them from demanding shareholders, there are easier ways to do so, such as by adopting staggered boards or poison pills, rather than engaging in cross-border, tax haven M&A (Gompers et al., 2003; Bebchuk and Cohen, 2003). Second, cross-border M&A involving havens such as Bermuda or Ireland implies the opposite of the "quiet life" hypothesis, since executives have to manage a more complex corporate organization and have to spend a substantial amount of time interacting with tax lawyers and accountants to implement and operate these corporate structures.

Political and Economic Instability

One possible alternative explanation is that M&A deals are structured through tax havens to protect the privacy of rich individuals in countries with a weak rule of law. Individuals in these countries might be worried about their safety because of, for instance, fears of kidnapping for a ransom. As such, they might structure M&A deals through tax havens not for tax avoidance purposes but to protect their privacy and identity as owners of large businesses. A related alternative explanation is that M&A transactions are structured through tax havens because the source country is politically or economically unstable. To address these concerns, we rerun our main gravity-model specification and restrict the sample such that the acquiror or target are in a stable non-haven or both sides of the deal are in a tax haven. Stable non-haven countries include the United States, Canada, and non-haven countries in Western Europe, since these countries are both politically and economically more stable than many other parts of the world and rich people in these countries generally do not fear for

their safety if their wealth becomes publicly known. The results reported in Table C2 in the appendix indicate that our results are robust to this alternative explanation–tax havens remain economically and statistically important drivers of M&A deal value in this limited sample.

Legal and Regulatory Constraints

Another explanation for our results could be that M&A deals are structured through tax havens to avoid legal and regulatory constraints such as capital controls that necessitate that a tax haven is used as an intermediary to enter a country. For instance, this might be the case for M&A deals between firms in Hong Kong and mainland China (which are coded by SDC and us as cross-border), since firms from other countries often are only able to operate in China through Hong Kong. As with the concerns regarding political and economic instability, we address concerns that legal and regulatory constraints explain our results by using the same stable-country sub-sample. The countries that we deem politically and economically stable have also liberalized their economies to a much greater extant than many other parts of the world. As the previous discussion indicated, the results reported in Table C2 in the appendix indicate that our results are robust to these alternative explanations.

Additional Control Variables

We also run robustness tests for the full sample of countries, controlling for the measure of capital account openness from Chinn and Ito (2006), tax information exchange arrangements from the Exchange of Information Database (2019), economic integration agreements (Kellogg Institute for International Studies, 2019), bilateral investment treaties (Bian et al., 2019), the World Uncertainty Index (Ahir et al., 2018), and membership in the EU, Euro Area, and the WTO. The results in Table C1, Table C2, and Table C3 in the appendix indicate that our results are robust to the inclusion of these additional controls.

Alternative Clustering

We have double clustered standard errors in regressions that correspond to a gravity model research design at both the acquirer- and target-country-level because this generally

results in the largest and thus most conservative standard errors. To document the robustness of these results, we replicate column 2 of Table 7 using country-pair clustering and report the results in Table C2 of the appendix. The haven coefficients remain statistically significant.

Comparison to Delaware

In addition, our results could be a variation of the role Delaware plays as a haven within the US, which would limit our contribution. This concern can easily be rejected for multiple reasons. First, Delaware is mostly a regulatory haven and less a tax haven (Bebchuk and Cohen, 2003; Dyreng et al., 2013). Second, Delaware is a haven for regulatory arbitrage across different US states but not at an international level across countries (Bebchuk and Cohen, 2003; Dyreng et al., 2013). Third, Delaware is, to a limited extent, a tax haven for the avoidance of state-level taxes but not for federal taxes in the US (Dyreng et al., 2013). Fourth, the role of Delaware as a within-US tax haven has been substantially declining over time (Dyreng et al., 2013), since most US states have switched their calculation of state corporate tax to a sales-based apportionment system, which appears to be quite robust to tax avoidance. Interestingly, this sales-based apportionment system is often considered as a potential policy approach that could substantially reduce tax avoidance at the international level, by, for instance, reducing the attractiveness of tax avoidance strategies such as the ones documented in this paper.

8 Comparison of Our Tax Residence Data to Uncorrected Data

A contribution of our paper to the tax avoidance literature, and also the tax literature more broadly, is that we create an algorithm based on novel, hand-collected data on tax residence laws to derive the tax residence of any company in 182 countries given data on the firm's country of incorporation and headquarters. As a result, our data is of superior quality compared to the many papers which take location data from sources such as SDC Platinum or Orbis at face value. This results in a systematic measurement error, since the

most aggressive tax avoiders are also the firms for which the tax residence is most likely to differ from the location reported in standard databases. We illustrate the quality of our data by rerunning our gravity model results using the original, uncorrected SDC data. Table 10 reports this comparison of our data to the uncorrected SDC data. Columns 1 and 2 of the table report our data, columns 3 and 4 report the SDC data, and columns 5 and 6 report the differences between columns 1 and 3, and 2 and 4, respectively. Columns 1, 3, and 5 report abnormal deal value based on the location of the acquiror using the gravity model estimates from column 3 of Table 5. Columns 2, 4, and 6 report total cross-border deal value based on the location of the acquiror. *Abnormal Deal Value* equals *Total Deal Value* minus the predicted M&A deal value had the country not been a tax haven. Our data yields $421.8 billion more cross-border, tax haven M&A deal value and $411.1 billion more abnormal deal value than the SDC location data. Importantly, the errors in the SDC data are heterogeneous across countries. For instance, SDC overcounts the cross-border M&A deal value for Switzerland, while it has fairly accurate data for Luxembourg. In contrast, SDC undercounts cross-border M&A deal value by 20% for Singapore, 30% for Ireland, 89% for the Cayman Islands, and 93% for the Netherlands Antilles. These numbers highlight the importance of having accurate tax residence data for conducting research on tax avoidance in particular and also research on taxation in general.

9 Policy Implications

Policy makers in non-havens interested in limiting the tax avoidance strategies documented in this paper have several options. One option is the so-called "formulary apportionment" that targets all forms of tax avoidance and is arguably the most effective way to fight tax avoidance, since it erodes the incentives for profit shifting in the first place (Keen and Konrad, 2013; Clausing, 2016). Instead of seeking to identify profits earned in particular jurisdictions, a sales-based formulary apportionment allocates profits based on the share of total sales for each jurisdiction. However, international formulary apportionment (instead

of formulary apportionment within a country for state-level taxation, such as in the US) is, from a political economy point of view, likely the most difficult policy proposal to implement as can be seen from the current disputes about tax policy between the EU/France on the one hand, and the US on the other hand.[15] Aside from this policy option, policy makers have four additional options that are narrower in focus but specifically target the avoidance strategies documented in this paper.

