Essays in tax avoidance and evasion

By

Jakob Brounstein

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Abstract

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This dissertation contributes to the literature on tax avoidance and evasion. In Chapter One, I study an effort by the Ecuadorian government to mitigate offshore tax avoidance through a tax havens outflows tax. First, I find that the outflows tax led to a sharp decrease in dividend payments to tax havens. I document a decrease by 66% in dividend payments sent to tax havens relative to non-havens following an increase in the relative cost of transacting with tax havens by 5%. I show that this drop implies net-of-tax elasticities of dividend payments abroad of between 13 and 40. Firms exposed to this legislative shock decreased overall dividend payouts by 50% and increased retained earnings in the short run by 600%. This response was largely unaccompanied by any change in post-tax investment behavior or extensive margin dividend payout behavior. Using administrative data on shareholder-company linkages to identify individuals highly connected to tax havens, I find that exposed individuals increased their domestic income reporting by 40% compared to the universe of unexposed taxpayers and paid 55% more in personal income taxes. This response was mainly driven by newly reported domestic capital and independent labor income flows and is consistent with a lasting reduction in offshore tax evasion. These results suggest the substantial scope for countries to act unilaterally in mitigating tax haven use and increasing tax collections.

In Chapter Two, I study how charitable contributions reported by nonprofit entities respond to variation in the federal and state estate tax rate. I focus on the asymmetric response by nonprofit vehicle type to changes in federal and state estate tax policy since 2000—distinguishing between private charities and public charities and between family foundations and non-familial private foundations. I find that private foundations respond between 7 and 10 times as strongly as public charities in response to variation in the top estate tax rate, exhibiting reported contributions elasticities of around 2 for changes in the federal estate tax and around 1 for same-state-level reforms. I also document a significant positive (negative) relationship between private foundation entry (exit) and estate tax rates. I document no significant difference in response between familial and non-familial foundations. Finally, I show that private foundations feature greater opacity in terms of their charitability objectives, demonstrate higher propensity to engage in self-benefiting transactions, and allocate greater shares of their expenses to administrative activities. This work demonstrates that the well-documented positive relationship between charitable bequests and estate taxation is largely driven by private foundations whose activity is associated with greater measures of private benefit.

Dedication

To a few of the *truly* excellent public school teachers whose care and mentorship I benefited from during my childhood in Las Vegas, Nevada:

Robin Hill
Denise Romonoski
Jeremy Strawn
Nicholas Wong

Thank you for your dedication to your students. My time with you has long since passed, but I know that my path couldn't have brought me where I am today without intersecting yours.

To my Mom and Dad, to Ronnie and Betty, 姥姥, and Ronald;

To my brother and sister, Zach and Samantha;

And to Vivian.

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Introduction

Taxation is the primary means by which governments engage in the redistribution of resources and in the provision of goods and services. From determining the breadth and generosity of the social safety net to influencing broader societal inequality, taxation plays a central role in shaping our lives. Moreover, for the purposes of fortifying public coffers and promoting different kinds of egalitarian values to varying extents, the burden of taxation has, at least in principle, broadly evolved to fall disproportionately of those with the greatest concentration of resources, which we refer to as progressive taxation.

However, taxation also often induces distortions in incentives and behavior; it is not profound to point out that taxpayers do not *like* paying taxes. Entire disciplines and industries have evolved so as to empower those with the most resources to mitigate their tax obligations. Indeed, much of the history of taxation features a perpetual arms race of tax authorities, who *want* to tax taxpayers, and taxpayers, who do *not* want to be taxed by tax authorities. A vast literature spanning many disciplines has studied the countless aspects of this relationship, with an emerging consensus that the combined sophistication of high earning taxpayers in mitigating their tax burdens and advancements in globalization and technology has grown to significantly undermine the process of taxation in facilitating redistribution as well as the provision of goods and services.

This dissertation contributes this rich tradition of study in presenting new empirical evidence on the different kinds of activities—both legal (avoidance) and illegal (evasion)—that high-earning individuals and businesses take in order to lower their tax burdens.

The first chapter focuses on the role of tax havens in facilitating tax avoidance and evasion, studying a novel policy in the Ecuadorian national setting and its impacts of tax haven usage. Tax haven usage (also referred to as "offshoring", among other terms) facilitates an important source of tax evasion and avoidance in the world, where taxpayers by legal or illicit means locate their income and wealth in low-to-no-tax jurisdictions that also feature a great deal of financial privacy. Recent work estimates that nearly 10% of global household financial wealth, largely attributable to the wealthiest households, is held in tax havens (Zucman, 2013). However, due to its clandestine nature, tax haven usage is difficult to empirically study. Moreover, in light of the increasing sophistication of taxpayers and their tax preparers as well as the diminishing role of international financial borders, policy aimed at discouraging tax haven usage has seen limited effectiveness.

I study a unique policy in Ecuador that adopts an unconventional approach in discouraging tax haven usage. While many policies focus on information sharing and enforcement, in 2008 Ecuador implemented a universal outflows tax that taxes (at least at the inception of the policy) all outflowing transactions. Additionally, the data that underlie the enforcement of the tax as well as subsequent legislative variation in the tax base and rate provide a highly novel environment for studying the behavioral dimensions of the relationship between incentives and tax haven usage. I ultimately produce evidence of an unprecedented success of this policy in reducing tax haven usage and increasing domestic income reporting. In short, individual tax haven users concentrated within the top 0.5% of the income distribution, in response to the imposition of the outflows that reduced the return of locating income/wealth abroad by 5%, increased their domestically reported income by around 40%; through the progressivity of the tax schedule, these individuals increased their personal income tax payments by 55%. The magnitude and persistence of this response is relatively unprecedented within the realm of anti-tax haven policy, and suggests a number of directions for the future research.

The second chapter focuses on the roles of charities and nonprofits in facilitating estate tax avoidance in the United States. The US tax code features a wide array of exemptions and considerations for nonprofits in its design so as to encourage charitable activity. To this end, a sizable literature has focused on estimating the precise quantitative relationship between the different tax incentives extended to the nonprofit sector in the US and the amount of observable charitable activity. However, recent work has pointed out the means by which this system of charitability tax preference has been abused for the purpose of facilitating tax evasion and avoidance (e.g. Fack and Landais, 2012). Other work has even called into question the normative desirability of nonprofit activity in light of critiques of the ability of the nonprofit sector to effectively serve as a substitute for state capacity and its potential to facilitate private benefit.

A long-standing literature has thoroughly documented a strongly positive, causal relationship between the estate tax rate, and charitable donations (which are fully deductible against the estate tax). The second chapter delves into this relationship, empirically studying recent federal and state estate tax reforms to demonstrate that nearly all of this long-standing relationship is driven by outsized responsiveness of private foundations (privately held nonprofits) as opposed to public charities (nonprofits that source their donations largely from the broader public) to the estate tax rate. The chapter also demonstrates the outsized scope of these private foundations to engage in potentially "privately-benefiting" activities in the form of payments, loans, and other financial relationships with administration and director networks. On a high level, the chapter argues that the private foundation, as a tax exempt vehicle, disproportionately facilitates tax mitigating activity while demonstrating substantial scope for fulfilling private benefit, as opposed to the supposed public benefit that serves as the premise for the broader social desirability of nonprofit entities and their tax privilege.

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While this dissertation carries my name alone, this work ultimately reflects a vast wealth of mentorship, feedback, support, and shared growth and learning from and alongside countless individuals. I thank my advisors first and foremost: Gabriel Zucman, Alan Auerbach, and Emmanuel Saez. My gratitude for their generosity and patience is profound, and I look forward to a career in which I continue to benefit from their tireless guidance and wisdom.

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Working, collaborating, and growing alongside my graduate student colleagues at UC Berkeley was undoubtledly the most rewarding aspect of graduate school. Hadar Avivi, Kayleigh Barnes, Sreerahul Kancherla, Felipe Lobel, Carl McPherson, William Morrison, Damián Vergara, and John Wieselthier, in addition to other graduate studies, all made graduate school the experience of a lifetime for me. Every day, my fellow PhD student colleagues inspire me to strive to be a better economist and a better person. Learning and growing alongside such intelligent and truly *good* people was nothing short of humbling and inspiring, and gave me a reason to be thankful each day in graduate school.

I lastly thank my large and ever-growing family for their endless love and support throughout graduate school. I couldn't have done it without them.

Chapter 1

Can countries unilaterally mitigate tax haven usage?

Evidence from Ecuadorian transaction tax data[†]

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1.1 Introduction

Can countries take unilateral action to mitigate offshore tax avoidance and increase domestic tax collections? Due to sophisticated methods of offshore tax haven use and to data information asymmetries between countries, conventional approaches to curbing offshore tax avoidance center around multinational coordination and information sharing OECD (2015)), which can prove difficult to attain. Thus, understanding the capacity of unilateral policy in mitigating offshore tax haven use is important in informing the design of effective policy aimed at mitigating offshore tax sheltering. Base erosion and profit shifting for corporations as well as offshore tax evasion on part of individuals have been identified as contributing substantially to global trends in inequality (e.g. Guyton et al. (2021); Tørsløv, Wier, and Zucman (2022)) and relative decreases in personal and corporate income tax collections (OECD (2015); J. Slemrod (2019)). Moreover, such activities have been identified and attributed in large part to the highest-earning taxpayers in the income distribution (Londoño-Vélez and Ávila-Mahecha (2022), Alstadsæter, Johannesen, Le Guern Herry, et al. (2022)), Alstadsæter, Johannesen, and Zucman (2019). More effective policies to curb offshore tax avoidance could contribute both to increasing tax collections and reducing inequality.

It is often difficult to observe offshore tax strategies (even legal) in a research setting. For this reason, recent work studying tax havens often relies on data from leaks of tax evasion service providers (Alstadsæter, Johannesen, and Zucman (2019); Londoño-Vélez and Ávila-Mahecha (2022)), governmental audit/amnesty programs (Johannesen et al. (2018); Alstadsæter, Johannesen, Le Guern Herry, et al. (2022); Kleven et al. (2011); J. Slemrod, Blumenthal, and Christian (2001)), or public data releases from international information sharing agreements (Bomaire and Le Guern Herry (2022); Menkhoff and Miethe (2019)). Due to data limitations and a lack of salient shocks, little work focuses on assessing the effectiveness of policies on part of single countries aimed at mitigating offshore tax evasion other than amnesty programs. However, amnesties do not represent ideal policies in curbing tax evasion insofar as they require infrequent and unanticipated implementation so as to remove strategic responses of taxpayers anticipating an amnesty program.

In this paper, I overcome these challenges by studying an original policy using rich administrative data in Ecuador. The Ecuadorian environment is characterized by several unique data and legislative features that allow me to study offshore tax haven use and the effectiveness of unilateral policy aimed at limited their use. In 2008, the Ecuadorian government installed a foreign transaction tax that was reshaped in 2011 specifically to penalize certain financial transactions made directly with tax havens. Comprehensive data infrastructure underpins both of these reforms: national tax authorities maintain a detailed database on the universe of transactions in and out of the Ecuadorian economy. Transaction-level data allow me to observe transaction amounts, the country of the foreign party, and transaction purpose, among many other details. The tax authorities also maintain a shareholder-company linkages database that allows me to identify the shareholders of companies connected to tax havens. I combine this unique data and legal environment to study how corporations, their shareholders, and affected individuals respond to changes in the cost of tax haven use.

Ecuador's reforms introduced significant change in the incentives of individuals to use offshore fiscal havens for tax strategic purposes. Initially introduced on December 27, 2007 at 0.5% tax per transaction for all currency exits from Ecuador, the Currency Outflows Tax (ISD) has seen several modifications to the tax base and rate depending on the transaction amount, purpose of transaction, and destination country. Since the ISD's installation, the Ecuadorian government has incrementally raised the rate until eventually reaching a statutory ad valorem rate of 5% per transaction, where the tax has remained from the end of 2011 until 2020. Starting in November 2011, the government began exempting certain financial transactions (namely dividend payments and post-tax profit distributions) to non-tax havens from the tax and charging financial transactions with tax havens at 5%.

In the first step of this analysis I study the reform affected dividend distributions to tax havens and to non-havens. I document a large drop by 66% in profit distribution payments sent to tax havens relative to dividends sent to non-havens following a rise in the outflows tax for dividends sent to tax havens from 2% to 5% and a simultaneous decrease in the outflows tax for dividends sent to non-havens from 2% to 0%. I demonstrate the robustness of this result by comparing dividend outflows to havens and non-havens separately to import payments, which were exempt from the outflows tax during the reform period and find consistent results. This response corresponds with net-of-tax elasticities of dividends sent to tax havens and to non-havens of between 13 and 40.

In the second step, I quantify changes in domestic behavior in firms exposed to the reform. I develop several measures of firm-level exposure to this anti-tax-haven reform, including 1) the share of pre-reform years in which a firm sent dividends to tax havens, 2) whether a firm was named in one of the ICIJ leaks datasets, and 3) whether a firm had at least one 10% or greater direct shareholder named in one of the ICIJ leaks datasets. I use a simple difference-in-differences design with single treatment-timing to evaluate the response of exposed firms to the reform. I find that firms on average decrease their overall dividend payments by 50%, while substantially increasing their retained earnings. Exposed firms increased their retained earnings by 600% immediately following the reform. Following this jump, affected firms gradually reduce their retained earnings back to pre-reform levels by around 10 years post-reform. The reform enacted relatively little effect in terms of reinvestment behavior for the duration of my time frame (8 years post-reform), and also resulted in no change in firms' extensive margin decision of whether to pay out dividends to shareholders. I also document some change in firm-level indicators of corporate income tax avoidance—namely a 10 percentage point drop in the probabilility that a company reports non-zero profits, although this extensive-margin response was unaccompanied by significant changes in overall corporate income tax payments by exposed firms.

The final empirical section studies the responses of individual personal income tax taxpayers exposed to the reform. I develop several measures of individual-level exposure to the outflows tax: 1) whether an individual is a 10% or greater direct shareholder of a company sending dividends to tax havens in the pre-reform period, 2) whether an individual was named in an ICIJ leaks dataset, and 3) whether an individual was a 10% or greater direct shareholder of a company named in an ICIJ leaks dataset. I estimate a simple difference-in-differences design to evaluate the effect of the outflows tax on the reporting behavior of individuals connected to tax havens compared to that of the universe of unexposed individuals. I document large, lasting responses of these individuals—largely concentrated in the very top of the earnings distribution. I find that exposed individuals increased domestic reporting by 40% and paid an additional 55% in income taxes. I document that this response was largely driven by increases in reported capital income and independent labor income, and not driven by repatriation of funds abroad or contrac wage income. As a robustness check to isolate the effect of the outflows tax as mediated through connectedness to tax havens, I implement a matching design that compares exposed individuals to high income non-tax haven user; this design yields consistent results. The implied semi-elasticity of domestic reported taxable with respect to the differential between the top marginal income tax rate and the outflows tax is around 10.

Last, I develop a model based on Piketty and Saez (2013) to study the optimality of a tax havens outflows tax considering information constraints of the tax authorities that also result in the tax affecting the price of consumption from tradable sectors.[1] The magnitude of the optimal outflows tax is on the same order of magnitude, but less than the optimal proportional income tax when failing to account for 1) the impacts of price spillovers onto tradeable industries and industruies with tradeable inputs and 2) non-tax-strategic consumer/producer welfare effects of an outflows tax. The model clearly demonstrates the dual benefits of the outflows tax in 1) inducing positive domestic reporting externalities in disincentivizing tax strategic outflows and 2) raising revenues off of funds located offshore, so that the outflows tax accomplishes the tax base widening goals of additional tax administration without the associated costs.

My work contributes to the large body of literature on personal income tax avoidance and evasion involving offshore fiscal havens (Hines and Rice (1994); Guyton et al. (2021); J. Slemrod (2019)). Alstadsæter, Johannesen, Le Guern Herry, et al. (2022) represents the most closely related work to my paper, in which the authors study the short-to-medium-run impacts of an offshore wealth disclosure program on domestic reporting (see also Johannesen et al. (2018), Bomaire and Le Guern Herry (2022)). My findings corroborate their results that individuals increase domestic reporting following changes in the incentives to locate wealth and income abroad. However, I focus on a reform that alters only the pecuniary cost of locating funds abroad, whereas previous studies analyze reforms both to the direct pecuniary incentives of locating funds offshore as well as the perceived probability of being detected by tax authorities. The more precise reform in my setting informs more sharply how taxpayers respond to anti-tax-haven reforms (Allingham and Sandmo (1972) Yitzhaki (1974)). In this respect, this work contributes provides a unique insight into taxpayer responses to direct changes in the cost of using tax havens, as opposed to individuals' perception of audit probability or tax morale pecuniary (J. Slemrod (2019)). I also document new descriptive facts on to the joint distribution of offshore fiscal haven use and income (Alstadsæter, Johannesen, and Zucman (2019)).

This work also contributes to the literature on corporate finance as pertaining to multinational profit shifting. A substantial body of work has documented how multinational corporations strategically locate profits abroad to minimize their global corporate income tax (OECD (2015); Huizinga and Laeven (2008); Bustos et al. (2022); Love (2021); Carrillo et al. (2022)). While I focus less on explicit corporate multinational profit shifting in my setting, I document firm-level responses to incentives in locating profits abroad. My results on intensive and extensive margin dividend payouts to shareholders imply a high level of firm responsiveness to the cost of paying dividends to shareholders (corroborating results from Boissel and Matray (2022)). Interestingly, I document extensive margin movement in shareholder relationships—foreign entities opting in or out of holding shares of Ecuadorian firms in response to the cost of sending dividends abroad—but no response in terms of Ecuadorian firms' overall decision of whether to pay out dividends to shareholders. Focusing on more direct measures of profit shifting, I find significant decreases in the exposed Ecuadorian

[1] In Section A.2, I develop other model results focused on optimal tax administration (based on Keen and J. Slemrod (2017)) and on the individual optimal underreporting problem (based on Allingham and Sandmo (1972) and Yitzhaki (1974). For each of these exercises I derive formulae for conceptualizing the properties of revenue-maximizing and social welfare-maximizing outflows taxes and perform numerical calibrations using reasonable environmental parameters.

firms' propensity to declare positive taxable profits domestically following increases in costs for multinational firms to locate profits in Ecuador, corroborating findings from Bilicka (2019). I also study changes in firm-level profitability that suggest profit shifting activity, although I find little response on this margin (Wier (2020), Langenmayr and Liu (2020), Tørsløv, Wier, and Zucman (2022)).

I proceed as follows. In Section 1.2, I discuss the fiscal context of Ecuador and the data environment. In Section 1.3, I present the impacts of the dividend reform on profit outflows to tax havens. Section 1.4 evaluates the responses of firms affected by the dividend reform. Section 1.5 studies the response of individuals connected to tax havens. Section 1.6 develops a model for understanding some of the tradeoffs associated with the outflows tax, how it implicates taxpayers' underreporting decisions, and how to think about the optimal design and rate of this tax. Section 1.7 concludes.

1.2 Fiscal context and data

The unique data and fiscal environments of Ecuador are closely linked and understudied.[2] In this section I explain their features, their interrelations, and the idiosyncratic national economic context that gave rise to these features.

1.2.1 Fiscal and legislative background

The Currency Outflows Tax. A lower-middle country, Ecuador Dollarized in January 2000 following a period of hyperinflation and general financial instability. However, as the global financial crisis emerged at the end of 2007, the Ecuadorian government anticipated widespread flight of US Dollars from the economy. In the absence of conventional monetary policy tools due to their Dollarization, the government ratified the *Impuesto a la Salida de Divisas* (ISD, literally *Currency Exit Tax*), a tax on all currency outflows abroad. This tax operated as a quasi-monetary policy, aimed to limit the flight of US Dollars from the Ecuadorian economy. The tax was not **initially** designed with the purpose of curbing offshore tax haven use.

Initially introduced at 0.5% tax per transaction for all currency exits from Ecuador, the outflows tax has seen several modifications to the tax base and rate. Since the ISD's installation, the Ecuadorian government incrementally raised the rate in an unanticipated manner until eventually reaching a statutory ad valorem rate of 5% per transaction, where the tax has remained since the end of 2011. Additionally, the tax authorities have modified the outflows tax base in several instances depending on the transaction amount, purpose of transaction, and destination country. Today, the outflows tax features an intricate exemption regime intended to avoid penalizing certain kinds of economic activities such as foreign direct investment into Ecuador or the import of primary materials for manufacturing purposes. The many outflows tax base and rate reforms are crucial for identifying the taxpayer response reactivity of different tax haven activities.

