The Transparency Tax: Discouraging firm ownership via tax havens in Ecuador

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Abstract

How can countries act unilaterally to curb tax haven usage and increase ownership transparency? We study an innovative anti-evasion policy in Ecuador: a corporate income tax surcharge applied to firms whose owners are located in tax havens, as reported in the corporate ownership registry. Comparing haven-owned firms to other foreign-owned firms, we show that the reform induced a roughly 20 percent exit in haven ownership. This occurs mainly through the reporting of non-haven foreign individual owners, rather than firms, thus raising transparency. Exposed firms reduce transactions with tax havens and increase corporate tax payments in Ecuador, without cutting payroll or investment. These results suggest that a unilateral tax on ownership secrecy can limit tax-haven use and raise tax compliance at low efficiency cost.

JEL codes: H26, H25, H32, F38

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1 Introduction

Tax havens impose global negative externalities by undermining other countries' ability to enforce laws and collect tax revenues (Alstadsæter, Johannesen and Zucman, 2019; Tørsløv, Wier and Zucman, 2022). A defining trait of tax havens is secrecy, which limits other countries' ability to obtain information on the beneficiaries of haven-based entities and to secure effective cooperation (Laffitte, 2024). While expectations for coordinated international reforms are high, existing agreements have fallen short of fully curbing the influence of tax havens (Bustos et al., 2022; Alstadsæter et al., 2023*a*; Bomare and Collin, 2025).

Alongside multilateral initiatives, the past decade has seen the rapid expansion of national ownership registries (Figure A.1), which record corporate shareholders and, when effectively enforced, identify ultimate beneficial owners (natural persons). By making ownership observable, these registries may relax a binding information constraint and expand the set of feasible unilateral tax policies. Whether they can be effectively leveraged to raise transparency and tax collection, and how firms adjust in response, remains an open question.

We study this question in the context of Ecuador's pioneering reform. We provide causal evidence on how ownership reporting enables the taxation of tax-haven links and on firms' responses along ownership, reporting, and real margins. In 2015, Ecuador introduced a 3-percentage-point corporate income tax (CIT) surcharge on tax-haven–owned firms, relying on the prior introduction of a beneficial ownership registry (BOR). The reform aimed to curb and compensate for presumed income tax evasion via havens (personal and corporate) while improving ownership transparency. Using an exposure design, we compare firms reporting tax-haven owners at baseline to other foreign owned firms. We find that the reform increased ownership transparency and induced 20 percent of exposed firms to sever ties with tax havens. Most exposed firms, however, remained connected to havens but increased tax payments, without reducing their activity in Ecuador. As many countries have recently adopted BOR, the results speak more broadly to unilateral action under incomplete global coordination.

Few countries have unilaterally challenged tax-haven arrangements, in part because of the lack of systematic data linking domestic firms to offshore ownership structures. In 2012,

Ecuador was among the first countries to establish a BOR, designed to record firms' ultimate individual owners—domestic and foreign—rather than only intermediate corporate entities. In practice, however, as in other countries, the registry exhibits limitations: some firms only report intermediate owners, particularly when ownership chains involve tax havens, preserving opacity of the beneficial owners. The tax-haven surcharge therefore targets both ownership links to havens and the opacity inherent in these structures.

Our analysis uses an annual firm-level panel for Ecuador spanning 2012–2019 that links ownership registry data to corporate tax returns and comprehensive records of cross-border transactions. We classify firms as domestically owned, foreign non-haven owned, or tax-haven owned based on the country of their reported terminal owner—the last observed ownership link. Tax havens follow Ecuador's official classification, which applies criteria related to limited cooperation in ownership transparency and closely aligns with standard tax-haven lists (e.g., Tørsløv, Wier and Zucman 2022). The bulk of Ecuador's exposure to tax havens is to Panama. Although beneficial ownership reporting (natural persons) is high for domestic firms, it falls to 70 percent for non-haven–owned firms and 43 percent for haven-owned firms.

To evaluate the 2015 reform, we use a difference-in-differences exposure design comparing firms with pre-reform majority ownership in tax havens ("exposed firms") to firms with majority ownership in foreign non-haven countries ("control firms"). At baseline, haven-owned firms exhibit similar revenues, profits, and tax liabilities as other internationally owned firms, but hold larger asset stocks and therefore display lower profit-to-asset ratios.

We hypothesize four responses to the reform. First, exposed firms may increase ownership transparency by reporting non-haven owners to avoid the surcharge. Second, disclosure is more likely among foreign haven users than Ecuadorians, for whom disclosure may *ipso facto* reveal prior non-compliance. Third, the reform may raise tax revenues mechanically—through higher taxes on firms retaining haven ownership—and behaviorally, by increasing the perceived cost of evasion via havens. Finally, if offshore structures serve productive purposes, the tax may raise financing costs and reduce activity among exposed firms.

First, we estimate that the reform reduced terminal tax-haven ownership among exposed

firms by 12 percentage points (a 20 percent decline relative to a 63 percent baseline), on average over the five years post-reform. This response operates along the extensive margin: the reform increases by 11 percentage points the probability that a firm exits terminal tax-haven ownership. Most of the adjustment occurs upon impact in 2015, with smaller changes thereafter. Newly reported terminal owners are predominantly individuals rather than firms, and are foreign non-haven owners, rather than Ecuadorians. Thus the reform increased offshore ownership transparency, leading more firms to report natural person terminal owners in cooperating countries. Responses are stronger among larger firms, firms with greater baseline ownership opacity, and weaker among firms frequently transacting with tax-havens. Results are robust to the exposure and control group definitions, and to being named in the Panama Papers (which occurred in 2016).

Second, we assess whether changes in terminal ownership reflect genuine disengagement from tax havens through ownership restructuring, rather than improved reporting of previously undisclosed owners. Several results support the former interpretation. We observe a 9 percentage point decline in the probability that a tax-haven intermediary appears anywhere in the ownership chain, accounting for roughly 70 percent of the estimated effect on terminal tax-haven ownership. Using comprehensive data on cross-border transactions from Ecuador's currency exit tax, we further show that exposed firms—initially more than twice as likely as control firms to transact with tax havens—reduce dividend payments to haven entities and overall haven outflows after the reform. These findings indicate that the reform both increased transparency and discouraged some firms to use tax havens.

Third, we estimate the impact of the reform on corporate tax payments. Although the surcharge applies only to the three quarter of firms reporting positive profits—and this share is unchanged by the reform—CIT liabilities of exposed firms increase by 17 percent relative to controls. This rise reflects both a mechanical effect from the higher tax rate on firms retaining tax-haven ownership and a behavioral response, as exposed firms report higher taxable profits, consistent with an increased perceived detection of tax non-compliance via havens (Allingham and Sandmo, 1972; Becker, 1968). Firms exiting tax-haven ownership,

and thus forfeiting secrecy, increase reported profits and tax payments by 25 percent.

Fourth, we examine firms' activity in Ecuador. While some studies find that crackdowns on tax havens reduce domestic activity of haven-linked firms (e.g., Suárez Serrato 2019), we find no such effects. The reform does not affect firms' probability of remaining active, nor their investment, asset value, leverage, or payroll. These null effects are consistent with a setting in which expenses are fully tax deductible, and where new investments are funded via retained earnings, as shown empirically. Overall, the reform appears to have raised ownership transparency and tax revenues at limited efficiency cost for the Ecuadorian economy.

To rationalize these results, we adapt the canonical Allingham and Sandmo (1972) framework to allow for heterogeneous fixed costs of using tax havens. The surcharge increases both the pecuniary cost of maintaining haven structures and the perceived probability of detection conditional on haven use. The model predicts partial exit from havens and a reduction in tax evasion, reflected in higher reported profits—particularly among firms that exit and thereby lose their evasion technology.

Guided by the model, we disentangle the pecuniary and deterrence channels by exploiting variation in surcharge intensity across firms. Minority haven-owned firms face a gradual surcharge of up to 1.5 percentage points, whereas majority-owned firms face a discrete 3-percentage-point increase. This structure generates variation in pecuniary costs while holding deterrence effects plausibly constant. Consistent with the model, reductions in tax-haven ownership scale with surcharge intensity. Our estimation suggests that roughly three-quarters of the observed haven ownership decline is attributable to the pecuniary tax cost rather than deterrence—though the two channels may be complementary.

Ecuador's unilateral policy offers a template as BORs expand globally. While large high-income countries rely on instruments such as controlled foreign company (CFC) rules to curb tax erosion by their own multinationals (Clifford, 2019), countries without domestically headquartered multinationals have few tools to mitigate the negative externalities generated by tax havens. Ecuador addresses this constraint through an incentive-based design that pairs a "flashlight" (the beneficial ownership registry) with a "stick" (the surcharge).

The reform improves the disclosure of beneficial owners located in cooperating jurisdictions, thereby strengthening the administration's ability to enforce reporting obligations and pursue information exchange (OECD, 2015). The policy may also pressure cooperation from havens: in 2025, Panama signed an information-exchange agreement in order to be removed from Ecuador's tax-haven list (CIAT, 2025).

The paper is organized as follows. Section 2 introduces the data and legislative context. Section 4 develops our empirical strategy. Section 5 estimates the effects of the CIT surcharge on shareholdership and corporate transparency. Section 6 studies economic activity, financing, and foreign transactions. Section 7 discusses policy considerations and concludes.

1.1 Contributions to the Literature

We make two main contributions. First, we provide causal evidence on the effectiveness of a unilateral, incentive-based policy to curb tax-haven use, complementing a literature that has largely focused on multilateral coordination and high-income countries. Second, we contribute to the sparse economic literature on corporate ownership transparency by showing how beneficial ownership registries (BORs), when paired with fiscal incentives, can improve corporate tax compliance and revenue collection.

A growing literature studies the impact of multilateral efforts to curb tax-base erosion, including information-sharing agreements and coordinated anti-haven rules (Casi, Spengel and Stage, 2020; Menkhoff and Miethe, 2019; Clifford, 2019). This work finds mixed effects, with effectiveness depending on governments' capacity to enforce agreements and exploit new information (Bomare and Collin, 2025; Alstadsæter et al., 2023*a*). For example, Fejerskov Boas et al. (2024) document strong compliance responses to automatic exchange of information in Denmark, whereas impacts are weaker in lower-capacity settings (Alstadsæter et al., 2023*a*). More broadly, international coordination is slow and consensus-driven, often diluted by exemptions, limiting its effectiveness in curbing offshore tax evasion (Alstadsaeter et al., 2023*b*). Our analysis complements this work by studying a unilateral policy in a middle-income country, where multilateral tools are either unavailable or weakly enforced.

The thinner literature that examines unilateral anti-haven policies, typically focuses on information-reporting mandates related to profit shifting and transfer pricing (e.g. Wier, 2020; Liu, Schmidt-Eisenlohr and Guo, 2020). While these measures reduce haven use, they can impose substantial compliance costs (Bustos et al., 2022) and dampen economic activity (Suárez Serrato, 2019), leaving their net revenue impact uncertain. Closest to our context, Brounstein (2025) shows that an earlier Ecuadorian policy imposing a pecuniary cost on outbound transfers reduced haven use among high-income PIT filers. We extend this work by studying a corporate-level policy tied to ownership disclosure, and by tracing both ownership structures and transactions to tax havens.

The literature on ownership transparency for non-financial assets is sparse. Existing work focuses mainly on real estate—an asset class excluded from international information exchange—showing that opacity facilitates tax evasion and money laundering (Alstadsæter et al., 2022; Bomare and Le Guern Herry, 2022), and that transparency reforms are often circumvented (Johannesen, Miethe and Weishaar, 2022; Collin, Hollenbach and Szakonyi, 2022). Evidence on corporate ownership transparency is limited. Bennedsen and Zeume (2017) show that firms linked to tax havens experience valuation gains when tax information exchange agreements are signed, which they interpret as evidence that opacity facilitates expropriation by managers. We instead study how pecuniary incentives tied to beneficial ownership disclosure affect firms' haven use and reported profits.

Finally, we contribute to the literature documenting tax-haven use. Prior work shows that haven usage is highly concentrated among the richest individuals (Londoño Vélez and Ávila Mahecha, 2024; Alstadsæter, Johannesen and Zucman, 2019) and that bilateral flows between countries and havens follow systematic patterns (Rose and Spiegel, 2007; Laffitte, 2024). We add to this evidence by studying a policy that raises the cost of haven use directly, using administrative data as to track both ownership linkages and transactions to havens.

2 Data, context, and sample construction

Ecuador is an upper-middle income country of 18 million inhabitants, located on the northwestern Pacific coast of South America. The country has been Dollarized since 2001. We collaborated with the Internal Revenue Service (SRI) to combine three primary data sources: the Annex of Participants, Shareholders, Administrators, and Board Members (APS), the corporate income tax (CIT), and the International Currency Movement Annex (MID). We describe below each dataset, the context, and the sample construction.

2.1 Data sources

Annex of Participants, Shareholders, Administrators, and Board Members (APS). In 2012, Ecuador became one of the first countries to establish a beneficial ownership registry. The APS aims to record each year the full ownership structure of Ecuadorian firms up to their ultimate individual owner. When filed as intended, it provides annual firm–shareholder linkages, including direct and indirect ownership shares, the tier (number of ownership layers), and the domicile country of every shareholder.

The tax administration maintains the APS by requiring all firms to hire a government-approved auditor who, each April, must report the firm's shareholders as of December 31 of the previous year.[1] Firms must disclose the full ownership chain—identifying every person and entity up to the ultimate beneficial owner—even when intermediaries are foreign. The administration verifies beneficial owners using an Ecuadorian ID or an international passport.

APS compliance with ownership reporting is high, likely because firms that fail to report 100% of their direct owners face a 3-percentage-point CIT surcharge—a sanction in place since the APS was introduced in 2012. However, this penalty applies only to incomplete ownership reporting, not to incomplete beneficial ownership reporting. As long as a firm reports 100% terminal ownership, it is considered compliant and avoids the sanction. This gap reflects a practical constraint: the administration recognizes that Ecuadorian subsidiaries

[1] The APS also requires within-year reporting of changes in shareholders, partners, board members, or administrators to prevent temporary reshuffling that conceals true ownership.

may not be able to obtain information on their ultimate individual owners. In ownership chains with multiple foreign layers, each entity would need to transmit its own shareholder information down the chain, which may be beyond the control of the Ecuadorian firm.

Corporate income tax declarations (Form F101). We combine the ownership registry with the annual corporate income tax declarations, over the period 2012 to 2019. Ecuador's tax structure only distinguishes between self-employed/single-person firms versus all other corporate entities. The CIT applies to the latter. By definition, the registry only reports information on the approximately 70,000 formal firms filing CIT.[2] The CIT contains the firm's full balance sheet information in addition to tax related variables.

Annex of International Currency Movements (MID). The MID records all cross-border transactions involving Ecuador from 2012 to 2019. Ecuador introduced the system in 2008 to administer its foreign transaction tax. The data are reported at the transaction level and include the amount, date, direction of the flow (into or out of Ecuador), the identity of the Ecuadorian party, and coarse transaction categories (e.g., dividends, imports, credit-card payments). Because the tax applies only to currency exits, outflows are considered more reliably captured than inflows. We therefore focus on outflows in our main analysis.

We express all monetary values in units real 2014 USD. All monetary variables from the F101 and the MID are winsorized above the 99% percentile; all share variables (e.g. tax haven outflows share of revenue) are winsorized above 1.

2.2 The distinction between beneficial versus terminal ownership

For clarity, we distinguish between two ownership concepts used in the paper. *Beneficial ownership* refers to the final owner in the chain who is not owned by any other entity.

[2]Informality is at roughly 30 percent of GDP and two-thirds of jobs are outside the formal sector (Elgin et al., 2021; Canelas, 2019). Informal firms are absent of our analysis, but prior studies have shown that tax haven usage is concentrated among high-earners and firms with access to formal banking (Brounstein (2025); Londoño Vélez and Ávila Mahecha (2024); Alstadsæter, Johannesen and Zucman (2019)).

Beneficial owners are usually people (as opposed to firms), but can also include not-for-profit and public entities. These alternate non-person beneficial owners are rarely observed in practice and are exempted from the tax surcharge. When a person-owner is recorded, we cannot tell whether they are the actual beneficial owner or a nominee acting on someone else's behalf. Yet, once the tax authority identifies a nominee owner it can still pursue compliance and litigation. As a result, we use *beneficial owner* to refer to a person-owner of a business. We contrast this with the concept of *terminal owner*, which corresponds to the last reported owner of a firm beyond which no further ownership linkages are reported. This distinction is needed, since in the absence of full compliance with beneficial ownership reporting standards, some *terminal* owners are persons (thus *beneficial owners*) and others are firms (thus *not* beneficial owners). All beneficial owners are terminal owners, but not all terminal owners are beneficial owners.

All ownership links in the APS fall into three categories. For Ecuadorian firm i in year t, a shareholder j is either: (1) another firm—domestic or foreign—that reports its own shareholders, allowing us to trace the chain further; (2) an individual; or (3) a foreign firm that does not report its ownership to the Ecuadorian tax authority. Cases (2) and (3) are terminal links. For each terminal link, the authority multiplies all ownership shares along the chain back to firm i. The tax haven terminal ownership share is then the sum of these indirect ownership amounts for all terminal owners located in tax havens.[3]

2.3 The corporate income tax surcharge on tax haven ownership

The CIT surcharge of 2015. Ecuador taxes corporate income on a territorial basis, at a flat 22% rate between 2012-2017, raised to 25% in 2018.[4] Using the ownership registry (APS), the tax authority built a measure of terminal ownership share by domicile, based

[3] Section E formally defines these concepts and discusses examples of effective ownership calculations. Figure E.1 shows the set inclusion, exclusion, and overlap of the different ownership concepts we employ.

[4] The CIT rate is higher for extractive industries, while some preferred industries see a reduction in their statutory rate. The CIT schedule also gives a 10 percentage point reduction for re-investment out of profit. Additionally, Ecuador taxes personal income on a worldwide basis with a top marginal rate of 35% and incorporates bilateral tax treaties for resolving international double taxation issues.

on the tax residence of the terminal owners. In June 2015—three years after the APS was introduced—it announced a 3-percentage-point CIT surcharge on firms with terminal owners in tax havens, based on APS filings as of December 31, 2015.

The three percentage point tax surcharge applies to any firm majority owned in tax havens (50% or more terminal ownership). For firms with minority-ownership in tax havens, a lower surcharge rate applies, increasing with the ownership share in tax havens: the surcharge starts at zero and rises linearly to 1.5 percentage points for firms with just under 50 percent terminal tax haven ownership (i.e. a slope of 0.03 percentage points CIT surcharge per percentage point in haven ownership). Upon reaching 50 percent tax haven ownership, the rate jumps discontinuously to 3 percentage points, above which it remains constant.

Tax Haven Classification. The tax administration classifies a country as a tax haven if at least two of three criteria hold: (1) A lack of cooperation on tax matters and no exchange of of beneficial ownership information; (2) a corporate tax rate below 60% of Ecuador's (i.e., 13% or less); and (3) Attracting activity primarily to appropriate other countries' tax bases. The first criterion—non-cooperation and opacity—is central to the 2015 reform, meaning tax havens are partly defined as non-transparent jurisdictions. In practice, the resulting list is largely stable over time and closely aligns with standard tax haven lists used in the literature (e.g. Hines and Rice (1994), Tørsløv, Wier and Zucman (2022)).

Objectives of the tax surcharge. Because the surcharge targets terminal ownership in havens, we interpret the reform as primarily addressing illicit uses of tax havens. Profit shifting and other tax-avoidance strategies can operate through any intermediate link to a haven, without requiring a haven as the ultimate owner. By contrast, illicit use of havens typically relies on the secrecy such jurisdictions provide—secrecy that obscures the true owner through limited information exchange. In this sense, the reform can be viewed as targeting evasive haven use by tightening ownership transparency.[5] If terminal haven ownership prox-

[5] Figure D.1–Figure D.3 illustrate ownership arrangements that facilitate tax evasion through havens. Figure D.4 illustrates structures used for tax avoidance rather than evasion.

ies for underlying opacity and evasion, the surcharge functions as a Pigouvian tax, helping internalize the fiscal externalities created by tax havens (Piketty and Saez, 2013).

Which fiscal externalities arise, and whose tax base is affected? We outline below several commonly cited mechanisms through which evasive haven use can impact tax revenues. In the example illustrated in Figure D.2, an Ecuadorian firm A, owned by a Panamanian firm B, evades Ecuador's CIT by routing payments from an arm's-length customer C to its Panamanian owner and failing to report the sale domestically. This arrangement erodes Ecuador's CIT. The beneficial owner of firm A may be an Ecuadorian resident—who would also evade Ecuador's PIT on dividends—or a foreign national evading their home-country PIT on worldwide income. In both cases, the secrecy provided by the haven obscures the true taxpayer, generating a fiscal externality for the jurisdiction where tax should have been paid. Consistent with this type of scheme, firms with haven owners tend to exhibit higher export intensity and lower profitability—patterns documented in Table B.1.

A second example, illustrated in Figure D.3, involves a Spanish individual who owns an Ecuadorian firm through a Panamanian intermediary in 2014, when Spain's top PIT rate was 47%. In the APS, the Ecuadorian firm reports only its Panamanian shareholder, not the Spanish beneficial owner. The Ecuadorian firm may fully comply with Ecuador's CIT, yet still remit dividends to the Panamanian entity's account, where they remain undisclosed to Spanish tax authorities. In this case, the evasion pertains entirely to Spain's PIT on worldwide income.

These two examples highlight the distinction between domestic and cross-country fiscal externalities. In the first case, Ecuador's tax surcharge addresses evasion of its own CIT—and, when the beneficial owner is Ecuadorian, its PIT as well. In the second, Ecuador does not lose revenue, but Spain does. The reform can therefore generate positive cross-country externalities if it induces foreign beneficial owners to reveal themselves or to repatriate income in compliance with their home-country tax obligations.

A priori, the surcharge may affect beneficial-ownership disclosure and continued haven use differently for firms owned through havens by foreign versus Ecuadorian nationals. Foreign

beneficial owners may be more willing to disclose: even if they reveal their ownership to the Ecuadorian authorities, their home country may remain unaware, though the heightened risk of audits or information exchange could still induce greater compliance. By contrast, Ecuadorian nationals have weaker incentives to disclose, as doing so would ipso facto reveal past PIT non-compliance and expose them to domestic audit. In both cases, higher detection risk and higher costs of haven use could reduce offshore evasion overall.

2.4 Sample construction and descriptive statistics

Sample Construction. We combine the APS, CIT, and MID data over the period 2012-2019. We require firms to (1) have filed a Corporate Income Tax declaration with positive revenue in 2014 and (2) have filed an APS declaration at least once between 2012 and 2014, such that firms can be assigned a baseline ownership profile.[6] The core sample thus consists of a yearly panel spanning 2012 to 2019, for firms with an attributable ownership and that are active in 2014, the baseline reform year. This core sample consists of 62,350 firms that satisfy these criteria. Table B.2, Table B.3, and Table B.5 compare excluded firms against our core sample, separately, based on not satisfying each respective exclusion criterion. Firms that do not satisfy this criterion appear approximately an order of magnitude smaller than firms comprising our core sample as measured by assets, revenues, and taxes paid, so we view their exclusion from our analysis as innocuous. Compared to Ecuadorian national statistics, firms in our core sample account for 90% of Ecuadorian CIT payments in 2014.

Descriptive statistics. Table B.1 presents descriptive statistics of Ecuadorian firms that comprise our core sample in 2014. The average (median) firm declares USD 1.9 Million (140,000) in yearly revenue. The mean (median) profitability by assets is 6.2% (4.3%), with 77% of firms reporting positive taxable profits in 2014. Nearly all firms face the standard 22% rate, and on average pay USD 15,000 in corporate taxes.

Table B.1 also reports information on terminal ownership, distinguishing between five cat-

[6] We also exclude firms that operate in one of the few industries exempt from the tax surcharge.

egories of owners: Ecuadorian persons, Ecuadorian non-person entities, foreign persons, foreign non-person entities, and a residual category of unaccounted for ownership. Ecuadorian persons account for 86% of terminal ownership of Ecuadorian firms in our core sample. An additional 4% ownership is attributable to foreign persons. Thus ownership by persons accounts for 90% of the total. Another 8% of terminal ownership is allocated to firms: 6.4% to Ecuadorian non-person entities, and 1.6% to foreign non-person entities, leaving 1.4% of terminal ownership unaccounted for on average for filing firms. These characteristics demonstrate partial non-compliance with the APS's intended beneficial ownership reporting standards. Since we required that firms in our sample filed the APS at least once between 2012-2014, it is not surprising that 99% of firms filed the APS in 2014. Further, 97% of firms complied with reporting requirements so as to *nominally* account for 100% of their ownership. Yet only 83% of firms reported 100% of their beneficial ownership.

Our core sample thus consists of a panel of 62,350 firms from 2012 to 2019. Our panel is well-balanced, with 88.4% and 89.8% of firm-years featuring an APS or form F101 filing respectively. Table B.7 shows that balance across all firms declines modestly between 2014 and 2019, with 80% and 78% of firms relative to baseline filing an APS or F101 declaration respectively in 2019. We further explore panel balance, differential attrition, and "extensive-margin" movement in and out of sample in Section 5.2.

Tax haven usage and ownership. Table 1 reports foreign terminal ownership of firms in our core sample by country and ownership threshold.[7] Panel (a) lists tax haven countries. We identify 584 firms majority-owned by a tax haven.[8] Panama largely dominates, with 377 majority-owned firms, followed by the Netherlands, the British Virgin Islands, Luxembourg, and Puerto Rico. The right half of the table shows the share of aggregate Ecuadorian corporate assets (and revenue) owned from each jurisdiction. Overall, 4.1% of assets are owned from tax havens, including 1.9% from Panama. Beneficial owners (natural-person owners) account for 1.6% of assets in havens—around 40% of all haven-owned assets.

[7] Table A.1 shows analogous results for all APS filers.

[8] Four additional firms are majority-owned jointly by multiple havens; these are excluded from the single-country column but included in the total of 588 majority–tax haven-owned firms in our analysis.

Panel (b) reports the corresponding statistics for foreign non-havens. We identify 3,397 firms majority-owned from these countries. Colombia and the United States each account for roughly 600 firms, followed by Spain, Peru, and Venezuela. Non-haven countries own 22.9% of corporate assets, of which just over half can be traced to a beneficial owner.

3 Simple conceptual model

How should we interpret the mechanisms through which the surcharge operates, and what impacts should we expect on tax-haven use, tax payments, reported profits, and real activity? To frame these questions, we build on the classic tax evasion model of Allingham and Sandmo (1972), in which agents choose how much income to conceal from the tax authority, trading off tax savings against the risk of audit and the associated repayment of evaded taxes plus penalties. We extend this framework in three ways. First, agents jointly decide whether to use a tax haven and how much income to underreport, allowing haven use to be an endogenous evasion margin. Second, agents face heterogeneous fixed costs of tax-haven use, capturing variation in legal, organizational, and informational frictions associated with offshore structures. Third, we model the CIT surcharge as a policy that affects both the cost of haven use and the perceived probability of detection.

This modeling environment is suited to studying the surcharge because the policy is targeted at illicit tax-haven use for income-tax evasion, and incomplete ownership reporting as discussed in Section 2.3. In our setting, agents may evade the Ecuadorian CIT (as firms), Ecuador's PIT (as resident individuals), or their home-country worldwide personal income tax (as foreign owners). We interpret "detection" broadly as the event that tax authorities uncover non-compliance by the agent. This may arise directly through audits of the haven-exposed entity, indirectly through audits of other domestically owned businesses, or through information exchange and cooperation with foreign tax authorities. Importantly, this interpretation allows the surcharge to raise expected enforcement even when the haven-exposed firm itself remains formally compliant with Ecuadorian corporate taxation.

3.1 Model setup

An individual i faces a linear income tax rate τ on her pre-tax income, which we presently for simplicity normalize to one (we later return to real responses). She makes two decisions: whether to make use of tax havens, as decision $E \in \{0,1\}$ at cost ξ_i, and what share $e \in [0,1]$ of her income to underreport to the tax authorities. In this case, reported income is $z := 1 - E \cdot e$. In this setting, we assume that all underreporting occurs via tax haven usage, which is only realized if $E = 1$.

Conditional upon tax haven usage, there is no direct variable cost of evasion. However, the probability of detection by the tax authorities ρ increases in income underreporting. Let $\rho := \rho(e)$ such that $\rho'(e) > 0$, and for simplicity, assume no curvature to this function: $\rho''(e) = 0$. If an individual is caught underreporting by the tax authorities, assume the authorities detect all of e, and is required to pay back the taxes due $\tau \cdot e$ plus a fine proportional to the taxes due $\tau \cdot e \cdot (1+\theta)$, for $\theta > 0$.

The agent maximizes quasilinear utility in income:

$$\max_{E \in \{0,1\},\ e \in [0,1]} 1 - \tau + \tau E e - \xi E - \rho(e) e \tau (1+\theta) E \tag{1}$$

The agent sets her latent underreporting e^* to maximize a first order condition in e such that $(\rho'(e^*)e^* + \rho(e^*))(1+\theta) = 1$, equating the marginal expected benefit and cost of underreporting income.[9] We can observe that underreporting on this intensive margin decreases in detection probability and statutory penalty rate and is unaffected by the tax rate and by the fixed cost of haven usage. However, this underreporting is only realized if the individual makes use of tax havens at cost ξ_i. This case occurs if $U(E=1, e^*) \geq U(E=0, e^*)$, i.e. that $\xi_i \leq \tau e^* - \rho(e^*)e^*\tau(1+\theta)$. The share of the population that uses tax havens is equal to $P(\xi_i \leq \tau e^* - \rho(e^*)e^*\tau(1+\theta)) = F\Big(\tau e^* - \rho(e^*)e^*\tau(1+\theta)\Big)$.

[9] The interior solution yields a local maximum for the objective function under the second order condition that $\frac{1}{\rho''(e^*) - 2\rho'(e^*)e^*} < 0$. When the subjective detection probability function $\rho(e)$ has zero curvature (i.e. $\rho''(e) \equiv 0$), this condition is trivially satisfied.

3.2 Interpretation and impacts of the policy

Now consider our policy which manifests as a fixed increase in the tax rate, $d\tau$, for agents using tax havens as well as a fixed increase in the perception of detection ρ_γ. This interpretation of the policy is intuitive, as the pecuniary component of the policy—the surcharge—corresponds directly with an increase in the tax rate, and the act of targeting tax haven usage itself likely invokes some change in detection probability.

The agent's problem then becomes:

$$\begin{aligned}\max_{E\in\{0,1\},\ e\in[0,1]} U &= 1\cdot(1-\tau+\tau Ee-d\tau\cdot E)-(\xi_i E+\tilde{\rho}(e)e\tau(1+\theta)E)\\ &= (1-\tau+\tau Ee)-(\tilde{\xi}_i E+\tilde{\rho}(e)e\tau(1+\theta)E) \qquad (2)\end{aligned}$$

Where $\tilde{\xi}=\xi_i+d\tau$ and $\tilde{\rho}(e)=\rho(e)+\rho_\gamma$. This representation of the policy leverages the simplifying assumption of fixed Ecuadorian production/income, where through the lens of the model the three percentage point surcharge effectively combines with the fixed cost of haven usage. Holding all else fixed, the reform induces an increase in tax obligation of $1\cdot d\tau\cdot E=d\tau$ for haven users.

Testable predictions & interpretation. The reform has two effects. Using the implicit function theorem, we can evaluate the impact of changing detection probability on underreporting:

$$\frac{\partial e^*}{\partial \rho_\gamma}|_{E=1}=\frac{-1}{2\rho'(e)}<0. \qquad (3)$$

The increase in subjective detection probability induces a decrease in intensive margin underreporting e^*. The second effect is to induce an extensive margin exit from haven usage through both the increased fixed cost γ and through the lower benefit of haven usage conditional that $E=1$ due to the decrease in underreporting from the first effect. Section 5.5 studies to what extent we can separate out the effects of the pecuniary surcharge $d\tau$ ("the stick") and the perceived detection effect ρ_γ ("the flashlight").

Let e_0^* and e_1^* represent agent's optimal underreporting prior to and following the reform (possibly censored by E). An agent making use of tax havens prior to the reform that

ceases to use tax havens has the characteristic that $\xi \leq \tau e_0^* - \rho(e_0^*)e_0^*\tau(1+\theta)$ and that $\tilde{\xi} \geq \tau e_1^* - \tilde{\rho}(e_1^*)e^*\tau(1+\theta)$. Here, the increased cost of haven usage and the increased subjective detection probability induces a mass of individuals to exit haven usage.[10] However, individuals with sufficiently low fixed costs or sufficiently high benefit of haven usage will maintain haven use in the post-reform environment. Based on our empirical estimates of the impact of the reform on haven usage, we will be able to calibrate $P\Big(\xi \geq \tau e_1^* - \gamma - \tilde{\rho}(e_1^*)e_1^*\tau(1+\theta)\Big|\xi \leq \tau e_0^* - \rho(e_0^*)e_0^*\tau(1+\theta)\Big)$.

This setup also yields some insight into characterizing the agents that exit from or maintain haven usage. For one, using our transaction data, we can observe which firms were transacting with havens prior to the reform. If we construe this activity as a measure of gross benefit of haven usage, the model would predict greater exit of firms with less tax haven activity. Second, the model yields some prediction for which firms would disclose their true owners based on owner nationality. Consider an asymmetric cost of disclosure to the Ecuadorian tax authorities by the agent based on whether she is Ecuadorian or a foreign national. If the tax haven user were an Ecuadorian individual, disclosure to the tax authorities may *ipso facto* reveal non-compliance and induce audit. However, for a foreign individual disclosing to the Ecuadorian government her beneficial ownership of the Panamanian intermediary, neither the foreign nor the Ecuadorian authorities necessarily know of the agent's evasion of her home country's personal income tax, although the agent may perceive an increased risk of audit or intergovernmental cooperation. This said, the probability of intergovernmental cooperation in the latter scenario is likely weakly less the probability of audit induced by revealed non-compliance in the former scenario. We therefore anticipate that the reform will induce revelation of foreign national owners rather than Ecuadorian owners.

The model also offers a set of predictions for the impacts of the policy on taxes paid and

[10] Figure A.20 graphically illustrates this mechanism for an arbitrary distribution of fixed costs.

on profits declared in Ecuador. Observe that we can express change in tax obligation as

$$\Delta T = \overbrace{d\tau \cdot (1 + \Delta E)}^{\substack{Mechanical \\ tax\ change}} + \underbrace{|\Delta(E \cdot e^*)|}_{\substack{Change\ in \\ undeclared\ profit}} \cdot \tau$$

The reform enacts 1) a mechanical effect on revenue collections for firms maintaining haven usage and 2) a behavioral effect on profits declared which also effects revenues.[11] For parsing the behavioral effects, note that if E shifts from 1 to 0, tax revenues increase by $\tau \cdot e^*$, as the agent loses access to the evasion technology via tax havens. However, also recall from Equation (3) that a marginal increase in subjective detection probability induces as reported income increase by $\frac{1}{2\rho'(e)}$. Thus, even for agents that maintain haven usage, we anticipate the impact of the policy on increased probability of detection induces a decrease in evasion on the intensive margin. Note that "detection" in this case could indeed refer to detection of non-compliance or more broadly to sustained investigation into other activities or even cooperation with other national tax authorities (if relevant). An agent engages in illicit activity wants to avoid all of any of these outcomes in our setup.