First, countries could change their tax and corporate laws such that tax residence is determined by the location where executives meet–usually at a company's headquarters– and not at a company's location of incorporation. While some countries already focus on the location of headquarters instead of the location of incorporation when determining tax residence, this is not the case in many countries, such as the United States (for details on the different practices across countries, see Appendix A). While it would not be impossible for firms to relocate their headquarters, it is presumably more costly than relocating the location of incorporation. In particular, in many industries and for many firms it is important that executives are close to their major establishments to facilitate management, communication, and monitoring–see, for instance, the evidence in Giroud (2013) on the effect of headquarters' proximity to plants on plant-level investment and productivity.

Second, while individual cross-border, tax-haven deals are unlikely to constitute a significant share of the aggregate global tax avoidance associated with such M&A, the picture is likely to be different once the dollar tax savings of individual countries are considered. Many smaller and mid-sized countries often have one firm or a small number of firms that are very large relative to the rest of the economy, as in, for instance, Samsung and South Korea, Anheuser-Busch InBev and Belgium, and Nokia and Finland. While such multinational companies usually do not break the letter of the tax law, they are often violating the spirit of the tax law. Since there could be differences in opinion with regards to tax-management gray areas among companies and tax authorities, tax audits and enforcement actions against

[15]Financial Times (2020): "Europeans vow to pursue digital tax plans after US 'provocation'," June 18, https://www.ft.com/content/df44d07c-f9cc-4025-9606-e46d2476375f (accessed July 24, 2020).

the corporations/M&As responsible for the largest dollar amounts of tax avoidance might be a way to reduce the losses in tax revenues for non-havens that result from cross-border, tax-haven M&A.

Third, countries can introduce or increase substance requirements similar to the "substantial operations" threshold in the US that make it more difficult for firms to move their tax domicile abroad by requiring that a large share of a firm's operations are in the country to which they seek tax residence. One shortcoming of this approach is that it would only curb inversions, which are a small subset of the transactions investigated in this paper. Furthermore, firms could respond by acquiring even larger foreign firms.

Fourth, another possibility to limit inversions is a one-off exit tax for firms that move their tax jurisdiction to another country. Ironically, the Netherlands, one of the largest tax havens in the world, is contemplating such a policy to prevent multinationals from moving to other tax havens.[16]

10 Conclusion

We document a novel tax avoidance strategy: Cross-border, tax-haven mergers and acquisitions (M&A). Tax havens have $2.4 trillion in M&A deal value beyond what is predicted based on economic fundamentals. Cross-border, tax-haven M&A results in $24.7 billion in recurring annual tax avoidance. In addition, tax avoidance from non-haven, cross-border M&A is $31.3 billion, bringing the total recurring annual tax avoidance from cross-border M&A to $56.0 billion. To our knowledge, our paper is the first to document that tax havens affect real investment on a large scale, and not just capital flows on paper.

We create an algorithm based on novel, hand-collected data on tax residence laws to derive the tax residence of any company in 182 countries given data on the firm's country of incorporation and headquarters.

One issue only touched upon by this paper is the amount of intra-country M&A deal

[16]Financial Times (2020): "Dutch plan to tax departing multinationals gains momentum'," August 16, https://www.ft.com/content/d5e84695-5f9b-498a-bb05-ba1a080a9b0f (accessed August 22, 2020).

volume in small havens that seems unusually large relative to the size of these economies. This interpretation is supported by the fact that intra-country deals for small havens are larger for both the mean and median than non-haven and large-haven, intra-country deals, which might seem surprising at first. At least two possible explanations come to mind. First, the tax haven status of the small havens could cause unusually high volumes of intra-country M&A activity. Second, some cross-border deals are incorrectly classified as intra-country, so that we are missing some transactions in the main analyses of this paper. Moreover, if such unusual intra-country patterns occur for small havens, they might also, at least to some extent, occur for large havens, though they might be more difficult to uncover since large havens most likely have a certain amount of intra-country M&A activity due to the considerable size of their economies.

In an ideal setting, one would like to estimate the following variables when investigating the tax avoidance associated with cross-border (tax-haven) M&A:

$$\begin{aligned} tax\ losses_{non\text{-}haven} + non\text{-}tax\ losses_{non\text{-}haven} = \\ tax\ savings_{firm} + tax\ gains_{haven} + non\text{-}tax\ gains_{haven} + deadweight\ loss. \end{aligned} \tag{13}$$

The non-tax losses for non-havens constitute losses from the possible reduction of employment and real investment if a firm moves real activity abroad after a cross-border, tax-haven M&A (e.g. the headquarters being relocated). Furthermore, these losses also include externalities from lower tax revenues or from lower local economic activity in the area affected by the possible reduction in employment. According to estimates by Tørsløv et al. (2020), tax havens gain about 20 cents in tax revenue for each $1 avoided in corporate tax revenue in high-tax countries. This average is however probably masking a lot of cross-sectional variation across different tax havens. In the extreme case of tax havens like Bermuda that do not levy a corporate income tax, companies have to pay registration and incorporation fees that are a major source of revenue for such tax havens. Since such fees are, in effect, taxes, although we do not list them separately in the above equation. Tax havens also gain

from the possible reallocation of real activity after cross-border, haven M&A and the positive externalities associated with these. For instance, in Ireland, foreign companies, and US multinationals in particular, pay higher wages than Irish firms and employ a significant minority of the labor force (Tørsløv et al., 2020). Lastly, there is likely a deadweight loss resulting from cross-border, tax haven M&A, since the resulting corporate structure might be, absent the tax savings, less efficient than an organizational form that does not span tax havens like Bermuda or Luxembourg.

Due to data issues and other limitations, we are only able to estimate the following terms:

$$tax\ losses_{non\text{-}haven} = tax\ savings_{firm} + error\ term. \tag{14}$$

Further improving the estimation and identification of the different components of equation 13 is a task for future research.

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Figure 1: Taxes Lost from Cross-Border, Tax-Haven M&A to Corporate Tax Revenue

This figure shows the ratio of *M&A Taxes Lost* to *Corp. Tax Revenue* by country. These variables are defined in Table 1. The data on annual corporate income tax revenue is from Tørsløv et al. (2020). The green dots correspond to tax havens. In cases where tax havens are geographically close, we slightly separate the green dots for clarity. All data is as of 2017. Ratios are in percentage points.