Starting in 2011, the Ecuadorian government began to reshape the outflows tax for the explicit

[2] Of note, Carrillo et al. (2022) also make use of the Ecuadorian data environment to study the prevalence and activity of shell companies.

purpose of mitigating offshore tax haven use. The central piece of these reforms involved an exemption on dividend payments and profit distributions to non-tax haven and a rate increase on distributions to tax havens.[3]

The Ecuadorian income tax environment closely resembles those of high income and OECD countries. Personal income is taxed on a worldwide basis and features a progressive gradation with a top marginal rate of 35%. Corporate income is taxed on a territorial basis at 25%, with small rate differences by industry.

1.2.2 Data sources

Foreign transaction data. To facilitate the collection and enforcement of the outflows tax, including the intricate exemption system, the tax authorities have installed comprehensive data infrastructure monitoring the universe of transactions that result in US Dollars entering or exiting the Ecuadorian economy, including a high level of detail on each transaction. The dataset reporting these transactions, the *Anexo - Movimiento Internacional de Divisas* (MID) represents the central piece of data architecture underlying the enforcement of the outflows tax.

The MID contains considerable information of interest on its own; the approximately 250 million observations since the MID's installation in 2008 until the end of 2019 report precise information from each individual transaction on the involved parties, amounts, date and time of transaction, purpose/nature of transaction (e.g. deposit in savings/checking account, capital investment, education payment, etc.),[4] and country of the foreign transacting party, among many other objects of interest. These data are denominated on the transaction level and can be tied to other administrative tax datasets using national identifiers.[5]

From these data I isolate currency exits and focus particularly on corporate and personal income tax filer activity.[6] Additionally, while the data assign every transaction to exclusively one of around seventy transaction purpose bins, I focus largely on financial transactions—namely dividend payments and bank account deposits, typically reserving other transaction bins as covariates for certain types of financial activities as well as other objects of interest in limited settings (e.g. credit

[3]Later reforms explicitly targeted other financial flows toward tax havens, such as credit amortization payments. However, these transactions are much less frequently borne out in the data.

[4]The MID transaction purposes field contains nearly 70 distinct categories that are listed in Table A.3.1. In absence of conventional monetary tools, the Ecuadorian central bank fulfills a statistical and financial monitoring role. As part of legal mandate, the central bank monitors the activity of financial intermediaries and enforces automatic reporting of cross-border transactions and other activities. Financial transactions and investments are universally automatically registered with the Central Bank of Ecuador to ensure accurate reporting.

[5]The MID data feature four groups of ISD taxpayers: 1) Ecuadorian individuals and 2) Ecuadorian companies which both have presence in other Ecuadorian tax datasets, and 3) foreign ISD taxpayers and 4) ISD taxpayers of unknown national origin, which cannot be linked to other Ecuadorian datasets.

[6]The MID data also report currency entrances, but the Ecuadorian tax authorities have expressed concern over the comprehensiveness and representativeness of such transactions; given that currency entries generate no tax revenues per the outflows tax, there is less monitoring infrastructure for currency entrances and little incentive compatibility for the tax authorities to invest further in currency entrance monitoring. Instead, I employ the data on currency entrances in highly stylized situations, such as counterfactuals to certain policy changes given their exempt-status from the currency outflows tax in Section 1.3 as well as probing the presence of repatriation behavior among individuals using tax havens in Section 1.5.

amortization payments). For additional environmental context, Appendix Figure A.4.3 displays the evolution of activity shares of the top 9 purpose bins by amount disaggregated between corporations and personal income tax filers.

Figure A.3.1 illustrates various metadata surrounding the MID universal transactions dataset. The MID data distinguishes four groups: corporations, individuals that file income tax, individuals with automatic income-tax filing or no income-tax filing requirements (earning near minimum wage and reporting no capital or independent labor income), and foreigners. Income tax filers and corporations represent a small proportion of the unique IDs present in the MID data but represent nearly the entirety of the corresponding economic activity. This detail is important for validating the comprehensiveness of the data environment, given the limitations to administrative data on individual earnings and activity due to the significant presence of informal labor in Ecuador (Canelas (2019)).

Personal and corporate income tax data. I make use of annual personal income tax and corporate income tax declarations from 2005 to 2019 and 2007 to 2019 respectively. Table 1.2.1 displays select descriptive statistics of individuals and companies, respectively, as according to their corresponding income tax declaration forms.[7] The Ecuadorian tax authorities maintain detailed annual-level data on taxpayers, featuring information on wealth and net worth by asset class for individual taxpayers as well reporting on financial, intra-group, and tax haven activity on part of corporations.

Importantly, while the corporate income tax dataset covers the universe formally incorporated business activity, the personal income tax declarations do not cover the entire Ecuadorian population within the formal labor market. These declarations systematically exclude individuals that either 1) have only ever reported wage income 2) pay their taxes entirely through automatic withholding, or 3) earn less than approximately twice the minimum wage. Approximately 1 million taxpayers file the manual personal income tax (form F102) every year; however, these manual filers represent only approximately 33% of the formal labor force. Because manual filing is required of individuals with salaried wage income greater than USD 1000 per month or ever having reported ownership connections to businesses, capital income, asset or liability ownership, this population of manual filers can be construed as a strictly higher income/wealth demographic than automatic filers. Indeed, Table 1.2.1 Panel (b) reports that the median income of F102 filers is approximately twice that of the national average. Moreover, the formal labor market only employs approximately 40% of workers. Finally, Ecuador sees a labor market participation rate of around 45%, so that the manual personal income tax filer dataset can be understood to capture the activity of around the top 10% of Ecuadorian citizens. However, these data are likely sufficient for the purposes of capturing the behaviors of the highest earners who likely account for the overwhelming share of tax haven activity (Alstadsæter, Johannesen, and Zucman (2019)). Individuals do not typically shift between automatic and manual filing between years.

Firm-shareholder ownership linkages data. The Ecuadorian tax authority maintains a unique dataset on annualized firm-shareholder linkages, reporting both direct and indirect, multi-tiered ownership flows along with direct and indirect ownership proportions. The data — the *Anexo de accionistas, partícipes, socios, miembros de directorio y administradores (APS)* — report the

[7] I express all real annualized monetary values in units of USD 2020; I express all transaction-level and monthly monetary values in units of USD January 2020. Nominal values are only used when explicitly noted.

Table 1.2.1: Panel (a): Corporate income tax declarations summary statistics

	Mean	SD	p5	p25	p50	p75	p95
Income	1.167e+06	4.110e+07	0	0	1482	137994	2.313e+06
Expenses	1.072e+06	3.350e+07	0	0	4120	134658	2.193e+06
Gross profit (pretax)	92820	1.100e+07	-18790	0	0	2673	102152
CIT tax base	93478	1.050e+07	0	0	0	2144	92955
CIT liability	21270	2.392e+06	0	0	0	427.3	20962
Effective CIT rate (CIT / gross profits)	0.141	0.148	0	0	0.187	0.220	0.354
CIT rate (CIT / taxable profit)	0.147	0.112	0	0	0.220	0.240	0.250
Dividends distributed (imputed)	101624	1.130e+07	0	0	0	2661	89887
Assets	1.709e+06	5.820e+07	0	384.7	11208	164860	2.488e+06
Liabilities	978181	3.490e+07	0	0	1457	76671	1.352e+06
K/L	303.6	69596	0	0	0.287	2.038	20.98
Max age in panel	6.407	4.397	1	2	6	11	13
Years per firm	6.314	4.348	1	2	5	11	13
Reporting ratio	0.989	0.0540	0.923	1	1	1	1
Unique firms	263898						
Total firm-years	1.666e+06						

This table displays summary statistics for select variables in the form F101 corporate income tax data aggregated between 2007 and 2019. All nominal values are expressed in USD 2020. Reporting ratio is defined as number of years present in the data divided by the in-panel firm age (last reporting year less first reporting year).

ownership flows of all Ecuadorian companies (both CIT-filers and non-filers).[8] The data report all shareholder relationships in and out of Ecuador (including shareholder country and type) with a greater than 2% direct controlling interest.

I use these data to identify the individual Ecuadorian shareholders of small businessnes demonstrating various kinds of ownership linkages and financial relationships with tax havens in the reform pre-period. These data begin in 2012. I employ these ownership linkages in a generally time-invariant manner primarily as a means of identifying taxpayers with an *a priori* strong individual response to the anti-tax haven reform.[9] I also use these data to identify the individual Ecuadorian shareholders of companies named in the Pandora and Panama Papers published by the International Consortium of Investigative Journalists.

Firm-shareholder dividend payment data. The government also maintains annual firm-shareholder dividend and profit distribution payment data since 2015.[10] Because of the limited time frame of this dataset and its intersection with only the latter end of the time horizon I study,

[8] Shareholder data are reported by firms against penalty of a 3% additional corporate income tax fine.
[9] Ongoing companion work studies ownership linkages with tax havens as a dependent variable.
[10] These data originate from the Ecuadorian tax administrative dataset, the *Anexo de Dividendos*.

Table 1.2.1: Panel (b): Personal income tax declarations summary statistics

	Mean	SD	p5	p25	p50	p75	p95	p99
Gross income	34279	1.041e+06	0	7151	18998	36440	105017	247115
Capital income	734.9	48933	0	0	0	0	59.81	4672
Net business profit	1089	21347	0	0	0	0	0	46258
Personal deductions	3008	8587	0	0	0	5133	13761	15923
Taxable income	17634	66053	0	2504	12175	21545	52887	111607
PIT tax base	14330	76293	0	1595	10049	15873	43785	101911
PIT obligation	1105	19450	0	0	0	190.4	3828	16305
Gross tax rate (PIT / gross income)	0.0100	0.0400	0	0	0	0	0.0500	0.150
Effective tax rate (PIT / taxable income)	0.0100	0.0300	0	0	0	0.0100	0.0800	0.150
Final tax rate (PIT / tax base)	0.0200	0.0400	0	0	0	0.0100	0.0900	0.170
Max age in panel	5.960	4.600	1	2	5	9	15	15
Years per individual	5.200	4.160	1	2	4	8	14	15
Reporting ratio	0.920	0.170	0.500	0.920	1	1	1	1
Unique individuals	1.994e+06							
Total ID-years	1.040e+07							

This table displays summary statistics for select variables in the form F102 personal income tax data aggregated between 2006 and 2019. All nominal values are expressed in USD 2020. Reporting ratio is defined as number of years present in the data divided by the in-panel taxpayer age (last reporting year less first reporting year).

I use the annual data on firm dividend payout behavior to calibrate and validate an accounting imputation for annual firm dividend payouts (detailed in Section 1.4). I use these data and my resulting imputation to study how firms substitute dividend payments between domestic, foreign non-haven, and foreign-haven recipients.

ICIJ offshore leaks data. I use publicly available data from various offshore tax strategy service providers leaks to identify the beneficial owners of shell companies. These data, leaked to and published by the International Consortium of Investigative Journalists (ICIJ), report the names of companies and the affiliated individuals connected to the creation and maintenance of shell companies. The ICIJ leaks include data from several different leak incidents, namely the Panama Papers and the Pandora Papers. The use of these offshore shell companies does not generally constitute an illegal, tax fraudulent act in of itself, but rather generally indicates the practice of offshore tax strategy.

I identify the Ecuadorian individuals and companies named in these leaks data and perform a fuzzy match against the publicly available online registry of taxpayer identification numbers to identify these individuals and firms in the tax data.

Public data on the Ecuadorian economic and fiscal environment. Lastly, I incorporate publicly available data on the Ecuadorian domestic economic environment (e.g. domestic top tax rates, price levels, GDP).[11] These data also include legislative shocks to the ISD that alter the tax's rate and base (including changes in exemptions involving transactions with fiscal havens) in order to study the price-reactivity of sending funds to offshore bank accounts and foreign corporate affiliates.

Importantly, among these data is the list of government-recognized tax havens. This list largely coincides with frequently used lists of tax havens (e.g. Hines and Rice (1994); Tørsløv, Wier, and Zucman (2022)), respectively. The biggest difference is that the Ecuadorian government also includes some microstates (e.g. Wallis and Futuna) and regions of countries (e.g. Trieste). However, these additional countries see no effectively no activity borne out in the data. The lists of countries and territories considered tax havens by the Ecuadorian government represent the definitive list of countries targeted by unilateral anti-tax haven policy. I generally treat tax haven status as time-invariant.[12]

Tax haven elusion mechanisms in Ecuador. The primary avoidance and evasion mechanisms I focus on elucidating here involve individuals' use of businesses to send yet-untaxed income to tax havens. As an illustrative example, take an Ecuadorian individual with a controlling interest in an Ecuadorian business. If the business directly pays her a dividend or profit distribution according to her ownership stake, she will pay income taxes on those earnings. The taxpayer could instead establish a business or bank account presence (either directly or indirectly) in a tax haven to receive payments either misreported as expenses or paid out as profit distributions, for example. Thus, an individual redirecting income flows originating from Ecuador abroad without declaring said income for tax purposes could evade the Ecuadorian personal income tax. From here, the individual can either continue accruing funds abroad, or can make use of a foreign credit card sourced from their tax haven bank account as a means of financing untaxed consumption.

[11]Importantly, there is minimal evolution in the domestic personal and corporate income tax environment throughout the period of interest. The top marginal personal income tax rate moved from 25 to 35% in 2008, where it has remained since; marginal tax bracket thresholds are indexed to inflation. The corporate income tax begins at 25% and decreased at a rate of 1pp per year between 2010 and 2013, settling at 22%. There are no provincial or local income taxes.

[12]The list of tax havens has seen some additions and removals of countries—mainly concerning microstates, small island nations not typically considered tax havens, and country regions that demonstrate minimal presence in the MID transaction data.

1.3 Dividend and profit distribution reform

In this section I estimate the tax-price sensitivity of dividends sent to tax havens. A reform to the outflows tax in November 2011 targeted dividends to tax havens by simultaneously raising the outflows tax rate and exempting all non-tax haven dividend payments and corporate profit distributions. In the period leading up this reform, all profit distributions abroad faced a tax rate of 2%, whereas in the post-period, dividend payments to non-fiscal-havens (e.g. the US), faced a tax rate of 0% and those sent to parties domiciled in tax havens were subject to an outflows tax rate of 5%. Simultaneously, as an anti-avoidance provision, the Ecuadorian tax authorities also extended the 5% transaction tax rate to companies domiciled in non-tax havens but featuring majority ownership by Ecuadorians. Finally, all other transaction purposes saw rate increases to 5% regardless of haven-status.

Using the universe of dividend payment and profit distribution transactions leaving Ecuador, I estimate a series of difference-in-differences designs around changes in the ISD regime. Additionally, incorporating the data on non-dividend transactions, I estimate a triple-differences design, whose third difference group includes the evolution of non-dividend transactions around the dividend reform. By carefully designing counterfactual groups of countries and transaction types, I estimate the sensitivity of dividend payments to tax havens to changes in the transaction cost. Prior evidence suggests that companies respond strongly to tax incentivize pertaining to their dividend distribution policies practices (Boissel and Matray (2022)), so a priori one might expect a similarly, if not larger response toward offshore profit distributions for tax strategic purposes.

Directing dividend payments to tax havens likely represents an instance of personal income tax strategy. Namely, individuals aiming to reduce their personal income tax base can establish recipient bank accounts and domiciles in tax havens that receive dividend payments (in addition to other kinds of payments) from related business. By distributing dividends to a related bank account domiciled in a fiscal haven and not declaring said income domestically, an individual with ownership connections with a business can shelter income from personal income taxation.[13]

1.3.1 Main dividends response design

Difference-in-difference designs. By focusing in on the evolution of funds sent to bank accounts in tax havens around changes in the cost of sending funds abroad (as observable in the MID data), I implicitly identify the responses of demand for sheltering dividends in tax havens. I estimate regressions of the following generalized difference-in-differences specification:

$$y_{ijt} = \beta_0 + \gamma 1\{Haven_j\} + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot 1\{Haven_j\} + \varepsilon_{ijt},$$

with alternate specifications including company, country, and time fixed effects. Here, y_{ijt} represents dividends (by various parameterizations) sent by company i to country j at time t. Parameter-

[13] According to the Ecuadorian firm-dividend registry, around 20% of the 500 firms publicly listed on the Guayaquil and Quito stock exchange made dividend payments to shareholders in a given year between 2015 and 2019; 2.5% of the 150,000 non-publicly listed corporate income tax-filing firms made dividend payments in a given year during the same timeframe.

Table 1.3.1: Descriptive statistics on profit distributions abroad

	Tax havens (25)	Non-havens (73)
Volume (1000s USD 2020m1)		
Mean amount per transaction	145.39	397.04
Median amount per transaction	45.44	28.71
Mean amount per id-quarter	305.12	865.12
Median amount per id-quarter	76.96	59.52
Mean amount per quarter	4860.07	107678.5
Median amount per quarter	3949.21	73838.44
Total volume	68040.91	1615177
Total volume per country	2721.64	22125.71
Number of transactions		
Mean no. transactions per id-quarter	2.10	2.18
Median no. transactions per id-quarter	1	1
Mean no. transactions per quarter	33.43	271.2
Median no. transactions per quarter	33	243
Total no. of transactions	468	4068
Total no. of transactions per country	18.72	55.73
Number of unique transactors		
Mean no. transactors per quarter	15.93	124.47
Median no. transactors per quarter	15	132
Total no. of transactors	223	1867

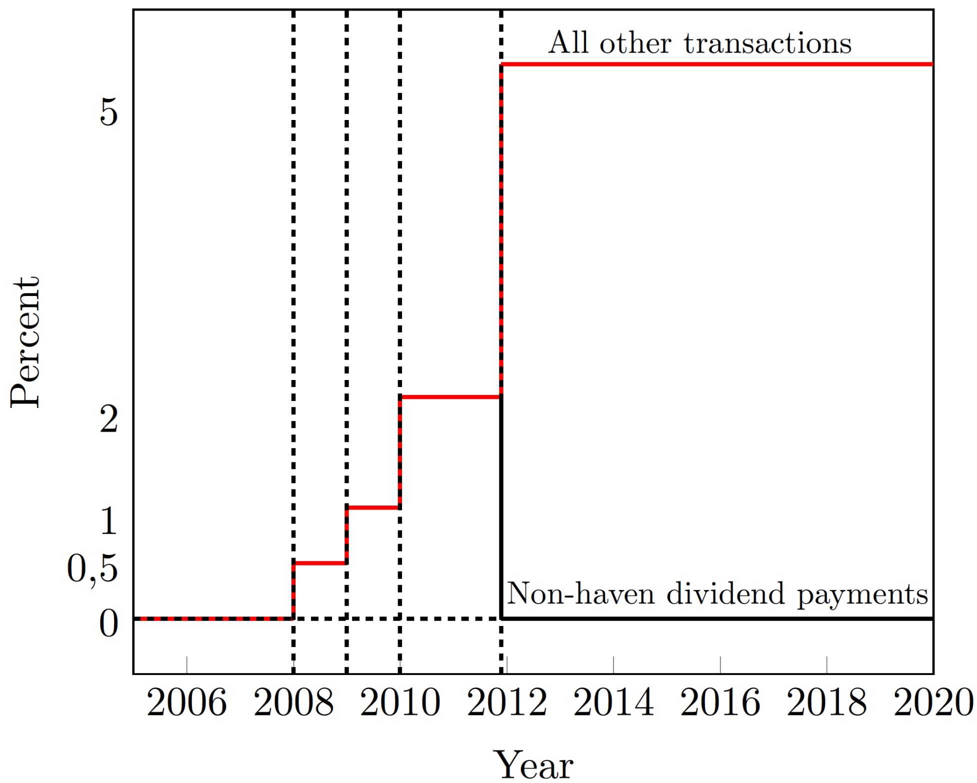
This table shows descriptive statistics aggregated from between 2008q1 and 2011q3 pertaining to how Ecuadorian taxpayers sent dividend payments and similar profit distributions abroad. Tax haven status refers whether a country was recognized in 2011 as a tax haven by the Ecuadorian government. The number in parentheses accompanying the labels "Havens" and "Non-havens" refer to the number of such countries receiving at least one transaction in the sample time frame.

iziations of dividend activity include levels and log Dollar amounts[14][15] and number of transactions as well as an indicator for whether at a non-zero number of transactions occur between a given individual and country during period t. Additional alternate designs explore aggregations to the annual level as well as disaggregations to the intensive margin of transaction behavior. In annual-

[14]Prior to aggregating transactions, I winsorize Dollar values at the 99th percentile.

[15]For all specifications that make use of a logarithm, zeros (and negative) values are mapped to missing unless noted otherwise.