Ex-ante, we anticipate that individuals entirely exiting haven usage decrease their underreporting more than do those that maintain haven usage, who also exhibit a decrease in haven usage (a hypothesis we investigate and confirm in Table 8).

Impacts of the policy on real activity. By normalizing pre-tax profits to one, we abstracted away from impacts of the policy on real activity. However, we highlight several internally conflicting potential corporate financial impacts of reform.

From the perspective that the surcharge taxes business profit, the tax may increase the cost of capital, placing downward pressure on investment and output (Hassett and Hubbard, 2002; Hall and Jorgenson, 1967). The tax also potentially discourages external financing from entities based in tax havens, further increasing the cost of capital Auerbach (2002). These

[11] We document that most firms owned in tax havens declare positive profit, although we also explore extensive margin responses of profit declaration. For the purposes of illicit tax haven usage, declaring precisely zero profits (e.g. Bilicka (2019)) would likely trigger audit.

forces suggest a negative impact on investment of exposed firms. However, while wage bill is normally tax deductible so that the surcharge wouldn't have direct effects on labor inputs, scale effects and capital substitution/complementarity effects would indirectly impact labor inputs (Curtis et al., 2021). The scale effect would presumably operate to depress labor inputs, but the sign of latter effect depends on to what extent labor and capital operates substitutes for exposed firms.[12]. Additionally, the effects of the reform on inputs will dampen to the extent that such input expenses are fully deductible (Kennedy et al., 2024).

Several forces operate in the opposite direction. The reform may have an impact on dividend outflows paid out to tax haven shareholders (Brounstein, 2025), a hypothesis we explicitly investigate. Under the "trapped equity" view of dividend taxation, firms finance marginal investment through retained earnings, so that changes in dividend payment policy likely affect investment via substitution effects (Yagan, 2015; Chetty and Saez, 2010; Zodrow, 1991). Therefore, to the extent that the reform reduces dividend payments, we may anticipate *positive* investment effects (and then analogous scale and capital-labor substitution/complementarity effects as discussed in Curtis et al. (2021)). Lastly, consider that the fixed cost of tax haven usage represents firm expenditure on unproductive activity (Bustos et al., 2022; Chetty, 2009). By reducing firm expense on unproductive inputs, the reform may generate an increase in productive inputs. Finally, the surcharge may operate simply as a tax on firm rents.

These forces generate conflicting predictions of the impact of the reform on real activity.

Testable predictions, implications, and considerations from the model. Summing up, the model generates several testable predictions and implications for the impacts of the policy that we empirically validate and explore:

1. The reform will induce exit from terminal ownership in tax havens. The share of exiting haven users depends on the empirical distribution of ξ. Conceptually, agents with sufficiently *high* costs of haven usage (lower net benefit) will exit tax haven usage,

[12] Curtis et al. (2021) document complementarity of capital and productive labor and substitutibility of capital and non-productive labor (i.e. managers), although it is unclear how these labor concepts as well as their setting of industrial plants map onto our setting of business usage of tax havens.

whereas those with low costs (greater net benefit) will maintain haven usage.

   (a) Entities with lower net benefit of haven usage will exhibit a greater exit response.

   (b) Entities with lower cost of revealing ownership to the Ecuadorian tax authorities will exhibit a greater exit/transparency response.

2. The reform will result in greater tax collection and lower evasion.

   (a) Firms that exit havens ($E = 0$) lose their evasion technology and increase their profits declared and taxes paid.

   (b) Firms that remain ($E = 1$) face a higher tax rate and, if they perceive a higher detection probability, reduce evasion (likely to a lesser extent than haven exiters).

3. The reform has ambiguous effects on real activity.

4. We are interested in separating the effects of "the stick" ($d\tau$) and "the flashlight" (ρ_γ), which has implications for policy design.

4 Empirical strategy

Defining exposure and control. To estimate the causal impact of the 2015 CIT surcharge on firm ownership and economic activity, our identification strategy compares firms with tax haven terminal ownership in 2014, versus firms with foreign *non-haven* terminal ownership in 2014. We construct an 'exposure' group, considering firms with at least 5% tax haven terminal ownership pre-reform. We define the control group as firms with pre-reform foreign non-haven terminal ownership exceeding 5% *and* tax haven ownership that does not exceed 5%. By construction the control group should not be directly impacted by the reform.

We distinguish between firms that are terminally foreign-owned on a majority or minority basis. Roughly three quarters of firms with any international ownership are majority foreign-owned, with notable mass points at 50% and 100% foreign ownership (Figure A.2).[13]

[13] Table A.2 tabulates observed and residual ownership for firms assigned to each ownership category.

Exposure and control firms display similar patterns in the distribution and concentration of ownership shares. Our main analysis focuses on majority foreign-owned firms, for which the reform generates a sharper treatment and which are much more numerous. We return to minority-owned firms in Section 5.5.

Table 2 shows descriptive statistics comparing exposure to control firms, as well as to domestically owned firms.[14] Our sample of interest consists of 3,940 unique firms that, by construction, are active in 2014. Of these, 588 are majority tax haven firms and 3,352 are majority foreign non-haven firms. These internationally owned firms exhibit stronger panel balance than domestically owned firms, with 93% and 90% balance for exposure and control firms, respectively, over 2012–2019. Panel (a) shows that exposed and control firms are observably similar by revenue, profits, and taxes paid. Both groups have annual revenues of approximately USD 6–7 million, placing them among mid-sized, closely held firms. Roughly three-quarters of firms in each group report positive profits.

One notable difference is that exposed firms export about 80% more and exhibit profitability-to-assets ratios that are roughly 40% lower than those of control firms. Panel (b) reports foreign outflows by destination category and shows that exposed (control) firms are disproportionately connected to tax havens (non-haven foreign destinations), as measured by the composition of their foreign payments. These patterns align with prior evidence on the characteristics and activity of firms using tax havens (Tørsløv, Wier and Zucman, 2022).

Table 2 Panel (c)-(d) show ownership and APS compliance characteristics. We document higher terminal ownership concentration among exposure firms as well as longer average ownership chains. Interestingly, we also observe that 10% of majority foreign non-haven firms have at least one intermediary domiciled in a tax haven.[15]

Both groups exhibit very high levels of nominal compliance with APS filing and reporting standards with over 99 percent of firms in both groups filing the APS in 2014 and 98% of their declarations nominally accounting for 100% of their ownership. However, exposure

[14] Table B.9 displays descriptive distributional statistics for majority exposure and control firms.
[15] By definition, these intermediaries report their respective shareholdership profiles, eventually revealing terminal ownership in non-havens.

firms appear to report less of their *true* ultimate BO. Within the major group of comparison, exposed firms only have 43% of their ultimate shareholdership attributable to individuals, whereas control firms report 70% of their ultimate ownership as attributable to people. Moreover, only 33% of exposure firms and 61% of control firms reveal 100% of their BO. Thus, descriptively, firms with ownership in tax havens are characterized by greater ownership complexity and opacity than firms with ownership in foreign non-havens.

Research design. Our empirical strategy compares the evolution of ownership and economic behavior of majority tax haven-owned firms in 2014, versus that of majority foreign owned (non-haven) firms in a standard difference-in-differences setting.[16]

$$y_{it} = \alpha_i + \delta_t + \sum_{t=2012,\neq 2014}^{2019} \beta_t \cdot Exposure_i Year_t + \varepsilon_{it}, \tag{4}$$

where y_{it} is the outcome of interest for firm i in year t, α_i and δ_t are firm and year fixed effects respectively. $Exposure_i$ indicates that firm i has majority terminal ownership in tax havens in 2014, such that it would face the tax surcharge absent changes to ownership. ε_{it} is a mean-zero error term.

Our outcomes of interest include ownership shares by domicile, owner type (person versus entity), cross-border transactions, and measures of economic activity such as tax liability, profits, and revenue. We estimate regressions both unweighted and weighted by firm importance, measured using 2014 assets. Standard errors are clustered at the firm level.

Under the parallel-trends assumption, the coefficients $\hat{\beta}t$ identify the Intent-to-Treat (ITT) effect of the tax-haven CIT surcharge on outcome y for exposed firms in year t relative to 2014. The pre-reform coefficients, $\hat{\beta}2012$ and $\hat{\beta}2013$, serve as placebos and provide a test of the parallel-trends assumption. We also estimate a post-versus-pre average difference-in-differences specification, yielding the coefficient $\hat{\beta}post$.

[16] While the discontinuity of the CIT surcharge rate at 50% effective tax haven terminal ownership suggests a regression discontinuity (RD) or bunching design, these designs see important implementation problems in our setting. Namely, as Figure A.2 illustrates, the distribution of firm terminal ownership sees little support below 50%. Additionally, the 50% threshold coincides with the standard definition of controlling ownership so that such a discontinuity likely implicates other exclusion violations.

The ITT effect may differ from the Average Treatment Effect on the Treated (ATT), defined here as the effect of actually paying the surcharge. The ATT corresponds to a 3-percentage-point increase in the CIT rate for firms that both maintain tax-haven terminal ownership and owe CIT. In practice, some exposed firms may adjust their behavior in order to avoid paying the surcharge, by reducing reported tax-haven ownership or reporting zero profit, such that the surcharge applies only to a subset of treated firms. We later instrument the actual change in the effective tax rate with firms' exposure status. Nonetheless, it is important to note that the reform may embody more than a tax-rate increase: it also signals the administration's intent to scrutinize firms lacking transparency and linked to tax havens.

Mean Reversion in Ownership. For outcomes related to economic activity (e.g., revenue), we compare the evolution of exposed and control firms under a standard parallel-trends assumption. When examining ownership structures, however, mean reversion becomes a concern. By design, exposed firms have more than 50% ownership in havens, whereas control firms have more than 50% ownership in foreign non-havens and no ownership in havens. Estimating Equation (4) with tax-haven ownership as the outcome might bias $\hat{\beta}$: even absent the reform, exposed firms may be more likely to reduce haven ownership, while control firms have no scope to do so and may instead be mechanically more likely to increase it.[17]

To mitigate this concern, we compare ownership shares in firms' 'baseline domicile group', instead of in tax havens. 'Baseline domicile' refers to the residence of the majority terminal ownership at baseline: for exposure firms this is tax havens; for control firms it is foreign non-havens. Thus, to estimate the impact of the reform on terminal ownership, we compare the tax haven ownership share of exposed firms to the international ownership of control firms. We generate the dependent variable:

$$y_{it} = \begin{cases} Tax\ haven\ ownership_{it},\ i \in Exposure, \\ Foreign\ non\text{-}haven\ ownership_{it},\ i \in Control \end{cases} \tag{5}$$

[17] This kind of mechanical mean reversion issue is common in settings simultaneously involving (1) defining exposure and control groups based on whether a running variable surpasses a given threshold and (2) studying said running variable as an outcome of interest, e.g. quantifying the earnings impacts of marginal tax rate changes above a given earnings level (e.g. Kleven et al. (Forthcoming)).

This strategy requires that the degree of mean reversion in ownership from the baseline domicile evolve similarly for exposed and control firms. In other words, absent the reform, tax-haven ownership among exposed firms would have followed the same trend as foreign non-haven ownership among control firms. Formally, the counterfactual condition is:

$$\mathbb{E}\Big[Haven\ ownership_{it} \Big| i \in Exposure, t \geq 2015, No\ policy\Big] = \\ \mathbb{E}\Big[Foreign\ non\text{-}haven\ ownership_{it} \Big| i \in Control, t \geq 2015, No\ policy\Big]. \quad (6)$$

Under the above assumptions, when we estimate Equation (4) with baseline domicile terminal ownership as the dependent variable, we interpret $\hat{\beta}_{dd}$ to estimate the impact of reform on terminal ownership in tax havens. Symmetrically, we define the 'inverse domicile group', as the opposite foreign domicile category. For exposure firms, the inverse domicile is foreign non-havens and for control firms, the inverse domicile is tax havens.[18]

We validate our approach through a series of robustness checks and complementary research designs. A key concern about differential mean reversion stems from the imbalance in group sizes: fewer than 600 firms are majority haven-owned, compared with more than 3,000 majority foreign–non-haven firms. As a result, ownership changes within groups are mechanically more likely for the smaller haven group. To address this, Section 5.3 explores alternative definitions of exposure and control groups—for example, firms with Panamanian versus Colombian owners—and shows that placebo exposure and control groups defined in earlier years exhibit similar mean-reversion patterns.

[18] A limitation of using 'inverse domicile group' ownership as the outcome, is that by construction the control groups' tax haven ownership is below 5%, while the exposure group can have some foreign non-haven ownership (below 50%). This could bias upward our estimates of substitution to foreign non-haven ownership if the control group sees mean reversion towards haven ownership. However, the magnitudes of our results in Section 5 suggest that this possibility is of limited concern.

5 Impact of the Reform on Tax Haven Connections

5.1 Reform Implementation

Was the 3% corporate income tax surcharge applied as planned? Figure A.3 Panel (a), estimates the difference in difference model (Equation (4)), using the effective CIT rate as the outcome.[19] On average, the CIT rate of exposed firms increases by one percentage point, relative to that of control firms. This moderate rise could be due to an incomplete application of the law or to firms' ex-post response to the reform. Panel (b) plots the CIT rate coefficient, conditioning the sample of exposure firms to those that pay CIT and maintained ownership in tax havens in 2015: we observe an only modest increase in the effective rate for these firms. Note that for the CIT rate to apply, a firm must report positive taxable profits, which is the case for between 75-80% of both exposure and control firms at baseline. We later show that that the relative likelihood of reporting positive profits is unaffected by the reform (Section 6 analyzes firms' economic activity further). Panel (c) adds an additional condition that the tax authorities verify firms' terminal ownership ex-post using additional data reporting that only began collection following implementation of the reform. In this latter case, we observe an increase in the effective CIT rate of just under 3 percentage points relative to control firms, that decreases after 2015 likely due to endogenous responses of firms exiting terminal ownership in tax havens which (also supported by the increase in the standard error bars). We conclude that the reform was implemented as intended, although at least at the onset of the reform the tax authorities engaged in some leniency in enforcing the full surcharge.

5.2 Terminal Ownership in Tax Havens

Figure 1 Panel (a) shows the time series for the 'baseline domicile' ownership share. For the exposure group this corresponds to their tax haven ownership, and for the control group to their foreign non-haven ownership. Both series slightly rise in pre-reform years, from just below 80% ownership in 2012, to almost 90% in 2014, the year used to define the groups.

[19] Table A.11 Panel (a) reports the first stage of the instrumental variable difference-in-differences.

We attribute this increase to mechanical movement to adhere to our exposure and control definitions. Thereafter, the series continuously decline until the end of the panel. This shape is consistent with some mean reversion in ownership of baseline domicile and expected given our definition of exposure/control as majority owned in 2014 in havens/non-havens. Yet we can approximate the extent of mean reversion using the control group's ownership share behavior post-reform. Indeed, while the two series are similar pre-reform in levels and trends, when the reform is enacted in 2015, the tax haven ownership share of exposed firms falls faster than the foreign non-haven ownership of control firms. A gap of 10 percentage points in baseline domicile ownership opens in 2015, and widens over time, to reach nearly 20 percentage points by 2019.[20] Figure 1 panel (b) plots the yearly coefficients relative to 2014 for baseline domicile ownership from estimating the model in Equation (4).

Figure 1 Panels (c)-(d) show the time series and yearly coefficients for the likelihood that terminal ownership in baseline domicile is zero. These effects are close to those of the average ownership share: terminal ownership relocation away from tax havens occurs on the "extensive margin".

Table 3 Panel (a) summarizes these results by estimating the pre- versus post-reform difference-in-differences with firm and year fixed effects. Odd numbered columns show unweighted coefficients, while even numbered columns weight results by firm assets at baseline. Our main coefficient in Column 1 indicates that the reform induced the exposure group to reduce its baseline domicile ownership by 12.3 percentage points on average during 2015-2019. The confidence interval is relatively tight [-15.6 to -8.4]. Regressions with weights for firm size display significantly larger reductions (Column 2 and Figure A.5). The share of firms reporting no ownership from their baseline domicile post-reform is 11.2 percentage points higher for exposed firms compared to control firms (Column 3).[21] We interpret the

[20] Figure 1 Panel (a) also plots the tax haven ownership share of control firms, which by definition is below 5% at baseline. It hardly changes post reform: control firms don't start reporting tax haven ownership.

[21] Using the results from the table, we can infer the size of extensive margin movement as based on a decomposition of average "intensive" margin movement and "extensive" margin weighted by their respective shares of compliers: $\hat{\beta}_{dd} = \left[\hat{\beta}|s_{i,t\geq 2015}^{Ult.\ haven\ own.} = 0\right] \cdot p_{t\geq 2015,=0} + \mathbb{E}\left[\hat{\beta}|s_{i,t\geq 2015}^{Ult.\ haven\ own.} > 0\right] \cdot p_{t\geq 2015,>0} \implies -.123 \approx -.696 \cdot 0.112 + \mathbb{E}\left[\hat{\beta}|s_{i,t\geq 2015}^{Ult.\ haven\ own.} > 0\right] \cdot (1 - 0.112) \implies \mathbb{E}\left[\hat{\beta}|s_{i,t\geq 2015}^{Ult.\ haven\ own.} > 0\right] = -0.051.$ This calculation implies that there exists relatively little intensive-margin movement in terminal owner-

difference-in-differences coefficients as the reform induced change in tax haven ownership.[22] In relative terms, these effects amount to approximately 20% of the exposure firms' counterfactual exit from tax havens or 30% after five years. Section C re-estimates these designs using data from Orbis, which validate our results using data generated independently of taxation purposes. This robustness check implies that the decrease in tax haven ownership does not reflect a nominal change in misreporting to the tax authorities, and that these changes are corroborated as well by external sources.[23]

Ownership transparency. Given the large decline in tax haven terminal ownership, we assess the extent to which ownership is attributable to individuals rather than firms, as intended by the spirit of the law. Figure 1 panel (e) plots the time series of the beneficial ownership share of exposure and control firms. As expected, tax haven owned firms are less transparent at baseline: in 2014 only 43% of their ownership can be attributed to individuals, versus 70% for non-haven foreign owned firms. The beneficial ownership share of the exposure group rises in 2015 and 2016, while the control's is unchanged, thus partially closing the gap. Figure 1 panel (f) shows the event study coefficients. We observe a mild negative pre-trend, which we interpret as mechanical where the treatment group becomes more tax haven-owned into 2014, thereby also becoming more opaquely owned. The increase in beneficial ownership estimated from the difference in difference model is about 10pp relative to 2014. This value provides one estimate of a lower bound for how much of the exit from tax havens was "real"; if the increase in beneficial ownership was entirely attributable to persons in foreign non-havens, this result implies that at least 50% of the decrease in terminal ownership in tax havens was not purely nominal, but corroborated by a change in person ownership. Table 3

ship: conditional on not reducing terminal ownership in tax havens to zero, the average exposure firm reduced its terminal ownership in havens by 5.1 percentage points. Figure A.6 shows difference-in-differences designs for log terminal ownership and using Poisson Pseudo Maximum Likelihood Estimation (PPMLE). The log specification, which by definition cannot capture extensive margin movement, unlike the PPMLE specification demonstrates imprecise and insigificant estimates.

[22] To highlight the mechanics of our identification strategy, (Figure A.4) shows the difference-in-differences design for a naive regression that uses tax haven instead of baseline domicile ownership as the outcome: the resulting estimate is much larger, and pre-reform trends are not parallel with this outcome.

[23] Orbis data are collected and maintained by Bureau van Dijk/Moody's, a private entity that collects ownership data largely from other business intelligence aggregators.

Columns (7)-(10) give estimates slightly lower in magnitude, due to the presence of this negative mechanical pre-trend. We observe that 3pp of the 20% of exposed firms with zero beneficial ownership declared at least some beneficial ownership post-reform, and that 5.5pp of the 44% of firms without 100% of their beneficial ownership disclosed were induced into doing so (Figure A.7 visually show these designs).

Mechanisms of ownership change. We then examine the domicile of new terminal owners and to what extent firms maintained *some* persisting presence in tax havens. One of the central issues in regulating tax haven usage is that anti-tax haven policy may be easy to circumvent by introducing different ownership layers between these three domicile groups. Therefore, part of investigating this possibility requires evaluating how terminal ownership is reallocated among the two other domicile groups as well as changes in intermediate ownership.

Figure 2, panel (a) plots the resulting average changes in terminal ownership in foreign non-haven and Ecuador: nearly all of the reform induced tax haven ownership was reallocated to foreign non-haven owners as opposed to domestic owners. Table 3 Panel (b), summarizes the difference in difference results. It shows a rise in the inverse foreign domicile of 10.4 percentage points for the exposure group, almost all of the reallocation effect. We interpret this response as full substitution of terminal ownership toward foreign non-havens as opposed to Ecuador. Importantly, Table A.4, Figure A.9, and Figure A.10 demonstrate no meaningfully differential attrition on part of exposure firms relative to control firms, indicating that these results are not driven by changes in purely nominal reporting behavior. Table A.5, Figure A.11 Panels (e) and (f), and Figure A.13 report changes in additional ownership characteristics, showing that beyond the above changes, exposed firms saw increased diffusion in their ownership post reform, an increased number of terminal owners, and reduced concentration of terminal ownership. Additionally, we observe an increase in the average number of ownership layers to reach a terminal owner, perhaps representing an increase in ownership complexity, although this result is not significant (likely due to a mild downward pre-trend in ownership layers).

Given this response, we can infer that the effect of the reform was to induce a mass of firms with terminal owners in tax havens prior to the reform to reveal their *true* person owners, who were domiciled in foreign non-havens.

Did Firms Cut Ties with Tax Havens? Because the reform only considers terminal ownership domiciled in tax havens, it has no statutory bearing on intermediate ownership in tax havens. However, we are interested in investigating whether usage of intermediaries in tax havens changed as a consequence of the reform.

Figure 2 Panel (b) shows that exposed firms also display changes in their intermediate ownership patterns. The figure plots the difference-in-difference estimates using as the dependent variable an indicator for whether a firm has either any terminal ownership or any wholly-owned intermediaries in its baseline domicile group. This result is juxtaposed by the dashed gray line that estimates a design using as the dependent variable an indicator for whether firm has any terminal ownership in its baseline domicile group. We interpret these two variables, respectively, as the percentage point change in probability that a firm has any substantive presence in tax havens or that a firm has any terminal ownership in tax havens. The figure, along with Table 3 Panel (b) Columns (5)-(6), shows a 7.9pp drop in the probability that exposed firms have *any* substantive presence in tax havens. Columns (7)-(8) show a similar decline in whether exposed firms have any tax haven intermediary, regardless of ownership share.[24] Comparing these result against Table 3 Panel (a) Column (3), we can evaluate that between 70-80% of the effect of firms exiting terminal ownership in havens consists of firms *entirely* exiting any visible presence in tax havens.

Table 4 explores whether the reform had an impact on haven outflows. Columns (1)-(4) show that following the implementation of the surcharge, treatment firms transacted less with tax havens, as measured by dividend and financial outflows in levels and as a share of firm revenue, as well as an increase in the probability that exposure firms see a

[24] By definition, a lower threshold of direct ownership implies a less-controlling shareholder relationship. For this reason, we are primarily interested in 100%-direct ownership arrangements via intermediaries. However, our results demonstrate robustness to varying this threshold, even to any positive direct ownership amount.

year-on-year decrease in outflows to tax havens (Kremer, Willis and You, 2021; Edmans, Fang and Lewellen, 2013).[25]. While our measure of outflows only reflect direct outflows from Ecuadorian firms to entities abroad, and would fail to capture other more convoluted methods of directing funds to tax havens (e.g. "round-tripping"), the table indeed shows that the reform produced a decrease in financial outflows to tax havens. Nonetheless, this drop in dividend payments further supports the hypothesis that the exit from tax havens was indeed "real" and not simply reflective of a change in misreporting behavior. Lastly, columns (5)-(7) use the corporate income tax data to corroborate this drop in dividend payments and demonstrate a commensurate increase in retained earnings.

Figure A.11 and Table A.5 document further changes to ownership structure, including strict intermediate presence in tax havens, in non-havens, ownership chain length, and number of terminal owners. Panels (a)-(d) shows changed in whether exposed firms have intermediaries in either tax havens or foreign non-havens beyond a given direct-ownership threshold. Table A.5 Column (5) shows a 5.6pp decrease (relative to a 38.7% baseline) in the probability that an exposed firm has any majority-owned intermediary in a tax haven. This effect is larger, albeit not significant when weighting on firm 2014 assets. Column (7) and Figure A.11 Panel (c) show the estimation results for whether the firm maintains its 2014 plurality terminal owner. While this variable does not directly indicate tax haven usage, it does indicate a true change in shareholdership. On this front, we document a 14pp decrease for exposed firms post-reform, reflecting a 20% relative additional decrease in the probability that an exposed firm has its initial plurality owner *anywhere* in its ownership chain. Lastly, panel (f) shows an aggregate increase in the average ownership chain length, indicating that the reform either revealed pre-existing structures or induced re-structuring toward more convoluted ownership arrangements.[26] These responses indicate that beyond induce an exit in

[25] Table 8 Column (4) also shows that firms exiting terminal ownership in tax havens exhibited a relative decrease in outflows to tax havens compared to exposure firms remaining in haven terminal ownership

[26] Figure A.14 disaggregates this response based on firms' ex-post majority terminal ownership domicile. The figure demonstrates that firms that changed their majority terminal ownership domicile to foreign non-havens saw an increase in average chain length by over one layer (or ∼50%) on average, whereas those "repatriating to Ecuador" saw a decrease in their average chain length by around 0.25 layers (∼30%) on average. Exposed firms maintaining majority terminal ownership in tax havens saw no change.

terminal ownership in tax havens and an increase in ultimate ownership transparency, the reform also induced some firms to reduce any ownership arrangements involving tax havens.

5.3 Robustness

Differential mean reversion A threat to our design is differential mean reversion between exposed and control firms in the absence of the reform. Since the support of non-haven foreign domiciles is larger than that of haven domiciles, even a symmetric stochastic process for ownership reallocation across countries generates asymmetric transitions: haven-domiciled ownership mechanically reverts toward non-havens more often than vice versa.

To address this source of differential mean reversion, we replicate our main comparison while restricting the definition of tax havens and non-havens to more similarly sized domicile groups. Table 5 and Figure A.15 report estimates analogous to our baseline results using alternative geographic definitions of exposure and control. Table 5 Columns (3)–(4) restrict the comparison to Panama as the tax-haven group and Colombia as the foreign non-haven group.[27] This restriction aligns group sizes more closely, with 437 Panama-domiciled firms and 663 Colombia-domiciled firms. Reassuringly, Column (3) yields a point estimate identical to that of our main specification. Columns (5)–(6) and (7)–(8) perform analogous exercises comparing all tax havens to Colombia and all tax havens to all Latin American non-havens, respectively. These specifications yield highly significant effects that are modestly smaller in magnitude, at –8.3 and –9.4 percentage points under equal weighting.[28]

Another possible reason for mean reversion could deal with differential "churn" between firms owned in tax havens versus those owned in non-havens. Ownership in tax havens could simply be more short-lasting or constitute a more temporary arrangement. In this case, we could consider a model of terminal ownership following the reform captured by a combination

[27] In this and subsequent sample redefinitions, foreign countries outside the redefined groups are assigned to a fourth auxiliary domicile category.

[28] Consistent with these results, Table A.6 presents placebo first-order autoregressions of terminal ownership shares between 2013 and 2014. Using our baseline haven definition, tax-haven firms exhibit greater pre-period decay than non-haven firms. However, this differential decay disappears under all alternative geographic definitions, indicating that our robustness results are not driven by mechanical mean reversion.

of mean reversion (itself modeled as geometric decay to zero) and a real effect of the reform:

$$s_{it} = y_{i,2014} \cdot (1 - \theta - \phi_g Exposure_i)^{t-2014} \cdot \beta^{Exposure_i Post_t} \cdot \delta_t \cdot \varepsilon_{it},$$

for ε_{it} distributed normally with mean one. This equation imposes a constant mean reversion rate θ common to both groups and an additional constant θ_g that compounds (or decreases) this rate for haven-owned firms. The case $\theta_g > 0$ would imply that haven-owned firms exhibit greater decay or "more churn" than do non-haven-owned firms. This specification could be consistent with the results of Figure 1 and Table 3 that show a continued decrease in tax haven shareholdership beyond the immediate implementation of the reform.

We can estimate forms of equation in logarithms or via Poisson Pseudo Maximum Likelihood Estimation (PPMLE) to yield a coefficient $\hat{\hat{\beta}}$ excised of any dynamic linear time component post reform. Section 7.2 shows the results of this estimation procedure in levels, logarithms, binary specification, and using PPMLE. The results show an effect of the reform that is highly significant, albeit slightly attenuated, relative to the estimates in Table 3. The estimates in the log specification are not significant however, likely due to the relative importance of extensive-margin movement as we highlight that would not be captured in logarithms. We can use this specification as a very conservative lower-bound estimate of the impact of the reform that assumes no continued evolution in the effect of the reform (or no effect of the reform on flow exit from tax haven usage).

Ruling out contamination effects of the reform on control firms We argue that the decline in terminal ownership in foreign non-havens observed among control firms is primarily a mechanical consequence of mean reversion. By construction, the control group is defined by high pre-reform ownership in foreign non-havens, making some post-reform reversion inevitable. At the same time, it is important to rule out an alternative interpretation in which this decline reflects contamination of the control group. Although the reform does not penalize terminal ownership in foreign non-havens, control firms may still have perceived themselves as exposed—if, for instance, they had other potential links to tax havens—and adjusted their ownership structures in response. Under this interpretation, the post-reform

decline would reflect behavioral responses to the reform rather than mechanical reversion.

To investigate this possibility, we construct measures of potential tax-haven association and estimate a series of difference-in-differences specifications within the control group. The goal is to test whether control firms that could plausibly have perceived themselves as exposed exhibit a differential post-reform decline in terminal ownership in foreign non-havens. We classify control firms along the following dimensions measured in 2014: (i) any inflow from a tax haven; (ii) below- or above-median tax-haven inflows relative to revenue among firms with positive inflows; (iii) any outflow to a tax haven; (iv) below- or above-median tax-haven outflows relative to revenue among firms with positive outflows; (v) the presence of any tax-haven intermediary; (vi) the presence of a tax-haven intermediary with at least 100%, 50%, 10%, or any positive direct ownership; and (vii) inclusion in the Panama Papers.

Table A.7 reports the results. Across all specifications, control firms with potential tax-haven associations do not exhibit a statistically significant differential decline in terminal ownership in foreign non-havens relative to unassociated control firms in the post-reform period. We therefore find no evidence that the observed decline among control firms reflects behavioral responses to perceived exposure to the reform. Instead, these patterns are consistent with mechanical mean reversion rather than contamination of the control group.

5.4 Effects of the reform by margins of ex-ante heterogeneity

How did the effects of the reform vary across exposed firms? We examine heterogeneity along several ex-ante margins of interest. First, we estimate two sets of difference-in-differences specifications with multi-level treatment intensity. The first distinguishes exposed firms by whether they transferred funds directly to tax-haven entities in 2014. The second differentiates exposed firms by whether they reported positive taxable profits in 2014. Second, we estimate a set of triple-difference specifications to explore heterogeneity based on firms' pre-reform ownership transparency and enforcement risk. We examine variation by the share of beneficial ownership declared in 2014 and by whether a firm was named in the Panama Papers, as revealed by the 2016 disclosures of the International Consortium of Investigative

Journalists (ICIJ).

Table A.8 summarizes the results and Figure 3 displays the coefficients over time. Table A.8 Column (1) and Figure 3 Panel (a) show a mitigated decrease in tax haven ownership by firms that made an outflow to tax havens in 2014 relative to those that made no outflows to tax havens. This response suggests that the reform had a lesser effect for firms with greater economic ties with havens. Column (2) and Panel (b) show no differential effect of the reform based on whether firms paid CIT in 2014, corroborating other results that firms do not appear to respond in terms of whether they declare taxable profits.

Column (3) and Panel (c) present evidence on heterogeneous treatment effects based on how much beneficial ownership firms already declared prior to the implementation of the reform. Column (3) indicates no effect of the reform for control firms that had substantial beneficial ownership. However, the estimates indicate that the reform had a substantially mitigated effect for exposure firms that already declared greater amounts of beneficial ownership prior to the reform. We interpret this result to confirm some intuition that true beneficial ownership may be less responsive to the disincentive of locating ownership in tax havens than is nominal, non-beneficial ownership. Alternatively, under the lens of the model developed in Section 3 the ownership ties with tax havens among firms declaring greater beneficial ownership may represent organic (non-tax-related) presence in tax havens, which may implicate greater ownership adjustment frictions (or another form of greater benefit of "haven presence").

Lastly, Column (4) and Panel (d) show results for the triple difference design assessing any differential effect of being in the Panama Papers. Ex-ante, the effects of being named in the Panama Papers offers several objects of interest pertaining to our setting. First, perhaps the publication of the Panama Papers in April 2016 compounded the effect of the reform, with the leak itself serving as a treatment in of itself. There is precedent for studying the Panama Papers from this perspective (e.g. O'Donovan, Wagner and Zeume (2019)). At worst, such a possibility could contaminate our research strategy. In this case, we would observe an additional effect occurring in 2016 upon the release of the Panama Papers, which could

possibly also explain the observed continued decline after the initial implementation of reform the reform after 2015. However, because being named in the Panama Papers is likely highly correlated with our measure of exposure—being observed with majority terminal ownership in tax havens, a triple differences design is well suited to separate out the differential effects of these different potential treatment sources. Additionally, we are also interested in assessing whether there was an outsized effect of the reform for exposed firms that were also named in the Panama Papers, perhaps for the reason that such firms may exhibit more unequivocal tax evasive use of tax havens.[29]

However, studying this margin presents challenges: although Brounstein (2025) finds around 1,000 Ecuadorian individuals and firms…, the number of such firms in our sample is much smaller. Of our 588 exposure firms and 3,352 control firms, we only match 14 exposure firms and 38 control firms (although ex-ante we might anticipate a lower match rate for control firms).[30] While this low match may prevent us from conducting precise inference on differential responses, we anticipate that point estimates will also be informative with respect to the above concerns. To this end, Column (4) and Panel (d) rule out any compelling contamination effect of the Panama Papers on our research design. Neither did the reform have any no outsized effect for firms named in the Panama Papers, nor did the leak event in 2016 itself appear to have any impact on terminal ownership of majority international firms.

5.5 Separating the surcharge from the transparency effect

As our last extension to studying the transparency effects of the reform, we are interested in isolating the effect of the strictly pecuniary dimension of the policy. To do so, we can model exposure to the surcharge continuously according to the statutory surcharge schedule. We can then alter our main specification and estimating equation Equation (4) to feature an

[29] Of course, being named in the Panama Papers itself did not indicate tax evasive or otherwise illegal behavior.

[30] Overall, we can match 9 ICIJ firms with incomplete ownership profiles, 226 firms that are over 95% domestic, and 338 firms excluded from our core sample.

interaction of the continuous effect of the predicted surcharge and a post-reform indicator:

$$y_{it} = \alpha_i + \delta_t + \sum_{k=2012,\neq 2014}^{2019} \gamma_k \cdot Predicted\ Surcharge_i \cdot Post_t + \varepsilon_{it}. \tag{7}$$

We can estimate Equation (7) to capture the effect of the surcharge while assuming no transparency effect. In doing so, we include minority foreign-owned firms in our estimation sample in order to leverage the continuous variation in the surcharge, recalling that minority exposure firms faced a surcharge of between 0 and 1.5pp. Following this specification, estimators $\{\hat{\gamma}_t\}$ capture the continuous dosage response to the surcharge.[31] We also argue that this design offers yet an additional check against differential reversion between tax haven and foreign non-haven owned firms: beyond an average differential mean reversion between exposure and control firms, differential mean reversion would also have to match the parametric form of the surcharge function, a possibility we find less plausible.