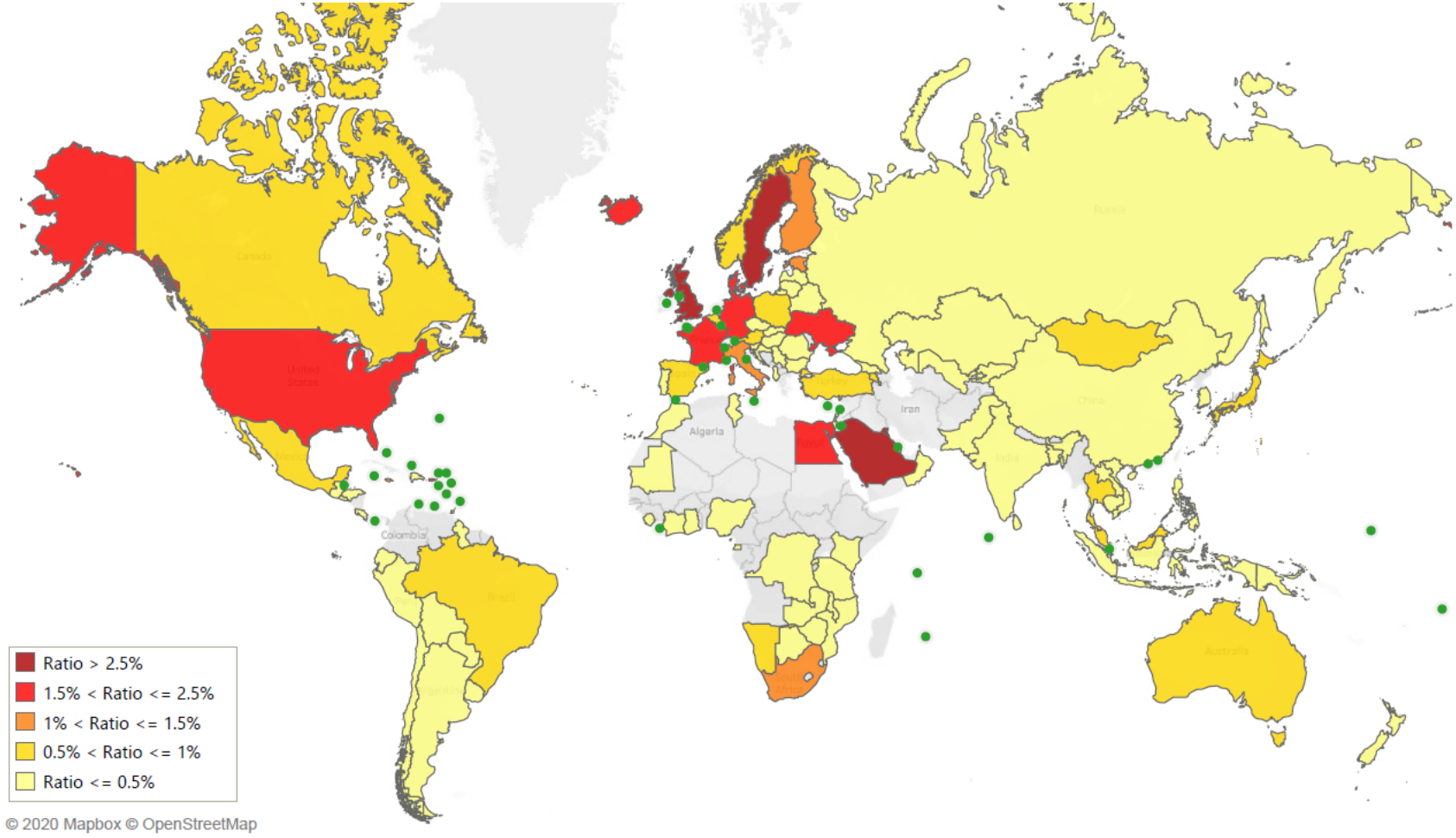

Table 1: Variable Definitions - Country and Country-Pair Level

This table defines country and country-pair level variables. See Section 3 for a complete list of sources. Country-level variables defined for the acquiror have an analogous definition for the target. Dollar figures are in 2017 USD.

Country-Pair-Level

Variable	Definition
$\mathbb{1}$(Colonial Relation)	Dummy that equals 1 if the acquiror and target countries have a past colonial relationship.
$\mathbb{1}$(Common Language)	Dummy that equals 1 if the acquiror and target countries have the same official language.
Distance	Bilateral geographic distance between each country's most populous city.
ln(M&A Value)	Aggregate M&A value at the country-pair level.
$\mathbb{1}$(Same Country)	Dummy that equals 1 if the acquiror and target countries were formerly part of the same country.

Country-Level

Variable	Definition
Control of Corruption	Measure of a country's control of corruption from the WGI.
GDP	GDP.
GDPPC	GDP per capita.
Exports	Real goods and services exports from country i to country j.
Imports	Real goods and services imports from country j to country i.
$\mathbb{1}$(UK Legal Origin)	Dummy that equals 1 if a country has a UK legal origin.
$\mathbb{1}$(Lg Haven Acquiror)	Dummy that equals 1 if the acquiror is in a large tax haven.
$\mathbb{1}$(Sm Haven Acquiror)	Dummy that equals 1 if the acquiror is in a small tax haven.
$\mathbb{1}$(US Acquiror)	Dummy that equals 1 if the acquiror is in the United States.
$\mathbb{1}$(Yr$\geq$ 2004)	Dummy that equals 1 if the year is 2004 or later.
M&A Taxes Lost	Recurring, annual amount of corporate income taxes lost from tax avoidance through cross-border, tax-haven M&A.
Corp. Tax Revenue	Annual amount of corporate income tax revenue.

Table 2: Variable Definitions - Firm Level

This table presents firm-level variable definitions. Accounting variables are from Compustat North America and Compustat Global and are winsorized at the 1% level on both sides. *Cash ETR* is further winsorized to ensure that it is between 0 and 1. We also winsorize the continuous measures of prior M&A volume to ensure that they are between 0 and 1. M&A data is from SDC Platinum. Variables defined for small havens have analogous definitions for large havens and non-havens. *CB* is an acronym for cross-border. M&A dollar figures are inflation-adjusted to 2017.

Accounting Variables

Variable	Definition
Cash/TA(t)	Cash divided by total book assets at time t.
Cash ETR(t)	Taxes paid from t-1 to t divided by pre-tax income from t-1 to t.
Leverage(t)	Total liabilities over total book assets at time t.
Profitability(t)	EBITDA divided by total book assets at time t.
Size(t)	ln(total book assets) at time t.

Measures of M&A Volume

Variable	Definition
Net Sm Haven M&A Value/TA(i,t)	Considering only the sample of CB deals that occured at any point up to and including time t where the target is in a small haven: Cumulative value of deals where firm i is the acquiror's ultimate parent minus the cumulative value of deals where firm i is the target's ultimate parent, all over inflation-adjusted total book assets. Replaced with 0 if negative.
Net Total M&A Value/TA(i,t)	Sum of Net Sm Haven M&A Value/TA (i,t), Net Lg Haven M&A Value/TA (i,t), and Net Non-Haven M&A Value/TA (i,t).
$\mathbb{1}$(Net Sm Haven M&A Value > 0)(i,t)	Dummy that equals 1 if *Net Sm Haven M&A Value* > 0 and 0 otherwise.
$\mathbb{1}$(Net Total M&A Value > 0)(i,t)	Dummy that equals 1 if *Net Total M&A Value* > 0 and 0 otherwise.

Table 3: M&A Summary Statistics

This table reports M&A summary statistics based on the location of the acquiror/target and whether the deal is cross-border or intra-country.