Figure 1.3.1: Outflows tax rate on tax haven status and purpose



This figure displays the evolution of the statutory outflows tax rate by tax haven status of the destination country and purpose of the transaction. This illustration does not take into account smaller base modifications, such as exemptions for small amounts and select imports.

level designs, I use 2011 as the base year. For quarter-level designs, to mitigate the roles of seasonal cyclicality and short-run anticipation of the policy in light of its announcement earlier in the summer of 2011 in affecting dividend payout behavior, I use quarter 4 of 2010 as the base period.

Under the assumption of non-anticipatory responses to the reform and parallel trends in the evolution of profit distribution activity between havens and non-havens, coefficients $\{\hat{\beta}_k\}$ estimate the average treatment effect on the treated countries. Identification of these coefficients relies on quasi-random timing of the reform and a parallel trends assumption precluding differential evolution of dividend flows between tax havens and havens. Moreover, because outflows tax rates to *both* tax havens and non-havens change at the same time, the coefficients $\{\hat{\beta}_k\}$ do not identify a response to changing the of directly interacting with a tax havens, but rather the response to changing the relative cost ratio of interacting with a tax haven versus with a non-haven. Assuming a constant cost of transacting with non-haven and haven countries θ_0 and θ_1 respectively, the proportion change in the cost ratio can be expressed as

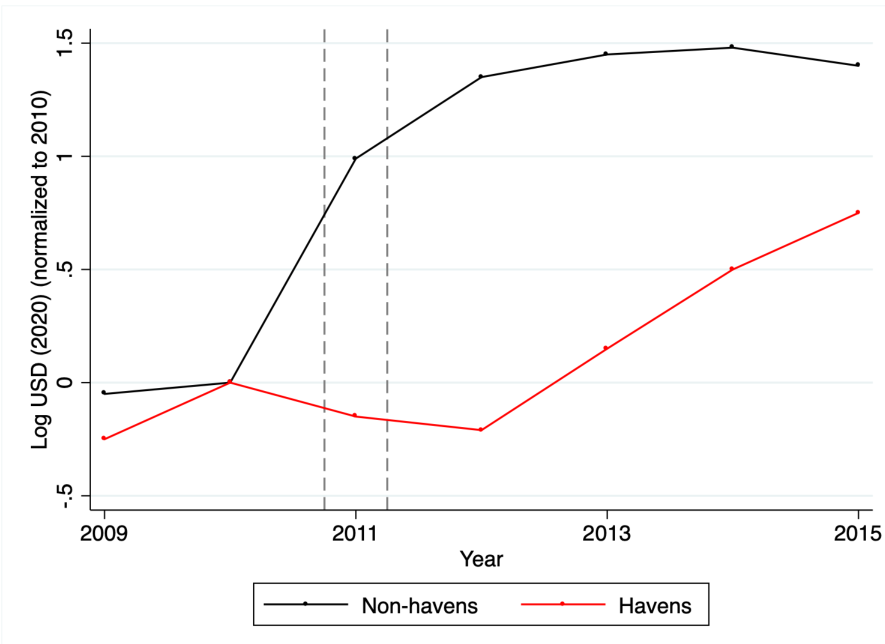
$$\frac{\frac{1.05\cdot\theta_1}{1.00\cdot\theta_0} - \frac{1.02\cdot\theta_1}{1.02\cdot\theta_0}}{\frac{1.02\cdot\theta_1}{1.02\cdot\theta_0}} = .05,$$

i.e. the reform induces a change such that the relative cost of interacting with tax haven relative to with a non-haven increases by 5%.

The validity of this design also relies on non-substitutibility of dividends and profit distribution funds between havens and non-havens. This condition is satisfied on the basis of two points. First, dividend payout policies do not allow for the payout to specific shareholders over other shareholders. That is: a firm deciding to pay out dividends cannot decide to not payout dividends to a shareholder in a tax haven and instead pay an additional distribution to shareholders domiciled in non-havens. Rather, dividends are simply paid out proportionally according to shareholder ownership. This condition means that dividend payouts can respond along two likely margins. 1) Firms can decide to reduce profit distributions (extensively and intensively); 2) Entities can exit and enter shareholder status: for example (if an Ecuadorian entity *de facto* controls the shareholders domiciled in haven- and non-haven countries), coordinating the selling off of shares by the tax-haven-domiciled entity and increasing shares owned by the non-haven entity, thereby reducing dividends paid out to tax havens in substitution to non-haven payouts. However, the anti-avoidance provision precludes this second possibility. Instead, a decrease in dividend payments to tax havens relative to non-havens reflects either a decrease in dividend payouts among companies with greater pre-period levels of tax haven dividend payouts or a closure of entities with tax haven shareholder status.

Figure 1.3.2 displays the evolution of aggregate dividend payments between tax havens and non-havens. In the pre-reform period, payments to havens and non-havens evolve identically; immediately following the reform, the difference in quarterly aggregate payments increases to around a whole log point—a near-tripling of the pre-period gap in payments between the two groups.

Figure 1.3.2: Evolution in dividend payments abroad by tax haven status of destination country



This figure displays log aggregates of USD in dividend outflows to tax havens and non-haven countries over time, with each time series normalized to 2010 levels. The two dashed lines surround 2011, the first year with exposure to the reform. The distinction of "tax haven" here refers to the group of countries considered tax havens by the Ecuadorian government.

Results. Figure 1.3.3 displays the coefficients $\{\hat{\beta}_k\}$ from the above reduced form. Panel (a) displays the response in levels USD, illustrating a large drop in quarterly dividend payments to tax havens of around USD 1000 per firm-country-quarter (around USD 25k per firm-quarter). On the intensive margin, Panel (b) shows that a decrease in the volume sent to tax havens the order of 66%. Figure A.1.4 shows these coefficients for the differences-in-differences model that includes two-way fixed effects by firm and quarter.[16]

Figure A.1.5 studies how firms respond to the reform in terms of their extensive-margin dividend payout practices. Panel (a) studies this response in levels, whereas Panel (b) studies an "intensive" version of this response. Contrasting these estimates reveals the presence of firms that cease paying out dividends to tax havens—either by ceasing any profit distribution payouts or by having their tax haven-domiciled shareholders relinquish shareholder status. However, there appears no change in the extensive-margin payout behavior among firms that do not cease paying out dividends entirely.

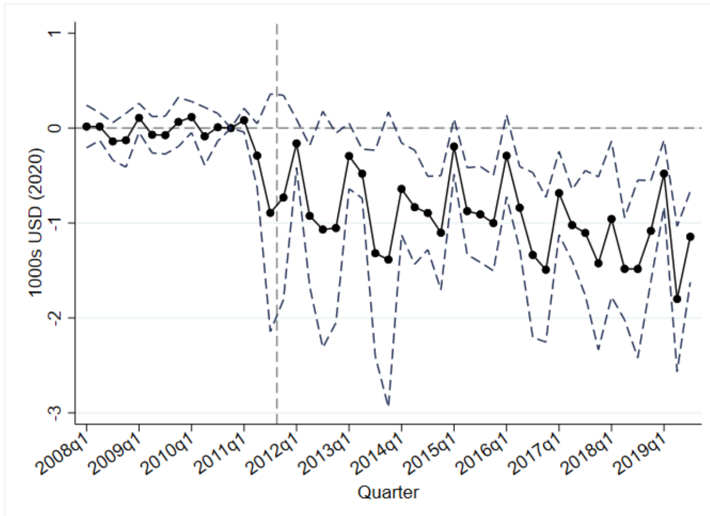
Table 1.3.2 summarizes these results, implying a high level of responsiveness of firms to changes in incentives in sending funds to tax havens. Contextualizing the percent change in dividend payment volume to tax havens with respect to the change in the relative cost of transacting with tax havens, the firm response to the reform corresponds with an elasticity of around -13: i.e. a one percent increase in the relative cost of sending funds to tax havens versus to non-havens induces a 13% decrease in funds sent to havens relative to non-havens. Interestingly, contrasting columns (7) and (8), including firm-level fixed effects eliminates the intensive-margin response in terms of of number of transactions. This contrast indicates the presence of substantial extensive margin movement—i.e. firms that entirely cease paying out dividends to shareholders in tax havens.[17] In contextualizing the external validity of this result, it is important to emphasize the role of the ISD rate increase to 5% for all other non-dividend-related transactions regardless of the tax haven status of the destination country in precluding other avoidance responses. The hypothetical absence of the 5% increase for non-dividend transactions regardless of tax haven status of the destination would open up the possibility of substitution to intragroup and other avoiding activities.

[16]Section A.1 replicates these designs aggregated to the annual level.

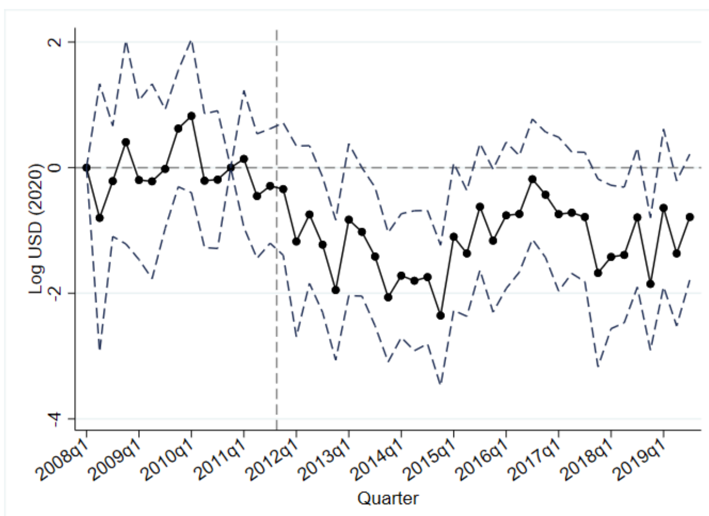
[17]This result does not indicate whether this change is precipitated by firm-level changes in extensive dividend payout policy or by changes in shareholder relationship. Section 1.4 elaborates on this response.

Figure 1.3.3: Dividend reform: tax havens versus non-havens (Volume)

(a) Levels USD



(b) Log USD



These figures display the difference-in-differences coefficients $\{\hat{\beta}_k\}_{k=2008q1}^{2019q4}$ from the reduced form

$$y_{ijt} = \beta_0 + \gamma 1\{Haven_j\} + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot 1\{Haven_j\} + \varepsilon_{ijt},$$

where y_{ijt} represents firm i's profit distributions to country j aggregated within quarter t. This specification uses 2010 quarter 4 as the base period. Dividend transactions are winsorized above the 99th percentile in transaction amount prior to aggregation. Panel (a) uses levels USD as the dependent variable; Panel (b) uses log USD. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors.

Table 1.3.2: Dividend reform: Tax havens versus non-havens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Amt.	Amt.	Log amt.	Log amt.	Transactions	Transactions	Log trans.	Log trans.
Taxhaven × Post	-235.2**	-235.2**	-1.03**	-0.48*	-0.35**	-0.35**	-0.18*	-0.047
	(35.3)	(35.3)	(0.22)	(0.21)	(0.033)	(0.033)	(0.084)	(0.11)
Taxhaven	-96.7**	-96.7**	0.20	-0.20	-0.29**	-0.29**	0.030	-0.40**
	(26.3)	(26.3)	(0.20)	(0.18)	(0.026)	(0.026)	(0.086)	(0.11)
Post	240.2**		0.42**		0.39**		0.14**	
	(35.3)		(0.077)		(0.032)		(0.028)	
Constant	102.0**	262.1**	11.3**	12.2**	0.32**	0.58**	0.60**	0.91**
	(26.3)	(18.9)	(0.079)	(0.015)	(0.029)	(0.017)	(0.029)	(0.0085)
Observations	85104	85104	7990	5845	85104	85104	7990	5845
Adjusted R^2	0.003	0.153	0.011	0.732	0.016	0.241	0.005	0.496
TWFE		X		X		X		X

Firm-clustered standard errors in parentheses

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

This table displays the estimated coefficients from the difference-in-difference model:

$$y_{ijt} = \beta_0 + \gamma Haven_j + \delta \cdot 1\{Year_t \geq 2011\} + \beta_k \cdot 1\{Year_t \geq 2011\} \cdot Haven_j + \varepsilon_{iet},$$

for individual i, country j, and quarter t. The model compares the change in tax haven dividend activity with non-haven dividend activity response to a decrease in the dividends outflows tax from 2% to 0% (while import payments remained exempt). This model is estimated on the universe of corporate foreign dividend payments aggregated to the firm-quarter-haven level. "TWFE" refers to two-way fixed effects on the firm- and year-level. The coefficients correspond with levels of firm-year-haven activity.

1.3.2 Exempt imports counterfactual

In order to estimate more precisely the price elasticity of tax haven dividend payments with respect to the transaction cost, I estimate a series of difference-in-differences designs that use corporate imports of primary and secondary goods—which have been exempt from the outflows tax since July 2008—as a counterfactual group for comparison with dividend and profit distribution outflows to tax havens.

Because the central specification in the previous section evaluates the change in dividend outflows to tax havens and non-havens following a change in the outflows tax rates to *both* groups of countries, the estimated response does not correspond with a straightforward price-sensitivity/demand response of simply altering the cost of transacting. Using exempt import transactions as a counterfactual group here therefore produces estimates of an elasticity of tax haven dividend outflows with respect to the price of offshore tax haven usage. I estimate equations of the form

$$y_{iet} = \beta_0 + \gamma Div_{ie} + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Div_{ie} + \varepsilon_{iet},$$

where Div_{ie} represents an indicator for whether firm i's transaction represents a dividend transaction. I estimate this specification on the universe of corporate import and dividend transactions to tax havens aggregated to the firm-quarter level and stratify my sample by tax haven status. Because import payments saw exemption since July 2008, since which the ISD rate increased three times, I restrict the pre-period to 2010, during which the outflows tax rate had stayed constant at 2%. I end this design at 2015, when changes to the Ecuadorian tariff regime contaminate the control group. [18]

Figure 1.3.4 (a) shows the results for this design within non-tax havens. Given a decrease of the outflows tax rate from 2% to 0%, I observe a significant increase in dividend payments to non-havens on the order of around 120%. Panel (b) shows this result for tax havens; in response to the rate increase from 2% to 5%, I observe a somewhat noisy intensive-margin response of slightly under a log-point drop in dividend payments sent to shareholders in tax havens.

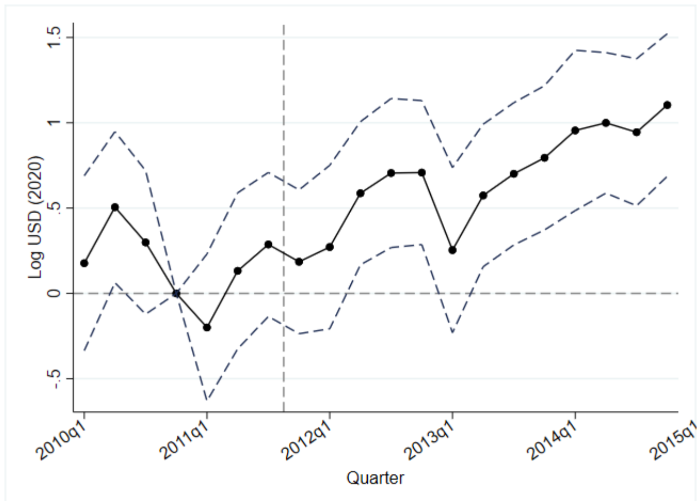
Table 1.3.3 summarizes these results. On average, divided payments to tax havens decreased by around 50% per firm and dividend payments to shareholders in non-havens increased by around 80% per firm overall. Taken with the decrease of the net-of-tax return from 0.98% to 0.95%, this drop in transaction volume corresponds with a net-of-tax elasticity of tax haven dividend payments with respect to the transaction cost of $\frac{-0.5}{\frac{0.95-0.98}{.98}} \approx 15$. The proportional response for dividend payments to non-havens implies a net-of-tax elasticity of upwards of 48. Columns (5)-(8) of both panels indicate similar responses in terms of the frequency of transactions. Importantly, including including two-way fixed effects on the ID- and quarter-level nearly entirely neutralizes the log (purely intensive-margin) results on transactions. This contrast between the unsaturated an the two-way fixed effects results suggests an important difference between dividend and non-dividend transactors that continue or cease payments to tax havens entirely.

These results illustrate a high level of responsiveness of firms to the costs of sending funds abroad. Importantly, the validity of these findings relies on a non-substitutibility between dividend payments and imports. While research on intragroup transfer pricing suggests sophisticated avoidance measures to use multinational corporate ownership linkages to reduce national tax obligations, the rules on dividend distribution likely preclude the possibility that firms increase their import payments to shareholders as means of redirecting compensatory post-tax profit distribution funds. However, it is difficult to empirically evaluate this possibility.

[18]Figure A.1.13 and Figure A.1.14 estimate this same design, however using personal bank account deposits in tax havens (along various parameterizations) as the dependent variable.

Figure 1.3.4: Dividend reform (tax havens):
Exempt imports counterfactual

(a) Non-havens (Log USD (2020)



(b) Tax havens (Log USD 2020)

These figures show the difference-in-differences coefficients from the model:

$$y_{iet} = \beta_0 + \gamma Div_{ie} + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Div_{ie} + \varepsilon_{iet},$$

that compares the change in tax haven dividend payments to the change in corporate import payments for primary and secondary goods in response to an increase in the dividends outflows tax from 2% to 5% (while import payments remained exempt). This model is estimated on the universe of corporate import and dividend transactions to tax havens aggregated to the firm-quarter level. Coefficients are estimated relative to 2010 quarter 4. Panel (a) isolates firm activity within tax havens; Panel (b) isolates activity within non-havens. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors. The dashed vertical line represents the date of the policy change.

Table 1.3.3: Foreign dividends outflows tax reform exempt imports counterfactual

Panel (a): Tax haven dividend payouts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Amt.	Amt.	Log amt.	Log amt.	Transactions	Transactions	Log trans.	Log trans.
Dividend × Post	-26.3**	-2.90	-0.75**	-0.23	-0.33**	-0.13	-0.16	0.021
	(4.42)	(86.8)	(0.20)	(0.27)	(0.041)	(0.60)	(0.095)	(0.12)
Dividend	-37.4**	-174.5+	0.74**	0.0048	-0.48**	-2.65*	-0.11	-0.50**
	(3.71)	(100.0)	(0.21)	(0.31)	(0.032)	(1.05)	(0.11)	(0.15)
Post	26.6**	69.0**	0.027	0.16**	0.33**	0.87**	0.079**	0.11**
	(4.41)	(21.4)	(0.052)	(0.049)	(0.041)	(0.24)	(0.022)	(0.026)
Constant	38.8**	253.7**	10.8**	10.8**	0.49**	3.15**	0.70**	0.74**
	(3.71)	(16.6)	(0.061)	(0.039)	(0.032)	(0.18)	(0.026)	(0.021)
Observations	140658	13484	14799	13484	140658	13484	14799	13484
Adjusted R^2	0.012	0.615	0.001	0.658	0.015	0.210	0.003	0.531
TWFE		X		X		X		X

Panel (b): Non-haven dividend payouts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Amt.	Amt.	Log amt.	Log amt.	Transactions	Transactions	Log trans.	Log trans.
Dividend × Post	-3.06	262.2*	0.61**	0.60**	-0.42**	-1.36	0.0055	0.046
	(2.49)	(127.5)	(0.11)	(0.11)	(0.030)	(1.55)	(0.039)	(0.060)
Dividend	-109.5**	-1691.5**	0.097	-1.21**	-1.77**	-21.5**	-0.77**	-1.55**
	(4.98)	(210.8)	(0.12)	(0.13)	(0.049)	(2.09)	(0.045)	(0.076)
Post	6.19*	47.8**	-0.17**	0.060**	0.43**	0.74**	0.025**	0.051**
	(2.44)	(11.0)	(0.016)	(0.014)	(0.030)	(0.11)	(0.0085)	(0.0076)
Constant	111.1**	491.5**	11.1**	11.0**	1.78**	8.81**	1.31**	1.34**
	(5.04)	(10.3)	(0.022)	(0.012)	(0.049)	(0.096)	(0.013)	(0.0068)
Observations	2025600	251000	257279	251000	2025600	251000	257279	251000
Adjusted R^2	0.008	0.702	0.004	0.708	0.021	0.703	0.013	0.694
TWFE		X		X		X		X

Firm-clustered standard errors in parentheses

$^+$ $p < .10$, * $p < .05$, ** $p < .01$

This table displays the estimated coefficients from the difference-in-difference model:

$$y_{iet} = \beta_0 + \gamma Div_{ie} + \delta \cdot 1\{Year_t \geq 2011\} + \beta_k \cdot 1\{Year_t \geq 2011\} \cdot Div_{ie} + \varepsilon_{iet},$$

for individual i, transaction purpose e, and quarter t. The model compares the change in dividend payouts activity to the change in corporate import activity in response to an increase in the dividends outflows tax from 2% to 5% for tax havens and from 2% to 0% for non-havens (while import payments remained exempt). Panel (a) uses parameterizations of tax haven dividend payouts as the dependent variable. Panel (a) uses parameterizations of non-haven dividend payouts as the dependent variable. This model is estimated on the universe of corporate import and dividend transactions abroad aggregated to the firm-quarter level. "TWFE" refers to two-way fixed effects on the firm- and quarter-level.