Table 6 summarizes the results from this estimation procedure and Figure 4 shows the estimates over time.[32] We find that the pecuniary surcharge itself enacts an effect on its own: a 1pp ex-ante increase in surcharge through terminal ownership in tax havens induced an additional 2.7pp probability of firms making a full exit from terminal ownership in tax havens. Scaling this effect up by 3 for the majority exposure sample yields a coefficient of 8.1pp accounting for around 70% of the effect size exhibited in Table 3 Column (1). We observe consistently negative effects of the reform across different parameterizations of terminal ownership. However, the implied effect sizes under these other parameterizations account for nearly *all* of the effects observed in the binary specification for majority exposed firms from our main specification. The table also indicates significant, but largely attenuated effects for minority exposed firms. This result aligns with prior results emphasizing the role

[31] An alternate specification to Equation (7) could also include a fully-interacted difference-in-differences term with binary exposure. While in principle this specification could isolate the continuous dosage effect conditional on any treatment (perhaps akin to a transparency effect in our setting), these two treatment specifications demonstrate high multicollinearity and there indeed exist substantially fewer minority haven firms, thereby exacerbating separate identification of these terms.

[32] Table A.9 and Figure A.16 show analogous results estimated on the subsample of minority foreign-owned firms.

of the pecuniary cost of using tax havens in designing anti-haven policies (Bilicka, Devereux and Güceri (2024); Brounstein (2025)).

6 Effect of the Reform on Reported Economic activity

How might the reform impact tax collection and economic activity of Ecuadorian firms exposed to the surcharge? We discuss hypothesis on plausible effects of the reform on the tax rate, tax base and economic activity.

First, the reform raises the tax rate for a subset of exposed firms that maintained terminal ownership in havens. The 3 percentage point surcharge (a 15% increase over a 22 percentage point base rate), should mechanically increase tax payments, absent responses of the tax base.

Second, how might profits be impacted? Beyond transparency, a motivation for the tax surcharge stems from the role that tax havens play in enabling tax base erosion. The reform targeted firms based on their terminal ownership domicile, whereas multinational firms can engage in profit shifting using any affiliate located in a tax haven. Ex ante, it is thus not evident how the reform might impact reported profits. Three channels are possible: one is that it has no effect on reported profits. Second, that it by regularizing tax haven connections, in exchange of a higher tax rate, and due to a higher rate, exposed firms might further increase tax avoidance/profit shifting. Third, by targeting firms in tax havens, the reform could have raised the perceived cost of tax evasion for exposed firms with links to tax havens (Bilicka, Devereux and Güceri (2024); Allingham and Sandmo (1972)). Finally, by imposing an additional tax and cost on exposed firms, the reform might have led to a real disinvestment of business activity in Ecuador.

Results. We begin our investigation of firm outcomes reported in annual income tax declarations Equation (4) using profit and tax variables. Table 7 and Figure 5 summarize the difference-in-differences designs for these outcomes. Panel (a) reports that on average exposed firms exhibited an increase in gross profits of around 17% per year. Additionally,

on average, exposed firms ended up paying around 17% more in CIT liability. While the increase in CIT payments in partly mechanical, reflecting that many firms remained in tax haven ownership and faced the 3pp surcharge, the commensurate increase in profits indicates some "behavioral" effect in which firms report more profits either due to losing access to evasion technology via havens or face some increase perception of detection probability of wrongdoing.

Proportionally, we can contextualize this 17% increase in profits declared (or CIT paid) with respect to the relative change in the net-of-tax rate differential $\%\Delta(\tau_{Ecuador} - \tau_{Haven})$. The denominator requires specifying *which* tax rate differential agents are exploiting here. If one considers the top marginal personal income tax rate of 0.35 or the corporate income tax rate of 0.22 as the relevant Ecuadorian tax, and approximating taxes paid in tax havens as zero, the 3pp surcharge yields an elasticity with respect to the net-of-tax rate differential of between -1.2 and -2. However, taking into account pecuniary costs of tax haven usage or risk aversion would reduce true tax rate differential, driving down this elasticity.[33]

Importantly, Columns (3)-(4) and (7)-(8) as well as Figure A.17 illustrate that exposure firms do not change *whether* they pay corporate income tax or whether they taxable profits in Ecuador). This increase in CIT liability reflects responses from both firms that ended up facing the CIT surcharge as well as firms that reduced their tax haven usage. Considering the relative size of exposure firms relative to most firms operating in the Ecuadorian economy, this profit and CIT payments response represents a quantitatively important dimension of the impacts of the reform. However, our results fail to attain significance when weighting by 2014 assets.

While we cannot precisely distinguish tax evasion in our setting, we identify tax evasive usage of havens as a key focus of the reform. Additionally, the reform is unlikely to induce a decrease in profit shifting, given its emphasis on *ultimate* beneficial ownership rather than

[33] For example, Nazzari and Favarin (2025) review a series of high-profile financial fraud cases and give a median pecuniary cost of money laundering of 9%. Further, if agents place a 5% discount on money held in havens (for instance reflecting risk aversion), the differential can be expressed as $\%\Delta(\tau_{Ecuador} - \tau_{Haven} - \phi_{fee} - \gamma_{risk})$, yielding an elasticity with respect to the *true* tax advantage on haven usage of between -0.45 and -1.2. To the extent that the policy also induces a change in risk perception, one can understand the 3pp surcharge as underestimating the size of the policy change, further attenuating the elasticity.

on any intermediate presence in tax havens. One possible interpretation of this effect of the policy is that the reform induced a decrease in tax evasion by Ecuadorian business making use of tax havens either 1) to evade the Ecuadorian corporate income tax themselves or 2) to evade the worldwide personal income tax of their beneficial owners. Because the policy increases the cost of tax haven usage via the surcharge and possibly via an increase in perceived detection probability, the tax may reasonably induce a decrease in tax evasion via tax havens. Figure 5 Panel (c) and Table A.10 corroborates this hypothesis, demonstrating an immediate and sustained increase in profitability of exposure firms by around 2pp. This result is particularly compelling considering that exposure firms exhibited 40% lower profitability than control firms prior to the reform.

Table 7 Panel (b) uses an identical design to investigate changes in firm financial outcomes and income-generating expenses pertaining to assets, investments, and labor expenses. Column (1) shows a relatively imprecisely estimated null-effect of the reform on assets. Columns (2)-(4) use different parameterizations of investment as the dependent variable, showing robustly across specifications that we can comfortably reject any statistically significant decrease in investment. Columns (5)-(7) show similar results for wage bill expenses.[34]

While in a standard framework, an increase in corporate income taxation would also precipitate a decline in investment, labor demand, and scale (Curtis et al. (2021)), it is possible that the reform either operates as a non-distortionary tax on pure rents (e.g. Kennedy et al. (2024) with full deductibility as $\theta = 1$) or dampens these forces by inducing a substitution effect away from "non-productive" tax planning inputs toward productive inputs (Bustos et al. (2022)).[35] We confidently conclude that the reform did not adversely distort firm operations and that the incidence of the tax fell largely on firm owners.

[34] Figure A.18 displays the visual event-study estimates for these outcomes.

[35] Indeed, Table A.11 uses the surcharge effect of the reform as an instrument to estimate the effects of corporate income taxation on firm financial outcomes. While we obtain a very strong first stage and a strong positive relationship between the tax rate and taxes paid, we obtain null results for other firm outcomes we study, such as gross profits and investment (although we do obtain a significant negative impact of the tax rate on labor expense), which corroborate the hypothesis that the CIT surcharge poses an exclusion violation through these other channels.

Mechanisms. To further explore mechanisms, we disaggregate these responses based exposure firms' ex-post change in their terminal ownership domicile. We assign each firm to an alternate treatment category based on whether its 2015 majority domicile was in 1) tax havens, 2) foreign non-havens, 3) Ecuador, 4) a combination of domicile categories with no majority. We compare these firms against all majority foreign control firms following our main specification, however with this multi-level treatment. These regressions are not to be interpreted causally; rather they describe how firms that changed or maintained terminal ownership in tax havens responded differentially to the reform.

Table A.12 displays descriptive statistics for these groups. Of the 588 exposure firms, we identify 424 firms that maintained majority terminal ownership in tax havens, 50 that changed their majority ownership to foreign non-havens, 92 that changed their majority ownership to Ecuador, and 22 non-allocable firms. Firms that repatriate ownership back to Ecuador are smaller than other firms in terms of assets and revenues, whereas firms changing ownership to foreign non-havens and non-allocable firms are larger.[36]

Table 8 reports results from this estimation procedure. Odd numbered columns display results as described above; even numbered columns use a coarser distinction based on whether firms exited terminal ownership tax havens entirely in 2015. Columns (1)-(4) show that firms that left terminal ownership in tax havens exhibited twice as large a response in tax payments and profit declarations (28% and 30%) as did firms that remained in tax havens (although the point estimates themselves are not statistically significantly different). Interestingly, in parsing mechanisms, we find no differential change along these margins in terms of whether firms have any outflow to tax havens in a given year. However, Columns (7) and (8) show that firms that left tax havens exhibited a more negative response in tax havens outflows share of revenue relative to firms that remained in tax havens, suggesting that exiting tax haven ownership may have also been accompanied by a relative decrease in outflows to tax havens.[37]

[36] Figure A.19 also gives an additional breakdown of the change in the beneficial ownership based on these margins of exposure firms' ex-post majority domicile response.

[37] The standard error on this difference is not displayed, yet, the difference itself is statistically significant.

7 Policy discussion and conclusion

7.1 Policy benchmarking

In this section we compare the reform implemented by Ecuador to alternative anti-opacity policies. In each case we discuss the objectives of the policy, the firms targeted, the size of the tax base concerned, and finally venture on plausible behavioral effects.

We compare tax bases under different scenarios of policies which could have been implemented, which would have applied the tax surcharge to a different tax base and different types of firms (based on their ownership structure) and discuss their plausible impacts. Table 9 displays aggregates for different tax bases based on different kinds of activities of firms constituting a given degree of ownership opacity or tax haven association.

Subject firms: 1. Policies of minimal deterrence to haven usage. If the objective is to target a lack of ownership transparency, Ecuador's implemented policy is sensible, although somewhat minimal in scope: it imposes a cost on firms whose terminal link is in an uncooperative jurisdiction. This is a minimalist policy for transparency for two reasons: (1) it accepts that Ecuadorian firms can report non-ultimate BOs as long as these intermediate owners are not based in tax havens (thus harming the quality of the BO registry and relying heavily on cooperation). (2) It also accepts that firms can have intermediate ownership and ties to tax havens: these can be issues for transparency and for tax base erosion. We count 24,000 firms that did not declare 100% of their nominal terminal ownership and 19,000 firms that did not file any ownership declaration.

2. Policies of moderate deterrence to haven usage. We thus consider scenarios that are more ambitious: in addition to firms that disclose terminal ownership in a non-cooperative jurisdiction, the surcharge would apply to any firm that does not disclose full BO ownership. This targeting corresponds to the policy proposal advanced in Neidle (2024) aimed at improving the quality of the UK's BO. Such a reform likely would not extend distinction between nominee and beneficial ownership, although it is likely the case that this distinction may not prove important for tax and law enforcement purposes.

Such policies that target lack of transparency in of itself could be broad in scope. Relative to other hypothetical bases, Table 9 documents a substantial increase in the number of firms that would be subject to a tax penalizing lack of transparency: 40,000 firms failed to declare declare 100% of their beneficial ownership.

3. Policies of greater deterrence to haven usage. Finally, we can consider a maximalist scenario that would impose taxes when firms have any ownership–including intermediate–in tax havens. This kind of scenario would more severely limit the number of firms for whom such a policy would be applicable. 934 firms saw majority terminal ownership in tax havens and 280 firms saw minority terminal ownership in tax havens. Around 2,000 firms see some association with tax havens via a majority-owned intermediary. In an alternate scenario, Ecuador could have designed a policy that would place an identical surcharge for firms with any presence in tax havens via intermediate owners, as opposed to terminal owners. While this definition would broaden the base, it would also likely discourage large multinational groups with tax haven intermediaries from operating in Ecuador.

Activity tax bases. Second, there is the question of which is the appropriate tax base. Using the profits of Ecuadorian firms presents several limitations: profits can be manipulated—profits could be zero. While we find that profits declared in Ecuador actually rise post-reform, it is possible that other similarly-intentioned policies could encourage further tax base erosion. In his proposal, Neidle (2024) calls for a tax on foreign financial transactions, which we can simulate in the context of Ecuador using the universe of cross-border transactions. Finally, one could consider a minimum tax/penalty based on Ecuadorian revenues or assets. Such a base would likely see less potential manipulation, but at potentially greater distortionary costs.

7.2 Conclusion

We study a unique unilateral anti-tax haven reform in Ecuador that implements a pecuniary penalty on terminal business ownership via tax havens. The rise of and resulting

challenges posed by multilateral policy solutions to combat tax haven usage for both tax evasion and avoidance and to circumvent international law demonstrate the impetus for determining the scope to which single countries can act on their own to observe and mitigate corporate usage of tax havens. The Ecuadorian CIT surcharge on tax haven terminal ownership reform represents an innovative incentive-based reform to study. Ecuador, a mid-sized middle income country, installed a shareholdership registry (back in 2012) *and* leveraged its new data infrastructure to impose a pecuniary penalty on terminal ownership based in tax havens. This kind of penalty-based reform represents a policy that other countries with beneficial ownership registries could implement to in targeting illicit usage of tax havens. Moreover, given recent results that show limited effectiveness of purely information-oriented policies in mitigating offshore tax evasion (Bomare and Collin (2025); Alstadsæter et al. (2023*a*, 2022)), the Ecuadorian experience could be relevant for other countries.

Our analysis yields a set of novel and surprising results. Our main analysis compares firms exposed to the reform based on their majority tax haven shareholdership status in 2014 (the final pre-reform year) against control firms defined based on their 2014 majority shareholdership in foreign non-havens and observed non-affiliation with tax havens.

Our first set of results pertains to changes in shareholdership. We find that the CIT surcharge induced a 12-13pp decrease in tax haven shareholdership among the control group (relative to a baseline of 63%). We document substantial "extensive-margin" movement here, estimating that the CIT surcharge counterfactually induced around 20% of exposed firms into reducing their observable tax haven shareholdership to zero in the post-reform period. We find that a substantial majority of the shareholdership of these firms relocates to foreign non-havens with no net increase in Ecuadorian terminal ownership.

We expand on this result by studying the precise response in terms of the domicile and personhood of terminal owners. In spite of the net relocation to terminal ownership in foreign non-havens, we find a broad increase in terminal ownership transparency; we document a broad decrease in terminal ownership by firms, who by definition cannot truly serve as beneficial owners, and an increase in terminal ownership by persons. This result is crucial

for enforcing tax policies to and ensuring compliance among offshore entities—a key goal of the establishment of the Common Reporting Standards and the Automatic Exchange of Information. We find an increase in observation of true terminal ownership among both firms that leave tax havens and firms that maintained their majority terminal shareholder domicile in tax havens. However, as a perhaps perverse response, we also observe a modest reduction in domestic corporate transparency in the form of a substitution of terminal ownership from Ecuadorian persons to Ecuadorian firms.

We then turn to studying the profit, CIT, and investment/labor/operations responses of affected firms. We find an exciting result that firms exposed to the tax haven surcharge increased their profits declared and CIT payments by more than 15%. These firms are substantially larger than most CIT-paying firms in the Ecuadorian economy, which further substantiates the importance of this response. We argue that by increasing the expected price of haven usage via the direct cost of the surcharge and via the impact of the policy on perceived detection probability the policy induced a decrease in tax evasion (Allingham and Sandmo (1972)). We corroborate this mechanism by showing that exposed firms also exhibited a sharp and sustained increase in their profitability. We further estimate precise null impacts of the reform on assets, investment, labor expense, and firm exit, suggesting that the reform came with relatively little efficiency cost.

We take our results to speak to policy aimed at improving business ownership transparency and discouraging tax haven usage in developing and developed countries (Bilicka, Devereux and Güceri (2024)). In our case, we find positive effects of the "flashlight and stick" combination to both transparency, taxes paid, and reducing tax haven association, at relatively limited real cost to firm activity. There is little work that evaluates the effects of unilateral anti-haven policies in a data environment in which the researcher can directly observe haven usage. Moreover, policies such as Ecuador's are becoming increasingly relevant as more countries install beneficial ownership reporting registries. Going against conventional wisdom that domestic policy likely proves insufficient in combating multinational tax strategy, we find that in combination with a saliently pecuniary threat (in our case the CIT

surcharge), domestic policy can demonstrate effectiveness in addressing multinational activity. Our results imply that multinational tax strategy is *not* frictionless, and that even single, developing countries, can leverage new beneficial ownership data to introduce measures to monitor and regulate tax haven activity.

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8 Main text figures and tables

Table 1: Foreign terminal ownership of Ecuadorian companies (2014)

		Count of firms by ownership threshold				Terminal ownership of all Ecuadorian firms			
						% of Ecuadorian assets		% of Ecuadorian revenue	
	Country	$\geq 50\%$	$> 25\%$	$> 15\%$	$> 5\%$	All	By persons	All	By persons
Panel (a): Tax havens									
1	Panama	377	449	501	513	1.93	1.12	1.66	.896
2	Netherlands	62	71	85	90	.57	.119	.693	.139
3	Bahamas	47	51	52	52	.425	.205	.256	.076
4	British Virgin Islands	16	22	27	29	.068	.032	.101	.049
5	Cayman Islands	11	11	11	11	.196	.001	.101	.001
6	Luxembourg	10	11	14	15	.215	0	.196	0
7	Belize	9	9	9	9	.062	.004	.014	.003
8+	All others	50	64	72	74	.599	.117	.532	.046
All	Total	584	686	758	780	4.07	1.6	3.56	1.21
	% of all firms in sample	.949	1.11	1.23	1.27				
	% of all assets	3.48	4.59	6.5	10.2				
	% of all revenue	3.14	3.76	5.56	6.18				
Panel (b): Foreign non-havens									
1	Colombia	668	783	866	900	1.23	.792	1.73	1.08
2	USA	597	840	1,051	1,154	3.55	1.76	5.3	2.46
3	Spain	328	404	462	485	1.87	1.29	2.01	1.3
4	Peru	228	271	306	323	.92	.68	1.05	.674
5	Venezuela	144	172	186	189	.372	.335	.522	.407
6	Chile	139	167	196	208	.421	.166	.646	.236
7	Argentina	118	152	177	184	.234	.192	.337	.277
8+	All others	1,101	1,403	1,638	1,732	14.3	7.18	10.5	4.92
All	Total	3,397	4,056	4,534	4,702	22.9	12.4	22.1	11.4
	% of all firms in sample	5.52	6.59	7.37	7.64				
	% of all assets	24.9	28.2	31.6	33.4				
	% of all revenue	22.4	26.3	28.9	30.5				

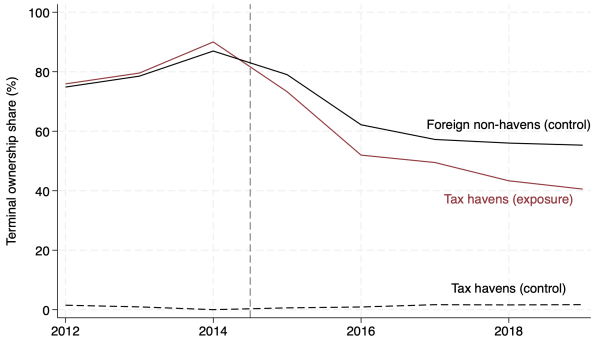
Note: This table uses the APS to tabulate the international terminal owners of Ecuadorian companies in our main sample in 2014 by country. Panel (a) displays the tax havens, and panel (b) the non-haven countries. Firms in sample include all firms that file the APS in 2014. Country rankings are constructed by tabulating the number of firms with 100% terminal ownership within a given country by haven/non-haven status in 2014 (below the column labeled "$\geq 50\%$"). The first five columns count the number of firms with terminal ownership above a specific threshold by country, where the threshold can take the value 100%, 50%, 25%, 15% or 5%. By definition, a single firm can be counted in multiple countries except in the 100% column. The next four columns show the terminal ownership share of Ecuadorian firms for each foreign country, weighted by firms' assets or revenue. The denominator of these terms consists of aggregate assets or revenues reported in the business income tax declarations. This table is discussed in Section 2.4.

Table 2: Descriptive statistics and ownership characteristics: Foreign-owned Ecuadorian Firms (2014)

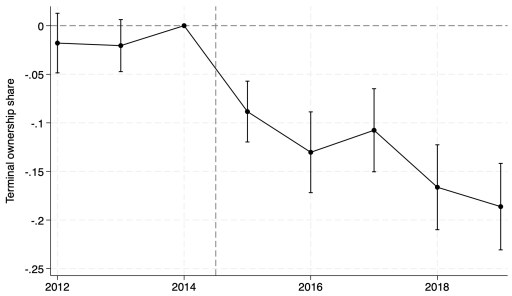
	Exposure	Control	Difference	Domestic firms	Difference of majority foreign firms v. Domestic
Panel (a): Firm Characteristics					
Log revenue	12.7	12.5	.185	11.5	1.06
			(.136)		(.05)
Log taxable profit	10.5	10.3	.156	8.84	1.51
			(.136)		(.052)
Has positive taxable profit	.747	.742	.005	.777	-.035
			(.019)		(.007)
Log CIT liability	8.96	8.81	.15	7.32	1.51
			(.136)		(.052)
Log exports	13.5	12.5	.962	11.8	.803
			(.328)		(.114)
Log assets	13.8	12.8	1.04	11.4	1.52
			(.105)		(.042)
Return on assets	.073	.119	-.046	.136	-.024
			(.007)		(.003)
Labor share of costs	.243	.29	-.047	.315	-.032
			(.011)		(.006)
Panel (b): Cross-border flows					
Any outflow to havens	.177	.151	.026	.051	.104
			(.017)		(.006)
Ratio of haven outflows to revenue	.029	.013	.016	.004	.011
			(.005)		(.001)
Panel (c): Ownership characteristics					
Terminal ownership in baseline domicile (%)	90	87	3.05	100	-12.6
			(.761)		(.299)
APS ownership residual (%)	.022	.35	-.328	-.032	.333
			(.205)		(.068)
Avg. ult. shareholder chain	1.92	1.54	.383	1.01	.584
			(.043)		(.016)
Has a haven strict intermediary	.561	.093	.468	.006	.158
			(.021)		(.006)
Panel (d): Ownership reporting compliance					
APS adds to 100	.983	.98	.003	.988	-.008
			(.006)		(.002)
Beneficial ownership declared (%)	42.7	70.3	-27.6	93.2	-27
			(2.07)		(.72)
Declared 100% beneficial ownership	.327	.612	-.285	.873	-.304
			(.021)		(.008)
Most common industry	Goods wholesale	Goods wholesale		Goods wholesale	
	[27.38]	[32.55]		[24.39]	
2nd most common	Real estate	Professional services		Professional services	
	[19.90]	[14.74]		[13.70]	
3rd most common	Primary sector	Manufacturing		Transport	
	[15.14]	[9.40]		[12.30]	
Unique firms	588	3,352		55,675	

Note: This table displays descriptive statistics of firms in our sample for 2014 from the F101 business income tax declarations and the APS ownership data. The first difference column corresponds with a cross-sectional univariate regression of the dependent variable (given by the row) on an indicator for exposure with the set of majority foreign-owned firms; the second difference column (the final column) compares the union of exposure and control firms against domestic firms. Parentheses contain heteroskedasticity-robust standard errors. This table is discussed in Section 4.

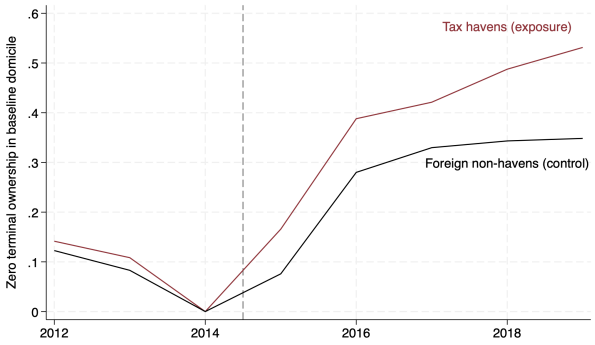
Figure 1: Tax reform impact on terminal ownership patterns



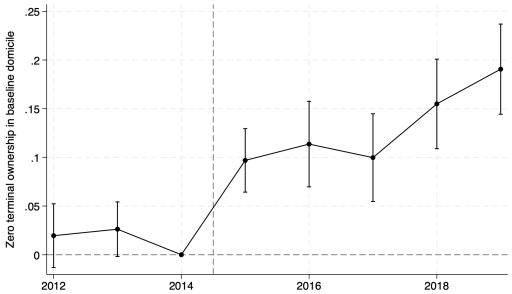
(a) Time series of terminal ownership



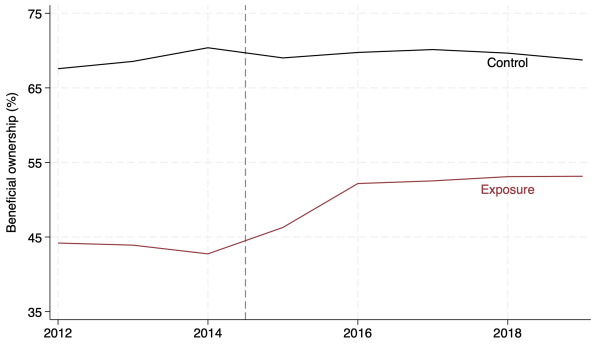
(b) Relative change in terminal ownership (DD)



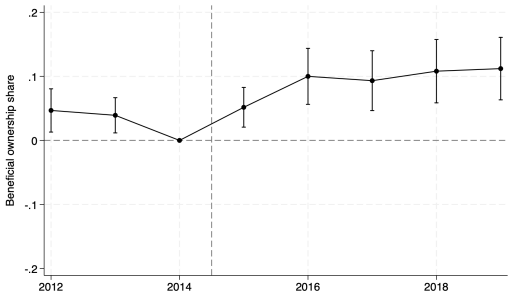
(c) Time series of whether firm has zero terminal ownership in baseline domicile



(d) Relative change in probability of zero terminal ownership in baseline domicile (DD)



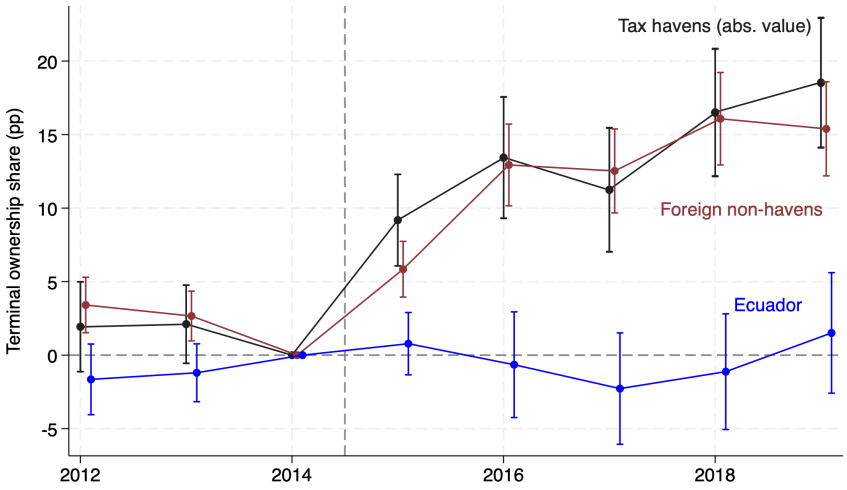
(e) Time series of beneficial ownership



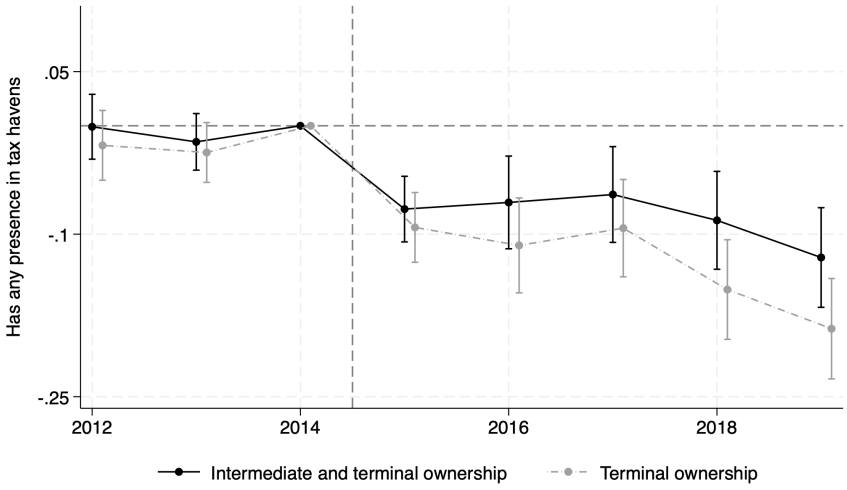
(f) Change in beneficial ownership (DD)

Note: These figures display the time series and the difference-in-differences results estimating the change in ownership by baseline domicile following the 2015 reform. Baseline domicile is defined as the reported location of the majority owner in 2014. Panel (a) plots the time series of outcome variables by group, including tax haven shareholdership for the control group to illustrate the utility of our approach for correcting mean reversion. Panel (b) uses main group shareholdership as the dependent variable; Panel (c) uses the a binary indicator for main group shareholdership share equals zero; Panel (d) uses inverse group and domestic shareholdership. Panel (e) plots the mean share of beneficial ownership by exposure/control group and Panel (f) plots the corresponding difference-in-differences coefficients. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals use standard errors clustered on the firm-level. This figure is referred to in Section 5.2.

Figure 2: Difference-in-differences:
Tax reform impact on location of terminal ownership and intermediary presence in havens



(a) Change in terminal ownership by country domicile category



(b) Any presence intermediate or terminal presence in tax havens

Note: These figures display difference-in-differences estimates following Equation (4). Panel (a) plots coefficients for terminal ownership changes by country domicile category. The black line plots the absolute value of the coefficients from Figure 1 Panel (b) for juxtaposition with the red line, which estimates the change in terminal ownership in foreign non-havens. The blue line plots the coefficients from a difference-in-differences design that uses Ecuadorian terminal ownership as the main dependent variable. In Panel (b), the solid black dashed line represents estimates using as the dependent variable an indicator for whether a firm has either (1) any terminal owner in the baseline domicile group or (2) any wholly-owned intermediate owner in tax havens. For reference, the dashed gray line plots estimates from a design using as the dependent variable an indicator for whether a firm has any terminal owner in the baseline domicile group. In both panels, the dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level. This figure is referred to in Section 5.2.

Table 3: Difference-in-Differences: Impacts of the reform on ownership structure

Panel (a): Tax haven ownership and beneficial ownership (BO) reporting

	Baseline domicile terminal ownership		Zero terminal ownership in Baseline domicile		Beneficial ownership declared		Any BO declared		100% of BO declared	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Exposure × Post	-12.30	-23.70	0.112	0.251	6.780	8.860	0.0280	0.0220	0.0550	0.0760
	(1.82)	(5.65)	(.019)	(.059)	(1.79)	(4.34)	(.014)	(.054)	(.019)	(.034)
Post	-17.90	-0.303	0.202	-0.00800	0.914	-1.700	-0.00300	-0.0190	0.0120	-0.0240
	(.618)	(2.54)	(.007)	(.019)	(.556)	(3.52)	(.005)	(.019)	(.006)	(.03)
Constant	69.60	79.80	0.193	0.0660	65.40	40.70	0.792	0.649	0.559	0.192
	(.173)	(.536)	(.002)	(.006)	(.17)	(.412)	(.001)	(.005)	(.002)	(.003)
TWFE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	Y	N	Y	N	Y	N	Y	N	Y
N	28,362	28,219	28,362	28,219	28,362	28,219	28,362	28,219	28,362	28,219
Unique firms	3,928	3,901	3,928	3,901	3,928	3,901	3,928	3,901	3,928	3,901
Adjusted R2	0.503	0.401	0.416	0.345	0.654	0.623	0.697	0.740	0.667	0.583

Panel (b): Mechanisms of ownership change

	Terminal ownership in Ecuador		Terminal ownership in inverse domicile group		Has a wholly-owned haven intermediary or haven terminal owner		Any strict intermediary in havens	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exposure × Post	0.568	4.320	10.40	15.10	-0.0790	-0.175	-0.0880	-0.0650
	(1.56)	(2.83)	(1.19)	(4.87)	(.019)	(.05)	(.015)	(.032)
Constant	27.30	13.90	1.820	3.480	0.936	0.952	0.899	0.937
	(.148)	(.269)	(.113)	(.463)	(.004)	(.005)	(.003)	(.003)
TWFE	Y	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	Y	N	Y	N	Y	N	Y
N	28,362	28,219	28,362	28,219	28,368	28,225	11,567	11,536
Unique firms	3,928	3,901	3,928	3,901	3,929	3,902	1,858	1,850
Adjusted R2	0.546	0.568	0.398	0.424	0.366	0.378	0.787	0.693

Note: This table summarizes the difference-in-differences results for our main specification on firm ownership and transparency. Panel (a) displays results pertaining to the change in tax haven ownership and beneficial ownership reporting. Panel (b) assesses the change in terminal ownership in other domiciles as well as mechanisms pertaining to intermediary or otherwise persistent usage of tax havens. The dependent variable in Panel (b) Columns (7)-(8) is only defined for firms with interior intermediaries (i.e. at least one firm separating the terminal owner from the Ecuadorian firm), and therefore has fewer observations. Standard errors are clustered on the firm-level. This table is referred to in Section 5.2.

Table 4: Difference-in-Differences: Impacts of the reform on tax haven outflows

	Dividend flows to havens				Post-tax profit activity (1000s USD)		
	Tax haven dividend outflows (1000s USD)	Tax haven dividend outflows (rev. share)	Any tax haven dividend outflow	Year-to-year decrease in haven outflows	Dividends paid	Retained earnings	Reinvested profits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Exposure × Post	-21.4	-.004	-.011	.024	-60.3	59.6	.694
	(3.29)	(.002)	(.006)	(.011)	(29)	(29.1)	(.136)
Constant	28.5	.007	.054	.098	220	25.9	.657
	(1.69)	(.001)	(.002)	(.003)	(4.63)	(8.26)	(.0684)
TWFE	Y	Y	Y	Y	Y	Y	Y
N	31,520	25,039	31,520	27,580	31,520	31,520	28,370
Unique firms	3,940	3,844	3,940	3,940	3,940	3,940	3,927

Note: This table summarizes the difference-in-differences results evaluating the impact of the reform on tax haven outflows and post-tax profit allocation activity. Variation in sample size across columns is due to 1) zero revenues (therefore an undefined dependent variable) as in Column (2), or as in Column (4) a dependent variable corresponding with a indicator for whether a firm i exhibits a year-to-year decrease in outflows to tax havens. By definition, it is not defined in year 2012. Because the dependent variable in Column (4) does not strictly pertain to dividend or financial flows, it compares uses haven outflows for both the exposure and control group. Standard errors are clustered on the firm-level. This table is referred to in Section 5.2.