Panel A: Total Deal Value (Billions of 2017 USD)

	Acquiror	Target	
Cross-Border	$12,490	$13,444	
Intra-Country	$26,317	$26,317	Non-Haven
Ratio	0.47	0.51	
Cross-Border	$1,984	$1,376	
Intra-Country	$676	$676	Large Haven
Ratio	2.94	2.04	
Cross-Border	$788	$441	
Intra-Country	$66	$66	Small Haven
Ratio	11.92	6.67	

Panel B: Number of Deals

	Acquiror	Target	
Cross-Border	43,929	47,978	
Intra-Country	121,618	121,618	Non-Haven
Ratio	0.36	0.39	
Cross-Border	6,630	4,229	
Intra-Country	4,234	4,234	Large Haven
Ratio	1.57	1.00	
Cross-Border	2,752	1,104	
Intra-Country	272	272	Small Haven
Ratio	10.12	4.06	

Table 3: M&A Summary Statistics (Continued)

Panel C: Mean Deal Value (Millions of 2017 USD)

	Acquiror	Target	
Cross-Border	\$284	\$280	Non-Haven
Intra-Country	\$216	\$216	
Cross-Border	\$299	\$325	Large Haven
Intra-Country	\$160	\$160	
Cross-Border	\$286	\$399	Small Haven
Intra-Country	\$243	\$243	

Panel D: Median Deal Value (Millions of 2017 USD)

	Acquiror	Target	
Cross-Border	\$32	\$33	Non-Haven
Intra-Country	\$22	\$22	
Cross-Border	\$34	\$31	Large Haven
Intra-Country	\$17	\$17	
Cross-Border	\$38	\$56	Small Haven
Intra-Country	\$29	\$29	

Table 4: Tax-Haven/Non-Haven Specialization - Important Pairs

This table shows the total M&A deal value in billions of 2017 USD between a selection of important tax-haven/non-haven pairs. A tax-haven/non-haven pair is included if the deal value is significant relative to the total deal value of the tax haven or the non-haven country.

Tax Haven(s)	Non-Haven(s)	Deal Value
Bermuda	United States	170.3
British Crown Dependencies	United Kingdom	49.7
Cayman Islands	China	66.3
Cyprus	Russia, Greece and Ukraine	18.6
Hong Kong and Singapore	Asia-Pacific	247.8
Ireland	United States	371.1
Luxembourg	Western Europe	92.5
Netherlands	Western Europe	260.0
Switzerland	Latin America	21.9

Table 5: Gravity Model with Baseline Controls

This is the first of two tables documenting the effect of tax havens on cross-border M&A deal value. This table uses a smaller set of control variables with substantial country coverage. Poisson pseudo-maximum likelihood estimation is used on this country-pair-year-level panel. All variables are measured contemporaneously, and are defined in Table 1. *Year FE* refers to year fixed-effects. Standard errors are double clustered at the acquiror and target country level, and reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Dep Var: ln(M&A Value)		
	(1)	(2)	(3)
𝟙(Sm Haven Acquiror)	3.07***	2.84***	1.76***
	(0.29)	(0.34)	(0.29)
𝟙(Lg Haven Acquiror)	1.33***	1.36***	0.73***
	(0.28)	(0.27)	(0.20)
𝟙(Sm Haven Target)	2.62***	2.35***	1.48***
	(0.52)	(0.47)	(0.46)
𝟙(Lg Haven Target)	0.99***	1.01***	0.49**
	(0.14)	(0.22)	(0.23)
ln(Acquiror GDP)	1.16***	1.11***	0.92***
	(0.03)	(0.03)	(0.03)
ln(Target GDP)	1.20***	1.15***	0.99***
	(0.09)	(0.07)	(0.06)
ln(Distance)	-0.61***	-0.55***	-0.40***
	(0.04)	(0.07)	(0.07)
𝟙(Same Country)		-0.18	0.36
		(0.27)	(0.30)
𝟙(Common Language)		1.02***	0.92***
		(0.20)	(0.19)
𝟙(Colonial Relation)		0.81***	0.62***
		(0.12)	(0.14)
ln(Acquiror GDPPC)			0.68***
			(0.11)
ln(Target GDPPC)			0.52***
			(0.10)
Year FE	Yes	Yes	Yes
Two-way SEs	Yes	Yes	Yes
N	805,500	805,500	805,500
Pseudo R^2	0.713	0.744	0.765
Mean of Dep Var	4.50	4.50	4.50

Table 6: Abnormal M&A Deal Value in Tax Havens

This table compares abnormal to actual deal value in tax havens. *Abnormal Deal Value* equals *Total Deal Value* minus the predicted M&A deal value had the country not been a tax haven using estimates from column 3 of Table 5. *Total Deal Value* is the total cross-border M&A deal value associated with the tax haven. For details on how *Abnormal Deal Value* and *Total Deal Value* are disaggregated by country, see Section 5.2. The Netherlands Antilles includes Curaçao and Sint Maarten after it was dissolved in 2010. Dollar figures are in billions of 2017 USD.

	Abnormal Deal Value	Total Deal Value	Abnormal/Total
Netherlands	715.4	1,259.6	56.8
Ireland	297.1	498.8	59.6
Bermuda	286.1	297.3	96.2
Switzerland	247.8	872.2	28.4
Luxembourg	171.7	255.1	67.3
Cayman Islands	168.9	174.1	97.0
Hong Kong	157.7	321.8	49.0
Singapore	129.9	259.3	50.1
Netherlands Antilles	44.6	46.1	96.8
Cyprus	36.5	45.1	81.0
British Virgin Islands	35.5	36.6	97.0
Guernsey	30.1	69.8	43.2
Bahrain	28.7	35.7	80.4
Panama	27.8	33.4	83.1
Jersey	13.7	32.1	42.6
The Bahamas	12.6	23.1	54.3
All Other Tax Havens	0.6	47.8	1.2
Total	2,405	4,308	55.8

Table 7: Gravity Model with Additional Controls

This is the second of two tables documenting the effect of tax havens on cross-border M&A deal value. This table uses a larger set of control variables with more limited country coverage. Poisson pseudo-maximum likelihood estimation is used on this country-pair-year-level panel. All variables are measured contemporaneously, and are defined in Table 1. *Year FE* refers to year fixed-effects. Baseline Controls refers to the control variables used in Table 5. Standard errors are double clustered at the acquiror and target country level, and reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Dep Var: ln(M&A Value)		
	(1)	(2)	(3)
𝟙(Sm Haven Acquiror)	2.23***	2.08***	2.13***
	(0.22)	(0.27)	(0.28)
𝟙(Lg Haven Acquiror)	0.66***	0.71***	0.70***
	(0.18)	(0.25)	(0.25)
𝟙(Sm Haven Target)	1.71***	1.44***	1.43***
	(0.47)	(0.38)	(0.34)
𝟙(Lg Haven Target)	0.40**	0.44**	0.43**
	(0.17)	(0.17)	(0.20)
ln(Acquiror Control of Corruption)	2.20***	1.88***	1.87***
	(0.46)	(0.27)	(0.27)
ln(Target Control of Corruption)	1.36***	0.91***	0.91***
	(0.35)	(0.32)	(0.32)
𝟙(Acquiror UK Legal Origin)		0.61***	0.63***
		(0.19)	(0.20)
𝟙(Target UK Legal Origin)		0.84***	0.82***
		(0.18)	(0.18)
ln(Acquiror Exports)			0.05
			(0.05)
ln(Acquiror Imports)			-0.03
			(0.07)
Baseline Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Two-way SEs	Yes	Yes	Yes
N	449,180	449,180	449,180
Pseudo R^2	0.760	0.771	0.771
Mean of Dep Var	4.52	4.52	4.52