1.4 Firm domestic activity responses

Having documented a substantial response of cross-border dividend payments to changes in the cost of doing so, I now turn to studying how the reform affected exposed firms' post-tax activity. In particular, following the sharp decline in dividends sent to tax havens, how do exposed firms respond in terms of their overall dividend payout policies, reinvestment behavior, earnings retaining, and other related accounting measures and tax strategy indicators?

I develop several binary and continuous measures of firm-level exposure to the anti-tax haven dividend reform. My main specification employs the fraction of pre-reform years (between 2008 and 2010) in which a firm sent dividends to a tax haven.[19][20]

I identify 400 firms that sent any dividends to tax havens in the pre-reform period. Conditional on sending any dividend payments to tax havens in the pre-reform period, the average firm did so for about 1/3 of the years in the pre-reform period, with over 100 firms sending dividends to tax havens every year in the pre-reform period. Figure A.1.15 illustrates the pre-reform covariate balance of these firms compared to firms never sending to dividends to tax havens. These firms are substantially different from unexposed firms, demonstrating significantly greater size in terms of income, expenses, profits, and assets.

I focus on firm post-profit accounting measures as the main outcomes of interest. The central dependent variables include: 1) domestic dividend distribution, 2) reinvestment behavior, and 3) earnings retaining, as well as their various parameterizations. Compared to firms that never sent any dividends to shareholders domiciled in tax havens, I find that a significant proportion of exposed firms actually decrease their overall dividend payments on the intensive margin (by around 50% on average); these changes are largely unaccompanied by extensive-margin movement in dividend payout policy. Underlying these responses, I document a substantial increases in retained earnings on the order of 600%. I also find that that affected firms see small declines in reinvestment behavior, but with little proportion change or extensive margin movement.

After establishing firm's post-profit accounting measure responses, I explore developments in firm-year activity that may indicate changes in profit shifting and corporate tax avoidance behavior. As in Tørsløv, Wier, and Zucman (2022), Bilicka (2019), and Liu, Schmidt-Eisenlohr, and Guo (2020), I study as outcome variables measures of profitability, pre-tax profits, and extensive-margin taxable profit declaration.

[19] Binary indicators include 1) whether a firm sent any dividends to tax havens in the pre-reform period, 2) whether a firm declares an individual named in the ICIJ leaks as a 10% or greater direct shareholder, 3) whether a firm itself is named in the ICIJ leaks, and 4) whether a firm has *both* at least 20% owned by entities domiciled in tax havens and at least one haven-domiciled shareholder owning at least 10% of the Ecuadorian firm's shares. I identify these linkages by combining the publicly available ICIJ leaks data on affiliated individuals and firms with the Ecuadorian administrative data on firm ownership linkages. Other intensive-margin variables include 1) the log of total dividends sent to tax havens in the pre-reform period, 3) the share of direct firm ownership domiciled in tax havens, and 4) the average over pre-period years of firms profit share of dividends sent to tax havens.

[20] Accompanying the main results, I present the results from the other independent variable specification—whether a firm is named in the ICIJ leaks datasets as well as whether a firm has at least one 10% or greater direct shareholder named in the ICIJ leaks datasets—Section A.1.3.

1.4.1 Post-profit accounting measure responses

Because Ecuadorian firm-level data on dividend payments is largely lacking for years prior to 2015, I employ an imputation technique to make inference on firm-year-level dividend payout policy. I start with the accounting identity:

$$Div_{it} = Profit_{it} \; - \; Tax_{it} - Reinvestment_{it} - (Retained\ Earnings_{it} \; - \; Retained\ Earnings_{it-t}),$$

for firm i in year t. All of the variables except for dividend payments are perfectly observed in the firm-year corporate income tax return data from 2007 to 2019. I further augment this accounting identity with extensive-margin indicators for whether a firm is listed in the Ecuadorian administrative dividend payment registry (where unlisted firms are hard-coded to zero dividend payments) along with other similar extensive-margin adjustments,[21] before scaling the imputed dividend payments by a factor of 1.03 to align with aggregate dividend payments between years 2015 and 2018.

Results. To determine the impact of the anti-tax haven dividend reform on exposed firms' domestic activity, I estimate regressions of the form:

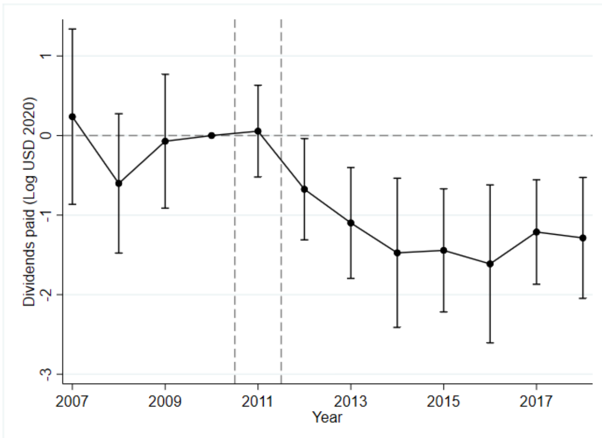
$$y_{it} = \alpha_i + \gamma HavenDividends_i + \sum_{k=2007}^{2018} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2007}^{2018} \beta_k \cdot 1\{Year_t = k\} \cdot HavenDividends_i + \varepsilon_{it},$$

for firm i in year t. This specification yields estimates of the treatment effect of the reform on exposed firms compared to the universe of unexposed firms. Because the reform occurs partially in 2011 with anticipation responses documented in the previous section, I estimate coefficients $\{\hat{\beta_k}\}$ relative to 2010.

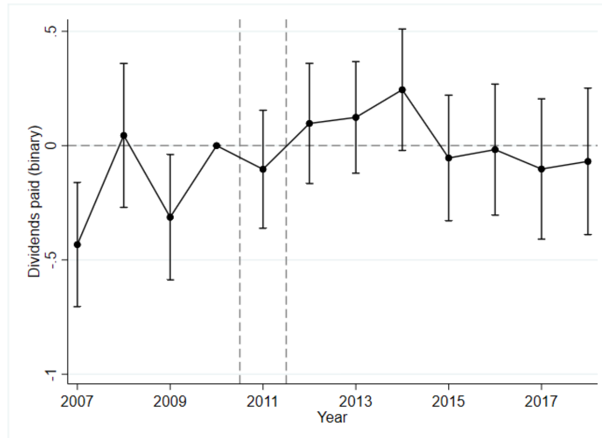
Figure 1.4.1 illustrates that following the reform, exposed firms decreased their domestic dividend payments on average by 50% on average. However, Panel (b) indicates that this change was unaccompanied by any change in extensive margin payout behavior: companies that paid out dividends to tax havens in the pre-reform period continued to pay out dividends to shareholders. This result, combined with the results from the previous section imply that the dividend reform induced changes in shareholder-firm linkages. Through its contrast with Panel (a), Panel (c) indicates the presence of important heterogeneity. In spite of the average proportional decrease in dividend payouts, estimating dividend payouts in levels USD implies little movement and possible a noisy increase likely driven by few firms.

[21] I discuss this process in greater detail in Section A.3.2.

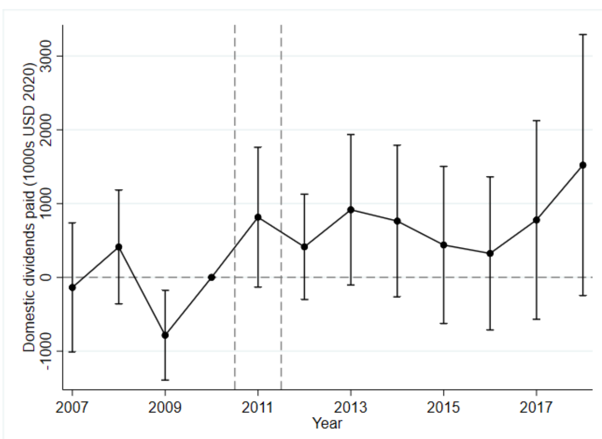
Figure 1.4.1: Firm response to the tax haven dividend reform: Dividend payout behavior



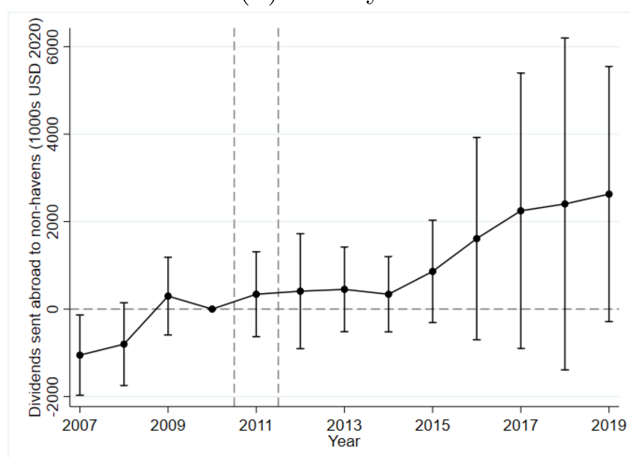
(a) Log total payouts



(b) Binary



(c) Domestic payouts



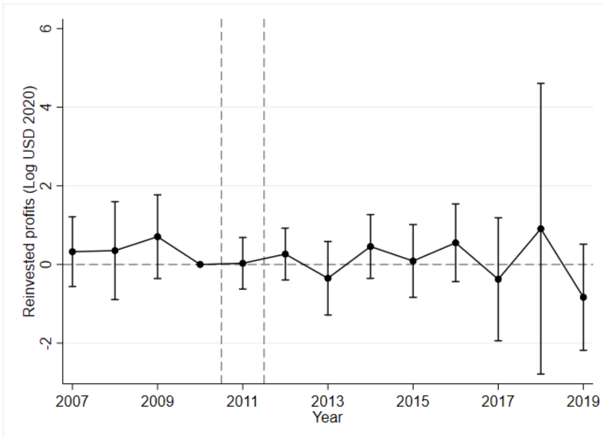
(d) Foreign non-haven payouts

These figures show the difference-in-differences coefficients estimated from the reduced form:

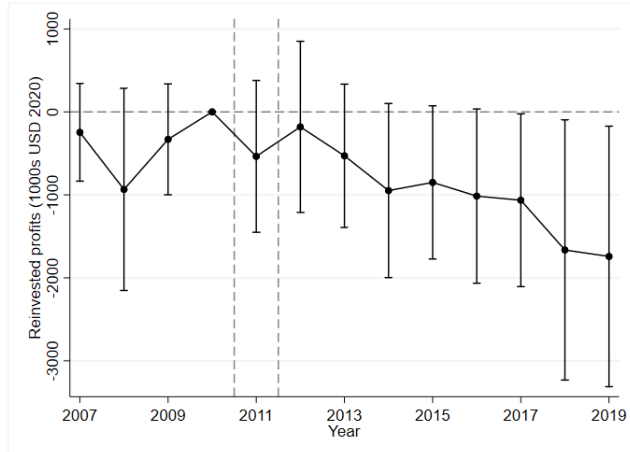
$$y_{it} = \alpha_i + \gamma HavenDividends_i + \sum_{k=2007}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2007}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot HavenDividends_i + \varepsilon_{it},$$

that evaluates the change in firm-year-level reinvestment behavior between firms "exposed" and "unexposed" to the tax haven dividend reform of 2011. $HavenDividends_i$ is defined as the share of years from 2008 to 2010 in which firm i directed profit distribution payments to shareholders domiciled in tax havens. The coefficients therefore evaluate the response of firms sending dividends to tax havens in every pre-reform year relative to those never sending dividends to tax havens. Coefficients are estimated relative to 2010. Panels (a) and (b) use levels USD (2020) sent to shareholders domestically and in foreign non-havens, respectively, as the dependent variables; Panel (c) uses log USD (2020) total profit distributions as the dependent variable; Panel (d) uses a binary indicator for any dividend payouts as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

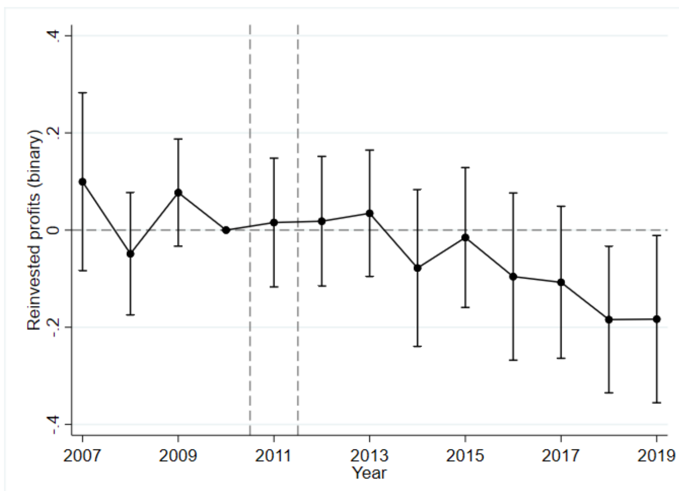
Figure 1.4.2: Firm response to the tax haven dividend reform:
Reinvestment behavior



(a) Log USD (2020)



(b) USD (2020)



(c) Binary

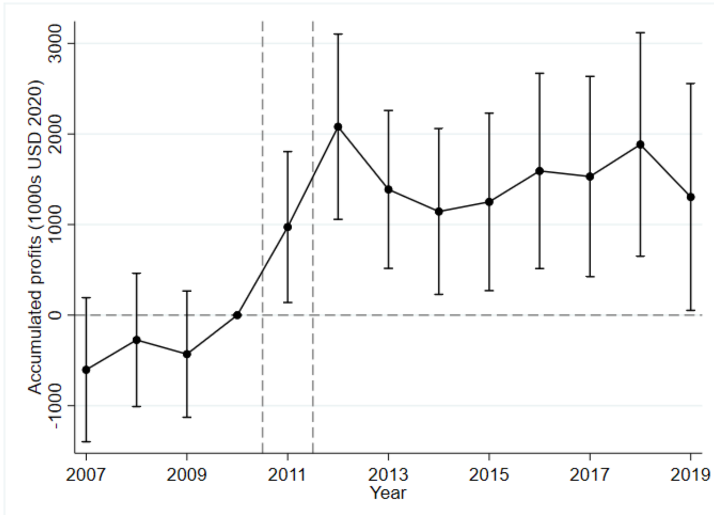
These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i + \gamma HavenDividends_i + \sum_{k=2007}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2007}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot HavenDividends_i + \varepsilon_{it},$$

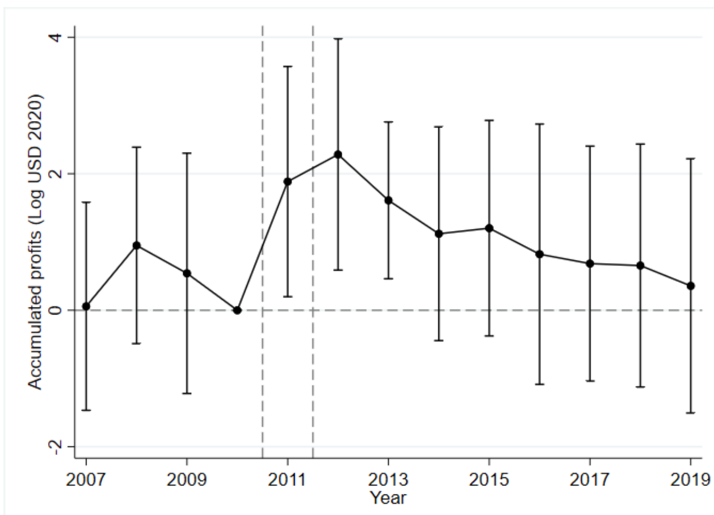
that evaluates the change in firm-year-level reinvestment behavior between firms "exposed" and "unexposed" to the tax haven dividend reform of 2011. $HavenDividends_i$ is defined as the share of years from 2008 to 2010 in which firm i directed profit distribution payments to shareholders domiciled in tax havens. The coefficients therefore evaluate the response of firms sending dividends to tax havens in every pre-reform year relative to those never sending dividends to tax havens. Coefficients are estimated relative to 2010. Panel (a) uses levels USD (2020) as the dependent variable; Panel (b) uses log USD (2020) as the dependent variable; Panel (c) uses a binary indicator for positive reinvestment as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Figure 1.4.3: Firm response to the tax haven dividend reform: Retained earnings

(a) Levels USD (2020))



(b) Log USD (2020)



These figures show the difference-in-differences coefficients from the model:

$$y_{it} = \alpha_i + \gamma HavenDividends_i + \sum_{k=2007}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2007}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot HavenDividends_i + \varepsilon_{it},$$

that evaluates the change in firm-year-level earnings retaining activity between firms "exposed" and "unexposed" to the tax haven dividend reform of 2011. $HavenDividends_i$ is defined as the share of years from 2008 to 2010 in which firm i directed profit distribution payments to shareholders domiciled in tax havens. The coefficients therefore evaluate the response of firms sending dividends to tax havens in every pre-reform year relative to those never sending dividends to tax havens. Coefficients are estimated relative to 2010. Panel (a) uses levels USD (2020) as the dependent variable; Panel (b) uses log USD (2020) as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

How do firms allocate the post-tax profits that are no longer paid out as dividends? Figure 1.4.2 demonstrates little response in terms of post-tax capital investments. Exposed firms demonstrate no intensive margin response in terms of their reinvestment behavior. Panel (b) and (c) suggest the presence of mild extensive margin decreases in post-tax reinvestment.

Given that exposed firms simultaneously decreased dividend payouts to shareholders while and not increasing post-tax capital investment, abstracting from changes in post-tax profit,[22] firms must have increased their retained cash earnings. Figure 1.4.3 confirms this accounting implication. Immediately in the post-reform period, exposed firms increased their retained cash earnings by $1.5 million per year, or around 600% relative to pre-period baseline levels. However, Panel (b) shows a gradual decline in this response back to pre-reform levels by the end of 2019. This proportion decline implies that firms are on average paying down their retained earnings in pre-tax activity. These results have important implications for precipitating changes in tax haven usage behavior of prominent shareholders redirecting income to tax havens through exposed companies. The observed decline following in exposed firms' immediate jump in retained earnings implies that may be redirecting funds to key shareholders through alternate means.

[22]Section A.1.3 explores the impacts of exposure to the anti-tax-haven reform of the outflows tax on multinational profit shifting activity.

Table 1.4.1: Exposed firms' post-tax accounting measures response
Panel (a): Dividend payout behavior

	(1) Dom. div.	(2) Dom. div.	(3) Log dom. div.	(4) Log dom. div.	(5) Div. (binary)	(6) Div. (binary)
Exposure × Post	1054.2*	964.7*	-0.056	-0.63*	-0.063	-0.078
	(424.8)	(415.8)	(0.44)	(0.32)	(0.097)	(0.099)
Exposure	1715.7**		10.2**		0.87**	
	(305.0)		(0.65)		(0.11)	
Post	22.3**	82.4**	0.043**	0.69**	0.072**	-0.16**
	(0.84)	(2.32)	(0.013)	(0.020)	(0.00089)	(0.0015)
Constant	30.6**	3.20*	8.74**	8.62**	0.20**	0.17**
	(0.74)	(1.56)	(0.013)	(0.016)	(0.00082)	(0.0013)
Observations	1214944	1185578	419002	387874	1666228	1623385
Adjusted R^2	0.007	0.335	0.003	0.709	0.006	0.223
TWFE		X		X		X

Panel (b): Profit accumulation and reinvestment

	(1) Acc. profits	(2) Acc. profits	(3) Log acc. prof.	(4) Log acc. prof.	(5) Reinv.	(6) Reinv.	(7) Reinv. (bin.)	(8) Reinv. (bin.)
Exposure × Post	1879.9**	1782.7**	1.89*	0.81	-504.9	-553.4	-0.089+	-0.095+
	(477.8)	(476.5)	(0.82)	(0.79)	(350.4)	(357.2)	(0.051)	(0.051)
Exposure	1999.6**		6.94**		1370.8*		0.26**	
	(470.8)		(1.01)		(572.3)		(0.068)	
Post	30.5**	116.4**	0.55**	1.99**	-3.06**	-8.41**	-0.0025**	-0.012**
	(0.94)	(2.55)	(0.011)	(0.016)	(0.42)	(1.03)	(0.00018)	(0.00042)
Constant	32.5**	-8.58**	8.93**	8.33**	5.05**	8.37**	0.0082**	0.013**
	(0.94)	(1.73)	(0.013)	(0.012)	(0.51)	(0.77)	(0.00019)	(0.00034)
Observations	1614911	1573725	525800	506814	1666228	1623385	1666228	1623385
Adjusted R^2	0.008	0.620	0.010	0.806	0.006	0.370	0.001	0.155
TWFE		X		X		X		X

Firm-clustered standard errors in parentheses

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

This table shows the coefficients estimated from the difference-in-differences model

$$y_{it} = \beta_0 + \gamma Exposure_i + \delta \cdot 1\{Year_t \geq 2011\} + \beta_k \cdot 1\{Year_t \geq 2011\} \cdot HavenDividends_i + \varepsilon_{it},$$

that evaluates the change in activity of exposed firms. $Exposure_i$ is defined as the share of years from 2008 to 2010 in which firm i directed profit distribution payments to shareholders domiciled in tax havens.