Table 5: Robustness of terminal ownership response
Panel (a): Robustness by sample definition

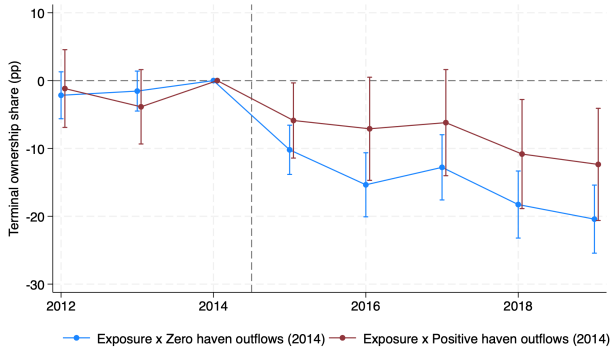
	Main specification		Caribbean havens v. Colombia		All havens v. Colombia		All havens v. Latin American non-havens	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exposure × Post	-12.30	-23.70	-12.30	-17.70	-8.340	-16.60	-9.400	-15.70
	(1.82)	(5.65)	(2.42)	(4.79)	(2.18)	(5.68)	(1.97)	(8.34)
Constant	69.60	79.80	67.60	72.90	67.60	75.50	67.10	70.50
	(.173)	(.536)	(.61)	(1.9)	(.646)	(2.71)	(.37)	(2.41)
TWFE	Y	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	Y	N	Y	N	Y	N	Y
N	28,362	28,219	8,004	7,970	9,080	9,043	14,327	14,262
Unique firms in regression	3,928	3,901	1,098	1,091	1,246	1,238	1,977	1,964
Unique control firms	3,352	3,352	663	663	660	660	1,393	1,393
Unique exposure firms	588	588	437	437	588	588	588	588
Adjusted R2	0.503	0.401	0.518	0.528	0.502	0.475	0.497	0.452

Panel (b): Controlling for continuous differential linear time trends

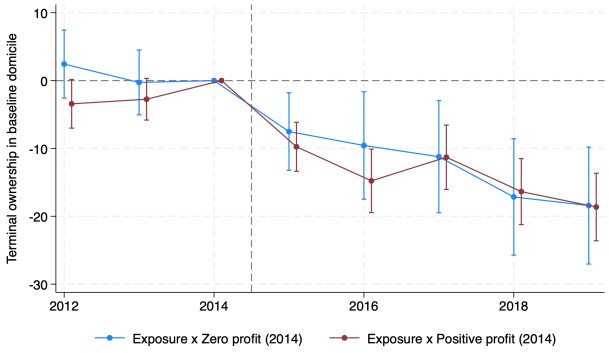
	Levels		Binary		Poisson		Log	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exposure × Post	-6.910	-15.30	-0.0549	-0.141	-0.0611	-0.181	-0.0654	-0.0658
	(1.88)	(5.65)	(.0197)	(.0514)	(.0274)	(.0795)	(.0661)	(.256)
Exposure $\times(t-2014)\times$ Post	-2.170	-2.890	-0.0226	-0.0390	-0.0564	-0.0605	-0.0104	-0.0376
	(.563)	(1.47)	(.006)	(.0114)	(.0125)	(.0269)	(.0197)	(.0673)
Exposure $\times(t-2014)$	0.988	0.302	0.00930	0.00560	0.0107	0.00310	0.0206	0.00350
	(.778)	(2.34)	(.0082)	(.0218)	(.0104)	(.0297)	(.0231)	(.0879)
Constant	69.80	79.80	0.808	0.935	4.350	4.420	4.360	4.330
	(.177)	(.546)	(.0019)	(.0053)	(.0025)	(.0064)	(.0041)	(.0117)
TWFE	Y	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	Y	N	Y	N	Y	N	Y
N	28,368	28,225	28,368	28,225	28,368	2.110e+11	22,530	22,412
Unique firms	3,929	3,902	3,929	3,902	3,929	3,902	3,873	3,848
Adjusted R2	0.503	0.402	0.416	0.349	0.347	0.268	0.287	0.164

Note: This table tests the robustness of our main results. Panel (a) summarizes the change in firms' terminal ownership in their respective baseline domicile group following our main difference-in-differences specification, where each pair of columns features a different geographic definition of tax havens and foreign non-havens. Columns (1) and (2) reproduce the specifications from Table 3 Panel (a) Columns (1) and (2) for ease of comparison. Panel (b) summarizes the change in firms' terminal ownership in their respective baseline domicile group by estimating the equation: $y_{it} = \alpha_i + \delta_t + \beta Treat_i Post_t + \xi(Year_t - 2014) \cdot Treat_i + \gamma(Year_t - 2014) \cdot Post_t \cdot Treat_i + \varepsilon_{it}$. Standard errors are clustered on the firm-level. This table is referred to in Section 5.3.

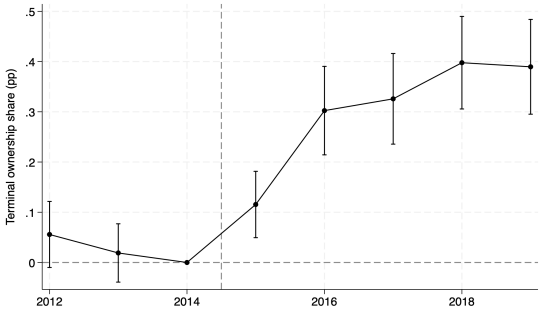
Figure 3: Difference-in-differences:
Terminal ownership responses along margins of ex-ante heterogeneity



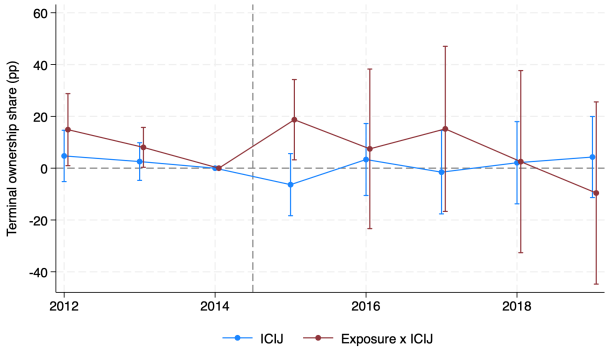
(a) Haven outflow in 2014



(b) Positive profit in 2014



(c) Beneficial ownership declared in 2014 (DDD)



(d) Firms named in the Panama Papers (DDD)

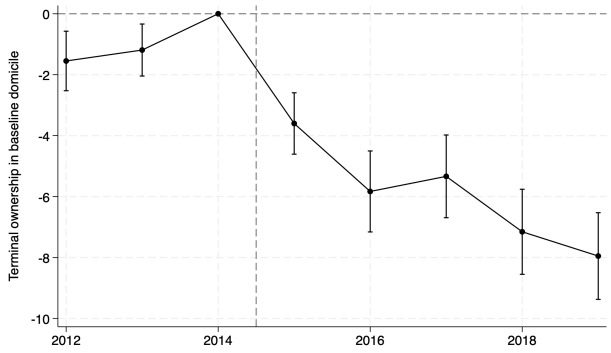
Note: These figures display the impacts of the reform on firms based on different margins of ex-ante heterogeneity. Panels (a) and (b) plot difference-in-difference coefficients using a multi-level treatment specification, where the baseline group consists of control firms. Panels (c) and (d) plot estimates from triple difference designs. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level. This figure is referred to in Section 5.4.

Table 6: Difference-in-differences with continuous exposure:
The effect of the pecuniary surcharge on terminal ownership in baseline domicile group

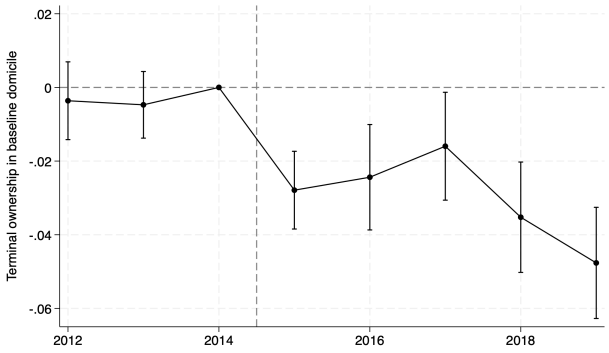
	Tax haven ownership (pp)			
	Levels	Binary	Poisson	Log
	(1)	(2)	(3)	(4)
Projected tax surcharge × Post	-5.020	-0.0270	-0.0680	-0.0380
	(.59)	(.006)	(.011)	(.02)
Constant	65.70	0.920	4.380	4.100
	(.285)	(.003)	(.005)	(.007)
Average minority effect	-3.870	-0.0210	-0.0520	-0.0290
	(.455)	(.005)	(.008)	(.015)
Average majority effect	-15	-0.0820	-0.204	-0.113
	(1.77)	(.019)	(.032)	(.059)
Main estimate	12.3	0.112	-0.205	-0.070
	(1.83)	(.019)	(.032)	(.060)
TWFE	Y	Y	Y	Y
N	38,472	38,472	38,472	29,522
Unique firms	5,305	5,305	5,305	5,201
Adjusted R2	0.590	0.359	0.474	0.541

Note: This table presents estimated of the model $y_{it} = \alpha_i + \delta_t + \gamma \cdot PredictedSurcharge_i Post_t + \varepsilon_{it}$. The dependent variable in all specifications consists of different parameterizations of terminal ownership in baseline domicile group (tax haven terminal ownership for exposure firms and foreign non-haven terminal ownership for control firms). The estimation sample here consists of all majority and minority exposure and control firms in our core sample. The rows labeled "average effect" correspond with the point estimate effect evaluated at each group's mean projected tax surcharge. Standard errors are clustered on the firm-level. This table is referred to in Section 5.5.

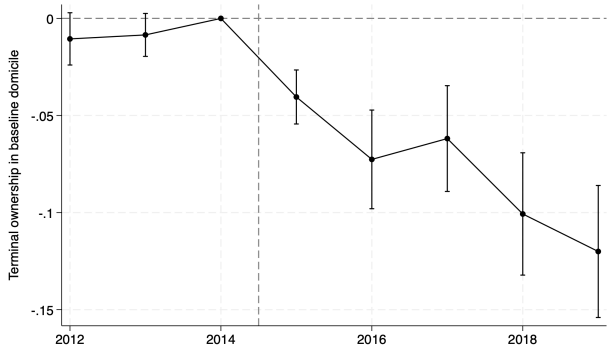
Figure 4: Difference-in-differences with continuous exposure:
The effect of the pecuniary surcharge on terminal ownership in baseline domicile group



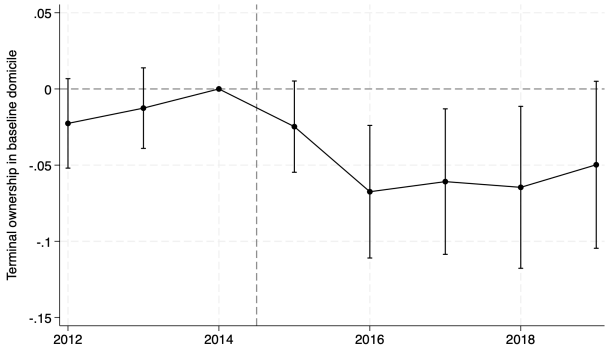
(a) Levels terminal ownership
in baseline domicile



(b) Any terminal ownership
in baseline domicile



(c) Terminal ownership
in baseline domicile (Poisson)



(d) Terminal ownership
in baseline domicile (log)

Note: this figure presents different parameterizations of the change in terminal group ownership as estimated by the continuous difference-in-differences equation $y_{it} = \alpha_i + \delta_t + \gamma \cdot PredictedSurcharge_i Post_t + \varepsilon_{it}$. The dependent variable in all specifications consists of different parameterizations of terminal ownership in baseline domicile group (tax haven terminal ownership for exposure firms and foreign non-haven terminal ownership for control firms). The sample in all plots consists of all majority and minority exposure and control firms in our core sample. The dashed gray vertical line marks the implementation of the CIT surcharge. The row "Main estimate" lists with estimates from Table 3 for comparison. Confidence intervals use standard errors clustered on the firm-level. This figure is referred to in Section 5.5.

Table 7: Difference-in-differences: firm financial activity

Panel (a): Profit and taxes

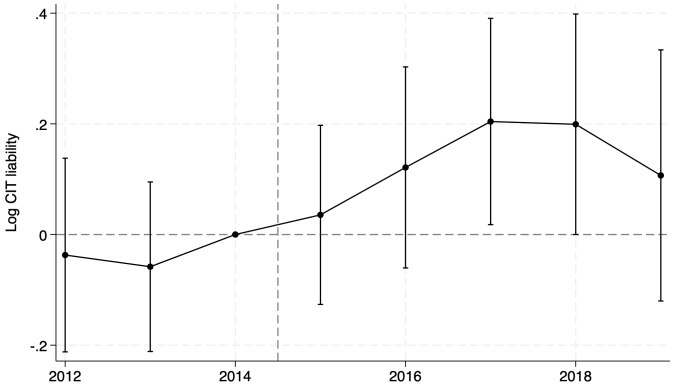
	Log CIT		Positive CIT		Log gross profit		Return on assets	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exposure × Post	0.159	0.123	0.00400	-0.00200	0.155	0.220	0.0190	0.0190
	(.069)	(.123)	(.016)	(.046)	(.072)	(.117)	(.004)	(.009)
Constant	9.180	-46.60	0.711	28.20	10.60	-13.30	0.107	2.150
	(.015)	(20.5)	(.004)	(14.3)	(.016)	(26.1)	(.001)	(1.79)
TWFE	Y	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	Y	N	Y	N	Y	N	Y
N	18,386	18,351	28,370	28,220	17,901	17,866	27,636	27,559
Unique firms	3,318	3,308	3,927	3,900	3,305	3,295	3,909	3,888
Adjusted R2	0.808	0.856	0.381	0.501	0.788	0.844	0.380	0.633

Panel (b): Assets, investment, and labor expenses

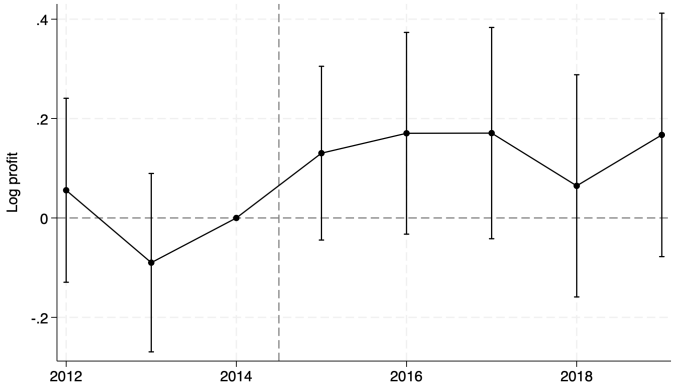
	Assets	Investment			Wage bill		
	Assets (log)	Any investment	Investments assets share	Year-to-year investment decrease	Labor expense (log)	Labor assets share	Year-to-year labor expense decrease
	(1)	(3)	(2)	(4)	(5)	(6)	(7)
Exposure × Post	-.008	.018	.017	.002	-.025	.015	-.076
	(.059)	(.014)	(.006)	(.012)	(.054)	(.008)	(.019)
Constant	13	.155	.031	.092	11.6	.306	.324
	(.013)	(.003)	(.001)	(.003)	(.011)	(.002)	(.005)
TWFE	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	N	N	N	N	N	N
N	27,636	31,520	27,636	27,580	22,887	27,636	24,373
Unique firms	3,909	3,940	3,909	3,940	3,628	3,909	3,883
Adjusted R2	.844	.512	.597	.258	.844	.665	.061

Note: This table summarizes the difference-in-differences results pertaining to profit, taxes, and other firm activity. Differences in sample sizes across columns come from three sources: specifications with log dependent variables exclude observations with zero-values; specifications that use a signed year-to-year first-difference parameterization of the dependent variable exclude year 2012 by construction; specifications that use outcomes normalized by assets omit firms with zero or missing assets. Standard errors are clustered on the firm-level. This table is referred to in Section 6.

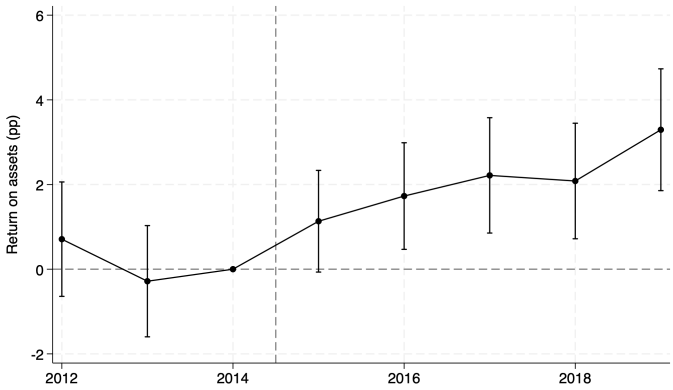
Figure 5: Tax reform impact on firm financial activity



Panel (a): Corporate income taxes



Panel (b): Gross profits declared



Panel (c): Return on assets

Note: These figures display difference-in-differences results pertaining to taxes, profit, and profitability. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

Table 8: Difference-in-differences by ex-post ownership domicile response
Firm tax, profits, profitability and haven outflows

	Log taxes paid	Log profit declared	Return on assets	Financial outflows to havens (1000s USD)
	(1)	(2)	(3)	(4)
Exposure × Remained in havens × Post	.083	.094	.01	9.97
	(.103)	(.116)	(.007)	(23.6)
Exposure × Partial haven exit × Post	.193	.166	.022	-44.1
	(.107)	(.104)	(.006)	(20.6)
Exposure × Left havens × Post	.243	.275	.036	-54
	(.1)	(.128)	(.008)	(30.2)
Constant	9.12	10.5	.085	344
	(.006)	(.006)	(0)	(1.81)
$\hat{\beta}_{partial\ exit} - \hat{\beta}_{remained}$	.111	.072	.013	-54.1
	(.143)	(.15)	(.008)	(19.4)
$\hat{\beta}_{left} - \hat{\beta}_{remained}$	.16	.181	.026	-63.9
	(.138)	(.167)	(.01)	(29.4)
TWFE	Y	Y	Y	Y
N	18,386	17,901	27,636	31,520
Unique firms	3,318	3,305	3,909	3,940
Adjusted R2	.808	.788	.382	.000716

Note: This table summarizes the results for difference-in-differences regression with a multi-leveled treatment specification, where each exposure firm is assigned to a mutually exclusive group based on its country category of terminal ownership domicile in 2015-2019. The control group consists of all majority foreign-owned control firms. Standard errors are clustered on the firm-level. This table is referred to in Section 6.

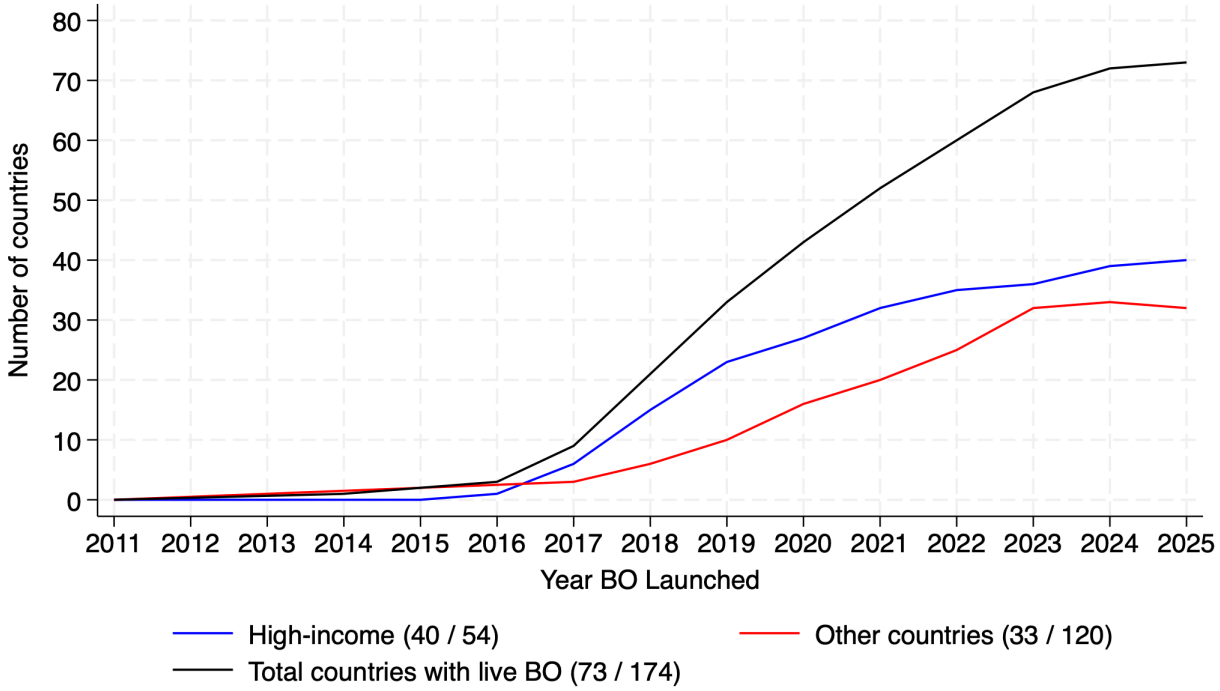
Table 9: Tax benchmarking exercises (2014)

		Activity base (Millions USD 2014)									
Firm base	Number of firms	Assets	Intangible assets	Revenue	Taxable profit	Dividends to havens	All flows to havens	All flows from havens	All dividend outflows	All outflows	All inflows
Majority terminal haven-owned	934	6,641	1,476	5,049	787	71.5	329	32.5	178	1,459	1,039
Majority terminal haven-owned & has ≤ 50% BO declared	549	5,051	1,448	3,971	713	70.9	256	15.7	168	1,127	724
Terminal haven ownership ∈ [.05, .5)	280	8,151	363	3,576	286	1.46	60.3	40.2	34.5	956	216
Has a 100% intermediary in a tax haven	1,192	24,803	5,562	15,285	1,664	80.7	518	53.9	262	5,952	4,361
Has a ≥50% intermediary in a tax haven	2,053	30,137	5,767	20,610	2,147	91.4	734	146	283	7,523	5,349
Has a ≥10% intermediary in a tax haven	2,292	32,511	5,842	22,787	2,327	91.6	763	152	337	8,131	5,530
Nominal ownership does not add to 100%	24,158	103,749	5,989	49,400	7,518	12.4	328	84.1	647	7,927	4,631
Beneficial ownership (BO) does not add to 100%	40,665	182,648	11,513	107,379	12,353	96.4	1,610	413	1,219	19,725	13,150
Has ≤ 50% BO declared	32,891	156,834	11,067	90,533	11,179	84	1,250	321	1,060	16,113	11,640
Has zero BO declared	25,431	125,584	9,488	67,029	9,651	71.6	853	145	921	9,167	5,993
Did not declare ownership structure	18,786	77,566	845	33,239	5,632	3.22	80	16.8	35.8	1,235	741

Note: This table summarizes hypothetical tax bases given different firms of interest and different taxed activities. Calculations consider all Ecuadorian firms in the administrative tax data environment, not only those considered in our quasi-experimental design. All firm definitions and flows correspond with 2014, the final pre-reform year. In 2014, we observe 132,183 filing a business income tax declaration in Ecuador. This table is referred to in Section 7.1.

Appendix A Additional figures and tables

Figure A.1: Countries with beneficial ownership registry over, by year and income category



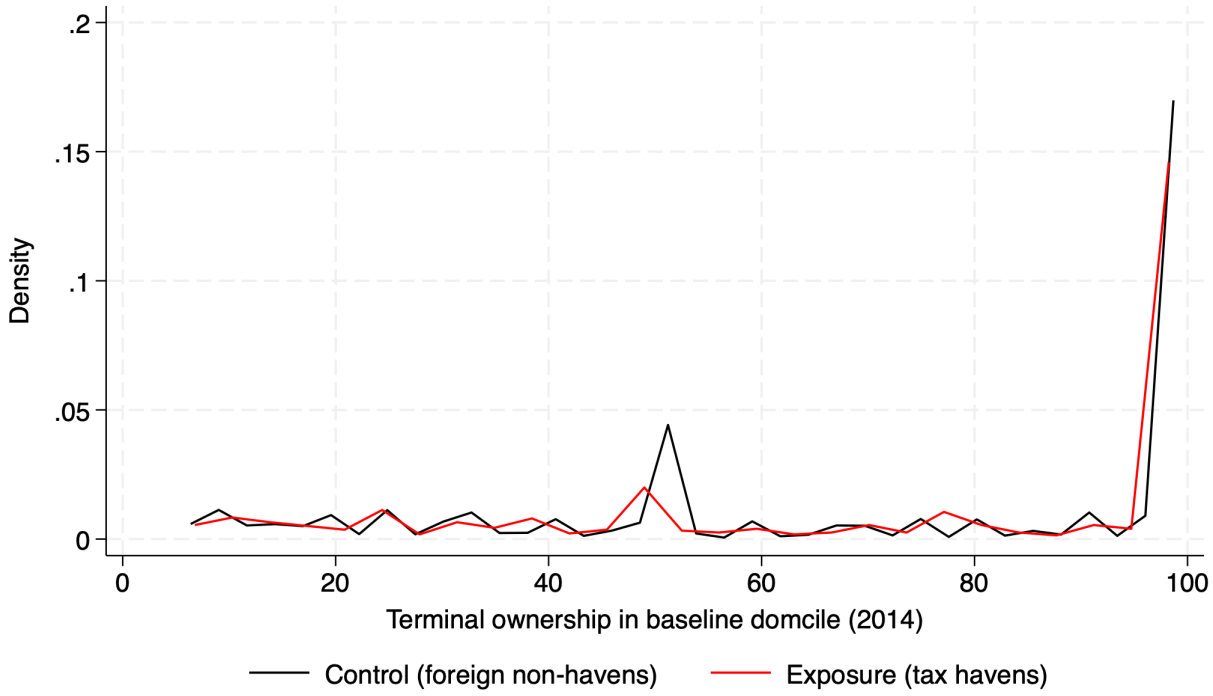
Note: This figure displays time series of the cumulative count of countries that maintain a beneficial ownership registry (BO). High-income and other countries are defined mutually exclusively according to World Bank country classifications of income level for 2024-2025. Data updated as of July 2025, 73 out of 174 (42%) countries with populations exceeding 500,000 have launched a live BO registry. Income classification: High-income (40); Upper-middle income (21); Lower-middle income (9); Low income (2)."

Table A.1: Foreign terminal ownership of Ecuadorian companies (2014)
All firms filing the APS

		Count of firms by ownership threshold					Terminal ownership of all Ecuadorian firms			
							% of Ecuadorian assets		% of Ecuadorian revenue	
	Country	100%	≥ 50%	> 25%	> 15%	> 5%	All	By persons	All	By persons
Panel (a): Tax havens										
1	Panama	188	624	730	797	810	1.08	.617	1.21	.651
2	Netherlands	36	82	95	115	120	.307	.061	.525	.101
3	Luxembourg	10	14	15	19	20	.154	0	.241	0
4	Curaçao	7	12	12	13	13	.734	0	.637	0
5	British Virgin Islands	6	30	37	44	46	.036	.017	.073	.036
6	Hong Kong	5	8	8	8	8	.126	0	.096	0
7	Puerto Rico	4	9	11	12	12	.006	.006	.003	.003
8+	All others	28	171	205	220	225	.621	.195	.574	.094
All	Total	294	951	1,110	1,214	1,245	3.06	.896	3.36	.885
	% of all firms in sample	.222	.719	.84	.918	.942				
	% of all assets	1.11	2.88	3.49	4.5	6.41				
	% of all revenue	1.45	3.13	3.59	4.9	5.35				
Panel (b): Foreign non-havens										
1	Colombia	404	978	1,158	1,293	1,354	.656	.427	1.26	.79
2	USA	335	1,017	1,387	1,700	1,830	2.03	.936	4.11	1.79
3	Spain	228	619	736	832	865	1.05	.672	1.5	.952
4	Peru	167	386	446	495	518	.82	.621	1.06	.494
5	Venezuela	117	319	379	406	411	.429	.182	.458	.296
6	China	84	151	172	188	191	1.55	.175	1.32	.18
7	Argentina	73	179	226	262	269	.166	.102	.3	.201
8+	All others	570	1,867	2,341	2,701	2,844	7.82	3.7	7.72	3.59
All	Total	2,311	5,595	6,628	7,376	7,633	14.5	6.82	17.7	8.3
	% of all firms in sample	1.75	4.23	5.01	5.58	5.78				
	% of all assets	4.85	15.5	17.8	19.7	20.6				
	% of all revenue	7.01	17.9	21	23	24.2				

Note: This table uses the APS to tabulate the international terminal owners of Ecuadorian companies in 2014 by country. Panel (a) displays the tax havens, and panel (b) the non-haven countries. Unlike Table 1 which only includes firms in the core sample, this table considers all firms filing the APS in 2014. Country rankings are constructed by tabulating the number of firms with 100% terminal ownership within a given country by haven/non-haven status in 2014 (below the column labeled "≥ 50%"). The first five columns count the number of firms with terminal ownership above a specific threshold by country, where the threshold can take the value 100%, 50%, 25%, 15% or 5%. The next four columns show the terminal ownership share of Ecuadorian firms for each foreign country, weighted by firms' assets or revenue. The denominator of these terms consists of aggregate assets or revenues reported in the business income tax declarations by firms in our core sample.

Figure A.2: Distribution of 2014 tax haven and non-haven terminal ownership
Among exposure and control firms



Note: This figure shows the 2014 distribution of terminal ownership attributable to owners in foreign non-havens and tax havens for our control and exposure groups respectively. Note that both spikes in density around 50% ownership indeed occur precisely at 50%; visual offset is due to discrepancies in kernel estimation.

Table A.2: APS compliance and (non-) observation of beneficial ownership by geography (2014)

	Incomplete	Domestic	C-majority	C-minority	T-majority	T-minority	Other
Ecuadorian person	27.6	93.2	11.2	62.4	5.14	31.2	85.7
Ecuadorian non-person entity	2.54	6.76	1.41	9.97	1.59	12.3	9.23
Foreign non-haven persons	.0383	.00945	59.1	21	2.03	14.3	4.39
Foreign non-haven non-person entity	.0344	.00107	27.8	4.56	.969	12.1	.341
Haven person	.00153	0	.00439	.0166	35.6	14.8	.264
Haven non-person entity	.00449	0	.0106	.0131	54.4	10.9	.128
Terminal ownership in Ecuador	30.1	100	12.6	72.4	6.73	43.6	94.9
Terminal ownership in havens	.00602	.000671	.015	.0298	90	25.7	.392
Terminal ownership in non-havens	.0727	.0105	87	25.6	3	26.4	4.73
APS ownership residual	69.7	-.0318	.35	1.87	.0218	4.26	0
Unique firms	1,315	55,674	3,351	1,183	588	195	44

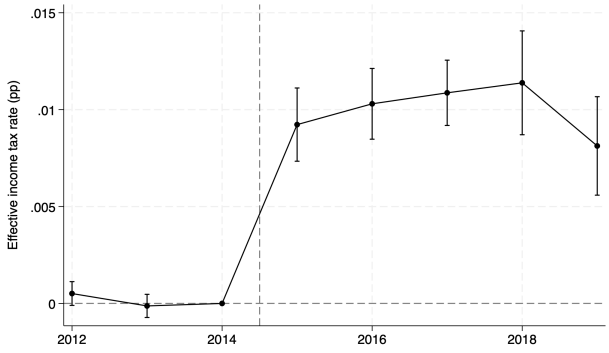
Note: This table tabulates the observation of terminal beneficial ownership of core sample firms in the APS data in 2014, based on their ownership-domicile and filing status and by beneficial owner type. All numbers correspond with percentage points. The 'T' columns refer to firms with terminal ownership in tax havens. The 'C' columns refer to firms with terminal ownership in foreign non-havens (and less than 5% ownership in tax havens). The "Majority" and "Minority" distinctions correspond with whether terminal ownership in each category is at least 50%. Non-person entities include both companies that cannot by definition serve as terminal beneficiaries as well as non-business entities such as non-profit and non-governmental organization. The residual refers to the non-reported share of terminal ownership in the APS such that terminal ownership adds up to 100%.

Table A.3: Descriptive statistics and ownership characteristics: Minority exposure and control and domestic Ecuadorian Firms (2014)

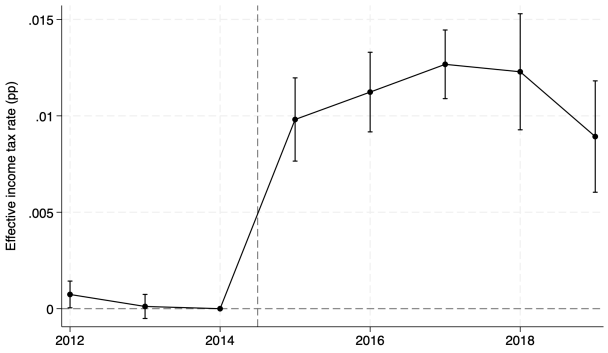
	Exposure	Control	Difference	Domestic firms	Difference of minority foreign firms v. Domestic
Panel (a): Firm Characteristics					
Log revenue	13.6	12.7	.945	11.5	1.31
			(.251)		(.08)
Log taxable profit	11.8	10.3	1.46	8.84	1.68
			(.24)		(.087)
Has positive taxable profit	.785	.752	.032	.777	-.02
			(.032)		(.012)
CIT liability (1000s USD)	317	113	204	18.9	123
			(79.4)		(21.2)
Log CIT liability	10.2	8.79	1.46	7.32	1.68
			(.24)		(.087)
Log assets	14.2	12.9	1.34	11.4	1.7
			(.206)		(.073)
Gross profit margin	.136	.109	.027	.091	.021
			(.017)		(.005)
Labor share of costs	.27	.285	-.015	.315	-.032
			(.019)		(.008)
Panel (b): Ownership characteristics					
Ecuadorian person (%)	31.2	62.4	-31.2	93.2	-35.2
			(2.37)		(.802)
Foreign person (%)	29.1	21	8.03	.01	22.2
			(2.04)		(.465)
Ecuadorian non-person entity (%)	12.3	9.97	2.35	6.76	3.54
			(1.78)		(.601)
Foreign non-person entity (%)	23	4.57	18.4	.001	7.17
			(2.36)		(.472)
Residual (%)	4.26	1.87	2.4	-.032	2.24
			(1.19)		(.353)
Terminal ownership in baseline domicile (%)	25.7	25.6	.118	100	-74.4
			(.982)		(.345)
Ownership share of plurality owner (%)	38.7	44.7	-6.06	62.2	-18.3
			(1.34)		(.555)
Average share of terminal owner (%)	18	25.2	-7.26	39.1	-14.9
			(.99)		(.381)
Number of terminal owners	25.4	18.7	6.77	8.65	11
			(11)		(5.41)
Avg. ult. shareholder chain	2.03	1.18	.846	1.01	.29
			(.087)		(.02)
Panel (c): Ownership reporting compliance					
Filed APS in 2014	1	.996	.004	.989	.007
			(.002)		(.002)
APS adds to 100	.877	.948	-.071	.988	-.05
			(.024)		(.007)
Declared any beneficial ownership	.897	.967	-.07	.973	-.016
			(.022)		(.006)
Beneficial ownership declared (%)	60.3	83.6	-23.3	93.2	-12.9
			(2.83)		(.842)
Declared 100% beneficial ownership	.277	.64	-.364	.873	-.284
			(.035)		(.013)
Panel (d): Cross-border flows					
Any outflow to havens	.308	.159	.149	.051	.129
			(.035)		(.01)
Ratio of haven outflows to revenue	.022	.011	.011	.004	.009
			(.007)		(.002)
Any outflow to non-havens	.585	.411	.174	.187	.249
			(.038)		(.013)
Ratio of non-haven outflows to revenue	.117	.103	.014	.038	.067
			(.017)		(.006)
Most common industry	Wholesale of goods	Wholesale of goods		Wholesale of goods	
	[23.08]	[28.76]		[24.39]	
2nd most common	Real estate	Manufacturing		Professional services	
	[20.00]	[11.51]		[13.70]	
3rd most common	Manufacturing	Real estate		Transport of goods and people	
	[12.82]	[11.17]		[12.30]	
Unique firms	195	1,182		55,675	

Note: This table displays descriptive statistics of minority-foreign-owned firms in our sample for 2014 from the F101 business income tax declarations and the APS ownership data. The first difference column corresponds with a cross-sectional univariate regression of the dependent variable (given by the row) on an indicator for exposure with the set of minority foreign-owned firms; the second difference column (the final column) compares the union of minority exposure and control firms against domestic firms. Parentheses contain heteroskedasticity-robust standard errors.