Table 8: Tax Avoidance from Haven Purchases

This table documents the tax avoidance from haven purchases using two different measures of prior M&A activity and OLS panel regressions at the firm-year level. All variables are defined in Table 2. *Firm Controls* refers to size, leverage, profitability, and cash/TA, all of which are lagged two periods. *Year and Firm FE* refers to year and firm fixed-effects. *Firm FE* refers to firm fixed-effects. Standard errors are clustered at the firm level and reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

Panel A: Continuous Measure of Prior M&A Activity

	Cash ETR(t)
ln(Net Sm Haven M&A Value/TA))(t-2)	-1.88***
	(0.70)
ln(Net Lg Haven M&A Value/TA)(t-2)	-1.27***
	(0.35)
ln(Net Total M&A Value/TA)(t-2)	-0.81***
	(0.16)
Firm Controls	Yes
Year and Firm FE	Yes
Clustering	Firm
N	239,253
Adjusted R^2	0.361
Dep Var Mean	25.20

Panel B: Dummy for Prior M&A Activity

	Cash ETR(t)
$\mathbb{1}$(Net Sm Haven M&A Value > 0)(t-2)	-4.37***
	(1.32)
$\mathbb{1}$(Net Lg Haven M&A Value > 0)(t-2)	-2.77***
	(0.71)
$\mathbb{1}$(Net Total M&A Value > 0)(t-2)	-1.83***
	(0.37)
Firm Controls	Yes
Year and Firm FE	Yes
Clustering	Firm
N	239,253
Adjusted R^2	0.361
Dep Var Mean	25.20

Table 9: Identification: Event Study Using 2004 US Tax Law Change

This table tests whether US firms acquired more large-haven firms in response to a US tax-law change implemented on 10/22/2004 that made inversions more difficult. Poisson pseudo-maximum likelihood estimation is used on this country-pair-year-level panel. The first column is the main event study. The second column tests the robustness of the first by excluding the years 2004-2005, since the United States implemented a repatriation tax holiday in 2004 that was effective during this time. All variables are measured contemporaneously, and are defined in Table 1. *Dummies and Interactions* refers to all other combinations of main effects and interactions of the dummies shown in the table, consistent with a triple differences-in-difference research design. *Time-Varying Controls* includes GDP and GDP per capita. *Year FE* refers to year fixed-effects. For the purposes of this regression, calendar years have been replaced with "fiscal" years that begin on October 22 of each year. Standard errors are double clustered at the acquiror and target country level, and reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Dep Var: ln(M&A Value)	
	(1)	(2)
$\mathbb{1}$(US Acquiror)×$\mathbb{1}$(Lg Haven Target)×$\mathbb{1}$(Yr≥ 2004)	0.59**	0.65**
	(0.25)	(0.32)
$\mathbb{1}$(US Acquiror)×$\mathbb{1}$(Sm Haven Target)×$\mathbb{1}$(Yr≥ 2004)	-0.62	-0.64
	(0.58)	(0.54)
Sample	All	Excl. 2004/05
Dummies and Interactions	Yes	Yes
Time-Varying Controls	Yes	Yes
Year FE	Yes	Yes
Two-way SEs	Yes	Yes
N	776,434	717,960
Pseudo R^2	0.712	0.712
Mean of Dep Var	4.50	4.48

Table 10: Comparison of Our Tax Residence Data to Uncorrected Data

This table reports abnormal and actual deal value in tax havens using our tax residence data as well as the location reported in SDC Platinum. *Abnormal Deal Value* equals *Total Deal Value* minus the predicted M&A deal value had the country not been a tax haven using estimates from column 3 of Table 5. *Total Deal Value* is the total cross-border M&A deal value associated with the tax haven. For details on how *Abnormal Deal Value* and *Total Deal Value* are disaggregated by country, see Section 5.2. The Netherlands Antilles includes Curaçao and Sint Maarten after it was dissolved in 2010. Dollar figures are in billions of 2017 USD.

	Our Data		SDC Data		Difference	
	Abnormal Deal Value	Total Deal Value	Abnormal Deal Value	Total Deal Value	Abnormal Deal Value	Total Deal Value
Netherlands	715.4	1,259.6	673.7	1,242.2	41.7	17.4
Ireland	297.1	498.8	150.5	347.7	146.5	151.2
Bermuda	286.1	297.3	251.7	262.1	34.4	35.2
Switzerland	247.8	872.2	311.9	928.3	-64.1	-56.0
Luxembourg	171.7	255.1	174.8	257.3	-3.1	-2.3
Cayman Islands	168.9	174.1	13.7	18.5	155.2	155.6
Hong Kong	157.7	321.8	161.1	316.7	-3.5	5.2
Singapore	129.9	259.3	88.6	207.5	41.4	51.8
Netherlands Antilles	44.6	46.1	1.7	3.1	42.9	43.0
Cyprus	36.5	45.1	36.8	45.1	-0.3	-0.0
British Virgin Islands	35.5	36.6	26.2	27.2	9.3	9.4
Guernsey	30.1	69.8	33.2	74.5	-3.1	-4.7
Bahrain	28.7	35.7	29.1	35.8	-0.4	-0.0
Panama	27.8	33.4	9.0	14.4	18.8	19.1
Jersey	13.7	32.1	16.0	36.4	-2.4	-4.3
The Bahamas	12.6	23.1	14.5	24.3	-1.9	-1.2
All Other Tax Havens	0.6	47.8	0.9	45.2	-0.3	2.6
Total	2,405	4,308	1,993	3,886	411.1	421.8

For Online Publication

Appendix to

"Tax Avoidance through Cross-Border Mergers and Acquisitions"

A Appendix: Tax Residence Definition

In this appendix, we explain how we define the tax residence of a company when it is headquartered and incorporated in different countries. First, we use the PwC Worldwide Tax Summaries for Corporate Taxes guide from 2017 to determine the applicable laws for 151 countries (PwC, 2017). The assumption is that the relevant laws have not changed during the sample period. Using this reference document, we classify all countries into five categories.

1. Incorporation or management and control (INC/MC): A company is a tax-resident in an INC/MC country, if it is incorporated or managed and controlled in that country. This catch-all definition is the most common, as it applies to 74 of the 151 countries that we classified. Some prominent examples include the UK, Hong Kong, Russia, and Germany.