1.5 Individual response

I now turn to studying the responses of individuals exposed to the outflows tax as a whole. In increasing the cost of transacting with tax havens, the reform altered the incentives of individuals to engage in tax strategy by quietly redirecting domestic income flows to offshore fiscal havens. I evaluate the changes in exposed individuals' domestic income reporting. Beyond decreasing outflows to tax havens, was the reform effective in increasing domestic income tax collections?

I document large impacts on exposed individuals' domestic reporting behavior. In response to the imposition of the outflows tax, individuals connected to tax havens either through substantial ownership of a company sending dividends to tax havens in the pre-reform period or individuals affiliation with tax havens as documented from the ICIJ leaks datasets substantially increased their domestically reported income and personal income taxes paid by approximately 40% and 55% respectively.[23] I show that these responses are largely driven by increased declaration of capital income and independent labor income (e.g. self-employment, sole-proprietorship/free-practice income); although deductions also increased somewhat, this increase did not offset the increase in income declared. I also document evidence that exposed individuals see no change in their repatriation behavior or declared wage income; that is, the response documented is likely driven by claiming domestically-generated income that would have otherwise been silently sent abroad.

I develop several measures of exposure and implement a series of designs that compare the evolution in personal income tax declarations of exposed individuals to that of unexposed individuals around the outflows tax reform. My preferred measure of exposure tags individuals identified as 10% or greater direct shareholders of companies sending dividends to tax havens.[24] Other measures of exposure include 1) being named as an officer in one of the ICIJ leaks datasets, 2) being identified as a 10% or greater shareholder in a company named in one of the ICIJ leaks datasets, and 3) being a 10% or greater direct shareholder of a firm domiciled in a tax haven, in addition to other six other similarly designed measures.[25]

[23]This difference between proportion change in income reported and income taxes paid is driven by the progressivity of the income tax schedule. I also document an increase in effective tax rate faced by about 7 percentage points, from a baseline of around 12%.

[24]To tag these individuals, first I identify the firms sending profit distribution payments to tax havens in the pre-reform period using the MID currency exit transactions data. Then, I identify all of the 10% of greater direct shareholders of these companies these individuals using the Ecuadorian administrative firm-shareholder linkages database in its earliest available year, 2012. Among these shareholders, I discard companies.

[25]The remaining six measures of exposure are: 1) being named under *any* role in one of the ICIJ leaks datasets, 2) being a 10% or greater shareholder of a company either making a bank account deposit in or sending dividends to an account domiciled in a tax haven, 3) being a 10% or greater shareholder of a company with at least 20% direct shareholder ownership domiciled in tax havens, 4) being a 10% or greater shareholder of an Ecuadorian company that is a 10% or greater direct shareholder of a company domiciled in a tax haven, 5) having directed personal bank account deposits to tax haven based accounts during the pre-reform period, and 6) having directed small business profit distributions to accounts based in tax havens in the pre-reform period.

1.5.1 Personal income tax and declaration responses

My central design for eliciting individual responses to the reform involves comparing "exposed" individuals against the universe of "unexposed" personal income tax filers.[26] Following the installation of the outflows tax, sending funds to tax havens becomes more expensive, so that taxpayers otherwise diverting income streams to tax havens see increased incentive to redirect their income to declare domestically.

Figure A.1.22 illustrates the pre-reform average covariate balance between exposed and unexposed individuals, demonstrating how different the two groups are. Individuals that I tag as "connected" to tax havens declare significantly more income of all kinds than 'unconnected" individuals. For this reason, my preferred design relies on the timing of the installation of the outflows tax and parallel trends between these two groups leading up to the reform in order to identify and estimate a treatment effect on the treated.

I estimate a differences-in-differences design that compares the annual personal income tax declarations of these two groups against the year 2007 as a baseline:

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

for individual i in year t. Using 2007 as the base year, I effectively treat years 2008-2011 a "phase-in" period during which the outflows tax rate increases from 0% to 5%. Placing the base-year immediately prior to the installation of the outflows tax helps ensure that the groups satisfy parallel trend assumptions: because the outflows tax continued to change leading up to its increase from 2% to 5% in 2011, placing the base-year at 2010 in order to focus specifically on the final reform would likely result in observed violations of parallel trend assumptions. Under the assumption of parallel trends, the coefficients $\{\hat{\beta}_k\}_{k=2005}^{2019}$ estimate the effect of the outflows tax on the reporting behavior of individuals connected to tax havens.

This design sees some limitations. First, by comparing "exposed" individuals against the universe of unexposed individuals, one could argue that this design does not isolate the role of tax haven usage, but rather the effect of having international tax presence; Section A.1.4 addresses this critique via a matching design that compares "exposed", high earning individuals with other high earners that demonstrate substantial international tax presence but no documented connection to tax havens. The design yields similar results as those that follow, confirming that my main specification is consistent with isolating the effects of the outflows tax on individuals connected with tax havens.

Second, the Ecuadorian government improved the reporting of finer disaggregations of income, tax credit usage, and deductions in 2008,[27] so this design disallows studying some of their finer disaggregations of income types; alternate designs focusing on the final reform *can*, however, study

[26] I classify "unexposed" individuals as those tagged as zero for *all* ten exposure measures I develop. As a simple example, an individual that is *not* a 10% greater shareholder of a company sending dividends to a tax haven in the pre-reform period but *is* named in the ICIJ leaks *excluded* not classified as "unconnected".

[27] E.g. distinguishing capital gains income or allowable income tax deductions on housing expenses specifically

these finer income disaggregations. Third, data on currency inflows only begins in 2009, so this design cannot study whether changes in income tax declarations are accompanied by changes in foreign inflows at the initial implementation of the tax; instead, I study repatriations following the final reform of the outflows tax. Last, the installation of the currency outflows tax is also accompanied by a top marginal income tax rate increase from 25% to 35% in 2008. To immediately address this fourth issue, I implement imputations of personal income tax payments for years 2005-2007 based the post-reform schedule with the top marginal rate of 35% (with tax bracket thresholds adjusted for inflation) while assuming no behavioral or reporting responses. Importantly, the validity of this imputation does not rely the absence of *any* behavioral response, but rather the absence of any differential behavioral/reporting response between exposed and unexposed individuals.[28] I also address all of these drawbacks with an alternate design in Section A.1.4 that relies on a matching procedure to more finely identify the effects of the final reform relative to a 2010 baseline.

Results. Figure 1.5.1 shows the results of this estimation strategy. Immediately following the installation of the outflows tax, both taxable income declared and tax obligation[29] increased among the exposed group relative to the unexposed group. Moreover, with each rate increase, the magnitude of this response also increases (with the largest increase occurring upon the rate increase from 1% to 2% at the beginning of 2010).

Relative to the pre-reform period, individuals declare around USD 30,000 more per year in taxable income by the end of the "phase-in" period, resulting in around USD 10,000 more per year in taxes. Figure A.1.24 demonstrates these results on the intensive margin by plotting the log of these outcome variables. The tax base of the exposed group increased by around 40% on average, and through the progressivity of the tax system, exposed individuals paid around 55% in come taxes and saw their average tax rates increase by 7 percentage points from a baseline of approximately 12 percent. Given the sharp increase in declared income among this group, one can infer simply that the newly declared income represents income flows that were previously undisclosed. In this way, this response reflects a decrease in offshore tax evasion. Moreover, the increase in income declaration appears stable well after the final reform.

Figure 1.5.2 explores some of the sources underlying these responses. Notably, most of the taxable income increase appears attributable to increases in "net independent income"—an income aggregation composed of self-employment and non-third-party-verified labor income and capital income. Figure 1.5.3 disaggregates the net earned income sources that comprise Panel (a) of Figure 1.5.2.[30] Panels (a) and (b) indicate that nearly half of the increase in net independent income

[28] The results for personal income tax payments are identical when using the imputation versus when using realized payments, validating this assumption. Moreover, because *a priori* it would be expected to induce greater tax haven usage, this assumption could induce bias opposite to an increase in domestic reporting behavior, further validating any documented increase in domestic reporting among the exposed group.

[29] See Figure A.1.23 for the analogous result to Panel (b), however using empirical income tax obligation as the dependent variable. Figure A.1.24 shows this result using log USD values.

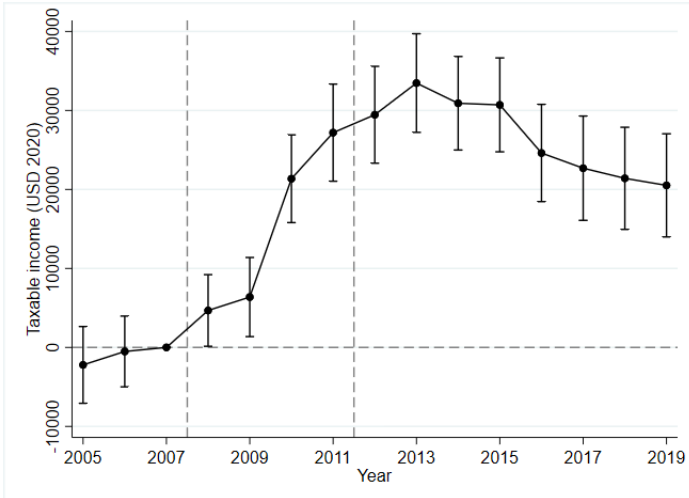
[30] Specifically, the reporting category "net independent income" is composed of the sum of 1) net independent practice income, 2) net self-employment income, 3) net asset rental income, 4) net housing rental income, 5) net agricultural income, 6) net banana agricultural income (excluded here due to the negligibility of its magnitude, but administratively disaggregated because of the existence of a separate tax regime on banana agriculture), 7) net income from other sources, and 6 other capital income sources whose disaggregations aren't frequently reported until 2008. These capital income sources are 1) dividend income, 2) business income, 3) royalty income, 4) foreign income, 5) financial returns (e.g. capital income), and 6) capital rights

is attributable to self-employment income and independent practice income, implying that capital income accounts for over half of the increase in net independent income. Panel (b) shows relatively little response in terms of contract labor income. Panels (c) and (d) show an increase in avoidance responses through use of deductions and tax credits, albeit that these increases are far exceeded by increases in reported income. These disaggregations corroborate results, such as those demonstrated in Kleven et al. (2011), that independently generated and non-third-party-verified income sources are most susceptible to misreporting.

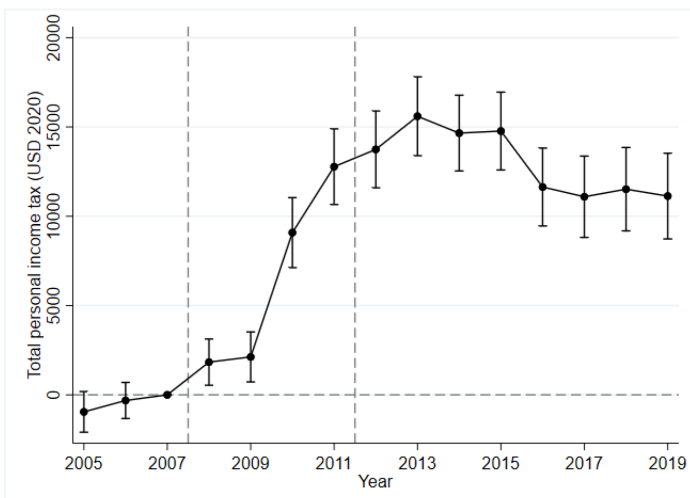
income.

Figure 1.5.1: Declared taxable income and personal income taxes

(a) Taxable income



(b) Personal income taxes

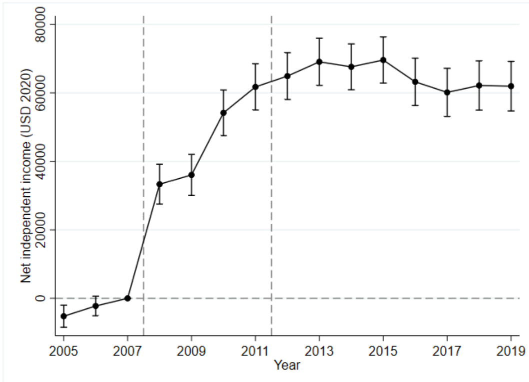


These figures show the difference-in-differences coefficients estimated from the reduced form:

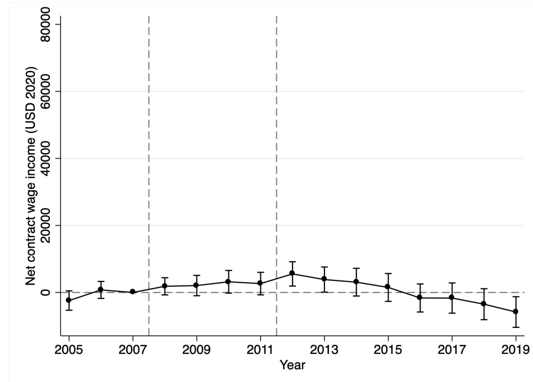
$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2007. Panel (a) uses taxable income as the dependent variable; Panel (b) uses personal income tax payments as the dependent variable, with years 2005-2007 using income tax imputations based on a top marginal rate of 35%. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

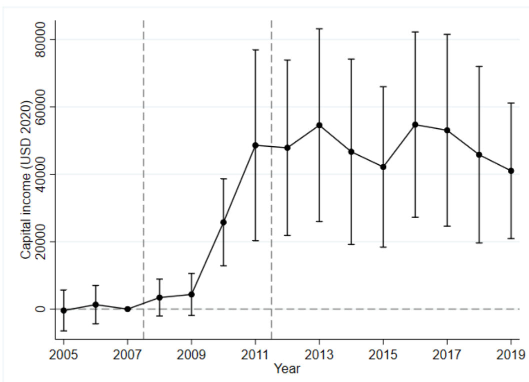
Figure 1.5.2: Evolution in specific income tax declaration items



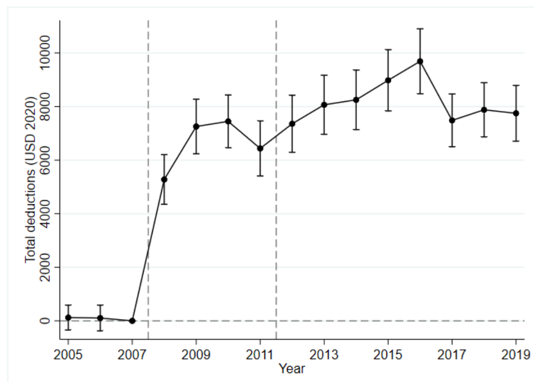
(a): Net independent income



(b): Contract labor income



(c): Capital income



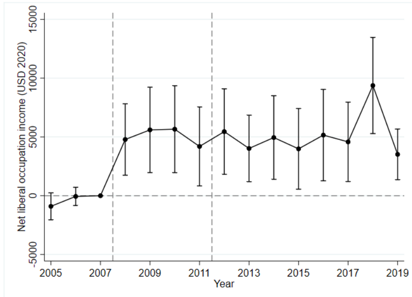
(d): Deductions

These figures show the difference-in-differences coefficients estimated from the reduced form:

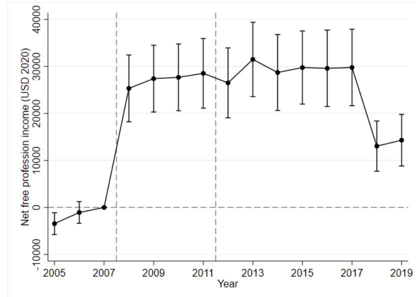
$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2010. Panel (a) uses independent income (an aggregation of capital income and self-employment income) as the dependent variable. Panel (b) uses contract employment income as the dependent variable. Panel (c) uses total capital income as the dependent variable. Panel (d) uses total income tax base deductions as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

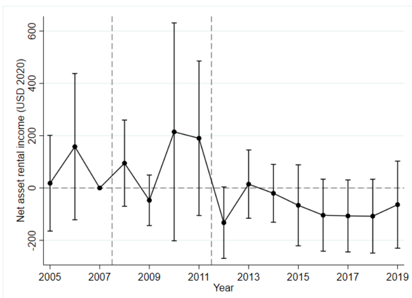
Figure 1.5.3: Net independent income breakdown



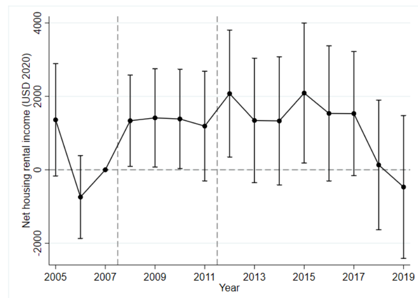
(a): Net free practice income



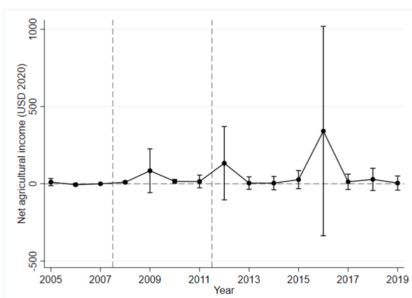
(b): Net self-employment income



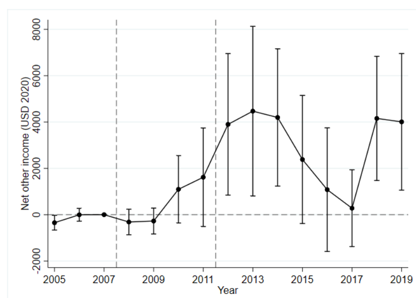
(c): Net asset rental income



(d): Net housing rental income



(e): Net agricultural income



(f): Net other income

These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2010. All of dependent variables here compose the tax base category of "Net taxable income" less the aggregation of capital income. Panel (a) uses independent practice income (called "liberal occupation"). Panel (b) uses self-employment income (called "free profession"). Panel (c) uses net asset rental income. Panel (d) net housing rental income. Panel (e) uses net agricultural income. Panel (f) uses net income from "other" sources. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

Table 1.5.1: Exposed individuals' income and personal income tax response

Panel (a): Tax base and income taxes

	(1) Taxable inc.	(2) Taxable inc.	(3) PIT	(4) PIT	(5) Avg. tax rate	(6) Avg. tax rate
Exposed × Post	24,887**	27,694**	8,561**	10,584.7**	0.07**	0.08**
	(2694)	(2620)	(1028)	(1009.4)	(0.007)	(0.007)
Exposed × Phase-in	8,558**	11,813**	831	1,984.5**	0.03**	0.035**
	(2302)	(2134)	(759)	(709.2)	(0.005)	(0.005)
Post	3,820**	7,629**	-388**	135.8**	-0.004**	-0.0001
	(26)	(41.9)	(6.13)	(9.61)	(0.0001)	(0.0002)
Phase-in	3,353**	4,666**	-300**	-43.1**	0.0005**	0.0001**
	(24.7)	(38.8)	(5.27)	(8.48)	(0.0001)	(0.0002)
Exposed	54,748**		14,624.1**		0.097**	
	(2781.6)		(1014.4)		(0.006)	
Constant	11,920**	9,874**	1,125**	717**	0.02**	0.015**
	(26.7)	(35.2)	(6.44)	(8.12)	(0.0001)	(0.0001)
Observations	10,286,366	9,845,895	10,286,366	9,845,895	8,777,135	8,363,153
Adjusted R^2	0.011	0.602	0.016	0.550	0.010	0.481
TWFE		X		X		X