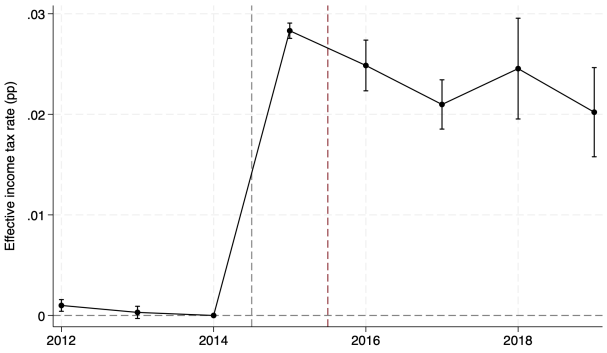
Figure A.3: First stage: Relative change in effective corporate income tax rate



(a) Simple first stage (DD)



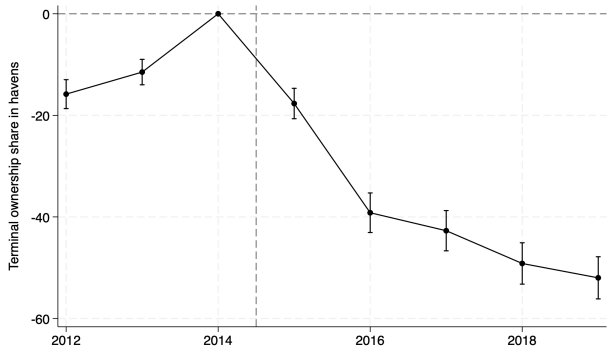
(c) First stage: ex-post conditional on remaining in havens and positive CIT



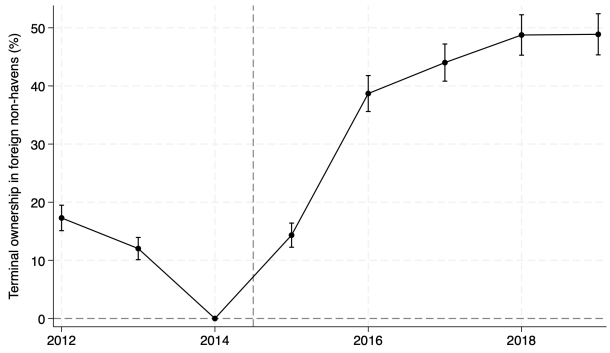
(c) First stage: ex-post conditional on remaining in havens and positive CIT and ex-post verified data

Note: These figures display difference-in-differences results that illustrate components of the "bindingness" of the CIT surcharge among firms that maintain majority shareholdership in tax havens and pay corporate income tax. Panel (a) uses features no additional conditioning beyond our main difference-in-differences specification. Panel (b) conditions exposure firms on having maintained terminal ownership in tax havens in 2015 and facing a positive CIT rate. Panel (c) adds on an additional condition that the terminal ownership data is verified ex-post by the tax authorities. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

Figure A.4: Difference-in-differences results in shareholdership:
Direct comparisons of haven and foreign non-haven ownership without using mean reversion correction technique



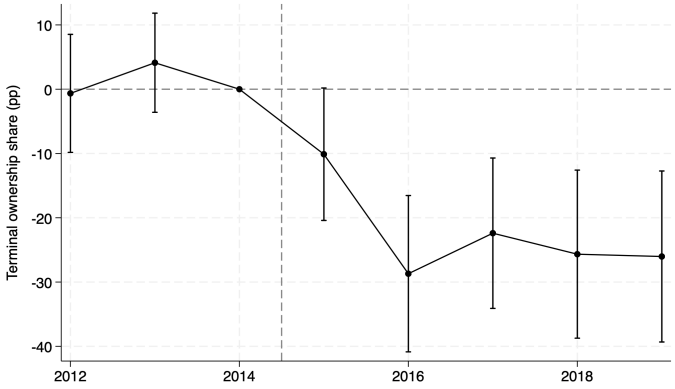
(a) Tax haven terminal ownership



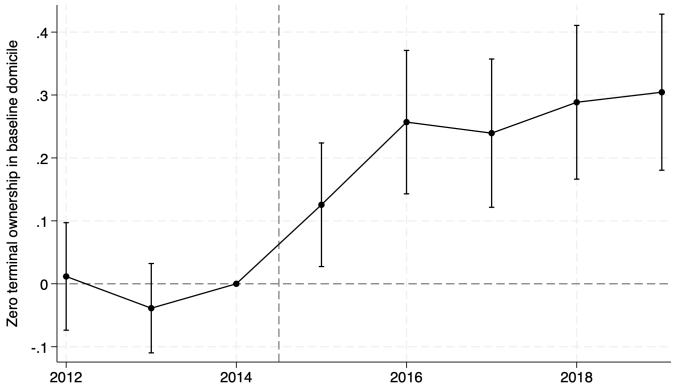
(b) Foreign non-haven terminal ownership

Note: These figures display difference-in-differences results that directly compare the relative changes in ownership domicile between the exposure and control groups. Panel (a) uses tax haven shareholdership as the dependent variable; Panel (b) uses foreign non-haven ownership as the dependent variable. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

Figure A.5: Difference-in-differences: terminal ownership in tax havens
Weighted by 2014 assets



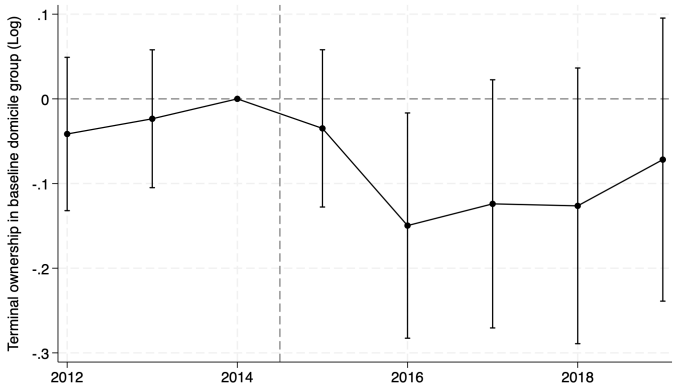
(a) Terminal ownership in baseline domicile



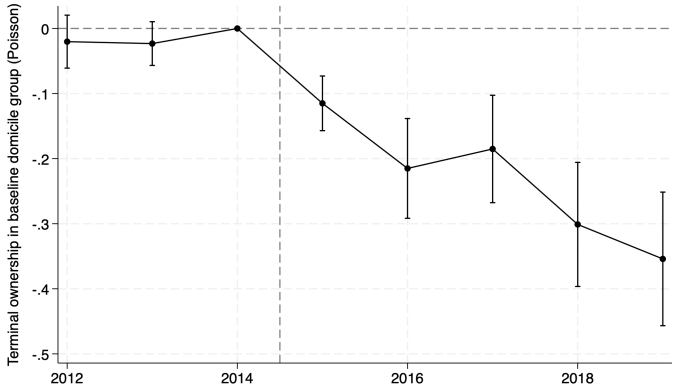
(b) Zero terminal ownership in baseline domicile

Note: These figures display difference-in-differences results for the change in terminal ownership in baseline domicile group between the exposure and control firms, featuring firm analytic weights for 2014 assets. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals use standard errors clustered on the firm-level.

Figure A.6: Difference-in-differences results in shareholdership: Additional parameterizations of prominent participation



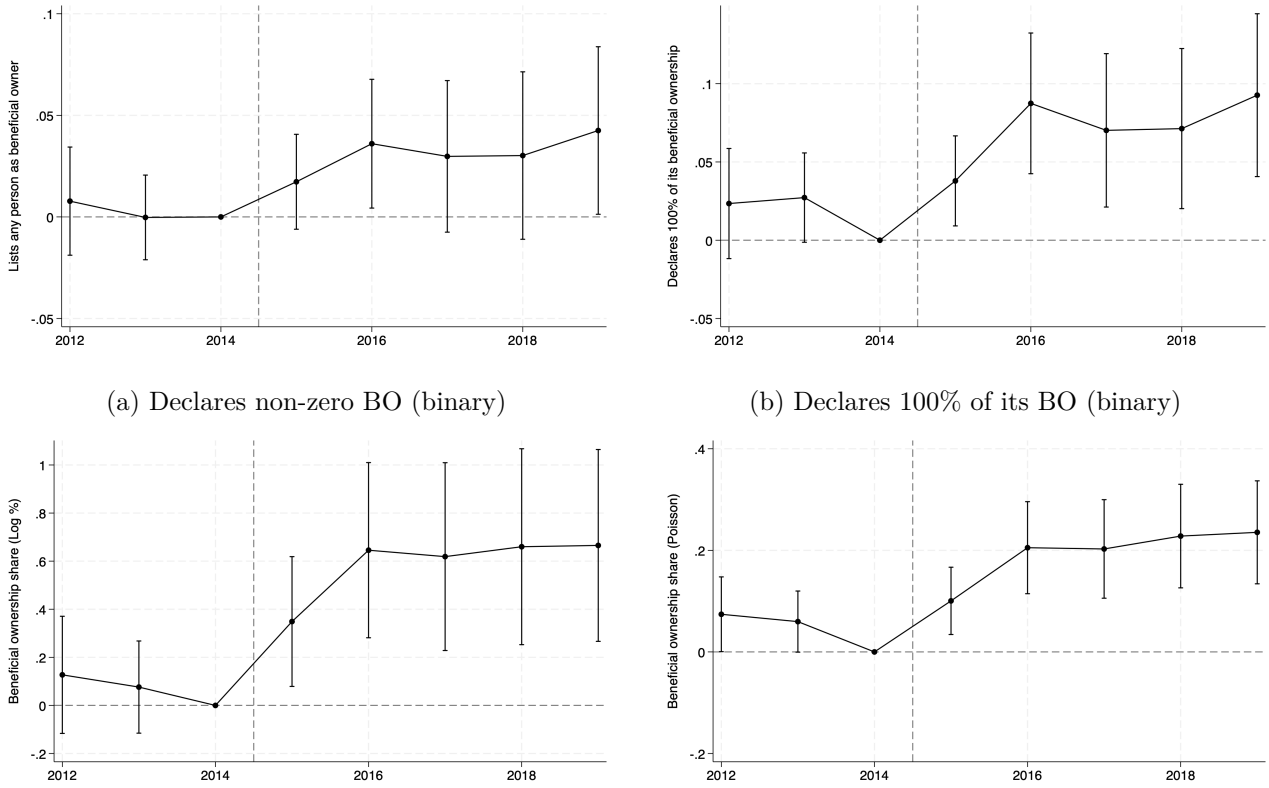
(a) Log



(b) Poisson

Note: These figures display difference-in-differences results for alternate parameterizations for the change in terminal ownership in baseline domicile group between the exposure and control firms in our main specification. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals use standard errors clustered on the firm-level.

Figure A.7: Additional results on beneficial ownership (BO)



(a) Declares non-zero BO (binary)

(b) Declares 100% of its BO (binary)

(c) Log BO

(d) BO (Poisson)

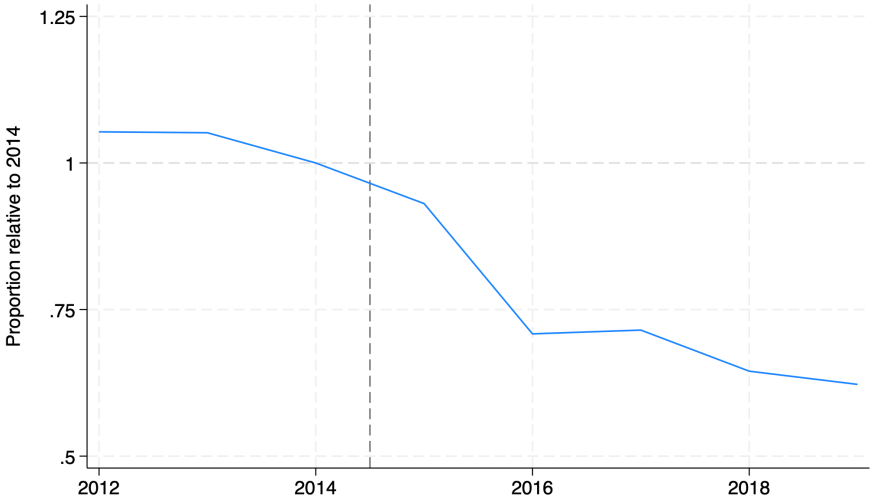
Note: These figures display the difference-in-differences results that estimate the change in beneficial ownership (BO) under different parameterizations. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

Table A.4: Panel balance and APS compliance

	Filed APS and active		Filed APS		Declared 100% of its nominal ownership		APS ownership residual	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exposure × Year ≥ 2015	0.00800	-0.0170	-0.0150	-0.00400	-0.0120	-0.0130	1.040	1.110
	(.016)	(.016)	(.011)	(.009)	(.008)	(.056)	(.51)	(3.28)
Constant	0.789	0.964	0.900	0.982	0.970	0.821	1.160	2.820
	(.001)	(.002)	(.001)	(.001)	(.001)	(.005)	(.048)	(.311)
TWFE	Y	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	Y	N	Y	N	Y	N	Y
N	31,512	31,296	31,512	31,296	28,315	28,176	28,315	28,176
Unique firms	3,939	3,912	3,939	3,912	3,925	3,898	3,925	3,898
Adjusted R2	0.408	0.306	0.321	0.250	0.337	0.553	0.192	0.200

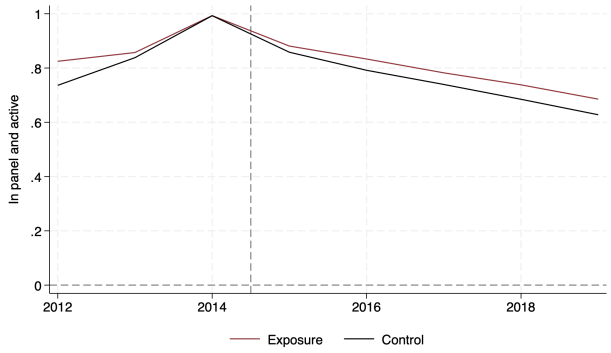
Note: this table displays results from a series of difference-in-differences regressions that evaluate the change in various compliance and panel balance measures between our main exposure and control groups. Parentheses contain standard errors clustered on the firm-level.

Figure A.8: Time series of aggregate ownership via tax havens

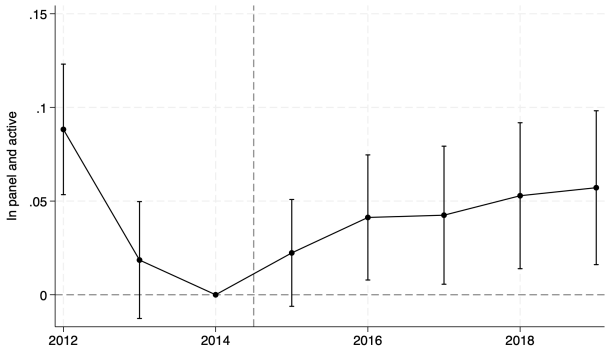


Note: this figure displays the timeseries evolution of counts of firms with either majority of positive minority terminal ownership in tax havens, relative to 2014.

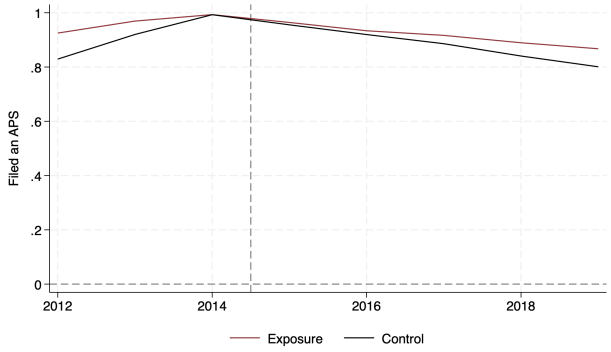
Figure A.9: Panel balance and filing an APS compliance



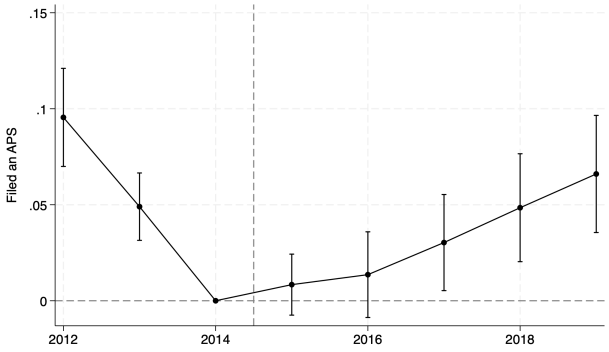
(a) Active in panel (time series)



(b) Active in panel (DD)



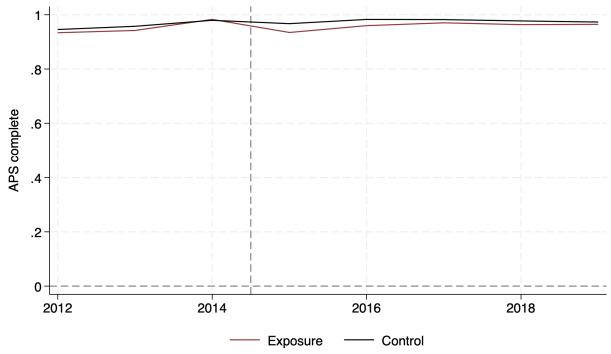
(c) Filed an APS (time series)



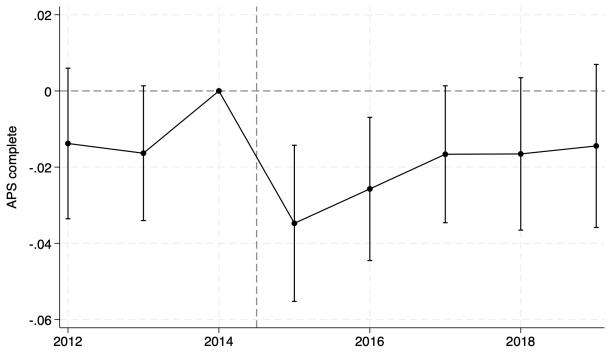
(d) Filed an APS (DD)

Note: These figures display time series averages and difference-in-differences estimates for changes in various measures of panel balance between our main exposure and control groups. "Active in panel" corresponds with an indicator for whether a firm both filed an APS and an F101 business income tax declaration with positive revenue in a given year. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

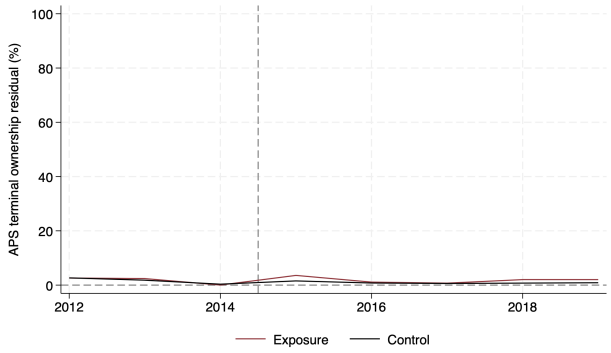
Figure A.10: Incomplete APS and APS ownership residual,
(Conditional on filing)



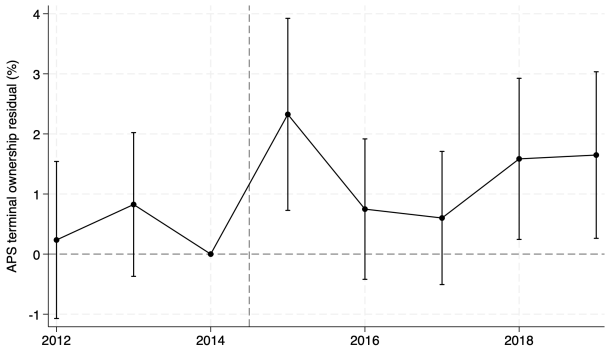
(a) Filed a complete APS conditional on filing (time series)



(b) Filed a complete APS conditional on filing (DD)



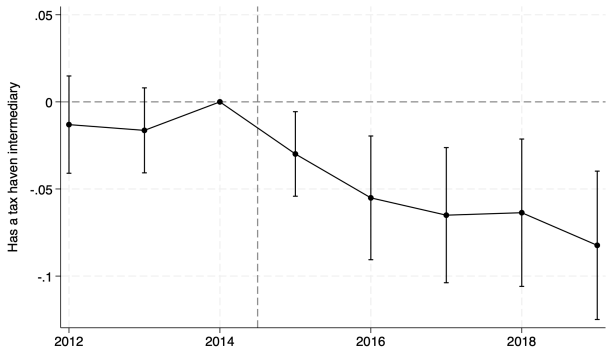
(c) APS ownership residual (time series)



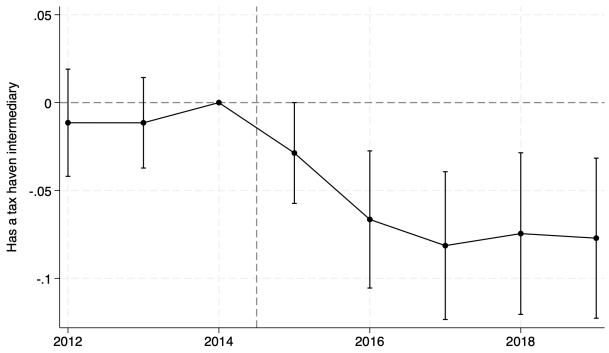
(d) APS ownership residual (DD)

Note: These figures display time series averages and difference-in-differences estimates for changes in additional measures of compliance with ownership reporting standards between our main exposure and control groups. "APS ownership residual" is calculated as 100 minus the total reported terminal ownership for a firm-year. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

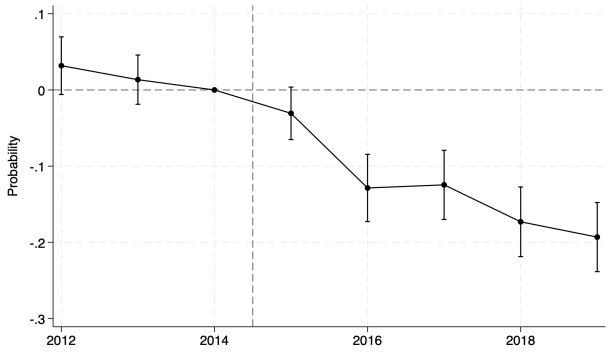
Figure A.11: Difference-in-differences:
Tax reform impact on intermediate and final ownership structure



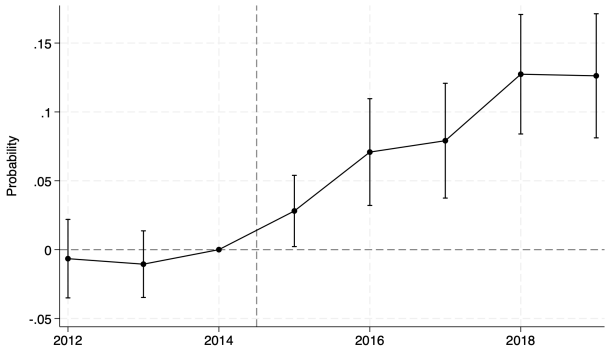
(a) Has an at-least partially-owned haven intermediary



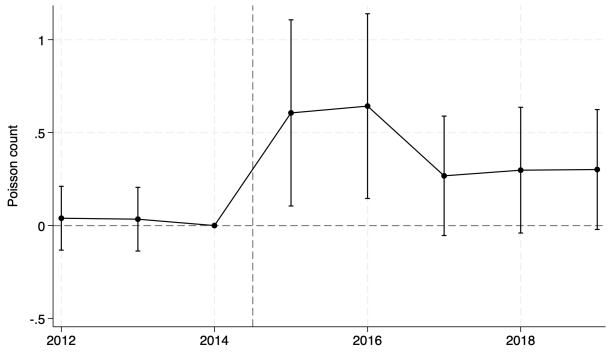
(b) Has a majority-owned haven intermediary



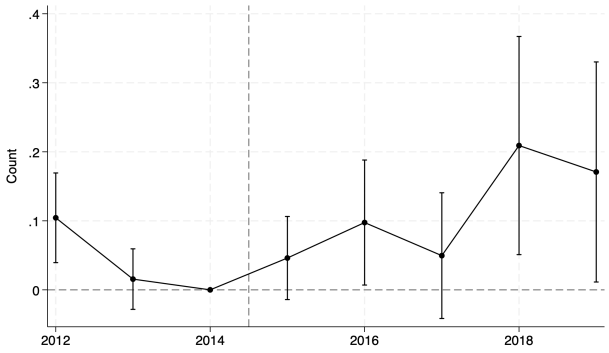
(c) Has its 2014 baseline group plurality shareholder



(d) Has an at-least partially-owned non-haven intermediary



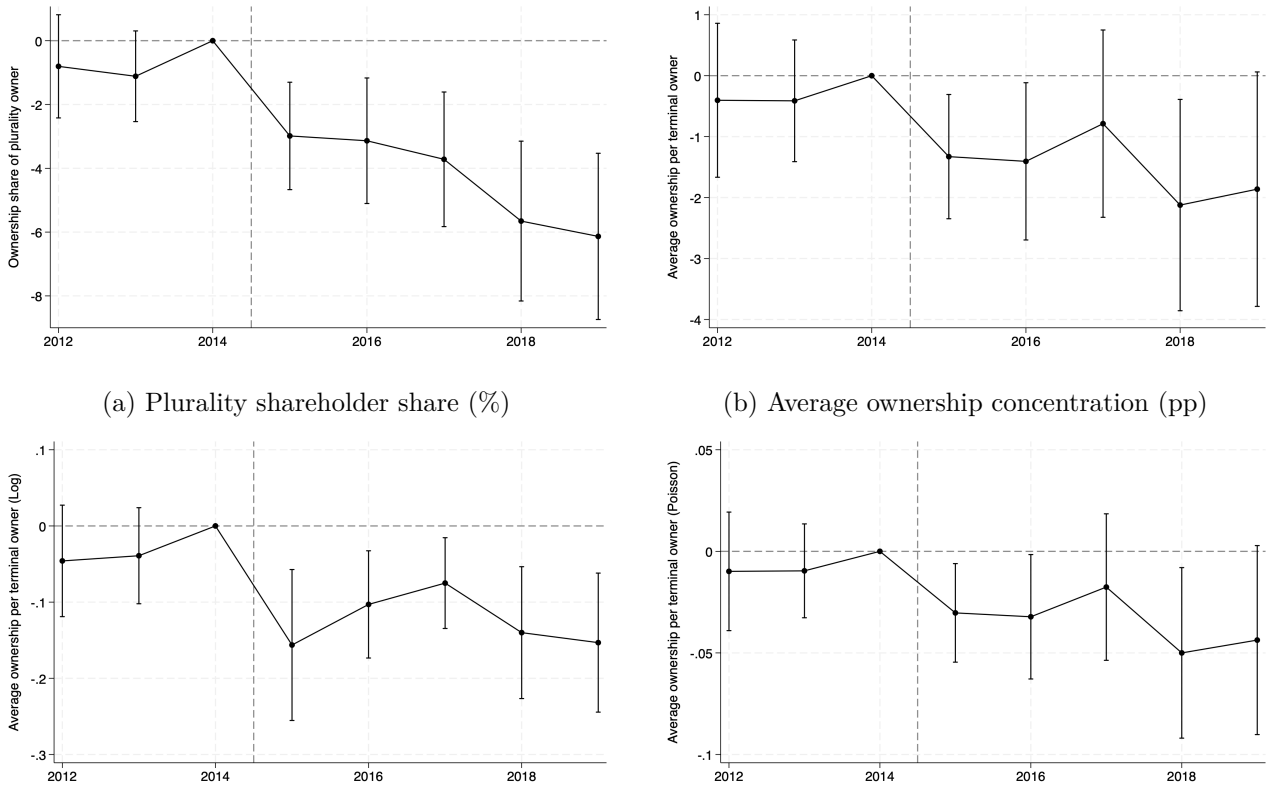
(e) Number of terminal owners (Poisson)



(f) Average ownership chain length

Note: These figures display the difference-in-differences results that estimate the change in intermediate ownership and overall ownership structure following the 2015 reform imposing a higher corporate tax rate on tax haven terminally owned firms. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals use standard errors clustered on the firm-level.

Figure A.12: Results on ownership concentration



(a) Plurality shareholder share (%)

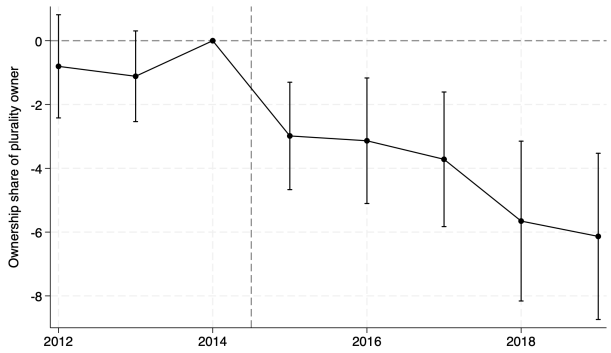
(b) Average ownership concentration (pp)

(c) Average ownership concentration (Log)

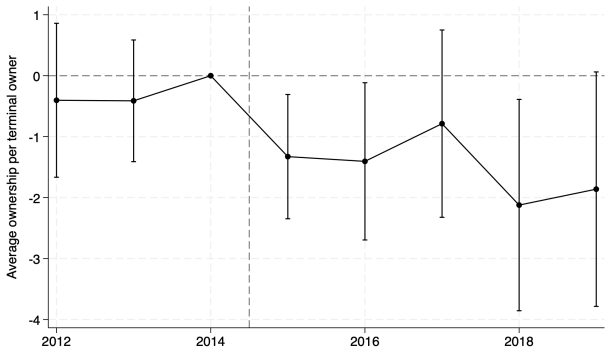
(d) Average ownership concentration (Poisson)

Note: These figures display difference-in-differences coefficients for alternate parameterizations of terminal ownership concentration. Average ownership concentration is defined on the firm-year level as 100 divided by the number of observed terminal owners. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

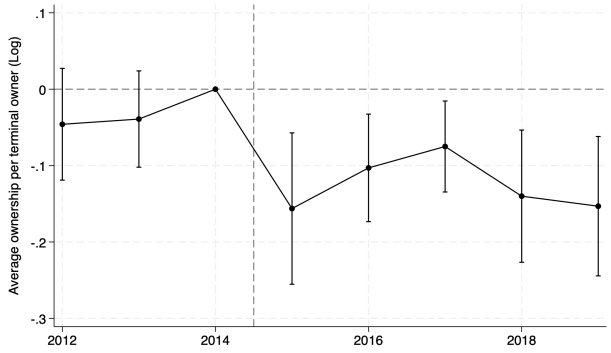
Figure A.13: Results on ownership concentration



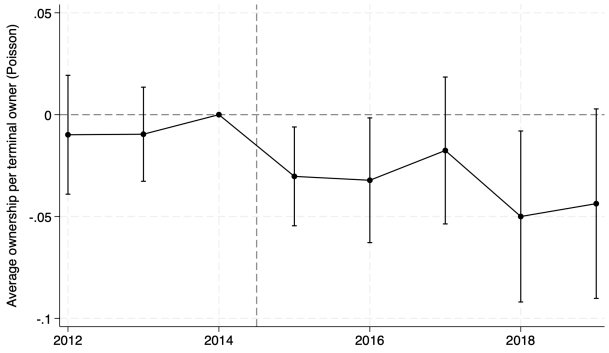
(a) Plurality shareholder share (%)



(b) Average ownership concentration (pp)



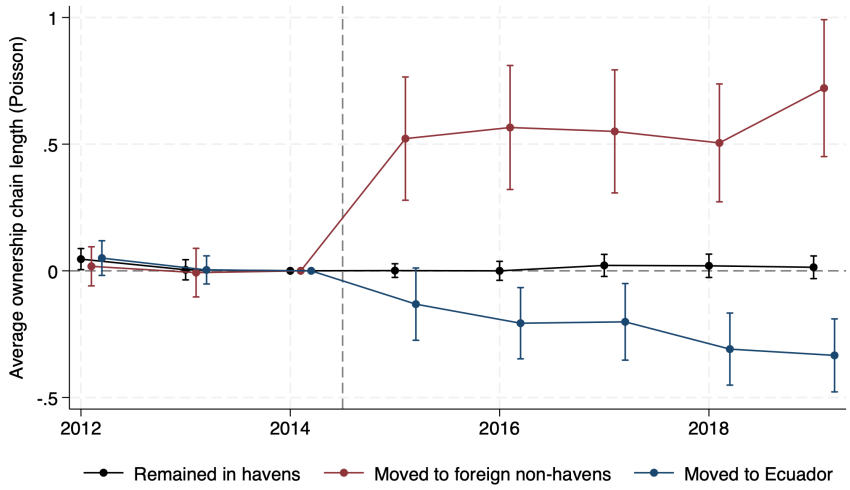
(c) Average ownership concentration (Log)



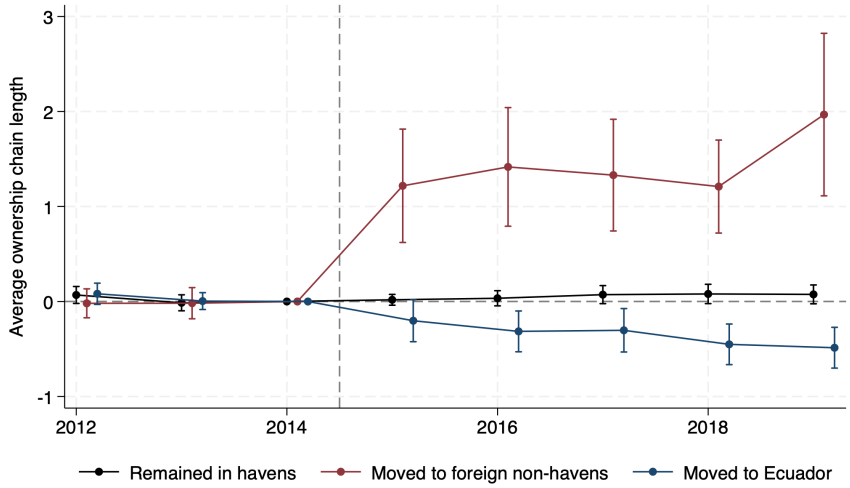
(d) Average ownership concentration (Poisson)

Note: These figures display difference-in-differences coefficients for alternate parameterizations of terminal ownership concentration. Average ownership concentration is defined on the firm-year level as 100 divided by the number of observed terminal owners. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

Figure A.14: Difference-in-differences:
Average ownership chain length, by ex-post response in terminal owner domicile group



(a) Poisson



(b) Levels

Note: These figures display difference-in-differences estimates following Equation (4), using a multi-level treatment that compares different subsets of exposed firms against all control firms. Subsets of control firms are defined ex-post based on having reallocated majority terminal ownership between 2015 and 2019 to (in red) foreign non-havens, (in navy) Ecuador, or (in black) maintained in tax havens. In both panels, the dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

Table A.5: Difference-in-differences: additional mechanisms of ownership change

	Number of terminal owners (Poisson)		Log average terminal ownership concentration		Ownership share of plurality terminal owner		Average ownership chain length
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Exposure × Post	0.418	0.0440	-0.0980	-0.299	-3.630	-9.880	0.0740
	(.176)	(.122)	(.034)	(.236)	(.871)	(3.63)	(.046)
Constant	3.890	5.660	3.500	2.360	69.60	68.70	1.650
	(.013)	(.001)	(.003)	(.022)	(.082)	(.344)	(.004)
TWFE	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	Y	N	Y	N	Y	N
N	28,362	-	28,278	28,135	28,280	28,137	28,278
Unique firms	3,928	3,902	3,928	3,901	3,928	3,901	3,928
Adjusted R2	0.870	0.947	0.662	0.725	0.738	0.644	0.719

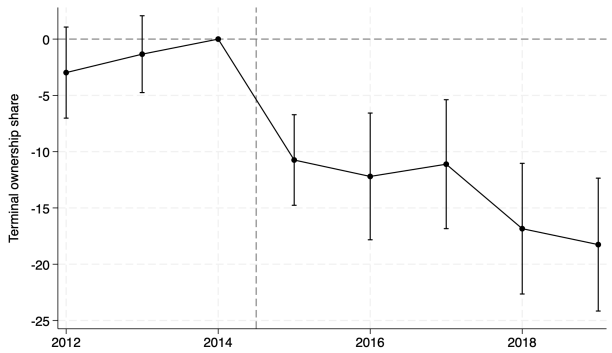
Note: This table summarizes the impacts of the reform on additional ownership characteristics following our our main difference-in-differences specification. Average terminal ownership concentration is calculated as 100 divided by the number of terminal owners. Average ownership chain length is calculated as the average number of ownership layers separating a firm and each of its terminal owners in a given year, weighted by the ownership share of each respective terminal owner. Column (7) omits a weighted specification due to a persistent differential pre-trend. Poisson specifications use frequency weights instead of analytic weights. Standard errors are clustered on the firm-level.