2. Incorporation (INC): A company is a tax resident in an INC country, if it is incorporated in that country. This category includes 47 countries, such as the United States, France, Sweden, and Thailand. A notable exception to this rule applies in the US according to section 7874 of the Internal Revenue Code, which prevents firms from moving their incorporation outside of the US if nearly all of their business is conducted in the US (Marples and Gravelle, 2014). In practice, this rule rarely applies since a company would not incorporate outside of the US, if it knew it would still be a US tax-resident company.

3. Management and control (MC): A company is a tax resident in an MC country, if it is managed and controlled in that country. This applies to 9 countries, including Singapore, Malaysia, and Cyprus.

4. Does not matter (DM): The fourth category includes countries with laws stipulating that in the event the nation of incorporation and the nation where the company is managed differ, the other country (not in this category) can always claim the company as a tax resident. This group has 12 countries with small economies, including Panama and the UAE. For instance, the laws in Panama stipulate that a company is a tax resident in Panama, if it is incorporated and headquartered in Panama. For the UAE, there is no concept of tax-residence.

5. No taxes (NO): The fifth and final category includes countries with no corporate taxes. This includes 9 countries, such as Bermuda, the Cayman Islands, and the British Virgin Islands.

The location where management and control is exercised is the place where the executives meet, which is typically the place where the headquarters is located. Therefore, we use the terms headquarter and location where management and control is exercised, interchangeably.

The difficult part about determining tax residence is the appropriate tie-breaking provision. For example, if two countries can claim the same company as a tax resident, then where is the company a tax resident? In rare cases, the company is a dual-resident—a tax resident in both countries. However, in most cases, the countries have a treaty in place that stipulates a single place of tax residence when both countries can claim the company as a tax resident. We have not found a comprehensive source for tax treaties. Instead, we rely on examples in 10-k and 20-f SEC filings. We used a sampling of companies to determine the application of tax treaty rules in practice. To get a sample of firms, we collected a list of firms where the nation of incorporation differ from the nation of headquarters. This was accomplished using two sources: Snapshot and data on SEC filings in WRDS. We then manually search 10-k and 20-f filings for hundreds of these companies in EDGAR, which contains SEC filings. There is good coverage in these filings of firms that are neither incorporated nor headquartered in the US. For each company, we looked at the most recent 10-k or 20-f filing and determined the place of residence. Most of the time, the filings do not mention anything about tax residence. When they do, they typically state their place of residence with a brief description of why this is the case. Based on our findings, we develop the following rules. These rules are applied sequentially to the entire sample of M&A deals. That is, rule 1 is applied first, and if rule 1 doesn't apply, then rule 2 applies, etc.

1. A country is tax resident in the US if and only if it is incorporated in the US. For example, consider the 2017 10-k of MySize, Inc. At the time, this company was incorporated in the US with headquarters in Israel. Here is a statement in their 10-k about their tax position: "We are subject to federal, state and local taxes in the U.S., as well as local taxes in Israel in [sic] respect to our operations in Israel."

2. If a company is headquartered in China (INC/MC), and incorporated in an INC/MC or NO country, then it is resident in the country of incorporation. For example, here is a quote from the 2017 20-f of YY Inc, who have their HQ in China and their incorporation in the Cayman Islands: "We are not aware of any offshore holding companies with a corporate structure similar to ours ever having been deemed to be a People's Republic of China (PRC) 'resident enterprise' by the PRC tax authorities."

3. If a company is incorporated in Mauritius (INC/MC) and managed in India (INC/MC), then it is resident in Mauritius. For example, Azure Power Global satisfies this criteria according to their 2017 20-f.

4. If the company is headquartered in an INC/MC or MC country, then it is resident in that country. Here are some examples:

   (a) IHS Markit is incorporated in Bermuda and headquartered in the UK. Here is a quote from their 2017 10-k:

   > It is the intention of the directors to conduct the affairs of IHS Markit Ltd. so that the central management and control of IHS Markit Ltd. is exercised in the United Kingdom such that IHS Markit Ltd. is treated as resident in the United Kingdom for U.K. tax purposes.

   (b) Delphi Automotive is incorporated in Jersey and headquartered in the UK. Here is a quote from their 2014 10-k. "We will seek to run ourselves in such a way that we are and remain tax resident in the United Kingdom."

   (c) Invitel Holdings stated the following in their 2009 20-f: "Invitel Holdings is a Danish incorporated company, however is [sic] considered a tax resident company in Hungary given that the effective place of management of Invitel Holdings is in Hungary."

   (d) Amarin Corporation is incorporated in the UK and headquartered in Ireland. Here is a quote from their 2017 10-k:

   > Where a company is treated as tax resident under the domestic laws of both the UK and Ireland then the provisions of article 4(3) of the Double Tax Convention between the UK and Ireland provides that such enterprise shall be treated as resident only in the jurisdiction in which its place of effective management is situated. We have sought to conduct our affairs in such a way so as to be resident only in Ireland for tax purposes by virtue of having our place of effective management situated in Ireland.

5. If the company is incorporated in an INC or INC/MC country and headquartered in a DM, NO, or INC country, then it is resident in the country of incorporation.

6. Otherwise, the company is resident in the country of headquarters.

Rules 1-3 of this list are exceptions to rules 4 and 5. The application of rule 4 is clear if the company is incorporated in a country that does not consider incorporation when determining residence (DM and MC). Next, with NO countries, we find that the residence tends to be allocated to the country of headquarters, as illustrated by examples 4a and 4b. Lastly, when the company is incorporated in an INC/MC, the appropriate double-tax treaty comes into play since both the country of incorporation and the country of headquarters could claim

the company as being tax resident. We have found that these treaties tend to allocate tax residence to the country of headquarters, as illustrated by examples 4c and 4d.

Rule 5 is straightforward when the company is headquartered in a DM or INC country. Although there are few examples of this, we presume that if the headquarters is in a NO country, then the country of incorporation will claim the company as a tax resident. Lastly, if rules 1-5 do not apply, then we assume that the company is a resident in the nation of headquarters. This most often occurs when the nation of incorporation is missing in the data or the company is headquartered in a country where we are unable to determine the tax residence laws and the country of incorporation is such that rules 1-5 do not apply. There are 182 countries in our sample but we are only able to obtain tax residence laws for 151 of them. Thus, there are 31 countries for which tax residence laws are unavailble and are thus affected by the assumption underlying rule 6.

B Appendix: Data for Additional Countries

This appendix explains how we calculate country-level variables for a select number of countries with missing data.

B.1 Gibraltar

We obtain GDP and GDP per capita from the government's website. Since Gibraltar fiscal year ends on June 30, we denote GDP for the year ending June 30 as actually ending 6 months later, on December 31. The data is available from 2005-2017. Since the Gibraltar Pound is pegged 1-1 with the British Pound, we convert it to US dollars using the GBR-to-USD exchange rate as of June 30, 2017.[17]

B.2 Guernsey and Jersey

We obtain GDP data from three sources. First, the WDI provides GDP and GDP per capita for the Channel Islands, without separately listing Guernsey and Jersey, from 1998-2007. Second, we obtain data for Jersey from the government of Jersey's website.[18] We use Gross Value Added as a proxy for GDP since it covers more years and is very similar to GDP for the years when both are available. For Guernsey, we obtain GDP data from its government's website.[19] Since the data from both sources is in 2018 units of local currency, we convert this to US Dollars using the GBR-to-USD exchange rate on December 31, 2018.