ID-clustered standard errors in parentheses

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

Panel (b): Income type breakdown

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Indep. lab. inc.	Indep. lab. inc.	Contract lab. inc.	Contract lab. inc.	Capital inc.	Capital inc.	Indep. oth. inc.	Indep. oth. inc.	Exempt inc.	Exempt inc.
Exposed × Post	26594.5**	32680.5**	822.9	1104.8	37891.5**	36945.4**	4380.8**	5843.0**	-4224.1**	-2981.5+
	(2718.5)	(3438.9)	(1861.6)	(1848.1)	(2110.9)	(2445.0)	(1226.5)	(1464.0)	(1547.3)	(1575.0)
Exposed × Phase-in	30367.0**	33878.3**	1219.4	2881.2*	12416.7**	12049.7**	1368.4*	1766.2*	4449.3**	5381.1**
	(3203.7)	(3606.0)	(1534.0)	(1466.7)	(1402.5)	(1651.2)	(652.2)	(742.6)	(1324.8)	(1312.1)
Post	2421.1**	4040.3**	4764.8**	4054.0**	4128.0**	7410.8**	219.0**	681.9**	1186.6**	2506.3**
	(8.52)	(24.1)	(17.5)	(26.1)	(9.81)	(28.3)	(6.91)	(17.0)	(4.39)	(11.0)
Phase-in	3300.7**	4506.4**	3435.9**	1730.0**	4283.5**	6558.3**	7.02	267.0**	171.2**	107.9**
	(15.3)	(26.4)	(16.2)	(21.8)	(14.1)	(27.7)	(4.50)	(10.5)	(4.07)	(7.63)
Exposed	2033.7**		20801.8**		320.3		3512.5**		14288.4**	
	(776.2)		(1904.3)		(282.1)		(634.2)		(1594.1)	
Constant	266.8**	-1176.7**	3447.9**	4772.1**	339.7**	-2025.4**	411.8**	72.0**	172.2**	-23.1**
	(3.19)	(20.8)	(16.7)	(20.8)	(4.29)	(22.7)	(5.46)	(12.7)	(3.68)	(7.12)
Observations	10286366	9845895	10286366	9845895	10286366	9845895	10286366	9845895	10286366	9845895
Adjusted R^2	0.008	0.380	0.012	0.722	0.013	0.343	0.000	0.106	0.012	0.193
TWFE		X		X		X		X		X

ID-clustered standard errors in parentheses

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

This table shows the coefficients estimated from the difference-in-differences model

$$y_{it} = \beta_0 + \gamma Exposure_i + \delta_1 Phase\text{-}in_t + \delta_2 Post_t + \beta_1 Exposure_i \cdot Phase\text{-}in_t + \beta_2 Exposure_i Post_t + \varepsilon_{it},$$

that evaluates the change in activity of exposed individuals relative to the universe of unexposed individuals. $Exposure_i$ is an indicator for whether an individual is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period. $Phase\text{-}in$ indicates $Year_t \geq 2008 \cap Year_t \leq 2010$. $Post$ indicates $Year_t \geq 2011$. Panel (b) uses as outcome variables levels of specific income disaggregations. "Empl. inc." represents income earned from contract employment. "Indep. inc" indicates the aggregation of capital income and self-employment income.

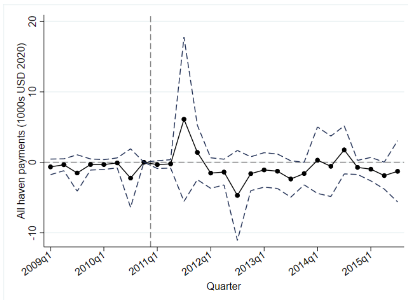
Repatriation and currency entrance responses

As an additional object of inquiry, I turn to studying any change in repatriation behavior among exposed individuals. Are some of the changes in increased declared income sustained by increases in currency entrances from abroad?

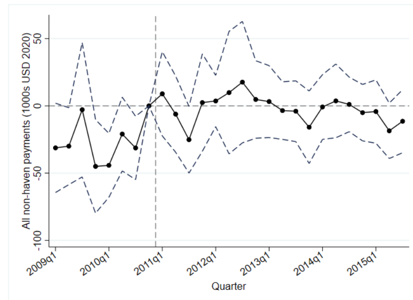
I use the MID data on currency entrances to answer this question. As discussed in Section 1.2.2, while MID data on currency *exits* demonstrates reliability, there does not exist any incentive compatibility for the government to maintain reliable data on currency entrances, as such entrances do not generate any outflows tax revenue. For this reason, the entrances data sees substantial reporting gaps by subject matter and by time period (but *not* strictly by foreign country of the transaction-originating party). Despite these limitations, if these instances of censoring occur in a manner orthogonal to individuals' connectedness to tax havens, the inflows data can inform to what extent changes in individual reporting are driven by repatriation behavior. Additionally, inflows data only begins with greater reliability starting 2009.

I run regressions of identical structure as Section 1.5.1, however on the quarter-level exploiting the disaggregated structure of the MID currency entrances data.

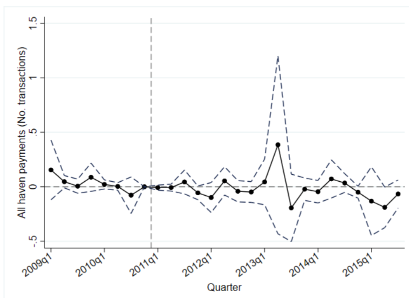
Figure 1.5.4: Total currency entrances (by tax haven status)



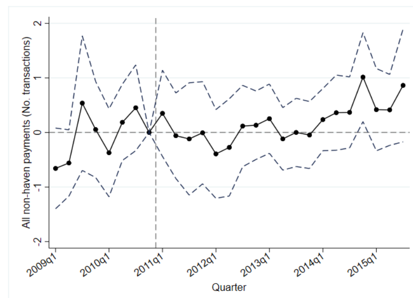
(a): Havens USD (2020)



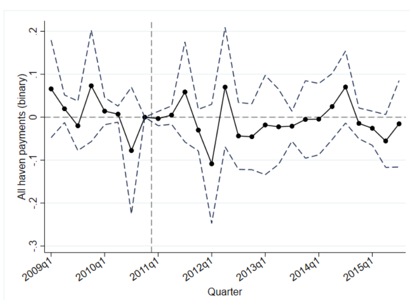
(b): Non-havens USD (2020)



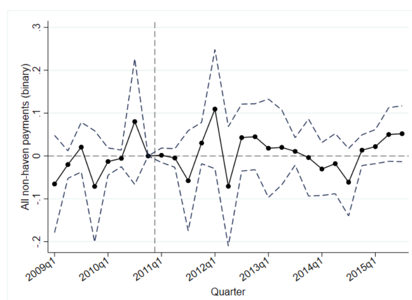
(c): Havens no. transactions



(d): Non-havens no. transactions



(e): Any haven transaction



(f): Any non-haven transaction

These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i \sum_{k=2009q1}^{2015q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2009q1}^{2015q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-quarter-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2010. Panels (a) and (b) use levels 1000s USD (2020) from as the dependent variable. Panels (c) and (d) use the number of currency entrances as the dependent variable. Panels (e) and (f) use a binary variable indicating the presence of *any* currency entrance as the dependent variable. All of the dependent variables are constructed from the MID entrance data aggregated to the taxpayer-quarter level. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Figure 1.5.4 shows precisely estimated null responses on several counts, demonstrating no significant response on part of exposed individuals in terms of volume of funds received and number of receiving transactions from both tax havens and non-havens. Panel (b) illustrates a very noisily estimated increase in volume received from non-havens between the pre- and post-reform periods by around USD 25,000; however, this timing of this response does not align with the timing of the reform and is unaccompanied by any increase in the number of transactions from non-havens.[31] The final panels show no change in extensive margin behavior in terms of whether individuals receive any funds from tax havens, precluding both a sustained repatriation response as well as an immediate repatriation response to the tax haven reform.

The null results here suggest that the responses documented in Section A.1.4 are not driven by repatriation behavior, but rather by redirecting domestically sourced income. In this respect, exposed taxpayers that were *quietly* locating funds abroad prior to the reform likely continued to maintain their abroad wealth, but no longer redirecting Ecuadorian income flows. The lack of repatriation response aligns with the absence of change in incentives to repatriate funds from abroad, as the reform featured no taxation or tax-penalty amnesties, although this null response does not preclude the presence of indirect repatriation through companies.

1.6 The optimal outflows tax

Given the evident success of the outflows tax in mitigating offshore tax evasion, how high should the optimal outflows tax be set? As a standard optimal tax result, when the government has access to a linear income tax as well as the ability to linearly tax avoidance and underreporting activities, a revenue-maximizing tax administration rate will set the tax on underreporting activity equal to the income tax (Piketty and Saez (2013); Feldstein (1999); Chetty (2009)).[32] However, (considering the outflows tax as assuming the role of the linear tax on avoidance/underreporting activity), the Ecuadorian environment features an outflows tax approximately an order of magnitude lower than the top marginal income tax rate. I develop a simple adaptation of the model environment of Piketty and Saez (2013) to demonstrate that this discrepancy can be rationalized by the negative welfare effects of price spillovers of the outflows tax to exposed goods and services in tradeable industries.[33]

The intuition for the optimal tax result is straightforward. In absence of information constrains and enforcement frictions, the outflows tax would only affect tax strategic uses of tax havens. However, in the presence of information constraints, the tax affects perfectly non-tax-strategic consumption—namely imported goods and goods produced using intermediate inputs that are affected by the tax ("false positives"). The price spillovers of the outflows tax generates negative welfare externalities that drives the optimal outflows tax rate lower than the linear income tax rate.

[31] Replications of this specification using other independent variables and designs in Figure A.1.31, Figure A.1.38, and Figure A.1.48 also fail to document a significant change in currency entrances behavior.

[32] This result holds similarly for a social welfare-maximizing social planner when 1) social marginal welfare weights are decreasing in income, and 2) underreporting activity increases in income.

[33] I refrain from modeling the negative corporate income tax collection spillovers of the outflows tax, which are second order (where the outflows tax distorts inputs, which weakly lowers corporate profits, which serves as the corporate income tax base. I also do not consider here either 1) the excise-tax-like properties of the outflows tax which generates revenue on non-tax-strategic consumption sourced from tax havens and abroad not 2) the impacts of the outflows tax on domestically declared capital income generated abroad.

Consider an economy with two types of agents. All agents generate utility composite in domestic consumption c_d and consumption exposed to the outflows tax c_n and disutility in labor supply $\psi(y)$, which generates labor income. All agents also receive a lump sum demogrant R shared equally among the population funded through taxation. Agents of type 1 comprise a proportion $(1-\lambda)$ of the population, maximizing

$$U^1(c_d^1, c_n^1, y^1) = u(c_d^1, c_n^1) - \psi(y^1) \tag{1.1}$$

such that

$$c_d^1 + p_n(\gamma)c_n^1 = (1-\tau)y^1 + R. \tag{1.2}$$

Here, domestic consumption serves as the numeraire, and the price of the exposed good c_n is expressed as a function of the outflows tax.[34] Composite consumption utility $u(c_d, c_n)$ concavely increases in both of its arguments and $\psi(\cdot)$ convexly increases in labor income earned.

Agents of type two comprise a proportion λ of the population and have access to an underreporting technology χ that allows them to circumvent labor income taxation, so that their labor income tax base z can be written as $z^2 = y^2 - \chi^2$. They face disutility cost $d(\chi^2)$ of underreporting, where $d(\cdot)$ is convexly increasing. Underreporting activity in this setting can be interpreted as directing funds abroad as outflows and is taxed at a linear rate γ. The utility maximization problem of agents of type 2 can be expressed as:

$$U^2(c_d^2, c_n^2, y^2, \chi^2) = u(c_d^2, c_n^2) - \psi(y^2) - d(\chi^2) \tag{1.3}$$

such that

$$c_d^2 + p_n(\gamma)c_n^2 = (1-\tau)y^2 + (\tau-\gamma)\chi^2 + R. \tag{1.4}$$

Agents' utility-maximizing decisions are characterized by the following envelope conditions:

$$(1-\tau)\mu^i = \psi'(y^i) \tag{1.5}$$

$$(\tau-\gamma)\mu^2 = d'(\chi^2), \tag{1.6}$$

where μ^i represents the Lagrange multiplier on the budget constraint of an agent of type i. Both types allocate consumption across goods such that $u_{c_d^i} = \frac{u_{c_n^i}}{p_n(\gamma)}$.

The demogrant, funded through total tax collections and allocated equally among the population of measure one, can be expressed as

$$R = (1-\lambda)\tau y^1 + \lambda(\tau z^2 + \gamma\chi^2) \tag{1.7}$$

$$= \tau Z + \gamma\chi, \tag{1.8}$$

where $Z := (1-\lambda)y^1 + \lambda z^2$, since type 1 agents do not have access to the underreporting technology so that $y^1 \equiv z^1$. Here, $\chi := (1-\lambda)\chi^1 + \lambda\chi^2 = \lambda\chi^2$, since $\chi^1 \equiv 0$. The fiscal environment induces Marshalling earnings functions $y^i(1-\tau, R, p_n(\gamma))$, defining an analogous aggregate earnings function $Y = Y(1-\tau, R, p_n(\gamma))$. Underreporting amount χ is an increasing function of the tax rate differential $\tau-\gamma$, so that $\chi = \chi(\tau-\gamma)$. These functions define an aggregate reported earnings function $Z = Z(1-\tau, \gamma, p_n(\gamma))$.

[34] I refrain from modeling the microfoundations of the pass-through of the outflows tax to producers of x_n. See Fajgelbaum et al. (2019) and Edmond, Midrigan, and Xu (2015).

1.6.1 Optimal tax rates

A social planner maximizes

$$SWF = (1-\lambda)\omega^1 G(U^1(c_d^1, c_n^1, y^1)) + \lambda\omega^2 G(U^2(c_d^2, c_n^2, y^2, \chi^2)), \tag{1.9}$$

for Pareto weights $\omega^i \geq 0$. $G(\cdot)$ is a concavely increasing social welfare function. The social planner optimizes the linear income tax rate and the outflows tax rate to maximizes social welfare.

Optimizing the linear income tax rate by differentiating and applying the envelope theorem results in the equivalence:

$$\frac{\partial SWF}{\partial \tau} = 0 \implies \frac{\partial R}{\partial \tau} = (1-\lambda)g^1 z^1 + \lambda g^2 z^2, \tag{1.10}$$

where g^i is the normalized social marginal welfare weight of an agent of type i defined as

$$g^i := \frac{\mu^i \omega^i G'(U^i)}{(1-\lambda)\mu^1\omega^1 G'(U^1) + \lambda\mu^2\omega^2 G'(U^2)}.$$

Further developing the social planner's first order condition in τ yields

$$1 - \frac{\tau}{1-\tau}e + \frac{\gamma}{1-\tau} \cdot sh_Z^2 \cdot (e_2 - \frac{y^2}{z^2}e_Y^2) = \frac{(1-\lambda)g^1 z^1 + \lambda g^2 z^2}{Z} := \bar{g}, \tag{1.11}$$

where $e = \frac{1-\tau}{Z}\frac{\partial Z}{\partial(1-\tau)} = \frac{Y}{Z}\frac{\partial Y}{\partial(1-\tau)} \cdot \frac{1-\tau}{Y} + \frac{1-\tau}{Z}\frac{\partial \chi}{\partial(\tau-\gamma)} \geq \frac{Y}{Z}e_Y$, $e_Y = \frac{1-\tau}{Y}\frac{\partial Y}{\partial(1-\tau)}$, and $sh_Z^2 = \frac{\lambda z^2}{Z}$.

Rearranging yields the optimal linear income tax

$$\tau^* = \frac{1 - \bar{g} + \gamma sh_Z^2(e^2 - \frac{y^2}{z^2}e_y^2)}{1-\bar{g}+e} = \frac{1-\bar{g}+\gamma(e - \frac{Y}{Z}e_Y)}{1-\bar{g}+e} \tag{1.12}$$

This result generalizes the revenue-maximizing linear income tax rate derived in Piketty and Saez (2013) for broader social welfare considerations.[35] In particular, the optimal linear income tax in this setting consists of the sum of the standard optimal linear income tax rate a second piece that reflects the importance and tax-sensitivity of underreporting relative to labor earnings.

Deriving the optimal outflows tax involves accounting for the spillover effects of the outflows tax onto to the price of tradable consumption $p_n(\gamma)$ as well as labor supply effects from changing price levels. Differentiating the social welfare function, applying envelope conditions, and setting equal to zero gives:

$$\frac{\partial R}{\partial \gamma} = (1-\lambda)g^1 c_n^1 \frac{\partial p_n(\gamma)}{\partial \gamma} + \lambda g^2 (c_n^2 \frac{\partial p_n(\gamma)}{\partial \gamma} + \chi^2) \tag{1.13}$$

$$\implies \gamma^* = \tau - \frac{1}{\tilde{e}_{\chi,\tau-\gamma}} \cdot \left(\tilde{e}_{p_n(\gamma),\gamma} \frac{Y}{\chi} \left(\bar{g}_{c_n} \frac{\mathcal{C}_n}{Y} - \tau\varepsilon_{Y,p_n(\gamma)} \right) + \lambda g^2 - 1 \right), \tag{1.14}$$

[35] Additionally, the first part of Equation 1.12 gives an expression that more granularly considers the behavioral characteristics of the specific group of underreporting taxpayers.

for semi-elasticities $\tilde{e}_{a,b} := \frac{\partial a}{\partial b}\frac{1}{a}$, by-type expenditure on the tradable good $\mathcal{C}_n^i := c_n^i p_n(\gamma)$, and $\bar{g}_{\mathcal{C}_n} := g^1 sh^1_{\mathcal{C}_n} + g^2 sh^2_{\mathcal{C}_n} = \frac{(1-\lambda)g^1\mathcal{C}_n^1+\lambda g^2\mathcal{C}_n^2}{\mathcal{C}_n}$.

This result gives an expression for an optimal linear tax on underreporting activities that is less than the linear income tax. This difference results from the welfare considerations of price spillovers of the outflows tax, which affects consumer welfare and labor supply. Observe that Equation 1.13 nests the more general and well-known optimal linear underreporting tax conditions (e.g. ignoring welfarist considerations and labor supply impacts of the outflows tax yields an optimal tax rate $\gamma = \tau$).[36]

Equation 1.14 gives intuition for how optimal outflows tax rate differs from the linear income tax rate based on environmental parameters. First, the semi-elasticity $\tilde{e}_{\chi,\tau-\gamma}$ determines a somewhat counterintuitive elasticity rule: the outflows tax *increases* in the sensitivity of underreporting taxpayers to the tax rate differential. However, the intuition is simple: a greater elasticity implies that taxpayers will engage in substantial underreporting at even small gaps of $\tau - \gamma$, which drives the optimal outflows tax higher, closer to eliminating the income-underreporting tax rate differential.

The second piece, $-\tilde{e}_{p_n(\gamma),\gamma}\frac{Y}{\chi}\bar{g}_{\mathcal{C}_n}\frac{\mathcal{C}_n}{Y}$ reflects the negative welfare impact of prices spillovers of the outflows tax onto the tradable-industry good weighted by both the first stage of how much the tradable-industry good price actually responds to the outflows tax and the aggregate importance of income underreporting. The third piece, $\tilde{e}_{p_n(\gamma),\gamma}\frac{Y}{\chi}\tau\varepsilon_{Y,p_n(\gamma)}$ reflects the impact of price changes on tax collections through labor income taxation (with similar weighting as to the second piece). However, the labor supply impacts of the price change could be positive or negative based on the complementarity of substitutibility of the tradable-industry good with leisure. The last piece λg^2 reflects the negative welfare impact of the outflows tax on underreporters.[37]

1.6.2 Calibration

To build some numerical intuition for this expression, assume the following simplifications for calibration purposes:

1. $\lambda = 0.005$ (i.e. half a percent of the population have access to the underreporting technology)
2. $\omega^2 = 0$, so that $g^1 = 1$ (i.e. the government does not consider the welfare of underreporters)
3. There is no labor supply response to tradable price increase ($\varepsilon_{Y,p_n(\gamma)} = 0$)
4. $Y/\chi = 24$
5. $\mathcal{C}_n/Y = 0.17$, in line with empirically-realized imports-to-GDP ratios.
6. $\frac{\mathcal{C}_n^1}{\mathcal{C}^n} = 0.95$, i.e. that the 0.5% of tax haven users represent a share of tradable consumption outsized by a factor of 10.