Table A.6: Modified AR1 tests of mean reversion by sample definition: Placebo groups set in 2013

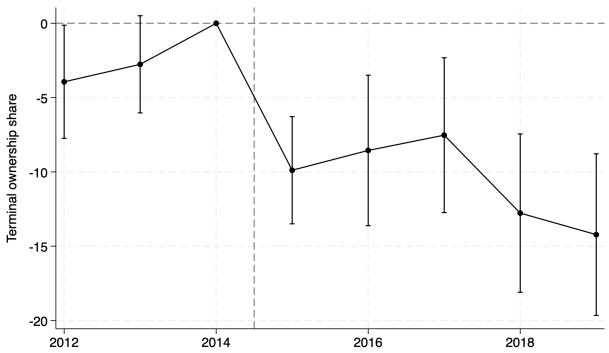
	Main definition	Caribbean havens v. Colombia	All havens v. Colombia	All havens v. Latin American non-havens
	(1)	(2)	(3)	(4)
$y_{i,t-1} \times Haven_{i,2013}$	-0.182	-0.169	-0.144	-0.212
	(.0331)	(.112)	(.105)	(.107)
N	55,322	1,010	1,151	1,819
Adjusted R2	0.686	0.711	0.711	0.655

Note: This table summarizes presents the results of regressions of the form: $y_{it} = \alpha + \xi Haven_{i,2013} + \beta y_{i,t-1} + \gamma\beta y_{i,t-1} Haven_{i,2013} + u_{it}$. In this exercise, we restrict observations to years 2013 and 2014 and construct "Placebo" exposure groups based on firms' 2013 ownership profile according to the geography definition given in the respective column. For brevity, only coefficients $\hat{\beta}$ are presented. Parentheses contain heteroskedasticity-robust standard errors.

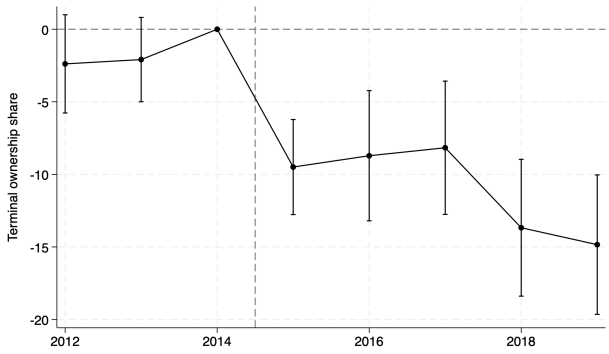
Figure A.15: Difference-in-differences: Terminal ownership in baseline domicile
Robustness by sample definition



(a) Caribbean havens v. Colombia



(b) All havens v. Colombia



(c) All havens v. Latin American non-havens

Note: These figures display the difference-in-differences coefficients estimating the change in terminal ownership in firms' baseline domicile groups. Each panel uses a different definition of tax haven and foreign non-haven to define the exposure and control groups as indicated by its label. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

Table A.7: Placebo test for contamination of control group:
Terminal ownership in foreign non-havens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\mathbb{1}\{Haven\ outflows_{i,2014} > 0\} \times$ Post	8.670							
	(1.67)							
Below median positive $\frac{Haven\ outflows_{i,2014}}{Revenue_{i,2014}} \times$ Post		6.670						
		(2.29)						
Above median positive $\frac{Haven\ outflows_{i,2014}}{Revenue_{i,2014}} \times$ Post		10.80						
		(2.22)						
$\mathbb{1}\{Haven\ inflows_{i,2014} > 0\} \times$Post			-0.392					
			(4.63)					
Below median positive $\frac{Haven\ inflows_{i,2014}}{Revenue_{i,2014}} \times$ Post				9.990				
				(5.71)				
Above median positive $\frac{Haven\ inflows_{i,2014}}{Revenue_{i,2014}} \times$ Post				-10.90				
				(6.66)				
Had a wholly-owned haven intermediary in 2014 × Post						11.70	12	
						(3.23)	(3.23)	
Had a $\geq$ 50% haven intermediary in 2014 × Post							1.150	
							(2.53)	
Had a $\geq$ 10% haven intermediary in 2014 × Post							17.70	
							(4.12)	
Had any haven intermediary in 2014 × Post					8.130			
					(1.9)			
ICIJ × Post								-2.180
								(6.64)
Constant	68.50	68.50	69.40	69.40	68.80	69	68.90	69.40
	(.165)	(.164)	(.053)	(.05)	(.125)	(.089)	(.119)	(.038)
TWFE	Y	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	N	N	N	N	N	N	N
N	23,970	23,970	23,970	23,970	23,970	23,970	23,970	23,970
Unique firms	3,340	3,340	3,340	3,340	3,340	3,340	3,340	3,340
Adjusted R2	0.513	0.513	0.511	0.511	0.512	0.512	0.513	0.511

Note: This table summarizes a series of difference-in-differences regressions studying sources of potential exposure of our control group of firms to the reform. All of the regressions only consider control firms, using terminal ownership in foreign non-havens as the dependent variable. Each column corresponds with a different difference-in-differences regression that relative to an omitted reference group, as indicated by the complement of each column's populated rows. For brevity, only the difference-in-differences coefficients are displayed. Standard errors are clustered on the firm-level. This table is referred to in Section 5.3.

Table A.8: Difference-in-differences:
Terminal ownership responses along margins of ex-ante heterogeneity

	(1)	(2)	(3)	(4)
Exposure × Zero haven outflows (2014) × Post	-14			
	(2.07)			
Exposure × Positive outflows (2014) × Post	-6.680			
	(3.46)			
Exposure × Zero profit (2014) × Post		-13.10		
		(3.44)		
Exposure × Positive profit (2014) × Post		-12		
		(2.09)		
Exposure × Post			-28.30	-12.30
			(2.59)	(1.84)
+1pp BO (2014) × Post			-0.164	
			(.013)	
Exposure × +1pp BO (2014) × Post			0.276	
			(.039)	
ICIJ × Post				-2.190
				(6.64)
Exposure × ICIJ × Post				0.248
				(12.7)
Constant	69.60	80.60	76.60	69.70
	(.172)	(.36)	(.58)	(.177)
TWFE	Y	Y	Y	Y
Regression specification	Multi-level treatment	Multi-level treatment	DDD	DDD
N	28,362	28,368	28,362	28,362
Unique firms	3,928	3,929	3,928	3,928
Adjusted R2	0.504	0.456	0.511	0.503

Note: This table summarizes the estimates from a series of regressions summarizing heterogeneous treatment effects of the reform based on different margins of ex-ante heterogeneity. Each column corresponds with a different regression. Standard errors are clustered on the firm-level. This table is referred to in Section 5.4.

Table A.9: Difference-in-differences for continuous exposure:
The effect of the pecuniary surcharge on terminal ownership in baseline domicile group:
Minority exposure firms

	Levels		Binary		Poisson		Log	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Projected tax surcharge × Post	-3.180		0.0310		-0.0930		-0.294	
	(2)		(.039)		(.089)		(.077)	
Projected tax surcharge × Ex-post verified × Post		-12.20		-0.239		-0.577		-0.298
		(5.39)		(.099)		(.403)		(.282)
Constant	20.70	24	0.695	0.890	3.310	3.440	3.140	3.110
	(.14)	(.349)	(.003)	(.007)	(.006)	(.016)	(.004)	(.012)
TWFE	Y	Y	Y	Y	Y	Y	Y	Y
N	10,110	10,104	10,110	10,104	10,110	10,104	7,000	6,992
Unique firms	1,377	1,376	1,377	1,376	1,377	1,376	1,329	1,328
Adjusted R2	0.471	0.455	0.453	0.355	0.426	0.414	0.564	0.560

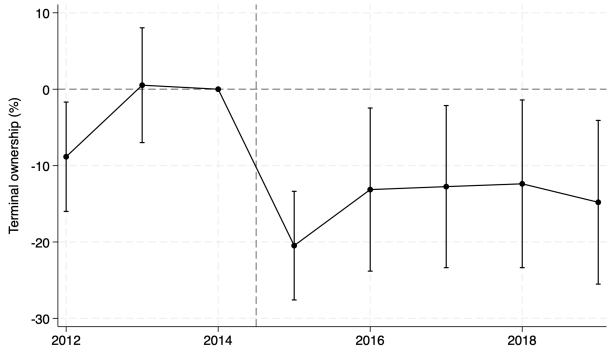
Note: This table presents estimated of the model $y_{it} = \alpha_i + \delta_t + \gamma \cdot PredictedSurcharge_i Post_t + \varepsilon_{it}$. The dependent variable in all specifications consists of different parameterizations of terminal ownership in baseline domicile group (tax haven terminal ownership for exposure firms and foreign non-haven terminal ownership for control firms). The estimation sample here consists of only minority exposure and control firms in our core sample. The even-numbered columns feature an additional interaction indicating whether firms' tax haven presence was ex-post verified by the tax authorities, which we argue indicated a more credible administration of the surcharge. Other coefficients are omitted for legibility. Standard errors are clustered on the firm-level.

Table A.10: Difference-in-differences: profit breakdown

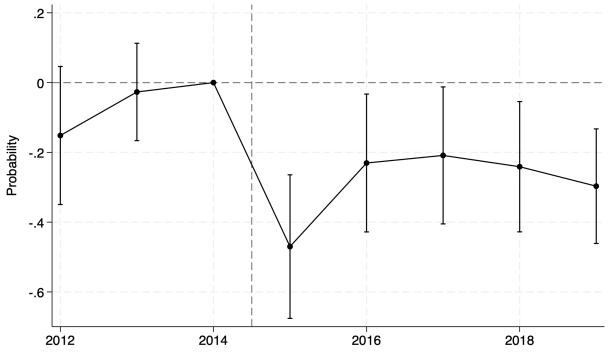
	Revenue		Expenses		Profitability	
	Levels	Log	Levels	Log	$\frac{Profit_{it}}{Revenue_{it}}$	$\frac{Profit_{it}}{Assets_{it}}$
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure × Year ≥ 2015	328,542	0.0110	292,004	-0.00400	0.0140	0.0190
	(240,521)	(.07)	(220,056)	(.066)	(.006)	(.004)
Constant	5,434,402	12.90	5,086,320	12.80	0.0970	0.0850
	(22,734)	(.006)	(20,800)	(.006)	(.001)	(0)
TWFE	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	N	N	N	N	N
N	28,364	25,047	28,364	26,265	25,047	27,630
Unique firms	3,926	3,844	3,926	3,886	3,844	3,908
Adjusted R2	0.943	0.758	0.942	0.803	0.534	0.382

Note: This table summarizes the difference-in-differences results pertaining to revenues and expenses. Differences in sample size across columns are due to presence of zeros in dependent variables in log specifications. Standard errors are clustered on the firm-level.

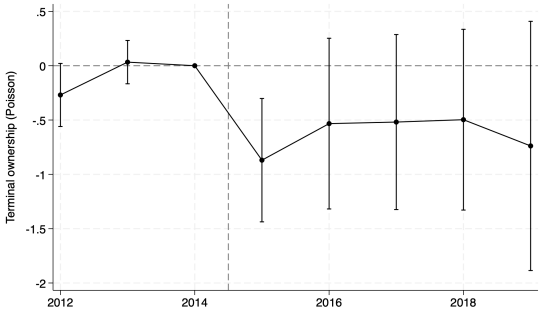
Figure A.16: Difference-in-differences for continuous exposure:
The effect of the pecuniary surcharge on terminal ownership in baseline domicile group:
Minority exposure firms



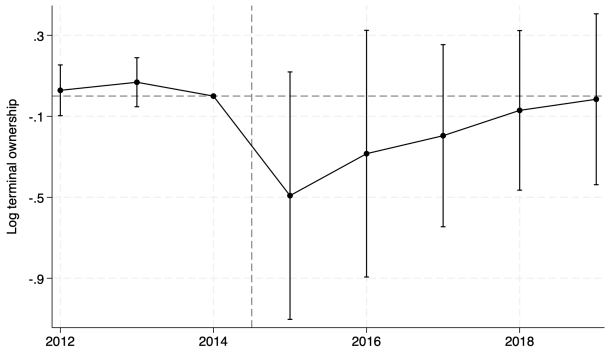
(a) Levels terminal ownership
in baseline domicile



(b) Any terminal ownership
in baseline domicile



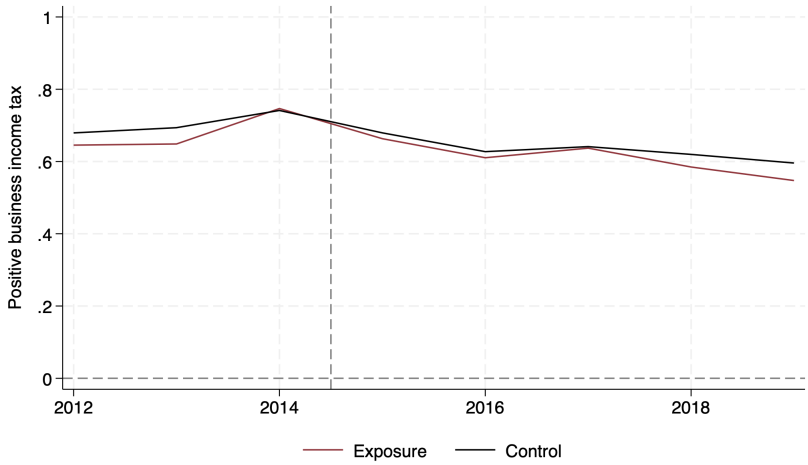
(c) Terminal ownership
in baseline domicile (Poisson)



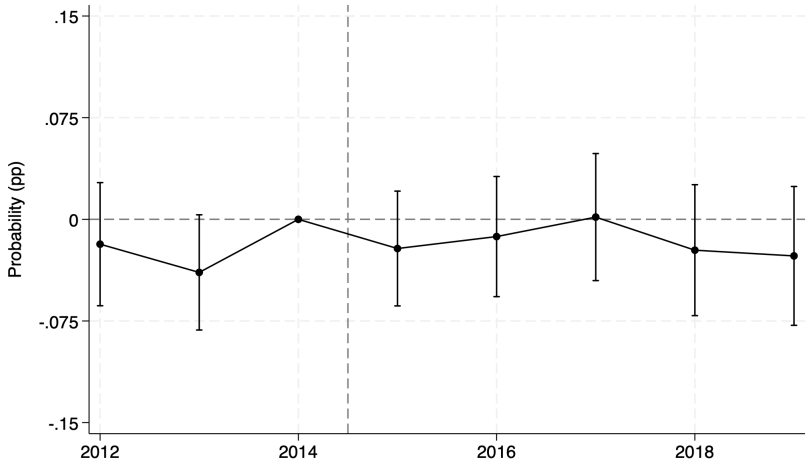
(d) Terminal ownership
in baseline domicile (log)

Note: this figure presents different parameterizations of the change in terminal group ownership as estimated by the continuous difference-in-differences equation $y_{it} = \alpha_i + \delta_t + \gamma \cdot PredictedSurcharge_i Post_t + \varepsilon_{it}$. The dependent variable in all specifications consists of different parameterizations of terminal ownership in baseline domicile group (tax haven terminal ownership for exposure firms and foreign non-haven terminal ownership for control firms). The sample in all plots consists only of foreign minority-owned exposure and control firms. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals use standard errors clustered on the firm-level.

Figure A.17: Positive CIT payment (extensive margin)



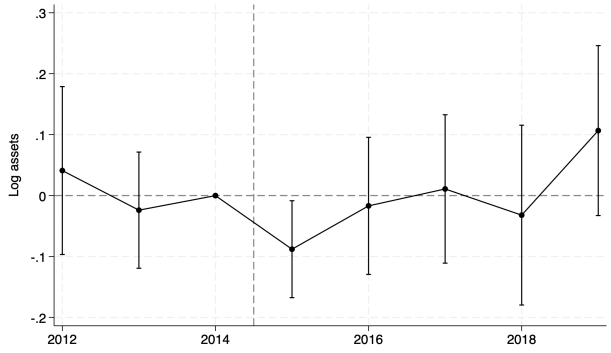
(a) Positive CIT liability (time series)



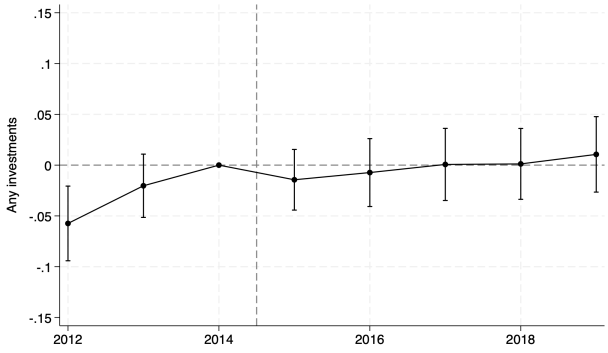
(b) Positive CIT liability (DD)

Note: These figures display difference-in-differences results that illustrate components of the "bindingness" of the CIT surcharge among firms that maintain majority shareholdership in tax havens and pay corporate income tax. Panel (a) uses exposure firms with positive CIT obligation in the exposure group; Panel (b) uses exposure firms with positive CIT and majority tax haven shareholdership in 2015 in the exposure group. Panel (c) uses a binary variable for whether firms pay corporate income tax as the dependent variable. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

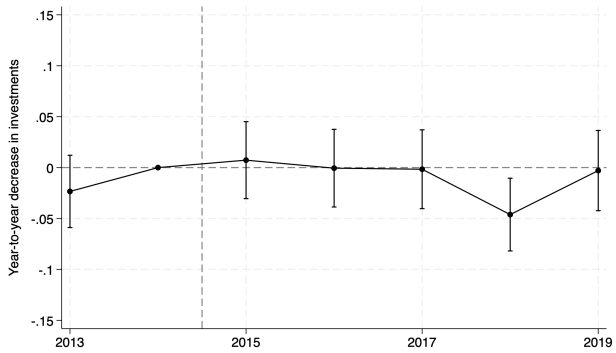
Figure A.18: Tax reform impact on firm financial activity



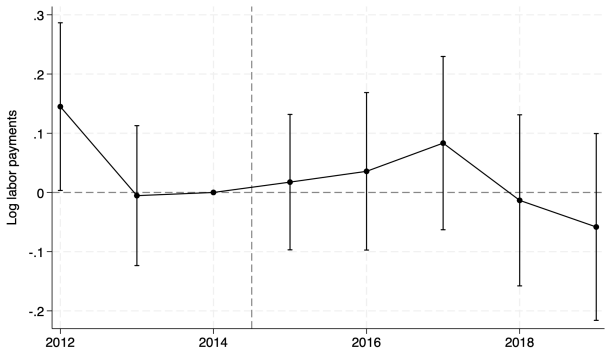
(a) Total assets



(b) Any new investments



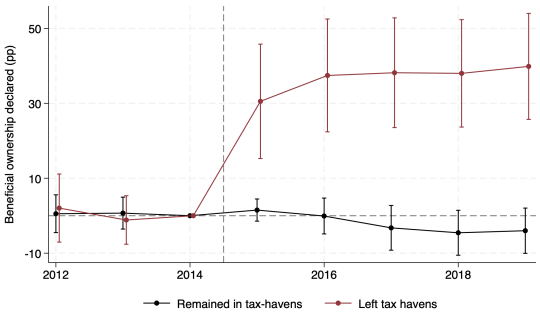
(c) Any year-to-year decrease in investments



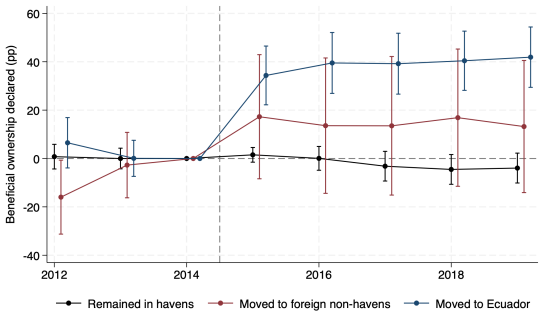
(d) Labor expense

Note: These figures display difference-in-differences results pertaining to revenue-generating expenses. Panel (c) begins in 2013 because the dependent variable takes year-to-year first differences. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals are constructed using standard errors clustered on the firm-level.

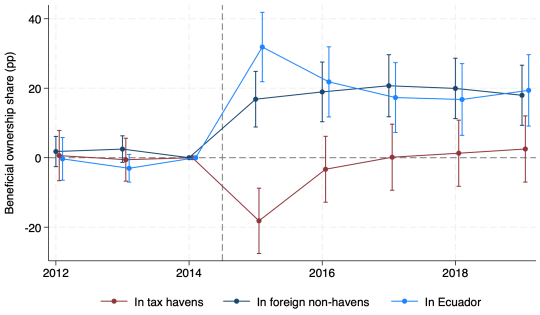
Figure A.19: Breakdown of beneficial ownership (BO) response



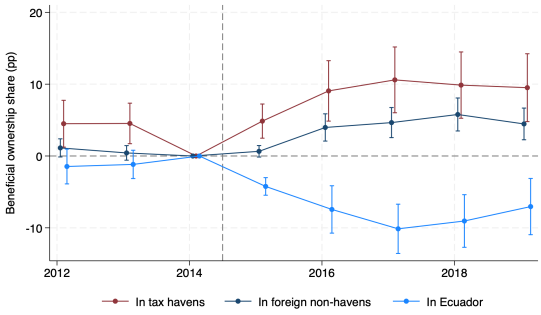
(a) BO revealed, by having left havens



(b) BO revealed, by ex-post domicile



(a) BO by country type
Among firms exiting haven ownership (pp)



(b) BO by country type
Among firms remaining in haven ownership (pp)

Note: These figures display for a series of difference-in-differences designs that evaluate the change in beneficial ownership declared (and the domicile of beneficial ownership) conditional on firms' ex-post majority domicile of terminal ownership. In all specifications, firms exposure firms are defined to a category based on the domicile of their 2015 terminal ownership and compared against all majority foreign control firms. The dashed gray vertical line marks the implementation of the CIT surcharge. Confidence intervals use standard errors clustered on the firm-level.

Table A.11: IV results: impact of business taxation on firm activity

Panel (a) First stage

	τ		$\ln \tau$		$\ln(1-\tau)$	
	(1)	(2)	(3)	(4)	(5)	(6)
Predicted surcharge × Post	.0044	-.0002	.0184	-.0008	-.0058	.0002
	(.0003)	(.0004)	(.0012)	(.0017)	(.0004)	(.0005)
Predicted surcharge × Ex-post verification × Post		.009		.0378		-.0118
		(.0005)		(.002)		(.0006)
TWFE	Y	Y	Y	Y	Y	Y
F-statistic	118	317	114	339	118	309
N	18,256	18,256	18,249	18,249	18,256	18,256
Unique firms	3,314	3,314	3,313	3,313	3,314	3,314
Adjusted R2	.377	.407	.369	.399	.386	.418

Panel (b): IV results

	Log CIT payments			Log gross profit		Log investment		Log assets		Log labor payments	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
τ	9.09										
	(3.68)										
$\ln \tau$		2.19		1.24		2.1		-.262		-1.44	
		(.881)		(.92)		(3.17)		(.451)		(.671)	
$\ln(1-\tau)$			-6.9		-4.02		-6.47		.839		4.59
			(2.8)		(2.93)		(9.74)		(1.44)		(2.13)
TWFE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Weight (2014 assets)	N	N	N	N	N	N	N	N	N	N	N
N	18,249	18,249	18,249	16,934	16,939	2,657	2,657	18,185	18,191	16,480	16,485
Unique firms	3,313	3,313	3,313	3,202	3,202	675	675	3,300	3,301	3,041	3,042

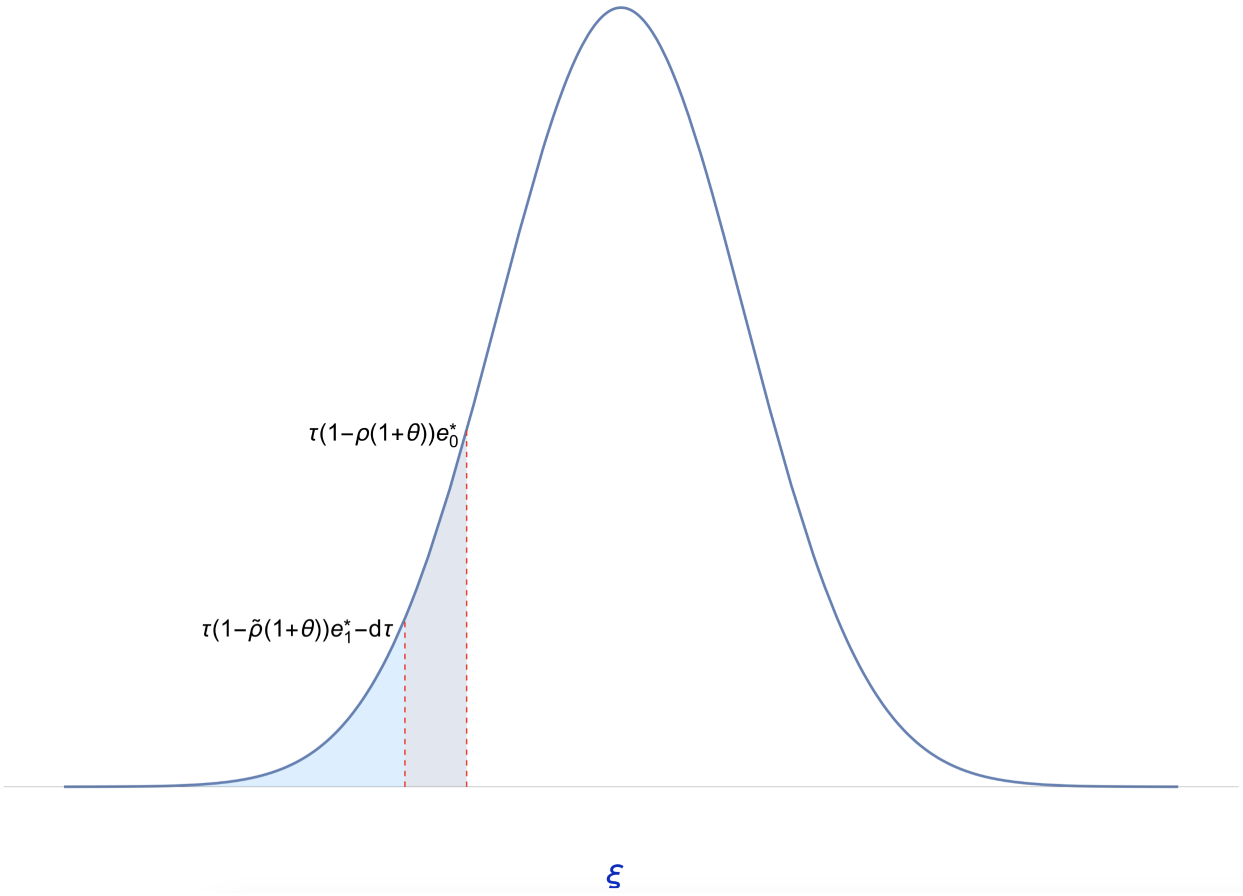
Note: This table presents IV difference-in-differences results. Panel (a) presents first stage results, where odd columns use the interaction of predicted surcharge and a post-reform indicator as the instrument, and even columns also include an interaction for ex-post verification of terminal ownership in tax havens. All of the IV difference-in-differences results in Panel (b) use this latter specification. Standard errors are clustered on the firm-ID level.

Table A.12: Descriptive statistics of firms by ex-post majority ownership domicile (2014)

	Remained in havens	Majority in foreign non-havens		Majority in Ecuador		Other	
	Mean	Mean	Difference	Mean	Difference	Mean	Difference
Log assets	13.9	14.6	.688	12.7	-1.15	14.5	.573
			(.298)		(.301)		(.41)
Log revenue	12.7	13.9	1.24	12	-.721	13.9	1.2
			(.408)		(.306)		(.699)
Labor share of costs	.248	.171	-.077	.27	.0218	.183	-.0652
			(.029)		(.0301)		(.0444)
Log gross profit	10.3	11.1	.777	9.96	-.383	11.7	1.33
			(.432)		(.344)		(.488)
Log CIT liability	8.95	9.54	.588	8.3	-.657	10.3	1.38
			(.423)		(.304)		(.47)
CIT liability (1000s USD)	130	105	-24.5	19.3	-110	129	-.215
			(57)		(35.8)		(85)
Any outflow to havens	.245	.32	.0747	.12	-.126	.227	-.018
			(.0692)		(.0398)		(.0918)
Ratio of haven outflows to revenue	.049	.0407	-.00827	.012	-.0369	.0412	-.00777
			(.0225)		(.0103)		(.027)
Number of firms	424	50		92		22	

Note: This table reports 2014 descriptive statistics for firms based on their 2015 ex-post terminal ownership domicile response. "Remained in havens", "Majority in foreign non-havens", and "Majority in Ecuador" indicate treatment firms with a majority of its terminal ownership attributable to each respective domicile group in 2015. Because these categories do not partition the space of ownership, 22 exposure firms are in a non-allocable "Other" category. "Difference" columns estimate the difference in 2014 of each respective group and variable relative to firms that remained in havens, with heteroskedasticity-robust standard errors in parentheses.

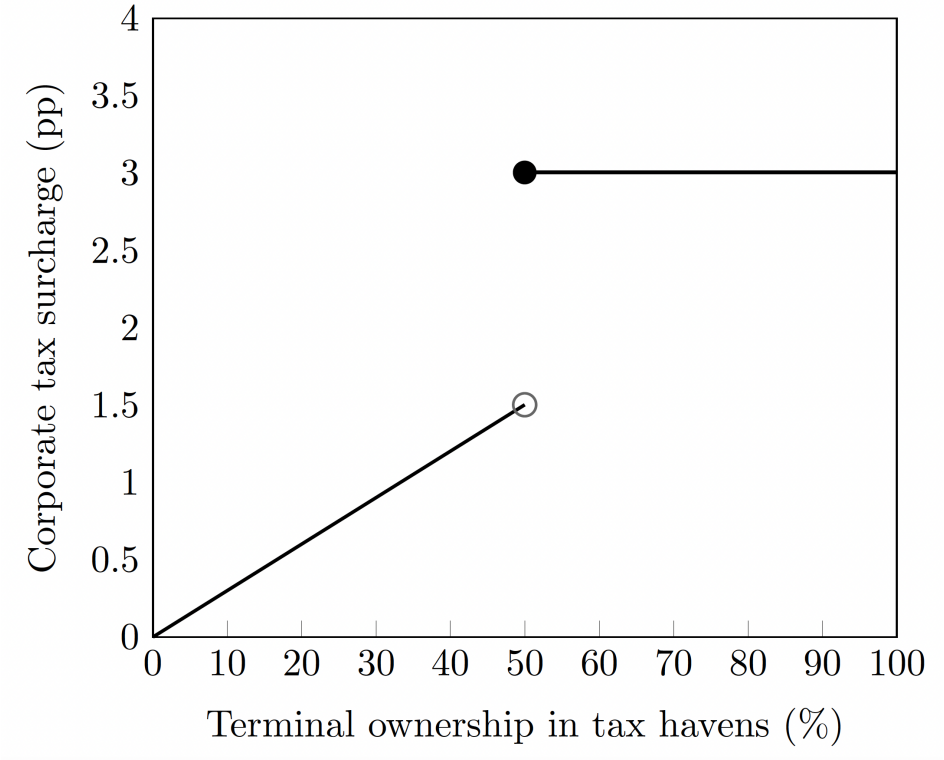
Figure A.20: Cutoff points for haven usage based on fixed costs ξ



Note: This figure shows a conceptual illustration for an arbitrary distribution of fixed costs of tax haven usage ξ. In the baseline scenario, for an interior optimum underreporting share e^* and induced audit rate $\rho(e^*)$, all individuals with fixed costs less than $\tau(1-\rho(1+\theta))e^*$ make use of tax havens. In the case corresponding with the policy, individuals with fixed costs in the region less than the baseline upper bound and greater than $\tau(1-\tilde{\rho}(1+\theta))e^* - d\tau$ (corresponding with the shaded darker blue region), are induced to exit tax haven usage, where all individuals with fixed costs less than this latter amount (in the shaded light blue region) maintain their tax haven usage.

Appendix B Data and environmental appendix

Figure B.1: CIT surcharge as a function of tax haven ownership



Note: This figure displays the statutory CIT surcharge based on terminal ownership attributable to tax havens.