[17]Statistics Office, HM Government of Gibraltar (2017): "Abstract of Statistics 2016," https://www.gibraltar.gov.gi/uploads/statistics/2019/Reports/Abstract%20of%20Statistics%202016%20whole%20report.pdf (accessed August 11, 2020).

[18]Government of Jersey (2019): "National Accounts: GVA and GDP," October 2 https://opendata.gov.je/dataset/national-accounts (accessed August 11, 2020).

[19]States of Guernsey (2019): "Guernsey Annual GVA and GDP Bulletin," August 15 https://gov.gg/CHttpHandler.ashx?id=120674&p=0 (accessed August 11, 2020).

We are left with Guernsey GDP and GDP per capita data from 2009-2018, Jersey GDP data from 1998-2018, and Jersey GDP per capita data from 2000-2018. Next, we fill in missing Jersey population data from 1998-1999, and Guernsey GDP and population data from 1998-2007 using the WDI Channel Islands data. Using data from 2009-2018, we take the average share of Channel Islands GDP and population for Jersey and Guernsey. We then use these shares to disaggregate the Channel Islands data into data for Jersey and Guernsey.

Since Jersey and Guernsey are not in the CEPII GeoDist Database, we gather the necessary data from additional sources. First, we need the bilateral geographic distance between the most populous cities in Jersey and Guernsey, and those for the remaining countries. We use the distances between the UK and all other countries as an approximation since London is relatively close to the most populous cities of Jersey and Guernsey. We manually fill in the distance between Jersey and Guernsey, which is 43.3 km. Next, we need the official language(s) for each of these countries. Based on information from Encyclopædia Britannica, the official language for Guernsey is English,[20] and the official languages for Jersey are English and French.[21] Based on the definition of the same country dummy, Jersey and Guernsey were never part of another country. Lastly, the colonial relation dummy should equal 1 only when Jersey or Guernsey are paired with the UK.

B.3 Luxembourg

The capital account openness measure (KAOPEN) used in Table C1 from Chinn and Ito (2006) is missing for Luxembourg. We replace the missing Luxembourg values with those of Belgium given their longstanding economic union.[22] Since KAOPEN is similarly high across all founding EU countries, we would have obtained similar results if we had instead used the values from France, Germany, or the Netherlands for Luxembourg.

C Appendix: Proof of Abnormal Deal Value Disaggregation

Define H as the set of all havens. Since we define $\alpha_{ij,t}$ for all country pairs where at least one side is in a haven, we can express the sum as

[20] Encyclopædia Britannica (2020): "Guernsey," August 12 https://www.britannica.com/place/Guernsey-island-and-bailiwick-Channel-Islands-English-Channel (accessed August 12, 2020).

[21] Encyclopædia Britannica (2020): "Jersey," August 12 https://www.britannica.com/place/Jersey-island-Channel-Islands-English-Channel (accessed August 12, 2020).

[22] Encyclopædia Britannica (2020): "The Benelux Economic Union," October 9 https://www.britannica.com/topic/international-trade/The-Benelux-Economic-Union#ref265789 (accessed October 9, 2020).

$$\sum_i \sum_j \sum_t \alpha_{ij,t} = \sum_{i \notin H} \sum_{j \in H} \sum_t \alpha_{ij,t} + \sum_{i \in H} \sum_{j \notin H} \sum_t \alpha_{ij,t} + \sum_{i \in H} \sum_{j \in H} \sum_t \alpha_{ij,t}.$$

Rearranging the order of summation and breaking up the final term into two parts yields

$$\sum_i \sum_j \sum_t \alpha_{ij,t} = \sum_t \left(\sum_{i \notin H} \sum_{j \in H} \alpha_{ij,t} + \sum_{i \in H} \sum_{j \notin H} \alpha_{ij,t} + \frac{1}{2} \left(\sum_{i \in H} \sum_{j \in H} \alpha_{ij,t} + \sum_{i \in H} \sum_{j \in H} \alpha_{ij,t} \right) \right).$$

Changing the index labels, rearranging the order of summation, and substituting for α_h completes the proof.

$$\begin{aligned}
\sum_i \sum_j \sum_t \alpha_{ij,t} &= \sum_t \left(\sum_{i \notin H} \sum_{h \in H} \alpha_{ih,t} + \sum_{h \in H} \sum_{j \notin H} \alpha_{hj,t} + \frac{1}{2} \left(\sum_{i \in H} \sum_{h \in H} \alpha_{ih,t} + \sum_{h \in H} \sum_{j \in H} \alpha_{hj,t} \right) \right) \\
&= \sum_h \sum_t \left(\sum_{i \notin H} \alpha_{ih,t} + \sum_{j \notin H} \alpha_{hj,t} + \frac{1}{2} \left(\sum_{i \in H} \alpha_{ih,t} + \sum_{j \in H} \alpha_{hj,t} \right) \right) \\
&= \sum_h \alpha_h
\end{aligned}$$

D Appendix: Calculating the Pre-Tax Profit Margin for Aggregate Tax Avoidance

In this appendix, we will explain how $PM_{k,t(k)}$, the pre-tax profit margin, is calculated for the purposes of aggregate tax avoidance from asset building in cases where the firm-year measure is missing. We replace the pre-tax margin with an average in the following order:

1. Size-weighted-average by the country and industry of the target in year $t(k)$ for deal k
2. Size-weighted-average by the country and industry of the acquiror in year $t(k)$ for deal k
3. Size-weighted-average by the industry of the target in year $t(k)$ for deal k

That is, we try the first method, and, if that's missing, then we try the second method, and so on. Each average requires at least 10 observations. Moreover, within each of the three steps, there are multiple sub-steps, as described next. For the weights, we use market assets. For the industries, we first try to define the industry based on the first 4 digits of the SIC code, and then by the first 3 digits, and so on, down to the first digit.