[36]Letting $\tilde{e}_{p_n(\gamma),\gamma} \equiv 0$ in Equation 1.14 does not yield this result, as it would involve implicitly dividing by zero.

[37]See Section A.2.1 for the fully simplified expressions for τ^* and γ^* in joint optimum.

7. The ad valorem outflows tax induces a price structure for the tradable good $p_n(\gamma) = (1 + \theta\gamma)p$, for some assumed composite pass-through rate $\theta \geq 0$, so that the semi price elasticity $\tilde{e}_{p_n(\gamma),\gamma} = \frac{\theta}{1+\theta\gamma}$. I assume that half of the tax is passed onto the price of the tradable good (i.e. $\theta = 0.5$) so that $\tilde{e}_{p_n(\gamma),\gamma} = \frac{1}{2+\gamma}$.[38]

These simplifications induce a quadratic structure of the optimal outflows tax with the following solutions:

$$\gamma^* = \frac{-(1 - \frac{1}{2\tilde{e}_\chi} - \frac{\tau}{2}) \pm \sqrt{(1 - \frac{1}{2\tilde{e}_\chi} - \frac{\tau}{2})^2 + 2(\tau - \frac{0.93}{\tilde{e}_\chi})}}{2 \cdot \frac{1}{2}} \tag{1.15}$$

Assuming values of $\tau = 0.35$[39] and $\tilde{e}_\chi = \frac{-40\%}{-.05} = 8$ yields an estimated optimal outflows tax of 25% (discarding the alternate negative solution). Effective income tax rates average to around $2 - 3\%$ for the median taxpayer and around 15% for tax haven users, which would imply an optimal rate quite close to the empirically implemented rate of 5%.

1.7 Conclusion

I study the effects of the Ecuadorian unilateral reform that raised the cost of transacting with tax havens. The unique data and legislative environment in Ecuador allow me to study the effects of this reform from many angles so as to evaluate the effectiveness of the reform in both lowering haven outflows and raising domestic tax collections as well as the effects of the reform on different kinds of taxpayers.

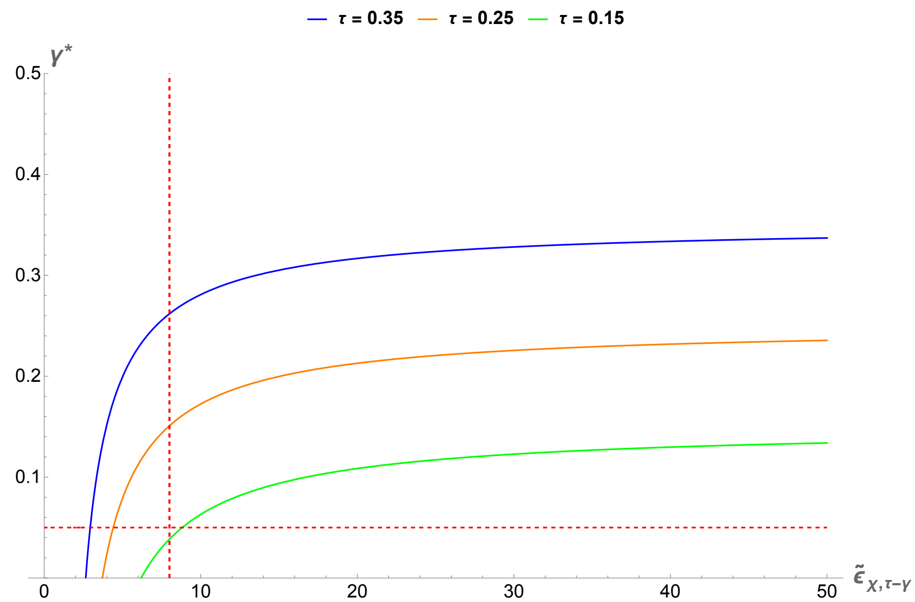
I first document a large drop by 66% in profit distribution payments sent to tax havens relative to dividends sent to non-havens following an increase in the cost of the outflows tax for dividends sent to tax havens from 2% to 5% and a simultaneous decrease in the outflows tax for dividends sent to non-havens from 2% to 0%. Interpreting this response in the context of the relative costs of sending funds to havens and non-havens respectively, I document an elasticity of profit distributions abroad with respect to the relative cost-ratio between havens and non-havens of approximately -13. I corroborate this result by comparing dividend outflows to havens and non-havens separately to import payments, which were exempt from the outflows tax during the reform period. I document net-of-tax price elasticities of similar magnitudes.

Second, I study the responses of firms most exposed to this reform. I develop several measures of firm-level exposure to this anti-tax-haven reform, including 1) the share of pre-reform years in which a firm sent dividends to tax havens, 2) whether a firm was named in one of the ICIJ leaks datasets, and 3) whether a firm had at least one 10% or greater direct shareholder named in one of the ICIJ leaks datasets. I use a simple OLS design to evaluate the response of exposed firms to the reform. I find that firms on average decrease their overall dividend payments by two-thirds, while substantially increasing their retained earnings. I find that exposed firms increased their retained

[38] To more directly consider the role of government information asymmetries in distinguishing tax strategic and non-strategic outflows, one could decompose $\theta := \xi \cdot \eta$, where $\xi \in [0, 1]$ reflects the level of government information asymmetry and $\eta \geq 0$ represents the composite pass-through of the tax to tradable consumption. Clearly in this setting, the outflows tax converges to the linear income tax when $\xi = 0$ and converges to the expression in Equation 1.14 for $\xi = 1$.

[39] This value represents the top marginal income tax rate in Ecuador.

Figure 1.6.1: Optimal outflows tax rate calibration



This figure displays calibrations of the optimal tax rate on underreporting activity. derived from a model based on Piketty and Saez (2013) that features positive price spillovers caused by the tax. The y-axis plots the optimal rate that corresponds with a given semi-elasticity of underreporting with respect to the difference between the linear income tax and the linear tax on underreporting activity. Each curve displays this calibration for a different linear income tax rate τ. The dashed red horizontal line indicates the empirical outflows tax rate of 5% in Ecuador starting November 2011. The dashed red vertical line represents the lower bound of the empirically realized semi-elasticity of income reporting with respect to the income-underreporting tax rate differential.

earnings by around USD 1 million—600%—immediately following the reform. Following this jump, affected firms gradually reduce their retained earnings back to pre-reform levels around 10 years post-reform. The reform enacted relatively little effect in terms of reinvestment behavior.

The final empirical section studies the responses of individuals exposed to the reform. Similarly to as for the firm-response design, I develop several measures of individual-level exposure to the anti-tax-haven reform. I focus on exposure measures including 1) whether an individual is a 10% or greater direct shareholder of a company sending dividends to tax havens in the pre-reform period, 2) whether an individual was named in an ICIJ leaks dataset, and 3) whether an individual was a 10% or greater direct shareholder of a company named in an ICIJ leaks dataset. I estimate a simple design that compares the tax and income declaration activity of exposed individuals to that of the universe of unexmposed individuals. I document large responses of these individuals—largely concentrated in the very top of the earnings distribution. I find that exposed individuals increased domestic reporting by 40% (USD 15,000) and by the progressivity of the income tax schedule, paid an additional 55% in income taxes. I document that this response was largely driven by increases in domestic independent labor and capital income claiming, and not driven by repatriation activity or wage income. Contextualizing the response within the tax change, exposed taxpayers demonstrate a highly level of sensitivity to incentives to locate funds abroad, with a net-of-tax elasticity of domestic reporting of around 10.

Given the residential basis of the personal income tax system in Ecuador, this response is consistent with a strong, lasting decrease in offshore tax evasion. The high level of responsiveness on part of taxpayers all suggests that countries can see a great deal of success in acting unilaterally so as to mitigate tax haven usage. Moreover, the results demonstrate not only that such reforms can mitigate funds sent direct abroad to tax havens, but also that they can effectively increase domestic tax collections in net of increasing taxpayer sophistication and substitution to other avoidance and evasion margins.

However, these results are grounded in important caveats. Namely, the Ecuadorian reform was very comprehensive in its scope. While the dividend reform created a wedge between the cost of sending profit distributions to tax havens relative to non-havens, most other outflows were taxed globally at 5% in the post-reform period, regardless of destination, with some exemptions for certain transaction purposes. This characteristic of the reform perhaps limits the external validity of these findings; while the Ecuadorian economy acts as a small open economy, similar outflows taxes adopted by larger countries may enact general equilibrium affects on both the market for offshore financial services and on the international market for more general trade. Moreover, the analysis did not engage with the distortions to production and consumption that may augment how we understand the negative aspects of using an outflows tax to mitigate tax haven usage. Nonetheless, the results here demonstrate that countries can enact significant scope in acting unilaterally against offshore tax havens.

Chapter 2

Estate tax avoidance and private benefit through charitable giving[†]

[†]I am grateful to Enrico Moretti and Dan Wilson for their generosity in compiling and sharing data on state estate taxes for this work. I thank seminar participants at the UC Berkeley Economic History group and the UC Berkeley Public Finance seminar. I thank Jon Bakija, William Gale, and David Joulfaian for their generous feedback. I thank Alicia Zhang for her invaluable research assistantship.

2.1 Introduction

How does the estate tax charitable deduction accrue differentially to different kinds of nonprofit vehicles? Is the estate tax charitable deduction more important for private foundations or public charities, and how do these nonprofit vehicles differ in the public benefits they generate? These questions have broad implications both for how to most effectively design tax policy that balances equity and efficiency interests and for how policymakers think about the overall redistributive impacts and desirability of charitable giving.

Previous work has documented a substantial positive relationship between individual charitable bequests at death and the estate tax rate (D. Joulfaian (2000), J. M. Bakija, Gale, and J. B. Slemrod (2003)). However, while individual bequesting behaviors as pertaining to the estate tax are better-understood, it is unclear quantitatively how important these responses are for are for charitable organizations themselves and how they vary differentially by nonprofit vehicle type. It is not known whether the funds absorbed through estate tax avoidance responses accrue disproportionately to private charitable entities, which may indicate the presence of quasi-privately benefiting or even tax-fraudulent charitable giving (Fack and Landais (2012)).

To address these questions, this paper estimates the magnitude of the estate tax-price responsiveness of reported charitable contributions of 501(c)(3) tax-exempt organizations in the US. I study how this response varies across charitable entity type—where namely, I investigate whether responses are stronger for more privately-held entities which may reflect more private interests in their operations (i.e. public charities versus private foundations). Furthermore, I study to what extent there exists a meaningful economic difference between family foundations and non-familial private foundations for estate tax avoidance purposes; this work is the first to incorporate data identifying family foundations and to study this distinction.

I view the contribution of this work as three-fold: First, I demonstrate that the large aggregate response of charitable giving to variation in the estate tax rate is almost entirely driven by changes in contributions to private foundations (as opposed to public charities). This distinction cannot normally be made using US donor-side tax data for the income tax deduction because high-value monetary contributions are not feature any requirement to file substantiating documentation; similarly, individual-level bequest administrative data typically have not featured recipient information. Studying a large federal estate tax rate decrease, I find that aggregate contributions to private foundations responds with an elasticity with respect to the top marginal estate tax rate of around 2, and between zero and 0.285 public charities. Within-nonprofit contributions respond on average with an elasticity with respect to the top marginal estate rate of between 1.3 and 2; fixed individual public charities respond with an elasticity between zero and 0.15.

Second, I leverage new state-level variation in top estate tax rates since the 2001 replacement of the federal-state estate tax credit with a less generous deduction to provide the first evidence on the responses of private foundations contributions to changes in the estate tax rate. The reported contributions elasticity of private foundations with respect to the top *overall* marginal estate tax rate for changes in *state* estate tax policy is around 1, where as the within-nonprofit contributions elasticity for private foundations is between .25 and .5. The response for public charities is indistinguishable from zero in the aggregate, where the within-nonprofit response for public charities corresponds with an elasticity between 0.1 and 0.5. These results are surprising surprising result in light of the geographic disconnect between state estate tax liability (based on state-of-residence) and the full deductibility of charitable bequests regardless of state.

I also provide the first evidence that family foundations and non-familial private foundations do not operate in a meaningfully distinguishable manner for tax-avoidance purposes. While my results do not suggest a strong difference between the estate tax strategizing behavior of family and non-familial foundations, they are suggestive that if there is an asymmetry in their behavior, it is actually non-familial private foundations that respond more strongly to changes in the estate tax rate. My findings here suggest that there are minimal benefits to legally distinguishing the two groups for tax enforcement purposes, and that there may be diminished scope for self-identified "family foundations" to operate as intergenerational transfer vehicles moreso than do non-familial private foundations. However, I do demonstrate that family foundations are associated with greater opacity in their stated charitability objectives and are more likely to hold substantial ownership interest in private businesses and make distributions to disqualified donor advised funds. On the other hand, I also document that family foundations engage in fewer disqualified transactions than do non-familial foundations.

After demonstrating the differential responses of charitable giving vehicle types to changes in the estate tax rate, I develop evidence on the extent of quasi-privately benefiting activity and charitability efficiency by nonprofit vehicle type. I demonstrate that private foundations, compared to public charities, private foundations are 1) substantially more opaque in terms of the exact subject matter of their charitable activity, 2) more prone using greater amounts of funds for administrative and non-charitable purposes, and 3) more likely to report business interests and activity pertaining to the financial interests of related and disqualified parties. I find less of an important distinction between familial and non-familial private foundations, but namely the family foundations 1) feature greater opacity in their charitability objectives and 2) greater likelihood of reporting substantial business ownership interests and distributions to related donor advised funds.

Estate and inheritance taxes in the US ostensibly serve to advance tax-progressivity interests over public revenue maximization moreso than do other kinds of taxes.[1] Only between 10,000-20,000 taxpayers face positive estate tax obligation in a given year, and by design—i.e. through the imposition of high exemption thresholds—these taxpayers generally come from the highest echelons of the wealth distribution. Moreover, federal estate tax collections typically total to only around 1% of federal tax receipts every year.[2]

Considering the role of the estate tax in the social planner's objective function, the relationship between charitable giving and inequality is ambiguous. Charitable activity is typically framed as fundamentally redistributive, but in settings where only the wealthiest taxpayers engage in charity or where charitable giving crowds out otherwise redistributive government public spending, inequality and charitable giving may covary in a positive manner. Indeed, accompanying increasing wealth and income inequality in the US, the volume of charitable giving has steadily increased as the num-

[1]Several works focusing on optimal estate and inheritance taxation have adopted this perspective, replacing more standard public revenue maximization objectives that are typical in models of optimal taxation with equity-oriented and distributional objectives. For example, Piketty and Saez (2013) specify and calibrate their model of optimal inheritance taxation to maximize transfers to individuals that receive no bequests. Farhi and Werning (2010) study estate and inheritances taxes that facilitate intergenerational utility smoothing from the social planner's perspective (as opposed to a purely dynastic generational perspective).

[2]Calculated using annual tabulations from IRS Statistics of Income.

ber of unique donors has decreased (Collins, Flannery, and Hoxie (2018), Saez and Zucman (2016)).

In this vein, several arguments pose the charitable giving regime in the US at odds to redistributive interests as specifically pertaining to the tax code. Namely, due to the limited settings in which the benefits of itemizing outweigh those of taking the standard income tax deduction[3] or where disproportionately wealthy individuals engage in charitable giving or bequesting as a means of reducing their tax obligation, the various permitted charitable deductions represent potentially distributionally regressive elements of the tax code.

There is also a substantial history of tax-fraudulent "charitable giving" in the US (Fack and Landais (2012)) where "charitable" giving effectively served to facilitate self-dealt non-taxed consumption. Charity fraud persists to the present day, even decades following the legal overhaul of the private foundations giving regime through the Tax Reform Act of 1969. Moreover, even on the strictly legal tax *avoidance* end of the spectrum of tax strategy, within a familial private foundation (i.e. a "family foundation"), intra-generational assets may serve to facilitate the accrual of both pecuniary and non-pecuniary private benefits.[4]

Critics in other disciplines have also called into question the desirability of public goods provided by private agents, as opposed to through governance and social planning. Early works in this area conceived of the (typically negatively-connoted) term *nonprofit industrial complex* to describe the relationship between the state and charitable giving entities (INCITE! (2007)), Gereffi (2001)). These scholars argue, issues of taxation notwithstanding, that the charitable giving/nonprofit regime ultimately operates *against* the redistributive goals they claim to espouse. A common critique in this space is that definitively solving a specific social problem poses an existential threat to the charitable entities organized against said issue, thus introducing a fundamental conflict of interest. Furthermore, by concentrating policy-making and decision-making capacities in private entities, the nonprofit industry dilutes government power and transfers power to the private leadership of nonprofit entities.

In this work, I combine data on the universe of nonprofit tax-exempt organizations with the underutilized legislative variation in the estate tax rate since the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) to more closely study charitable organizations and how their reported contributions respond to changes in tax incentives.

First I study the impact of the top marginal federal estate tax rate decrease from between 2001 and 2006 from 55% to 45% on reported charitable contributions by nonprofit 501(c) organizations, testing whether this response varies by organization vehicle type. I implement a difference-in-differences design using nonprofit organizations with non-tax-exempt contributions (i.e. 501(c) entities incorporated under sections excluding (3)) as the control group to estimate large elasticities of reported contributions with respect to the top marginal federal estate tax rate. I document that private foundations exhibit significantly greater responsiveness than do public charities. I find that private foundations exhibit a reported contributions elasticity of 2.4, whereas public charities

[3]Prior to the implementation of the Tax Cuts and Jobs Act (TCJA) beginning in 2017, less than a third of filers claimed an itemized deduction on their annual federal income taxes (Parisi (2018)). This proportion has likely decreased since the TCJA due to the removal of select incentives to itemize.

[4]For example, individuals with familial connections to private foundation leadership roles may benefit from quasi-self dealing (i.e. not strict self-dealing, such as use of properties or consumption organizational work products or may benefit from increased social capital from expanded networks).

see an elasticity of approximately unity. I also document that this estate tax rate decrease induced a slowdown in private foundation entry and an increase in exits compared to public charities.

Second, I focus on the contributions and entry/exit response of nonprofit entities to changes in state-level estate tax policy. A priori, it is unclear how nonprofit activity might respond to state-level estate tax policy due to the geographic disconnect between state estate tax liability based on state-of-residence and the full deductibility of charitable bequests regardless of state of the recipient nonprofit. As two illustrative examples, 1) an individual with New Jersey state tax residence faces no direct or immediate incentive to engaging in tax strategy in response to elimination of the state estate tax in Tennessee, and 2) a New Jersey resident with positive New Jersey state estate tax liability faces equal tax incentive to make a charitable bequest out of their estate to a nonprofit recipient in New Jersey versus in Tennessee (which no longer features a state estate tax). To this end, I use a triple-differences design and a generalized event-study framework (Callaway and Sant'Anna (2020)) to document an average private foundations response to changes in the same-state estate tax rate with an elasticity between .25 and .5 and an average public charity response corresponding to an elasticity between .05 and .1. In doing so, I also introduce improvements to extant data on state-level estate tax policy.

Throughout both of these exercises I make use of proprietary data on the near-universe of 501(c) entities to explore the distinction between familial and non-familial private foundations. This exercise sees some complication because identification as a "family foundation" is not a legal designation, but rather a colloquial one to indicate intra-familial ownership of and/or affiliation with a private foundation. This distinction, albeit carrying no legal implication, has implications for understanding private foundation management as an intergenerational asset or tax strategy vehicle. However, I find that there is no statistically significant difference between the responsiveness of familial and non-familial private foundations to variation in both top marginal federal and state estate tax rates.

Lastly, I develop evidence on the extent of quasi-privately benefiting activity and charitability efficiency by nonprofit vehicle type. I demonstrate that private foundations, compared to public charities, are 1) substantially more opaque in terms of the exact subject matter of their charitable activity, 2) more prone using greater amounts of funds for administrative and non-charitable purposes, and 3) more likely to report business interests and activity pertaining to the financial interests of related and disqualified parties. These results substantiate the perspective that private foundation activity generate less public benefit than does public charity activity.

I find fewer large differences between familial and non-familial private foundations. Most importantly, I find among family foundations 1) greater opacity in terms of their stated charitability fields, 2) lower likelihood of engaging in and quantitatively lower importance of quasi-self dealing activities, such as compensation to officers and compensating disqualified persons, 3) greater likelihood of reporting substantial business ownership interests and distributions to related donor advised funds, and 4) similar levels of bunching on IRS-required minimum payout levels.