Table B.1: Descriptive statistics and ownership of Ecuadorian Firms (2014)

	Mean	SD	p10	Median	p90	p99	Count	N
Firm Characteristics:								
Revenue (1000s USD)	1,929,413	16,843,744	4,300	137,447	2,361,029	30,412,296	62,350	62,350
Log revenue	11.6	2.68	8.37	11.8	14.7	17.2	62,350	62,350
Log taxable profit	8.98	2.56	5.63	9.16	12	14.8	48,065	62,350
Has taxable profit revenue	.771						62,350	62,350
CIT liability (1000s USD)	29,311	622,357	0	834	25,154	424,830	62,350	62,350
Log CIT liability	7.46	2.55	4.11	7.65	10.5	13.3	48,060	62,350
CIT rate	.22	.00392	.22	.22	.22	.22	48,073	62,350
Log assets	11.6	2.42	8.27	11.7	14.5	17.2	61,354	62,350
Gross profit margin	.0927	.173	0	.0335	.231	.993	62,350	62,350
Labor share of costs	.312	.922	0	.223	.743	1	61,823	62,350
Terminal ownership:								
Ecuadorian person (%)	85.8	32.1	8.92	100	100	100	62,350	62,350
Foreign person (%)	3.65	16.8	0	0	0	100	62,350	62,350
Ecuadorian non-person entity (%)	6.42	22.1	0	0	6.25	100	62,350	62,350
Foreign non-person entity (%)	1.63	11.9	0	0	0	99	62,350	62,350
Residual (%)	1.4	11.1	0	0	0	90	61,619	62,350
Ownership characteristics:								
Ownership share of plurality owner	61.3	30.2	20	52	99.8	100	62,283	62,350
Average share of terminal owner	38.4	19.7	8.33	50	50	100	62,283	62,350
Number of terminal owners	8.99	392	2	2	10	78	62,350	62,350
Avg. ult. shareholder chain	1.05	.347	1	1	1	2.98	62,283	62,350
Ownership reporting compliance:								
Filed APS	.988						62,350	62,350
Declared 100% nominal ownership	.967						61,619	62,350
Declared any beneficial ownership	.96						62,350	62,350
Beneficial ownership declared (%)	89.8	27.7	50	100	100	100	62,350	62,350
Declared 100% beneficial ownership	.829						62,350	62,350
Cross-border flows:								
Any outflow to havens	.0773						62,350	62,350
Ratio of haven outflows to revenue	.0198	1.46	0	0	0	.145	62,350	62,350
Any inflow from havens	.0097						62,350	62,350
Ratio of haven inflows to revenue	.0316	3.61	0	0	0	0	62,350	62,350
Any outflow to non-havens	.262						62,350	62,350
Ratio of non-haven outflows to revenue	29	4,608	0	0	.144	.87	62,350	62,350
Any inflow from non-havens	.122						62,350	62,350
Ratio of non-haven inflows to revenue	259	58,249	0	0	.00453	1.34	62,350	62,350

Note: This table displays descriptive statistics of firms in our core sample for 2014 from the form F101 business income tax declarations, the APS ownership data, and the MID cross-border flows data.

Table B.2: Covariate balance of active firms
based on whether they appear in the APS business ownership data

	Firms not present in the APS	Difference relative to main sample
Revenue (1000s USD)	2,115	186
		(1,086)
Log revenue	10.3	-1.28
		(.046)
Gross profit (1000s USD)	459	306
		(311)
Log gross profit	8.13	-.821
		(.068)
Log taxable profit	6.9	-2.08
		(.113)
Has taxable profit revenue	.071	-.7
		(.003)
CIT liability (1000s USD)	81.1	51.8
		(68.1)
Log CIT liability	5.54	-1.92
		(.106)
CIT rate	.217	-.003
		(.001)
Log assets	9.59	-1.97
		(.042)
Gross profit margin	.118	.025
		(.004)
Labor share of costs	.368	.056
		(.007)
Any outflow to havens	.142	-.105
		(.012)
Ratio of haven outflows to revenue	.001	-.004
Any outflow to non-havens	.526	-.312
		(.017)
Ratio of non-haven outflows to revenue	.009	-.041
		(.001)
Active firms never filing APS	14,830	
Core sample firms	62,350	

Note: This table displays results from a series of cross-sectional univariate regressions of 2014 firm business characteristics on an indicator for whether the firm is included in our core sample. Parentheses contain heteroskedasticity-robust standard errors. Firms in these cross-sectional regressions are deemed active in 2014 by having a business income tax declaration with non-zero revenue; firms within this group are further included in the core sample if they also have filed the APS at least once between 2012 and 2014.

Table B.3: Covariate balance of active firms
based on whether operate in an excluded industry

	Firms in excluded industries	Difference relative to main sample
Revenue (1000s USD)	1,252	-678
		(590)
Log revenue	10.3	-1.32
		(.031)
Gross profit (1000s USD)	278	125
		(170)
Log gross profit	8.12	-.839
		(.046)
Log taxable profit	6.85	-2.12
		(.077)
Has taxable profit revenue	.08	-.691
		(.002)
CIT liability (1000s USD)	50.7	21.4
		(37.2)
Log CIT liability	5.41	-2.06
		(.075)
CIT rate	.218	-.002
		(0)
Log assets	10.8	-.726
		(.03)
Filed APS in 2014	.392	-.596
		(.002)
APS adds to 100	.803	-.166
		(.003)
Beneficial ownership (BO) declared (%)	74.2	-15.7
		(.303)
100% of BO declared	.622	-.208
		(.004)
Ownership share of plurality owner (%)	50.9	-10.4
		(.312)
Avg. ult. shareholder chain	1.01	-.041
		(.002)
Any outflow to havens	.108	-.139
		(.008)
Ratio of haven outflows to revenue	.001	-.004
		(.000)
Any outflow to non-havens	.491	-.347
		(.012)
Ratio of non-haven outflows to revenue	.01	-.039
		(.001)
Firms excluded based on industry	27,234	
Core sample firms	62,350	

Note: This table displays summary statistics and results from a series of cross-sectional univariate regressions of 2014 firm business characteristics on an indicator for whether the firm operates in an industry exempt from the corporate income tax surcharge. Excluded industries include included in our core sample. Parentheses contain heteroskedasticity-robust standard errors.

Table B.4: Summary statistics for excluded industry firms by industry

Industry	N	Log revenue		Log gross profit		Log assets	
		Mean	SD	Mean	SD	Mean	SD
Entities with social mission	50	11.2	2.03	7.13	2.38	11.4	2.21
Trusts	3734	10.3	4.53	10.6	3.28	12.5	2.94
Investment funds	10	13.7	1.47	12.9	1.53	16.2	1.51
Non-profit entities	22681	10.2	2.73	7.73	2.87	10	2.8
International organizations	16	11.4	3.18	8.36	3.17	11.7	2.83
Petroleum industry	59	17.2	2.48	16.9	1.37	17.8	2.63
Public sector	665	11.8	3.43	10.2	3.77	12.7	3.98
Estates	19	11.5	2.3	9.87	1.72	12.9	1.07

Note: This table displays summary statistics for firms based on their specific industry excluded from the corporate income tax surcharge.

Table B.5: Covariate balance of core sample v. inactive firms

	Firms without revenue in 2014	Difference relative to main sample
Assets (1000s USD)	441	-1,513
		(229)
Log assets	8.5	-3.06
		(.017)
Liabilities (1000s USD)	126	-1,184
		(110)
Log liabilities	9.27	-1.66
		(.029)
Debt ratio	69.5	66.2
		(33.2)
Log taxable profit	4.91	-4.07
		(.594)
Has taxable profit revenue	0	-.771
		(.002)
Filed APS in 2014	.311	-.677
		(.001)
Filed APS in 2012-2014	.379	-.621
		(.001)
APS adds to 100	.941	-.028
		(.001)
Terminal ownership in havens (%)	.678	-.264
		(.048)
Beneficial ownership (BO) declared (%)	86.9	-3.03
		(.169)
100% of BO declared	.804	-.026
		(.002)
Avg. ult. shareholder chain	1.02	-.031
		(.002)
Any haven exit	.109	-.138
		(.007)
Any non-haven exit	.618	-.22
		(.011)
Inactive firms	58,248	
Core sample firms	62,350	

Note: This table displays summary statistics and results from a series of cross-sectional univariate regressions of 2014 firm business characteristics on an indicator for whether the firm is excluded from our core sample on grounds of not having filed a business income tax declaration with positive revenue in 2014. Parentheses contain heteroskedasticity-robust standard errors.

Table B.6: Covariate balance of core sample v. firms with incomplete APS

	Mean	Difference
Log revenue	11.6	.052
		(.086)
Log assets	12.6	1.08
		(.08)
Filed APS in 2014	.915	-.075
		(.008)
Percent declared (%)	30.3	-69.6
		(1)
Terminal ownership in havens (%)	.006	-.946
		(.037)
Terminal ownership in havens (% of declared)	.6	-.4
		(.2)
Terminal ownership in foreign non-havens (%)	.073	-5.32
		(.085)
Terminal ownership in foreign non-havens (% of declared)	5	-.5
		(.7)
Terminal ownership in Ecuador (%)	30.1	-63.5
		(.957)
Terminal ownership in Ecuador (% of declared)	94.4	0.9
		(.7)
Beneficial ownership (BO) declared (%)	27.6	-63.6
		(.925)
Beneficial ownership (BO) declared (% of declared)	88.7	-2.5
		(.9)
Avg. ult. shareholder chain	1.11	.06
		(.017)
Has a haven strict intermediary	.078	.059
		(.007)
Has a haven strict intermediary (conditional on having an intermediary)	.372	-.13
		(.031)
Any outflow to havens	.09	.013
		(.008)
Ratio of haven outflows to revenue	.008	-.011
		(.006)
Any outflow to non-havens	.213	-.05
		(.011)
Firms with incomplete ownership declarations	1,315	
Core sample firms with complete declarations	61,035	

Note: This table displays summary statistics and results from a series of cross-sectional univariate regressions of 2014 firm business characteristics on an indicator for whether the firm filed an APS whose terminal ownership added to less than 100%. The sample consists of our core sample of firms. Variables including "(% of declared)" pertain to ownership characteristics formalized by the amount of overall terminal ownership declared. Parentheses contain heteroskedasticity-robust standard errors.

Table B.7: Panel balance of the core sample

Year	Filed APS	Complete APS (Conditional on filing)	Filed F101	Filed F101 with positive revenue	Filed both APS and F101	Filed APS and F101 With positive revenue
2012	.823	.95	.836	.737	.821	.726
2013	.914	.956	.929	.839	.912	.827
2014	.988	.967	1	1	.988	.988
2015	.956	.972	.969	.873	.948	.857
2016	.897	.987	.921	.788	.881	.76
2017	.872	.986	.885	.737	.857	.721
2018	.827	.99	.868	.714	.813	.674
2019	.795	.991	.781	.632	.731	.598

Note: This table tabulates various measures of panel balance for our core sample over time relative to the full count of 62,350 firms in 2014.

Table B.8: Descriptive statistics majority exposure firms (2014)

	Mean	SD	p10	Median	p90	p99	Count	N
Firm Characteristics:								
Revenue (1000s USD)	6,239,985	23,293,255	8,793	410,006	13,348,707	96,955,267	588	588
Log revenue	12.7	3.05	9.08	12.9	16.4	18.4	588	588
Log taxable profit	10.5	2.6	7.03	10.4	13.7	16.2	439	588
Has taxable profit revenue	.747						588	588
CIT liability (1000s USD)	110,280	631,148	0	2,908	134,250	2,044,385	588	588
Log CIT liability	8.96	2.6	5.52	8.92	12.2	14.7	439	588
CIT rate	.22	.0000123	.22	.22	.22	.22	439	588
Log exports	13.5	2.87	9.8	14.1	16.8	18.7	81	588
Log assets	13.8	2.31	10.8	13.9	16.7	18.5	585	588
Gross profit margin	.122	.214	0	.0326	.392	.985	588	588
Return on assets	.0921	.368	0	.015	.214	.917	585	588
Labor share of costs	.243	.246	0	.154	.633	.935	587	588
Terminal ownership:								
Ecuadorian person (%)	5.14	11.8	0	0	21	50	588	588
Foreign person (%)	2.03	8.21	0	0	3	50	588	588
Ecuadorian non-person entity (%)	1.59	7.63	0	0	.0161	50	588	588
Foreign non-person entity (%)	.969	6.16	0	0	0	49.3	588	588
Residual (%)	.0218	4.62	0	0	0	.5	584	588
Terminal ownership in baseline domicile (%)	90	16.6	56.3	99.9	100	100	588	588
Ownership characteristics:								
Ownership share of plurality owner	80.3	24.2	49.5	98	100	100	588	588
Average share of terminal owner	43.9	19.6	14.3	50	50	100	588	588
Number of terminal owners	3.37	3.76	2	2	7	18	588	588
Avg. ult. shareholder chain	1.92	.965	1	2	3	4.97	588	588
Ownership reporting compliance:								
Filed APS	.993						588	588
Declared 100% nominal ownership	.983						584	588
Declared 100% beneficial ownership	.327						588	588
Cross-border flows:								
Any outflow to havens	.231						588	588
Ratio of haven outflows to revenue	.0615	.426	0	0	.0694	1.1	588	588
Any inflow from havens	.0374						588	588
Ratio of haven inflows to revenue	.259	5.92	0	0	0	.539	588	588
Any outflow to non-havens	.442						588	588
Ratio of non-haven outflows to revenue	2.33	47	0	0	.437	4.43	588	588
Any inflow from non-havens	.381						588	588
Ratio of non-haven inflows to revenue	96.5	1,661	0	0	.883	79.3	588	588

Note: This table displays descriptive statistics of majority exposure firms in 2014.

Table B.9: Descriptive statistics of majority control firms (2014)

	Mean	SD	p10	Median	p90	p99	Count	N
Firm Characteristics:								
Revenue (1000s USD)	7,091,598	38,647,103	8,676	349,673	9,955,425	137,679,589	3,352	3,352
Log revenue	12.5	3.03	9.07	12.8	16.1	18.7	3,352	3,352
Log taxable profit	10.3	2.78	6.96	10.3	13.8	16.3	2,486	3,352
Has taxable profit revenue	.742						3,352	3,352
CIT liability (1000s USD)	117,535	838,522	0	2,222	125,291	1,993,614	3,352	3,352
Log CIT liability	8.81	2.76	5.45	8.82	12.3	14.8	2,485	3,352
CIT rate	.22	.00497	.22	.22	.22	.22	2,486	3,352
Log exports	12.6	2.67	9.17	12.5	16	18.6	564	3,352
Log assets	12.8	2.56	9.53	12.9	16	18.5	3,330	3,352
Gross profit margin	.104	.188	0	.0342	.282	.982	3,352	3,352
Return on assets	223	9,101	0	.0402	.337	.98	3,330	3,352
Labor share of costs	.29	.27	.00467	.217	.707	.992	3,333	3,352
Terminal ownership:								
Ecuadorian person (%)	11.2	18.2	0	0	50	50	3,352	3,352
Foreign person (%)	59.1	41.3	0	70	100	100	3,352	3,352
Ecuadorian non-person entity (%)	1.44	7.32	0	0	0	50	3,352	3,352
Foreign non-person entity (%)	27.8	42.4	0	0	100	100	3,352	3,352
Residual (%)	.365	4.28	0	0	0	14.2	3,328	3,352
Terminal ownership in baseline domicile (%)	87	19.1	50	99.9	100	100	3,352	3,352
Ownership characteristics:								
Ownership share of plurality owner	68.5	27.2	33	65	100	100	3,352	3,352
Average share of terminal owner	42	20.9	14.3	50	50	100	3,352	3,352
Number of terminal owners	7.12	67.2	2	2	7	70	3,352	3,352
Avg. ult. shareholder chain	1.54	1.02	1	1	2.96	5.92	3,352	3,352
Ownership reporting compliance:								
Filed APS	.993						3,352	3,352
Declared 100% nominal ownership	.979						3,328	3,352
Declared 100% beneficial ownership	.612						3,352	3,352
Cross-border flows:								
Any outflow to havens	.177						3,352	3,352
Ratio of haven outflows to revenue	.155	5.44	0	0	.0087	.489	3,352	3,352
Any inflow from havens	.031						3,352	3,352
Ratio of haven inflows to revenue	.37	13.9	0	0	0	.0541	3,352	3,352
Any outflow to non-havens	.55						3,352	3,352
Ratio of non-haven outflows to revenue	8.09	176	0	.00326	.568	9.98	3,352	3,352
Any inflow from non-havens	.379						3,352	3,352
Ratio of non-haven inflows to revenue	4,700	251,177	0	0	.843	78	3,352	3,352

Note: This table displays descriptive statistics of majority control firms in 2014.

Table B.10: Demonstration of haven and non-haven flows:
Majority exposure and control firms observed in the MID (2012-2014)

	Exposure	Control
Haven flows		
Share of years with a haven outflow	.203	.163
Any haven outflow	.298	.245
Average haven outflows to revenue ratio	.0368	.0154
Share of years with a haven inflow	.0295	.0261
Any haven inflow	.0544	.0504
Average haven inflows to revenue ratio	.00934	.00541
Non-haven flows		
Share of years with a non-haven outflow	.426	.492
Any non-haven outflow	.56	.629
Average non-haven outflows to revenue ratio	.108	.163
Share of years with a non-haven inflow	.35	.327
Any non-haven inflow	.498	.494
Average non-haven inflows to revenue ratio	.152	.148

Note: This table summarizes the cross-border financial flows for with havens and non-havens for majority exposure and control firms. All dependent variables are constructed using years 2012-2014.

Table B.11: Panel balance over time by subsample

Year	Incomplete	Domestic	C majority	C minority	T majority	T minority	Other
2012	1047	40142	2467	953	485	157	40
	[.87]	[.729]	[.742]	[.809]	[.83]	[.805]	[.909]
2013	1089	45944	2809	1032	504	172	40
	[.905]	[.834]	[.844]	[.876]	[.863]	[.882]	[.909]
2014	1203	55088	3327	1178	584	195	44
	[1]	[1]	[1]	[1]	[1]	[1]	[1]
2015	1055	47715	2876	1060	518	180	42
	[.877]	[.866]	[.864]	[.9]	[.887]	[.923]	[.955]
2016	566	42499	2653	971	490	178	38
	[.47]	[.771]	[.797]	[.824]	[.839]	[.913]	[.864]
2017	622	40294	2478	906	460	169	38
	[.517]	[.731]	[.745]	[.769]	[.788]	[.867]	[.864]
2018	506	37736	2295	864	434	163	36
	[.421]	[.685]	[.69]	[.733]	[.743]	[.836]	[.818]
2019	455	33327	2104	805	403	152	34
	[.378]	[.605]	[.632]	[.683]	[.69]	[.779]	[.773]

Note: This table tabulates the balance of the core panel by subsample. Hard brackets give the proportion of firms present in the subsample relative to 2014.

Table B.12: Movement in and out of sample

Year	Incomplete & missing	Firms with majority domestic ownership	Firms with majority ownership in foreign non-havens	Firms with terminal ownership in foreign non-havens $\in [.05, .5)$	Firms with majority ownership in havens	Firms with terminal ownership in havens $\in [.05, .5)$	Other
2012	98953	89689	4826	1755	1032	276	64
	[1.19]	[.856]	[.877]	[.948]	[1.09]	[.948]	[.914]
2013	90836	97517	5076	1787	1014	292	73
	[1.09]	[.931]	[.923]	[.965]	[1.07]	[1]	[1.04]
2014	83199	104733	5500	1851	951	291	70
	[1]	[1]	[1]	[1]	[1]	[1]	[1]
2015	77280	110373	5857	1851	889	267	78
	[.929]	[1.05]	[1.06]	[1]	[.935]	[.918]	[1.11]
2016	75164	114310	4940	1269	689	191	32
	[.903]	[1.09]	[.898]	[.686]	[.725]	[.656]	[.457]
2017	69885	119795	4801	1197	684	204	29
	[.84]	[1.14]	[.873]	[.647]	[.719]	[.701]	[.414]
2018	66849	122838	4847	1230	615	186	30
	[.803]	[1.17]	[.881]	[.665]	[.647]	[.639]	[.429]
2019	60383	129215	4933	1256	585	188	35
	[.726]	[1.23]	[.897]	[.679]	[.615]	[.646]	[.5]

Note: This table displays counts of firms in the raw APS data based on their allocable terminal ownership category. Hard brackets give the proportion of firms present in the subsample relative to 2014.

Table B.13: Movement in and out of ownership category (APS forwarded)

Year	Incomplete & missing	Firms with majority domestic ownership	Firms with majority ownership in foreign non-havens	Firms with terminal ownership in foreign non-havens $\in [.05, .5)$	Firms with majority ownership in havens	Firms with terminal ownership in havens $\in [.05, .5)$	Other
2012	98954	89686	4834	1747	1033	275	66
	[1.38]	[.778]	[.805]	[.878]	[1.01]	[.902]	[.88]
2013	85683	102311	5332	1849	1046	298	76
	[1.19]	[.887]	[.888]	[.929]	[1.02]	[.977]	[1.01]
2014	71861	115334	6006	1990	1024	305	75
	[1]	[1]	[1]	[1]	[1]	[1]	[1]
2015	58094	128245	6736	2113	1023	299	85
	[.808]	[1.11]	[1.12]	[1.06]	[.999]	[.98]	[1.13]
2016	45796	141816	6208	1622	874	232	47
	[.637]	[1.23]	[1.03]	[.815]	[.854]	[.761]	[.627]
2017	33379	154053	6338	1621	909	249	46
	[.464]	[1.34]	[1.06]	[.815]	[.888]	[.816]	[.613]
2018	20569	166450	6690	1716	882	239	49
	[.286]	[1.44]	[1.11]	[.862]	[.861]	[.784]	[.653]
2019	5298	181224	7085	1797	888	247	56
	[.0737]	[1.57]	[1.18]	[.903]	[.867]	[.81]	[.747]

Note: This table displays counts of firms in the raw APS data based on their allocable terminal ownership category. Hard brackets give the proportion of firms present in the subsample relative to 2014.

Table B.14: Movement in and out of ownership category (APS forwarded)
Among firms filing F101 and in an included industry
Panel (a): Counts

Year	Incomplete/missing	Domestic	C-majority	C-minority	T-majority	T-minority	Other
2012	5528	75880	4518	1563	988	249	62
	[1.38]	[.85]	[.875]	[.93]	[1.1]	[.95]	[.925]
2013	4704	83641	4763	1599	970	270	71
	[1.17]	[.937]	[.922]	[.952]	[1.08]	[1.03]	[1.06]
2014	4020	89261	5166	1680	902	262	67
	[1]	[1]	[1]	[1]	[1]	[1]	[1]
2015	3449	96562	5614	1698	846	250	73
	[.858]	[1.08]	[1.09]	[1.01]	[.938]	[.954]	[1.09]
2016	2450	101295	4789	1197	632	186	32
	[.609]	[1.13]	[.927]	[.713]	[.701]	[.71]	[.478]
2017	1777	104857	4602	1134	641	197	28
	[.442]	[1.17]	[.891]	[.675]	[.711]	[.752]	[.418]
2018	1933	110042	4661	1146	573	178	32
	[.481]	[1.23]	[.902]	[.682]	[.635]	[.679]	[.478]
2019	1245	106827	4549	1120	520	174	37
	[.31]	[1.2]	[.881]	[.667]	[.576]	[.664]	[.552]

Panel (b): Assets, revenue, and profits

Year	Incomplete/missing			C-majority			C-minority			T-majority			T-minority		
	Assets	Rev.	Profit	Assets	Rev.	Profit	Assets	Rev.	Profit	Assets	Rev.	Profit	Assets	Rev.	Profit
2012	.93	1.03	1.1	.999	.907	.822	.925	.989	.792	.99	1.15	.87	.787	.924	.888
2013	1.02	1.1	1.08	.947	.913	.772	.945	.925	.881	1.06	1.21	.992	.862	.986	.959
2014	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2015	.866	.859	.816	1.03	.925	.795	1.03	.896	.847	1.11	1.03	.821	.871	.791	.752
2016	.638	.306	.249	1.38	1.08	1.05	1.36	.92	.825	1.2	1.02	1.07	.869	.853	.614
2017	.652	.279	.249	1.65	1.22	1.87	1.37	.886	.853	1.37	1.29	1.42	.42	.857	.636
2018	.646	.269	.246	1.58	1.15	1.25	1.74	1.04	.995	1.28	1.08	1.2	.533	1.3	1.62
2019	.699	.244	.252	1.64	1.12	1.32	1.88	1.11	.995	1.37	1.19	1.53	.59	1.27	1.54

Note: This table displays results on extensive margin counts of different geographic ownership categories within the entire Ecuadorian administrative data environment including active firms in industries exposed to the reform (abstracting from the core sample used in the main text). Panel (a) tabulates counts; Panel (b) weights these counts by assets, revenues, and profits, relative to the total in 2014.

Appendix C Analysis Using Orbis Data

This section uses ownership data from Orbis to replicate the analysis from the APS.

C.1 Data

Orbis is a subscription-based global database managed by Bureau van Dijk/Moody's that aims to provide comprehensive financial and corporate information on millions of public and private companies worldwide, including their ownership structures. In what follows we focus on direct ownership, as other definitions of ownership (e.g. intermediate or terminal beyond a single layer) are not always observable or only available for the latest cross-section, rather than on an annual basis.

Our aim is to collect a panel of foreign-owned firms operating in Ecuador. The first year with data in Orbis is 2014 (at least that we have access to). We select Ecuadorian firms that are active and that have foreign shareholders anywhere in the world, regardless of the shares of the direct owner. For each subsidiary we include information on direct ownership such as the name, location, and share of direct owners (at the end of December of each year). We exclude from the sample firms with missing direct ownership shares, and firms with 100% of direct ownership located in Ecuador or in unknown/missing countries.

Our empirical strategy using Orbis mirrors our baseline approach with the APS from Section 4. We compare Ecuadorian firms with tax haven (direct) ownership in 2014–a modified version of the exposure group—versus firms with foreign non-haven direct ownership in 2014—the control group. We classify direct owners in three country groups:

1. Tax havens, following the list of tax haven countries established by the Ecuadorian government, as in the baseline analysis.

2. Foreign non-tax havens: any country not listed as tax haven, excluding Ecuador or any other country labeled as "unknown".

3. Ecuador & Unknown

We collapse shares of direct ownership at the firm × country group × year-level. We then build our exposure and control groups based on direct ownership type, as follows:

- **Majority haven-owned:** firm with $\geq 50\%$ direct ownership in tax haven countries.
- **Majority non-haven foreign-owned:** firm with $\geq 50\%$ direct ownership in foreign non-tax haven country & 0% direct ownership in tax havens.

Sample size and data quality. In 2014 (the pre tax reform year) Orbis lists 499 majority foreign-owned Ecuadorian firms, of which 73 are tax haven-owned and 426 are foreign non-haven-owned. This is a small (and likely selected) subset of the firms we observe in the APS, although the ratio of tax haven- to foreign-owned is similar as in the main analysis. Two cautionary notes are worth highlighting. First, economic data on Ecuadorian subsidiaries are missing in the vast majority of cases, in contrast to ownership information, which is largely

available. Second, the number of Ecuadorian firms covered in Orbis fluctuates considerably over time, showing an overall upward trend, though not a linear one.

To mirror our main estimation strategy, we track forward the 499 subsidiaries identified in 2014. Table C.1 presents the number of these firms appearing in the Orbis data for each subsequent year between 2014 and 2019. Attrition is considerable, with nearly half of the firms (46%) no longer observed by 2016.

Table C.1: Tracking foreign-owned Ecuadorian firms, active in 2014

	2014	2015	2016	2017	2018	2019
Foreign-owned firms	499	451	293	271	328	313
1(Mostly tax haven-owned)	73	64	34	34	35	32
1(Non tax haven-owned)	426	387	259	237	293	281

Note: This table tracks Ecuadorian firms with foreign direct ownership, in the Orbis data. We fix the sample to the 499 firms active in 2014 and count how many are present in the sample each year. The group labeled as "1(mostly tax haven-owned)" are the firms with ≥50% direct ownership in tax haven countries (exposed firms). The group labeled as "1(non-tax haven-owned)" are the foreign-owned firms, with 0% direct ownership in tax havens (control firms).

C.2 Empirical Strategy

The empirical strategy compares the impact of the CIT surcharge on firms directly owned by majority tax haven-owned firms versus majority non-haven-owned firms. Given the unbalanced nature of the panel, we estimate a simple two-period difference-in-differences model comparing outcomes in 2018 (the post-period) and 2014 (the pre-period). We select 2018 as the post period due to its relatively lower attrition rate than 2016 and 2017. The estimating equation takes the standard before-after difference-in-differences form:

$$y_{it} = \alpha_i + \beta \cdot \mathbf{1}(Treatment_i) \times \mathbf{1}(Post_t) + \gamma \cdot \mathbf{1}(Post_t) + \varepsilon_{it} \tag{8}$$

Where y_{it} is the outcome-of-interest for firm i in year t; α_i are firm fixed effects; $\mathbf{1}(Treatment_i)$ takes the value of 1 for tax haven owned firms and zero for foreign owned firms. $\mathbf{1}(Post)$ is a dummy equal to zero in 2014 and 1 in 2018. β measures the differential effect of the tax haven surcharge in Ecuador. Standard errors are clustered at the firm-level. As in the baseline estimates in the paper, we mitigate mean reversion in ownership by using majority direct ownership at baseline: for treated/exposure firms this is tax havens; for controls firms it is foreign non-havens. Thus, to estimate the impact of the reform on direct ownership, we compare the tax haven ownership share of exposed firms to the international ownership of control firms. We generate the composite dependent variable y_{it}:

$$y_{it} = \begin{cases} \text{Tax haven ownership} & \text{if } i \in \text{ 1(Mostly tax haven owned)} \\ \text{Foreign non-haven ownership} & \text{if } i \in \text{ 1(Non tax haven owned)} \end{cases}$$

Our outcomes-of-interest are extensive and intensive margin changes in ownership (y_{it}). We measure extensive margin as having zero observable direct ownership, and the intensive margin as the change in direct ownership shares. We estimate the effects on these two outcomes for two different owner types: all direct owners and the main direct owner at baseline.

We run our estimates using two samples. The first sample includes 328 firms observed in both 2014 and 2018. The second set of estimates is based on a balanced sample by way of imputation, with 471 firms: we impute missing outcome values using the last available year post reform (e.g. missing direct ownership in 2018 is replaced with the latest non-missing value from 2015 to 2017).

C.3 Results

Table C.2 presents the difference-in-differences results. Panel A reports estimates using only the 328 firms in the balanced sample that report ownership in both 2014 and 2018. Panel B presents results based on the imputed sample, where missing ownership values in 2018 were filled using the last available year with ownership data.

Panel (A), Column (1), shows that attrition is large in the Orbis data and substantially larger for the exposure group than the control group, with 21 percentage points higher probability of attrition. For the firms appearing in both 2014 and 2018, we estimate a marginally significant increase in the extensive margin of baseline domicile ownership by 14 percentage points. In addition, we observe a marginally significantly higher decrease in baseline domicile ownership for exposure firms rather than for the control firms by 11 percentage points. These results are similar but noisier than those observed in the paper using the APS.

Panel (B), runs the same regression on the imputed ownership share sample, comparing again 2014 to 2018. The imputation implies that firm ownership data is imputed for 2018 based on the latest available year of data post reform. Column (1) shows that attrition in the Orbis data in any period post reform–i.e. any period from 2015 to 2018– increased by 7 percentage points for exposure firms, compared to control group. Results for changes in direct ownership are smaller in magnitudes and significance to those of Panel (A), but remain qualitatively consistent. The point estimates for changes in baseline domicile ownership (Column 2-3) show a marginally significant increase in having zero baseline domicile ownership by 8 percentage points. Ownership changes concerning the main baseline owner are, however, smaller than in Panel (A) and insignificant (Columns 4-5).

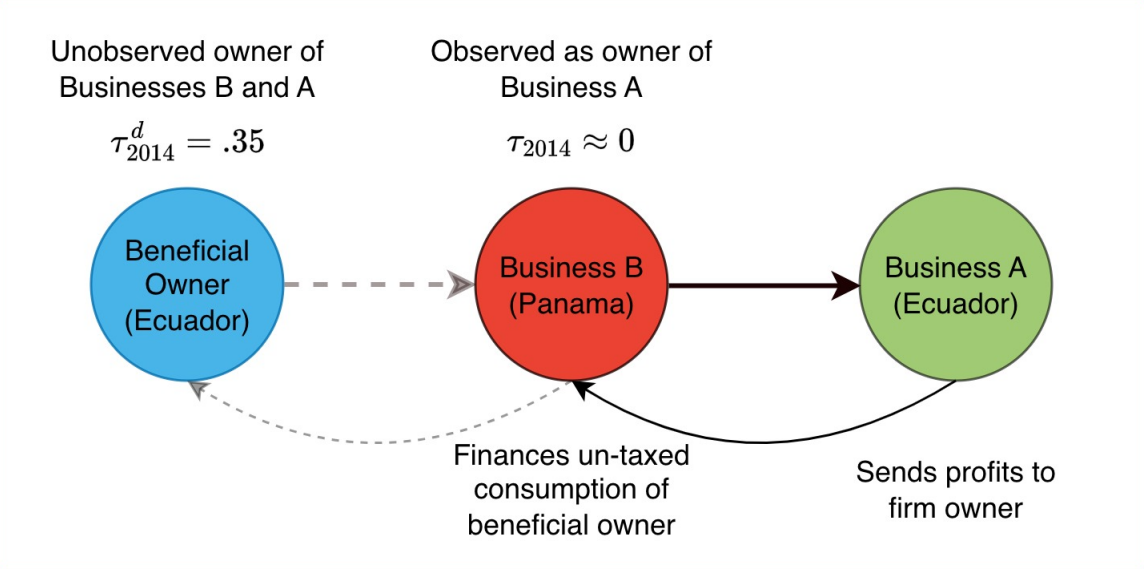
Table C.2: Tax Reform Impact in Orbis Data: DiD Estimates (2014 vs 2018)

		Baseline domicile ownership		Ownership of main baseline owner	
	(1)	(2)	(3)	(4)	(5)
	Attrition	Zero ownership	Ownership %	Zero ownership	Ownership %
Panel A: Balanced Sample					
1(Mostly tax haven owned) × 1(Post)	0.208***	0.144*	-0.106*	0.127	-0.104*
	(0.06)	(0.08)	(0.06)	(0.08)	(0.06)
1(Post)	0.312***	0.171***	-0.024**	0.188***	-0.025**
	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)
Observations	998	656	656	656	656
# Firms	499	328	328	328	328
R-Squared	0.61	0.56	0.86	0.56	0.87
Control Mean Dep Var 2014	0.00	0.00	0.88	0.00	0.85
Treatment Mean Dep Var 2014	0.00	0.00	0.93	0.00	0.90
Panel B: Imputed Sample Last Available Year					
1(Mostly tax haven owned) × 1(Post)	0.067*	0.083*	-0.052	0.017	-0.051
	(0.04)	(0.05)	(0.03)	(0.05)	(0.03)
1(Post)	0.042***	0.086***	-0.018**	0.153***	-0.018**
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Observations	998	942	942	942	942
# Firms	499	471	471	471	471
R-Squared	0.52	0.53	0.91	0.54	0.91
Control Mean Dep Var 2014	0.00	0.00	0.86	0.00	0.83
Treatment Mean Dep Var 2014	0.00	0.00	0.95	0.00	0.91

Note: This table summarizes the difference-in-differences results on firm direct ownership using a pairwise comparison on a sample of firms that are in both years 2014 and 2018. Panel A displays results using the first observed year for the subsidiaries, hence, there are missing values for those subsidiaries that are not in sample in 2018. Panel B displays results using a balanced version of the sample by replacing missing values in 2018 with the observation in the previous (post-reform) year available. In all cases, our treatment group is composed of active Ecuadorian subsidiaries with $\geq$50% direct ownership in a tax haven in 2014, which we refer to as "mostly tax haven-owned". The dependent variable in column (1) is a dummy taking the value of one if the firm is not in sample in 2018 and zero otherwise. The dependent variable in even columns (2) and (4) named as "zero ownership" is the extensive margin measured by any change in any direct owner and the main direct owner, respectively. The dependent variable in odd columns (3) and (5) named as "ownership %" is the intensive margin measured by changes in the shares of any direct owner and the main direct owner, respectively. Every regression includes firm fixed effects and standard errors are clustered on the firm-level. Significance levels are denoted as * 0.10, ** 0.05, and *** 0.01, respectively.