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E Appendix: Additional Results

Table C1: Gravity Model Robustness Tests I/III

This is the first of three tables testing the robustness of the results in Table 7. *Controls* refers to the controls used in column 2 of Table 7. The *FX Regime 1-5* dummy equals 1 if the country has a course classification code from 1-5 according to Ilzetzki et al. (2017). *KAOPEN* measures a country's capital account openness (Chinn and Ito, 2006). *WUI* is the World Uncertainty Index developed in Ahir et al. (2018). The *Bilateral Investment Treaty* dummy equals 1 if the country pair has a bilateral investment treaty at time t (Bian et al., 2019). Standard errors are double clustered at the acquiror and target country level, and are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Dep Var: ln(M&A Value)			
	(1)	(2)	(3)	(4)
𝟙(Sm Haven Acquiror)	2.01***	1.83***	2.06***	1.38**
	(0.27)	(0.22)	(0.27)	(0.63)
𝟙(Lg Haven Acquiror)	0.71***	0.73**	0.72***	0.75**
	(0.26)	(0.29)	(0.25)	(0.29)
𝟙(Sm Haven Target)	1.21***	0.78***	1.41***	1.52***
	(0.40)	(0.28)	(0.37)	(0.44)
𝟙(Lg Haven Target)	0.46***	0.50***	0.46***	0.51***
	(0.17)	(0.16)	(0.16)	(0.17)
𝟙(Acquiror FX Regime 1-5)	-1.14***			
	(0.40)			
𝟙(Target FX Regime 1-5)	1.86***			
	(0.27)			
ln(Acquiror KAOPEN)		0.28		
		(0.45)		
ln(Target KAOPEN)		0.56		
		(0.60)		
𝟙(Bilateral Investment Treaty)			-0.36***	
			(0.12)	
ln(Acquiror WUI)				0.02
				(0.32)
ln(Target WUI)				0.60
				(0.42)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Clustering	Two-way	Two-way	Two-way	Two-way
Sample	All	All	All	All
N	443,018	414,696	449,180	291,104
Pseudo R^2	0.777	0.785	0.772	0.787
Mean of Dep Var	4.52	4.52	4.52	4.58

Table C2: Gravity Model Robustness Tests II/III

This is the second of three tables testing the robustness of the results in Table 7. *Controls* refers to the controls used in column 2 of Table 7. The *EOI* and *Double Tax Treaty* dummies are from the Exchange of Information Database (2019). The dummies on economic integration agreements in the last column are from the NSF-Kellogg Institute Database on Economic Integration Agreements (Kellogg Institute for International Studies, 2019). Standard errors are double clustered at the acquiror and target country level, and are reported in parentheses. . ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Dep Var: ln(M&A Value)	
	(1)	(2)
𝟙(Sm Haven Acquiror)	2.02***	2.26***
	(0.25)	(0.23)
𝟙(Lg Haven Acquiror)	0.73***	0.76***
	(0.24)	(0.20)
𝟙(Sm Haven Target)	1.39***	1.57***
	(0.36)	(0.37)
𝟙(Lg Haven Target)	0.43***	0.50***
	(0.13)	(0.16)
𝟙(Double Tax Treaty)	-0.05	
	(0.16)	
𝟙(On Request EOI)	0.27*	
	(0.15)	
𝟙(Automatic EOI)	0.39	
	(0.27)	
𝟙(Non-Reciprocal PTA)		-0.36
		(0.25)
𝟙(Preferential Trade Agreement)		0.27
		(0.33)
𝟙(Free Trade Agreement)		-0.08
		(0.17)
𝟙(Customs Union)		0.12
		(0.25)
𝟙(Common Market)		0.62**
		(0.26)
𝟙(Economic Union)		0.15
		(0.29)
Controls	Yes	Yes
Year FE	Yes	Yes
Clustering	Two-way	Two-way
Sample	All	All
N	449,180	443,828
Pseudo R^2	0.773	0.774
Mean of Dep Var	4.52	4.53

Table C3: Gravity Model Robustness Tests III/III

This is the last of three tables testing the robustness of the results in Table 7. *Controls* refers to the controls used in column 2 of Table 7. To be included in the *Stable* sample, both the acquiror and the target must be in tax havens or at least one side of the deal must be from a politically stable country, which includes Canada, the United States, and the non-haven countries of Western Europe. *EU* refers to the European Union. *WTO* refers to the World Trade Organization. Standard errors are clustered at the country-pair level or double-clustered at the acquiror- and target-country level, and are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Dep Var: ln(M&A Value)			
	(1)	(2)	(3)	(4)
𝟙(Sm Haven Acquiror)	2.06***	2.08***	2.22***	1.92***
	(0.32)	(0.23)	(0.23)	(0.22)
𝟙(Lg Haven Acquiror)	0.67**	0.71***	0.75***	0.71***
	(0.31)	(0.17)	(0.21)	(0.26)
𝟙(Sm Haven Target)	1.39***	1.44***	1.55***	1.28***
	(0.33)	(0.25)	(0.38)	(0.32)
𝟙(Lg Haven Target)	0.45***	0.44**	0.46***	0.45***
	(0.17)	(0.18)	(0.18)	(0.17)
𝟙(Acquiror is in EU)			0.24**	
			(0.10)	
𝟙(Target is in EU)			0.11	
			(0.20)	
𝟙(Both Sides are in EU)			0.39	
			(0.27)	
𝟙(Acquiror is in Euro Area)			0.07	
			(0.11)	
𝟙(Target is in Euro Area)			0.12	
			(0.19)	
𝟙(Both Sides are in Euro Area)			-0.57**	
			(0.28)	
𝟙(Acquiror is in WTO)				-0.43
				(0.78)
𝟙(Target is in WTO)				-0.35
				(0.49)
𝟙(Both Sides are in WTO)				-0.35
				(0.52)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Clustering	Two-way	Ctry-Pair	Two-way	Two-way
Sample	Stable	All	All	All
N	139,160	449,180	449,180	449,180
Pseudo R^2	0.764	0.771	0.774	0.773
Mean of Dep Var	4.81	4.52	4.52	4.52

Table C4: Top 30 Countries by Taxes Lost from Cross-Border, Haven M&A

This table summarizes the top 30 countries by the total recurring annual amount of taxes lost through cross-border, tax-haven M&A. The M&A data is from SDC Platinum. The data on tax revenue is from Tørsløv et al. (2020). *Ratio* is the ratio of *M&A Taxes Lost* to *Tax Revenue*, displayed in percentage points. All variables are as of 2017. Dollar figures are in millions of USD.

	M&A Taxes Lost	Corp. Tax Revenue	Ratio
U.S.	7,562	372,035	2.03
U.K.	2,680	75,058	3.57
Germany	1,625	73,576	2.21
France	1,362	60,654	2.24
Japan	1,317	218,497	0.60
China	731	469,878	0.16
Australia	614	62,614	0.98
Italy	460	40,891	1.12
Canada	391	56,366	0.69
Sweden	390	14,287	2.73
India	376	101,770	0.37
Brazil	344	57,827	0.60
Russia	280	56,798	0.49
Mexico	254	40,624	0.63
South Africa	200	18,689	1.07
Spain	181	30,215	0.60
Denmark	167	9,884	1.69
Saudi Arabia	151	3,737	4.05
Egypt	136	7,861	1.73
Belgium	122	20,748	0.59
Malaysia	117	18,667	0.63
Thailand	112	18,204	0.62
Norway	96	13,648	0.71
Finland	87	6,963	1.26
Turkey	77	14,521	0.53
Kuwait	71	443	16.11
Ukraine	65	2,761	2.37
South Korea	63	58,650	0.11
Austria	58	10,289	0.57
Poland	51	10,191	0.50