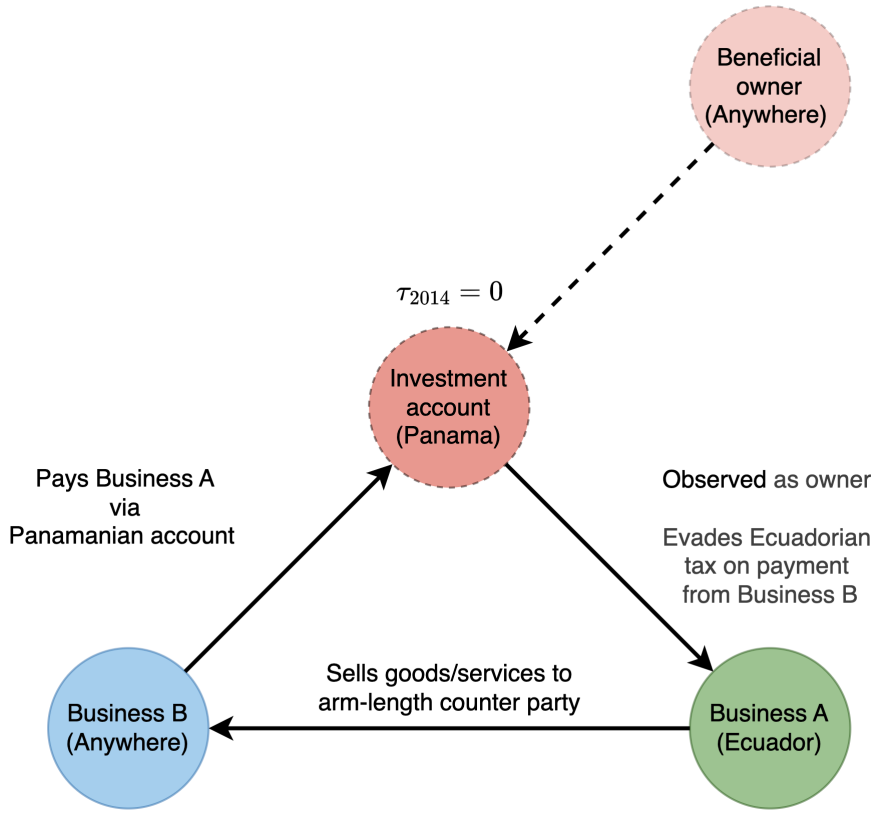
Appendix D Supplementary materials

Figure D.1: Illustration of Ecuadorian personal income tax evasion via tax havens



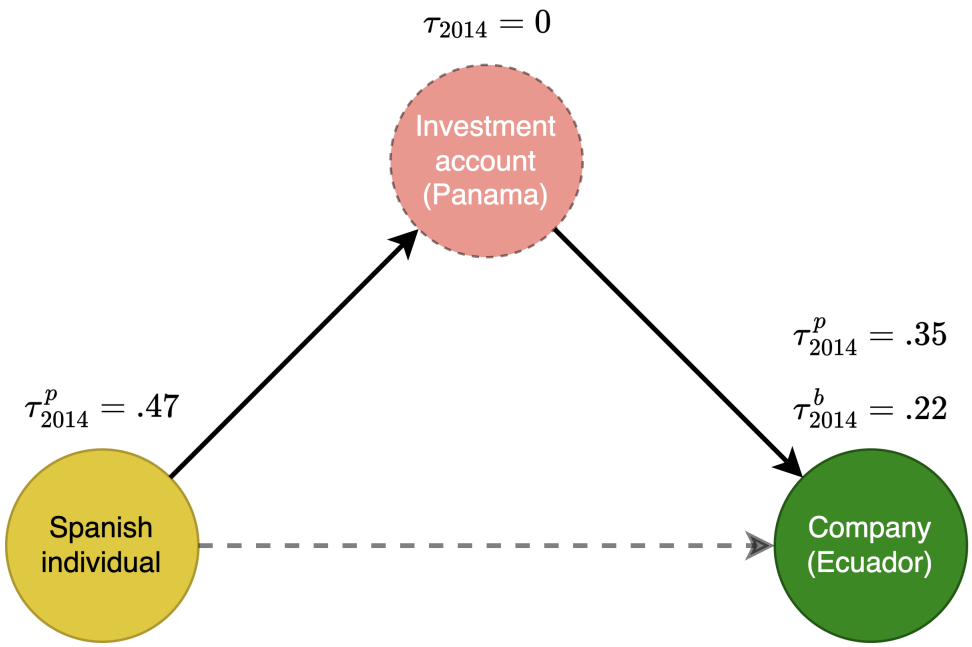
Note: This figure illustrates a generic example of evasive usage of a tax haven. In this example, an Ecuadorian Business A sends post-tax profits to its Panamanian owner, Business B. The Ecuadorian beneficial owner of Businesses B and A can finance untaxed consumption out of the Panamanian Business B. By not reporting the profit distributions paid to the Panamanian account as personal income, the Ecuadorian beneficial owner evades the Ecuadorian corporate income tax.

Figure D.2: Illustration of Ecuadorian corporate income tax evasion via tax havens



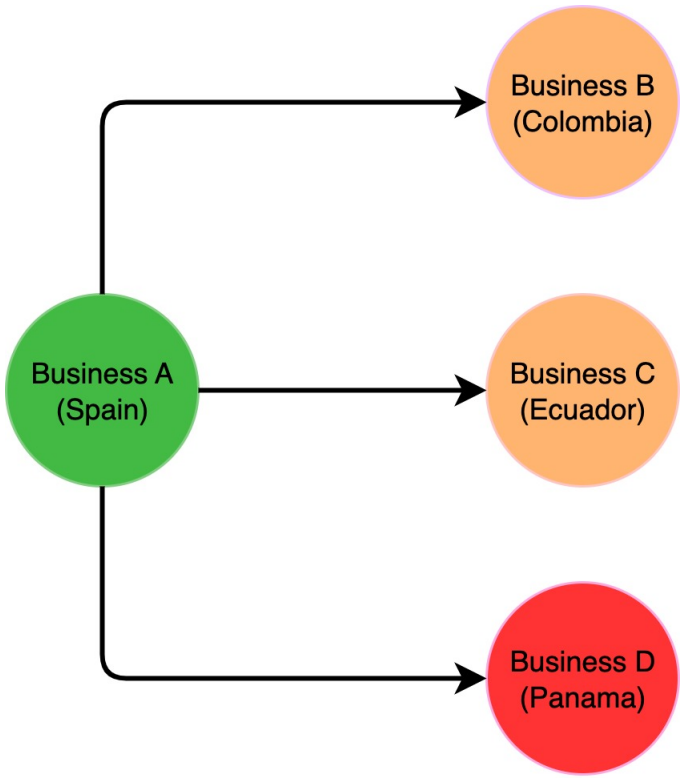
Note: This figure illustrates a generic example of evasive usage of a tax haven. In this example, an Ecuadorian Business A provides goods or services to Business B (located in Ecuador or abroad), with an agreement that Business B pays Business A via a Panamanian account that owns Business A. In this example, the beneficial owner of Business A and the Panamanian account can be located anywhere. By not reporting income paid to the Panamanian account for goods/services provided to Business B, Business A evades the Ecuadorian corporate income tax.

Figure D.3: Illustration of offshore evasion arrangement via tax havens of foreign personal income tax on worldwide income



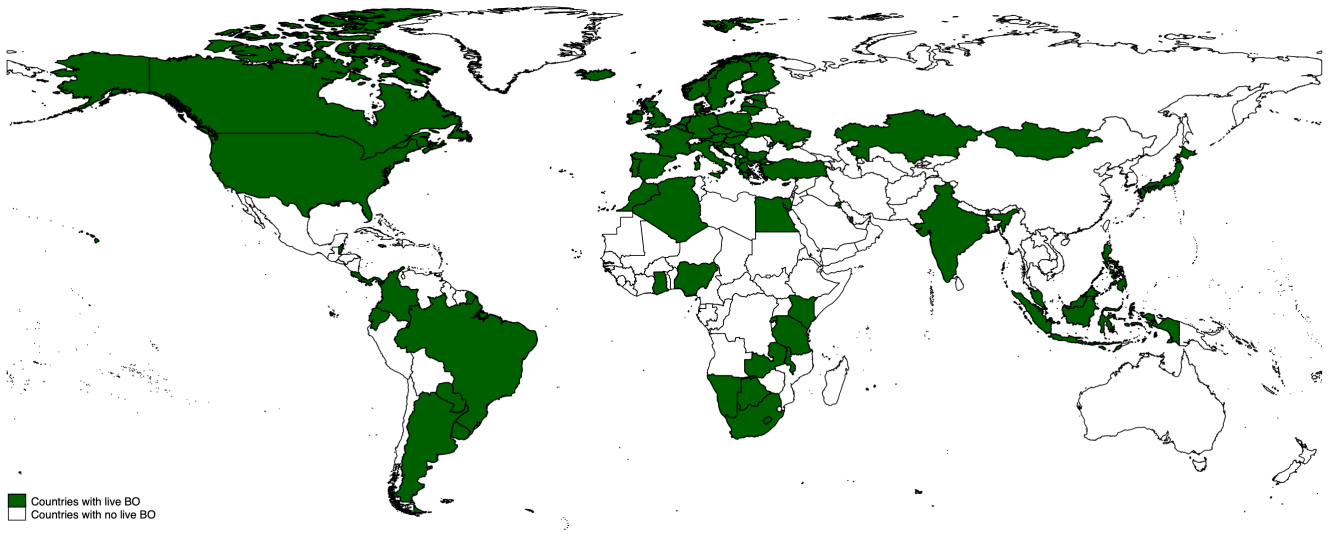
Note: This figure illustrates evasive usage of a tax haven. In this example, a Spanish national owns an Ecuadorian-operating business via a Panamanian intermediary. The business pays Ecuadorian corporate income tax, sending remaining profits to the Panamanian account. Leverage financial secrecy protections, the Spanish individual can evade the Spain's tax on worldwide income. τ^{p}_{2014} and τ^{b}_{2014} give top marginal personal and corporate income tax rates, respectively, in 2014 for each respective country.

Figure D.4: Illustration of an offshore avoidance arrangement via tax havens



Note: This figure illustrates tax-avoiding usage of a tax haven. In this example, a multinational group has disbursed ownership across many jurisdictions. One such arbitrary linkage corresponds with an intermediary based in Panama that is of arbitrary ownership tier. In this case, profits can be generated in any jurisdiction and located within the Panama, the low tax jurisdiction, using profit shifting technology to maximize post-tax profit of the multinational group.

Figure D.5: Countries with live beneficial ownership registries (2025)



Note: This figure maps countries that maintain a beneficial ownership registry. Data are updated as of July 2025.

Appendix E On the Ownership Registry (APS), Direct, and Indirect ownership

All shareholdership linkages observed in the APS reflect one of three possibilities. Consider the shareholdership of a given Ecuadorian firm i and a given shareholder j of business i. In the first scenario 1), shareholder j is itself a business that reports its own shareholdership structure. We can then assign shareholder j's ownership to firm i, weighted by the appropriate shares. The other two scenarios result in a terminal ownership observation: 2) shareholder j is an individual (not a business); 3) shareholder j is a business and does not report its shareholdership structure to the Ecuadorian tax authorities. These latter two shareholder linkages types represent the terminal linkages for business i, and are used to calculate firm i's effective tax haven terminal ownership share. Specifically, for each terminal ownership linkage, the tax authorities multiplies all direct shareholdership amounts until reaching business i; the effective tax haven terminal ownership share is the sum of these indirect ownership amounts over terminal linkages domiciled in tax havens. Figure E.3 gives an illustrative example of two hypothetical Ecuadorian companies' effective tax haven ownership shares and CIT surcharges based on their observed shareholder linkages.

More formally, we can define these ownership relations in terms of a weighted directed graph $G_i = G(V_i, E_i)$ that represents the comprehensive flow of shareholdership into entity i,[38] with nodes/vertices V_i representing entities and edges E_i representing shareholdership linkages that connect two nodes weighted by an amount of direct ownership $s_{jk} \in [0, 1]$ (where the edge tuple (j, k) reflects that j is a direct shareholder of k and s_{jk} reads "j directly owns $100 \cdot s_{jk}$ percent of k"), where $j, k \in \mathcal{N}$, a comprehensive index of entities. We can define the set of *direct owners* $\{i_{\mathcal{D}}\}$ of any entity i based on the bijection $(j, i) \in \{i_{\mathcal{D}}\} \iff s_{ji} \neq 0$, where $\{i_{\mathcal{D}}\} \subseteq V_i$. We also impose the definition that considering all of the edge weights associated with edges $(j, i) \in \{i_{\mathcal{D}}\}$, $\sum_{j \in \{i_{\mathcal{D}}\}} s_{ji} \equiv 1$.

An *indirect owner* of entity i is another entity $k \in \mathcal{N}$ such that $\exists$ some $\{l_1, l_2, \ldots, l_m\} := \mathcal{M} \subseteq \mathcal{V}_i$, $m \geq 1$, where $k \in \{l_{1_{\mathcal{D}}}\}$ for $l_1 \in \mathcal{M}$, $l_1 \in \{l_{2_{\mathcal{D}}}\}$ where $l_2 \in \mathcal{M} \backslash l_1$, and $l_2 \in \{l_{3_{\mathcal{D}}}\}$, where $l_3 \in \mathcal{M} \backslash l_1, l_2$, and ..., and $l_{m-1} \in \{l_{m_{\mathcal{D}}}\}$ where $l_m \in \mathcal{M} \backslash l_1, l_2, \ldots, l_{m-1}$, and $l_m \in \{i_{\mathcal{D}}\}$. I.e. there exists some chain of direct ownership that sequentially links together companies starting from k to company i where each edge is a direct ownership linkage.

The *indirect ownership share* can be computed here by considering all of the unique pathways $\mathcal{M}_{ji}$ that connect nodes j to i through a series of direct ownership linkages. We can index each pathway $\mathcal{M}_{ji}^c$ as a set of unique edges that follows the above procedure, as well as $\left|\mathcal{M}_{ji}^c\right|$, the number of direct ownership linkage steps in connecting that connect entity j to entity i.

Assume that the graph G_i does not contain ownership cycles that connect two entities $j \neq k$ via $\mathcal{M}_{jk}$ and $\mathcal{M}_{kj}$.[39] We can define the *indirect ownership share* as the sum of the

[38] For simplicity and relevance to our setting, we only consider the shareholderhip that flows *into* entity i as opposed to the shares that entity i owns of other entities, flowing *out* of entity i.

[39] Ownership cycles can be resolved using the limiting sum of the product of their indirect ownership shares

product of direct ownership linkages that connect j to i within a given pathway $\mathcal{M}_{ji}^{c}$ over all of the distinct ownership pathways $\mathcal{M}_{ji}^{c} \in \mathcal{P}_{ji}$ that connect j and i without repeating any edges within a given pathway:

$$s_{ji}^{\mathcal{I}} = \sum_{\mathcal{M}_{ji}^{c} \in \mathcal{P}_{ji}} \prod_{(q,r) \in \mathcal{M}_{ji}^{c}} s_{qr}. \tag{9}$$

We can define the *terminal owners* of entity i as the collection of node-entities $\{i_{\mathcal{U}}\}$ such that $j \in \{i_{\mathcal{U}}\} \iff j \in V_i$ and $\nexists z \in \mathcal{N}$ such that $s_{zj} > 0$. By definition, $\sum_{j \in \{i_{\mathcal{U}}\}} s_{ji}^{\mathcal{I}} = 1$, i.e. the sum of a entity's terminal ownership shares accounts for the entirety of its ownership.

Let us augment the above notation with a year subscript to index time. For each firm year (i,t), we can define i's terminal shareholdership in tax havens as the sum of indirect ownership of company i in year t by terminal owners $j \in \{i_{\mathcal{U}_t}\}$ where j in year t has the characteristic that is is domiciled in a tax haven. More formally yet, we can define three mutually exclusive domicile categories $l \in \{D, F, H\}$ (corresponding with Ecuador/domestic, foreign non-haven, and tax havens respectively) and function $\mathcal{L}(j,t)$ that maps a firm-year to one of these three domicile values. Thus, we can construct a firm i's terminal ownership attributable to shareholders in tax havens in year t as

$$s_{i,t}^{\textit{Ult. haven own.}} = \sum_{\left\{j \in \mathcal{N} | j \in \{i_{\mathcal{U}_t}\},\ \mathcal{L}(j,t) = H\right\}} s_{jit}^{\mathcal{I}}. \tag{10}$$

Lastly, we can also define the indirect-shareholdership weighted terminal owner chain length and maximum ownership chain length as

$$\textit{Avg. ult. ownership chain length}_{it} = \sum_{\{\mathcal{M}_{jit}^{c} \in \mathcal{P}_{jit} | j \in \{i_{\mathcal{U}_t}\}\}} \left|\mathcal{M}_{ji}^{c}\right| \cdot s_{jit}^{\mathcal{I}} \tag{11}$$

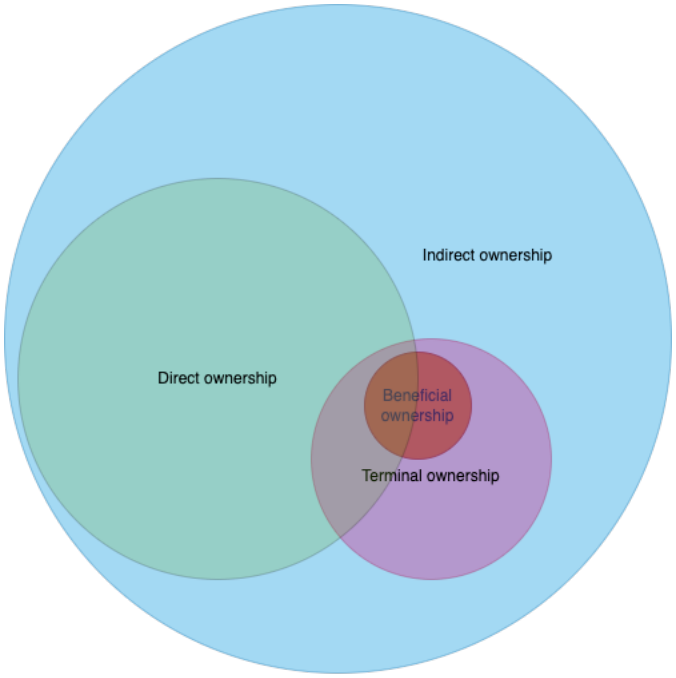
$$\textit{Maximum ult. ownership chain length}_{it} = \max_{\{\mathcal{M}_{jit}^{c} \in \mathcal{P}_{jit} | j \in \{i_{\mathcal{U}_t}\}\}} \left|\mathcal{M}_{ji}^{c}\right|. \tag{12}$$

Upon observation with non-zero beneficial ownership attributable to tax haven shareholders, Ecuadorian companies see two possibilities. First, a company that does not respond and adjust its shareholdership composition faces the CIT surcharge according to the above description. Of course, this threat of CIT surcharge is non-binding for firms that report non-positive. Figure A.3 shows that the CIT surcharge was binding for firms that remained in tax havens. Alternatively, a company can reduce its observable tax haven terminal shareholdership by either closing out the external shareholdership positions in tax havens or by extending its true beneficial ownership *beyond* the tax haven (in the case that the beneficial owner appears as a non-person entity). If these linkages reflect perfectly controlling,

within non-cyclical subgraphs, but in practice the process of identifying and reducing such cycles is very cumbersome.

tax strategic relationships the company can simply change the shareholdership positions themselves. Alternatively, if the linkages instead reflect truly arms-length relationships with unrelated shareholder parties domiciled in tax havens, either the shareholders can voluntarily close out their out positions themselves (or similar extend their true beneficial ownership reporting), perhaps in response to observing that the company in which they are invested faces a relatively higher CIT rate, or the Ecuadorian company can negotiate a sale of said positions back to the firm. We cannot directly observe the *true* nature of the intra-group shareholder relationship (i.e. to what extent the relationships are de facto purely controlling or truly arms-length by unrelated parties). However, we *can* make *some* inference on some of the mechanisms underlying shareholdership responses by observing *how* ownership changes based on the number of shareholder layers/chains and the change in the *kind* of observed terminal ownership (i.e. person versus non-person entity).

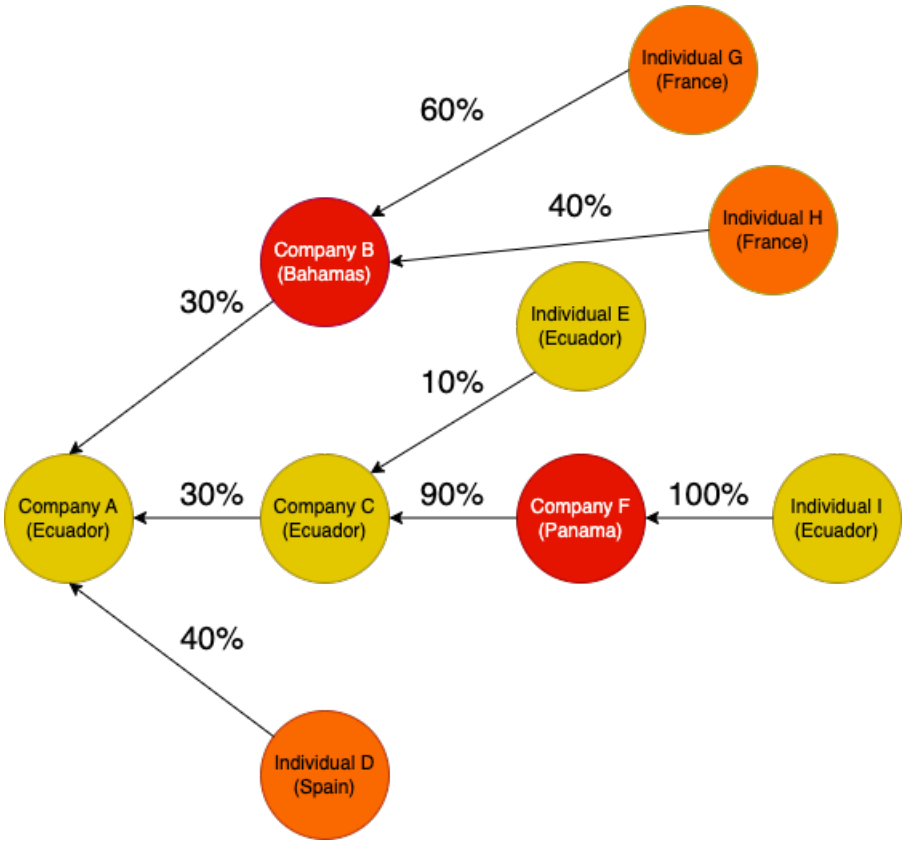
Figure E.1: Venn diagram illustrating the set-relationships of different ownership definitions



Note: This figure is a Venn diagram illustrating the set inclusion, exclusion, and overlap of the four ownership concepts we employ here. Areas correspond with ordinal size. The concept of "intermediate ownership" is not pictured here, which corresponds with the complement of beneficial ownership within indirect ownership. The figure also does not consider nominee ownership in which another person nominally serves as an owner-intermediary on behalf of a *true* beneficial owner.

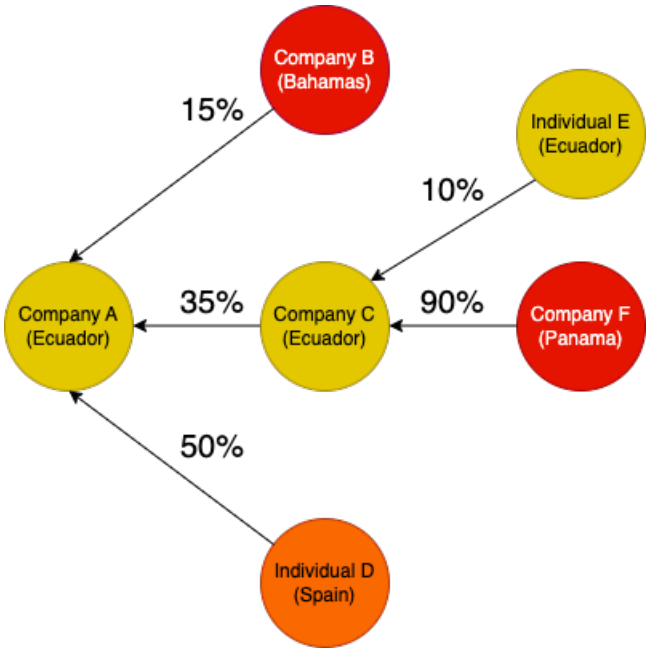
E.1 Illustrative examples of ownership graphs and CIT surcharge calculations

Figure E.2: Example of a simple ownership graph



Note: this graphic illustrates a simple ownership example where no ownership cycles occur and all beneficial ownership is accounted for.

Figure E.3: Example of tax haven CIT surcharge calculation



Note: this figure gives an illustrative example of how the Ecuadorian tax authorities would calculate the CIT surcharge. Ecuadorian entities are colored in yellow, tax haven entities are colored in red, and foreign non-haven entities are colored in orange. Based on this observed ownership structure, Company A is assigned with effective tax haven ownership of $0.15\% + 35\% \cdot 90\% = 46.5\%$. Company A would therefore face an additional CIT surcharge of $0.465 \cdot 3 = 1.395$pp. Company C sees effective tax haven ownership of 90% and would therefore face a CIT surcharge of 3pp.

Figure E.2 gives an illustrative example of complete and beneficial business ownership in a simple case with no cyclical ownership or repeated shareholders. Applying the above procedures, we can calculate the indirect and beneficial ownership by and of different entities in the graphic. Here, we place focus on Company A. Note that at every node, all of the direct ownership linkages (arrows leading into an entity) add up to 100%. Also note that the only entities whose ownership is not further allocated to shareholders downstream are individuals.

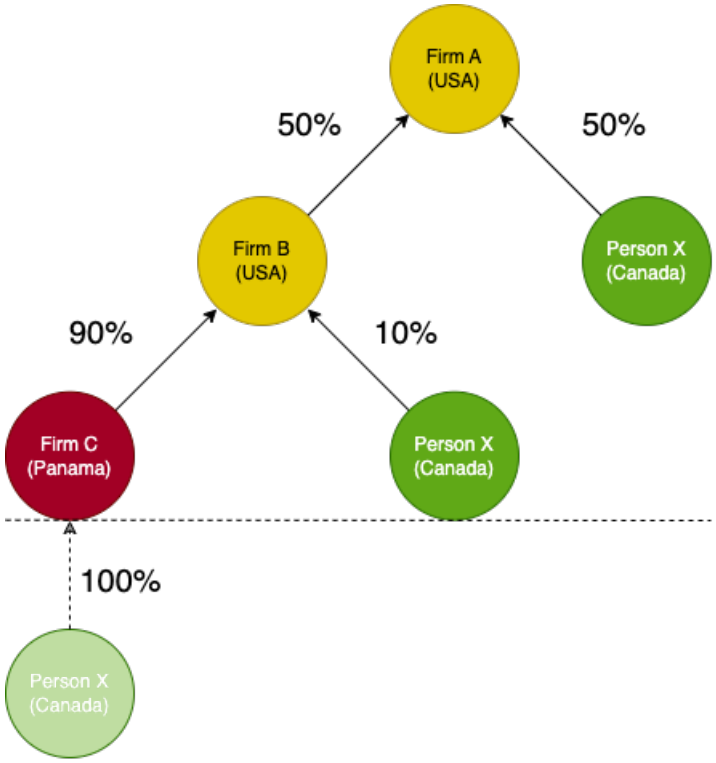
We can calculate the beneficial ownership shares of each individual by multiplying the ownership shares reflected in direct ownership linkages from an individual to the destination company. For example, Individual G's indirect ownership of Company A is equal to Company B's direct ownership of Company A, mediated by Individual G's direct ownership of Company B: $60\% \cdot 30\% = 18\%$. By a similar process, we can see that Individual H has an effective 12% control over Company A. We can also observe that the group of French beneficial owners, maintain 30% control over Company A. We can also see that Individual I has $100\% \cdot 90\% \cdot 30\%$ of Company A, and Individuals E and D have 3% and 40% respectively of company A. Similarly as for direct ownership, beneficial ownership must add too 100, which we can confirm here. Importantly, we can perform this exercise for all companies represented here. For example, individuals G and H are both direct *and* beneficial owners of Company B. As another example, we can see that the ultimate ownership of Company C is allocated 10% to Individual E and 90% to Individual I.

E.1.1 Example of (non-trivial) terminal ownership

Figure E.4 shows a non-trivial example of terminal ownership. We emphasize that this example is *non-trivial* in the respect that Figure E.2 also illustrates terminal ownership insofar as perfect ownership reporting also generates perfect coincidence of beneficial and terminal ownership. However, Figure E.4 illustrates an example where beneficial and terminal ownership diverge.

The example shows an ownership scenario of an American firm A, whose direct ownership is evenly split between a Canadian Person X and another American firm B. Direct ownership of American firm B is split 10% to Canadian person X and 90% to a Panamanian firm C. The ownership structure behind Firm C is depicted in shaded coloring and dashed lines simply to signify an information barrier, so that the shareholdership of Firm C is not observed by the researcher. The true beneficial owner of Firm C is Canadian person X (in full), but the researcher observes no ownership of Firm C. Therefore, in this example, while Firm C is a terminal owner of Firm A (specifically, a terminal owner with 45% indirect ownership), they cannot serve as a beneficial owner of either Firms B or A. The graphic shows that the true ultimate owner of Firm A, B, and C, is Person X.

Figure E.4: Example of terminal ownership



Note: this graphic illustrates an ownership arrangement where only the ownership relationships in transparent filling and below the dashed lines are unobserved to the researcher.

E.1.2 Indirect ownership in the context of cyclical ownership

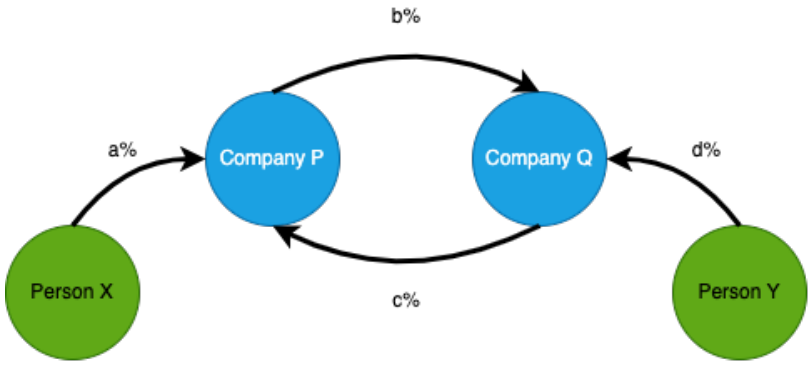
Consider a simple example of cyclical firm ownership, as depicted in Figure E.5. Person X directly owns $100 \cdot a\%$ of Company P and person Y directly owns $100 \cdot d\%$ of company Q. At the same time, Company P owns $100 \cdot b\%$ of Company Q and Company Q in turn owns $100 \cdot c\%$ of company P. Consider all of these numbers to be strictly positive so as to render the example non-trivial.

Identifying direct ownership is straightforward, as by definition, it must be the case that $a + c = 1$ so that all of the direct ownership of Company P is accounted for; as is the case that $b + d = 1$ for Company Q. However, how do we think about the ultimate ownership of Companies P and Q, considering that all such ultimate ownership must either be allocated to Persons X or Y?.

The standard procedure of multiplicatively following direct business-to-business ownership chains until reaching a person appears to fail here, as Company P owns Company Q, who owns Company P, who owns Company Q, etc.

Defining indirect ownership in this case and analogous cases with cyclical ownership can be resolved by considering the cyclical ownership between business as an infinite sum. We can express the indirect ownership of Company Q by Company P as $(b + b^2c + b^3c^2 +$

Figure E.5: Example of a cyclical ownership arrangement



Note: This graphic illustrates a cyclical ownership arrangement where as a feature of the ownership graph, two companies have direct ownership claims in each other. Direct ownership is defined such that $a, b, c, d \in [0, 1]$ and $a + c = b + d = 1$. The percent signs correspond with these values multiplied by 100.

$\ldots) = b \cdot \sum_{n=0}^{\infty}(b \cdot c)^n = b \cdot \frac{1}{1-bc}$ Here, the infinite sum is-well defined by the fact that $b \cdot c < 1$. Likewise, the indirect ownership of Company P by Company Q is defined as $(c + bc^2 + b^2c^3 + \ldots) = c \cdot \sum_{n=0}^{\infty}(b \cdot c)^n = c \cdot \frac{1}{1-bc}$. which is well-defined under an analogous regularity condition. We can then allocate the indirect ownership of Company P by Person Y in a simple manner, just as their direct ownership share in Company Q multiplied by the indirect ownership of Company P by Company Q, which is $d \cdot c \cdot \frac{1}{1-bc}$.

The intuition of this manner of defining indirect ownership consists of repeatedly summing the iteratively infinite ownership cycles between the two companies. Each additional term in the infinite sum corresponds with an additional iteration in the ownership cycle, which diminishes in size due to the convergent nature of the sum.

We can demonstrate that in this way, the ultimate ownership of both Companies P and Q is well-accounted for and allocated wholly between Persons X and Y. Consider the ultimate ownership of Company P as the sum of the indirect ownership of Persons X and Y:

$$
\begin{aligned}
s^{\mathcal{I}}_{XP} + s^{\mathcal{I}}_{YP} &= a \cdot (1 + bc + (bc)^2 + \ldots) + d \cdot c \cdot (1 + bc + (bc)^2 + \ldots) \\
&= a \cdot \sum_{n=0}^{\infty} (b \cdot c)^n + d \cdot c \cdot \sum_{n=0}^{\infty} (b \cdot c)^n \\
&= (a + cd) \cdot \sum_{n=0}^{\infty} (b \cdot c)^n \\
&= (a + cd) \cdot \frac{1}{1 - bc} \\
&= (1 - c + c \cdot (1 - b)) \cdot \frac{1}{1 - bc} \\
&= \frac{1 - c + c - bc}{1 - bc} \\
&= \frac{1 - bc}{1 - bc} \\
&= 1,
\end{aligned}
$$

demonstrating that all of the ultimate ownership of Company P is accounted for between Persons X and Y.

In practice, what does this process look like? As an example, set $a = b = c = d = 0.5$, which clearly satisfies the regularity conditions required of an ownership graph. Without this procedure of iteratively summing over repeated ownership cycles, we might have allocated the ultimate ownership of company P as 50% to Person X and $50\% \cdot 50\% = 25\%$ to Person Y. However, clearly this approach leaves 25% of the ultimate ownership of company P indeterminate and unaccounted-for.

Using the above approach, we can compute the indirect ownership of Company P by Person X as $\frac{0.5}{1-.25} = 66.\overline{6}\% = 2/3$ ownership and that of Person Y as $\frac{0.25}{1-.25} = 33.\overline{3}\% = 1/3$ ownership.

However, in practice, a central empirical difficulty in implementing this procedure is identifying ownership cycles in a computationally feasible and efficient manner, considering that a cycle can be of arbitrary length, and that an ownership chain could feature an arbitrary number of ownership cycles. Once a cycle is identified, its indirect ownership can be resolved through the above procedure.