These findings come with several important implications. First, the results depict a charitable giving environment where private foundations exhibit strong responses to incentives, suggesting that these kinds of vehicles see disproportionate use for tax strategic purposes as compared to public charities. Taken with the evidence on the lower plausible public benefit generated by private foundations, this possibility may serve as impetus to re-evaluate the distributional impacts and characteristics of the charitable giving regime in the US. Second, the concentration among private foundations of the aggregate responsiveness of charitable contributions to variation in the estate tax rate may prompt us to re-frame earlier findings and discussions around charitable bequesting responses to the estate tax. Namely, the results imply that estate tax avoidance through charitable bequests is primarily a phenomenon for private foundations, as opposed to for public charities. Lastly, the large elasticities documented suggest the potential for large avoidance responses to alternative forms of wealth taxation through potentially semi-private charitable giving.

I proceed as follows: in Section 2, I discuss the literature related to charitability, wealth and income inequality, and taxation. Section 3 presents the data environment and establishes the relevant legislative background for estate tax avoidance via charitable giving. Section 4 presents and develops a simple model of intergenerational consumption and asset transfer to illustrate the incentives and mechanisms underpinning tax avoidance through charitable and semi-private charitable giving. Section 5 estimates charitable contribution responses to changes in the federal estate tax environment, and Section 6 studies contributions responses of private foundations to variation in state estate taxes. In Section 7, I develop descriptive evidence on the extent of quasi-privately-benefiting activity and charitability efficiency by nonprofit vehicle type. Section 8 provides a discussion of the results and concludes.

2.2 Related literature

In this section I discuss the relationship between this work and previous discussion on charitability, taxation, and inequality. In brief, the intersection of these topics is relatively understudied. Most work in this area has focused on estimating the relationship between tax incentives and charitable giving. Additionally, a smaller literature has explored the potentially tax-fraudulent dimensions of charitable giving.

Within the body of work focusing on giving responses to taxation, much discussion has centered around taxpayers' charitable deductions response to income and estate taxes (and similar terminal wealth taxes) and whether the corresponding elasticity exceeds or is less than one in absolute value—i.e. whether the volume of charitable funds generated by the tax incentives exceed the tax expenditure. There exist several challenges in estimating the tax-price response of giving. For example, where the local charitable deduction reduces the per-unit cost of donating from 1 to $(1-t)$,[5] the precise marginal tax rate t faced by donors is a function of income. Additionally, in the US, there exist non-linearities in the deduction schedule through charitable deduction caps[6] and deduction itemization requirements that introduce censoring issues for typically lower-to-middle-income

[5]Tax preferences extended to charitable giving may also induce broader impacts on the overall provision of both public and charitable goods and services based on whether public and charitable funds behave as complements or as substitutes.

[6]These deduction caps also vary by giving vehicle and type of tax. Individuals cannot deduct more than 50% of adjusted gross income (AGI) for giving to public charities, but cannot deduct more than 30% for private foundations. Other gifts see different deduction limits for the personal income tax.

individuals who do not itemize their income tax deductions.[7][8]

Much of the empirical work in this area has demonstrated disagreement over the magnitude of giving elasticities with respect to the net-of-tax rate—albeit moreso with respect to personal income taxation than for estate taxation. Bakija and Heim (2011) use tax return data to study a panel of taxpayers over the course of 25 years, documenting significant variance in the giving elasticity depending on the perceived persistence of the tax-price shock and taxpayer income group. Notably, they find elasticities with respect to the personal income tax induced price of giving statistically indistinguishable from negative one (albeit with preferred point estimates less than negative one) with responses mainly concentrated among taxpayers earning more than USD 1M in a given year. Auten, Sieg, and Clotfelter (2002) apply a structural estimation procedure to another panel of income tax filers in the US in order to more comprehensively separate transitory and persistent effects of tax-price changes. They document a large difference between short- and long-run responses, at -.4 and -1.26 (significantly lower than -1) respectively. Lastly, experimental evidence finds smaller responses to changes in the price of giving—approximately -.2 (Gandullia and Lezzi (2018)); however, this work also finds elasticities slightly, but significantly in excess of one in absolute value when combined with a donation-matching scheme.

Another body of work focuses on these tax price responses of charitable giving within the estate, gift, and inheritance tax regime. A substantial body of evidence exists suggesting large responses to wealth taxation via savings decisions as well as avoidance and geographic mobility responses (e.g. David Joulfaian (2006) on savings decisions, J. Bakija and J. Slemrod (2004) and Moretti and Wilson (2019) on mobility, Kopczuk and J. Slemrod (2003) on estate and end-of-life planning); but within this area, other work has focused on how individuals anticipating paying the federal estate tax engage in charitable bequesting to mitigate their eventual tax obligations. Challenges in this area also tend to arise due to data censoring on part of the high estate tax filing exemption threshold as well as measurement error from the lightly progressive estate and inheritance tax schedules.

J. M. Bakija, Gale, and J. B. Slemrod (2003) use the universe of estate tax returns aggregated up to coarse wealth bins to study the change in bequesting behavior in response to variation in the marginal federal estate tax rate from throughout the 20th century. Under a wide variety of specifications, they recover elasticities between 1.6 and 2.1 in absolute value, soundly in excess of one including the error on their point estimates. Other works in this area typically make use of federal estate tax declaration samples or the universe of these declarations in select years, and report estimates of similar magnitude (e.g. D. Joulfaian (2000), D. Joulfaian (1991)), and that responsiveness tends to increase as a function of wealth. Importantly, I seek to estimate the elasticity of contributions reported by nonprofits, not the taxpayer's bequest response to end-of-life taxation.

Censoring of lower estate values issue plays an important role in this estimating bequest responses to the estate tax, but works relying on cross-sectional estate tax return samples and local probate records find similar results. Brunetti (2005) uses San Francisco probate records to study the responses of a wider range of taxpayers to changes in the federal estate tax and Californian in-

[7] While only one-third of taxpayers itemize their deductions—thus opening up the ability to make use of charitable deduction to the income tax—the 2017 Tax Cuts and Jobs Act (TCJA) introduced an above-the-line deduction of $300 for non-itemizing taxpayers.

[8] See Andreoni (2006) for a more comprehensive discussion of the theoretical foundations of behavioral responses in incentives to engage in charitable giving.

heritance tax, finding largely discrepant responses between federal estate tax filers and non-filers. In particular, federal estate tax filers exhibit tax-price elasticities of charitable bequest share of wealth between 1 and 2, with federal non-filers responding typically twice as strongly. Moreover, the authors also document a significant relationship between wealth and charitable bequests with on elasticity approximately equal to one.

Similarly relevant is the related literature focusing on the optimality of subsidizing charitable activity and optimal tax treatment of charitable activity. Model environments in this area tend to vary widely given the simultaneously behavioral and public-finance dimensions of charitable giving. Discussions on the optimal charitability subsidy rate often begin with Feldstein (1980), which considers the cost and revenue raising efficiency of charitable giving subsidies versus direct government expenditure on a public "charitable" good: the primary tradeoff in this setting considers the size of individual income and substitution responses to changes in the cost of the charitable good and the degree of substitutability between public funds and charitable funds. A simple result of the revenue maximization problem in this setting is that the subsidy is preferable to direct government spending when the subsidy induces some behavioral response in favor of the charitable activity/good. However, the optimality condition is augmented by the degree of substitutability between public and charitable goods/services, where the optimal subsidy decreases in the relative efficiency of government spending as compared to private charitable spending.

Hochman and Rodgers (1977) argues the possibility of that a decentralized giving equilibrium in the absence of price distortions may be non-pareto optimal due to discrepancies between individual marginal benefit and marginal cost in a free-rider setting. This model environment deals with the fundamental "publicness" and excludability of the charitable good, where non-donors can behave as free-riders. Kaplow (1995) argues that donors derive warm glow utility from donations through perceived benefit in the donee, but fail to consider fully internalize the social welfare impact of giving. I.e., donations have positive externalities that are underprovided in the absence of subsidies.

Other theoretical works consider charitable giving as a commodity in an Atkison-Stigitz tax expenditure setting, where revenue-raising objectives can support taxes on goods/services whose consumption is positively correlated with income and preferences Atkinson and Stiglitz (1976). Saez (2004) expands on this framework by focusing on a "contribution" good with positive externalities incorporating the crowd-out of charitability on government spending as well as the social welfare impact of both public spending sources.[9]

However, these optimal taxation/subsidization model environments do not typically engage with the tax evasive and tax avoiding dimensions of charitability. Although I do not advance claims on explicitly tax evasive behavior through fraudulent use of charitable organizations, other works have studied tax evasion in the context of charitability and charitable giving.

A simple model conception of tax fraudulent giving assumes a constant fraudulent share of sub-

[9]Evidence on aggregate substitutability between government spending and charitable activity is scarce. However, empirical work on donor behaviors suggests the presence of crowd-out among different types of giving. For example Yildirim et al. (2020) and K. (2015) find evidence that donations to natural disaster relief decrease political donations; the former work also documents a decrease in charitable giving in response to political advertisement campaigns.

sidized giving that dilutes the social benefit of giving that provides the initial impetus for subsidization. In this kind of setting, increasing subsidies to charitable activity is optimal if the ratio of the non-fraudulent giving and fraudulent giving tax-price elasticities exceeds one plus an increasing function of the local fraudulent contribution share (Fack and Landais (2012)).

There exists a slightly greater volume of empirical work that substantiates the presence and behavioral characteristics of tax fraud through "charitability". A central difficulty in thoroughly and studying tax evasive behavior via charity fraud lies in the limited precision in 1) connecting individuals with their related foundations, and in 2) granularly documenting privately-accruing benefit either on the side of donation transactions or on the side of charitable activity. As a result, other works that study charity abuse tend to rely on aggregated data or highly stylized subsamples.

Fack and Landais (2012) demonstrate that up until the passage of anti-self-dealing laws, high-earning taxpayers could pass income through private foundations and engage in untaxed consumption. Following the ratification of the Tax Reform Act of 1969 (TRA69) that placed substantial scrutiny on the use of private foundations, prohibited self-dealing activities, and taxed income unrelated to private foundations' central activities,[10] the number of private foundations created dropped from 1250 to 200 entities per year, while the number of these foundations terminated increased from several dozen to around 600 entities per year. Moreover, aggregated charitable giving statistics demonstrate that while charitable giving continued to increase for lower income brackets, following TRA69 the total charitable giving of the top .01 percent of earners dropped by 25% relative to a 1968 baseline. The work establishes the historical precedent for the abuse of private foundations for tax strategic purposes by high earners, but is less readily applicable for understanding charity abuse in today's fiscal environment. Additionally, because TRA1969 affected so many aspects of the charitable giving regime in the US, it is difficult to interpret responses quantitatively in terms of a tax-price elasticity.

Other works studying charity abuse include Yermack (2009) which documents a trend of corporate CEOs systematically donating owned company stock to their own family foundations prior to a significant drop in stock price, and that these gifts are often fraudulenty backdated. Tazhitdinova (2018) studies how reporting requirements limit evasion in the context of charitable deductions to income taxation. In line with evidence documented in other works on reporting requirements (e.g. Kleven et al. (2011)), the removal of donation documentation requirements up to a small threshold of several hundred dollars induces a substantial volume of tax cheating. Tazhitdinova (2018) demonstrates substantial bunching in claimed deductions up to this small threshold that corresponds with a greater overall mass of deductions prior to the kinked scheduled, finding that over half of new donations are fraudulent in nature.

[10]Other methods of charity abuse are detailed in Fack and Landais (2012) as compiled from governmental committees and also include falsely claimed deductions, overvaluation of donated property to increase personal deductions from donated assets, and political bribery.

2.3 Data and background

2.3.1 Data

I study the contributions response of charitable entities by combining data from three main sources: 1) annual financial statements from the universe of 501(c) organizations in the US as reported on mandatory tax filing declarations, 2) indicators for family foundation status from a charitability research and statistical services provider, and 3) publicly available data on state and federal top federal estate tax rates. I describe and summarize these data including their scope and limitations here.

Annual nonprofit organization activity declarations

I compile annual tax declarations from the universe of US nonprofit entities from between 1989 and 2015.[11] The designation of nonprofit entity includes organizations with non-tax-exempt contributions for donors (organized under subsections of US Code § 501(c) other than (3)) as well as public charities and private foundations and private operating foundations (all organized under US Code § 501(c)(3)) whose contributions are tax-exempt. These organizations are required to file annual activity statements, from which publicly available excepts are published.[12][13]

These public data report nonprofit ID $\times$ fiscal year levels of contributions from donors, various income and expense aggregations, and asset statements for the approximately 1.1 million unique nonprofits filing between 1989 and 2015.[14] The data also include EIN-level metadata such as organization type (non-tax-exempt contributions for donors (i.e. 501(c) non-(3)), public charity, and private foundation (both 501(c)(3)), operating location, name, and industry of operation, *inter alia*.[15]

Each nonprofit organization is assigned an employment identification number (EIN). To construct my final sample, I drop 1) US organizations that ever report domicile in a US territory or protectorate or outside of the US, 2) organizations ever having organized under a *partially* tax-exempt subsection of US Code § 501(c), 3) organizations ever having changed tax-exempt status or private foundation status, 4) entities ever having organized under one of the 501(c) subsection codes outside

[11] Data from 1989 to 2013 are maintained by the National Center for Charitability (NCCS) at Urban Institute; the Internal Revenue Service Statistics of Income (SOI) division publishes the universe of annual filings from 2012 to 2015 (with approximately two year's delay; i.e. filings labeled for a specific year contain returns for the fiscal year typically two years prior. Data from 1993 only feature a sample of private foundations that over-samples larger organizations.

[12] I express all dollar values in terms of real USD 2015 except in the case of listing nominal tax bracket locations and exemption threshold.

[13] Of note, although donations to foreign nonprofits also generate estate tax deductions, the NCCS/SOI data only report the financial declarations of on US-based entities.

[14] Nonprofit organizations have varied fiscal year endings. Approximately 60% of EINs end their fiscal year and declare their annual activity to the IRS in December, and another 20% file in June. In my main specification, I truncate on the year-level: e.g. all months 1-12 of year 2015 are mapped to year 2015. Nonprofit entities typically do not change their fiscal year (with 95% of EINs only declaring on a single filing month throughout their span of activity), and such organizations tend to file every consecutive year during their activity as legally prescribed.

[15] The public releases of these data do not permit identifying organization leadership, although the NCCS data feature this information for fiscal year 2005.

of subsection (3) that do not solicit donations,[16] and 5) organizations ever having been flagged to be removed from the sample of nonprofits by NCCS or SOI. I also assign values of zero for reported contribution for entity-years in which an entity is operating but has not filed. Table 2.3.1 displays select summary statistics of this final panel, stratified by each organization type.

Family foundation indicators

To distinguish between non-familial private foundations and family foundations, I scrape data from a prominent charitability statistics service provider for charities. The key difficulty for distinguishing these two groups within all private foundations is that the term *family foundation* does not confer a specific legal designation with separate taxation or legal implications, but rather serves as a colloquial distinction for an intra-generational private foundation asset.[17] That is, both "non-familial private foundations" and "family foundations" have legal recognition as private foundations and file identical annual financial activity declarations as private foundations. Little is known about to what extent this colloquial distinction is economically meaningful.

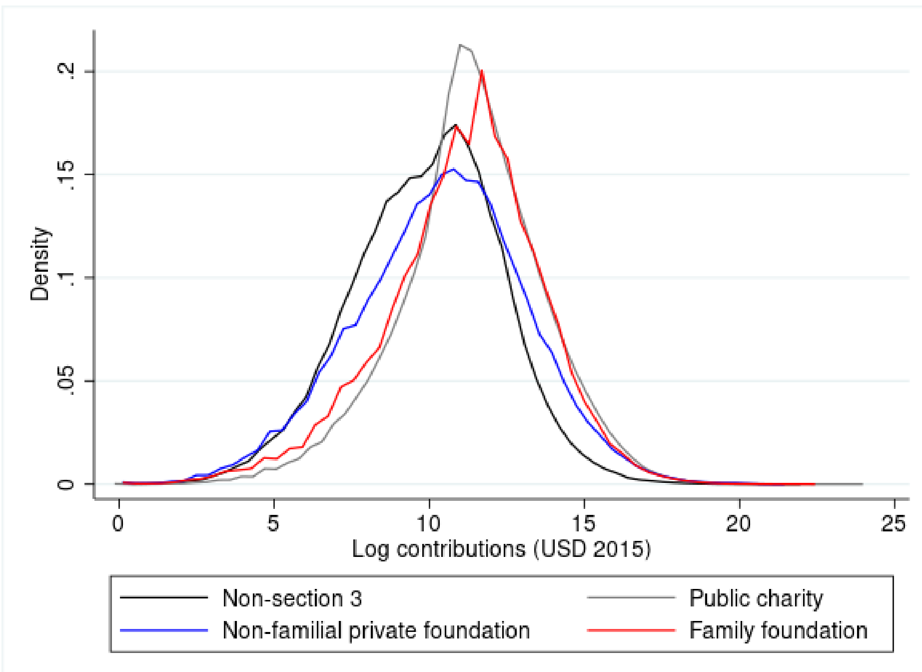
This statistical service provider contains proprietary data on the near-universe of US-operating 501(c)(3) organizations, including (in addition to full tax declarations) indicators for family foundation status based on opt-in identification or the presence of individuals with the identical last names as the foundation namesake on declared organization leadership or major donor.[18] I treat family-foundation status as time-invariant.

[16]As an illustrative example, I drop subsection (14)—*state-chartered credit unions and mutual reserve funds offering loans to members*, which *does not* solicit donations—and keep subsection (07)—*social and recreational clubs which provide pleasure, recreation, and social activities*, which *does* solicit donations. Of note, I also drop subsections (02) and (71)—*title-holding corporations* (generally used by nonprofit entities as a means of pooling risk across legally separated entities and which do not solicit donations)—and subsection (90)—*split interest trusts* (whose purposes deal with optimizing charitable donations for income tax strategic purposes). Lastly, I exclude subsections 8, 10, and 13, due to their partial deductibility regimes that state that donations to such entities may be deducted from the estate tax base if the donations are used for similiar purposes as of 501(c)(3) entities. In total, I keep entities organized under subsections: 3, 4, 6, 7, 19, and 23, as well as select sections organized outside of 501(c) including 501(d), 501(e), 501(f), 501(k), 527, and 4947(a)(1).

[17]In this way, the self-identification of a private foundation as a family-foundation is likely a strategy-free decision. However, this may not be the case if there are differences in public perception, which may have implications organizations' abilities to solicit contributions or external partnerships and loans.

[18]I perform a fuzzy-match on foundation name between the service provider dataset and the NCCS/SOI data, complemented with a partial list of EINs jointly included between the data sources, yielding a 87% match rate of the list of family foundations to private foundations.

Figure 2.3.1: Histogram of log contributions by organization type



This figure displays a histogram of log contributions for years 1989-2015 stratified by organization type. Throughout the timeframe, approximately 60% of private foundations and non-section-3 organizations report zero contributions in a given year, whereas only 16% of public charities report zero contributions in a given year.

Table 2.3.1: Panel (a): Summary statistics by organization type (1989-2015)

	Non-section 3		Public charities	
	Mean	Median	Mean	Median
Age	30.60	26	19.23	14
	(23.82)	[74.00]	(17.52)	[53.00]
Contributions	130000	0	1.100e+06	55674
	(5.7e+06)	[2.1e+05]	(2.3e+07)	[2.9e+06]
Revenue	3.000e+06	130000	5.200e+06	170000
	(6.1e+07)	[5.9e+06]	(9.8e+07)	[1.0e+07]
Expenses	2.700e+06	120000	4.800e+06	150000
	(4.3e+07)	[5.4e+06]	(9.2e+07)	[9.5e+06]
Assets	7.400e+06	150000	9.500e+06	180000
	(2.9e+08)	[1.1e+07]	(2.5e+08)	[1.6e+07]
Contributions / assets	1759	0	388.5	0.280
	(9.2e+05)	[1.40]	(82943.63)	[8.19]
Revenue / assets	7913	0.910	1182	1.080
	(2.2e+06)	[9.83]	(3.0e+05)	[14.48]
Expense / assets	7851	0.860	1391	0.980
	(2.1e+06)	[10.29]	(4.0e+05)	[15.18]
Cont. / revenue	0.130	0	0.500	0.500
	(0.28)	[0.94]	(0.40)	[1.00]
Revenue / expense	10.07	1.030	9.810	1.030
	(4157.94)	[1.19]	(1317.62)	[2.18]
Distinct EINs	3.3e+05		6.0e+05	
Observations	3.5e+06		5.2e+06	

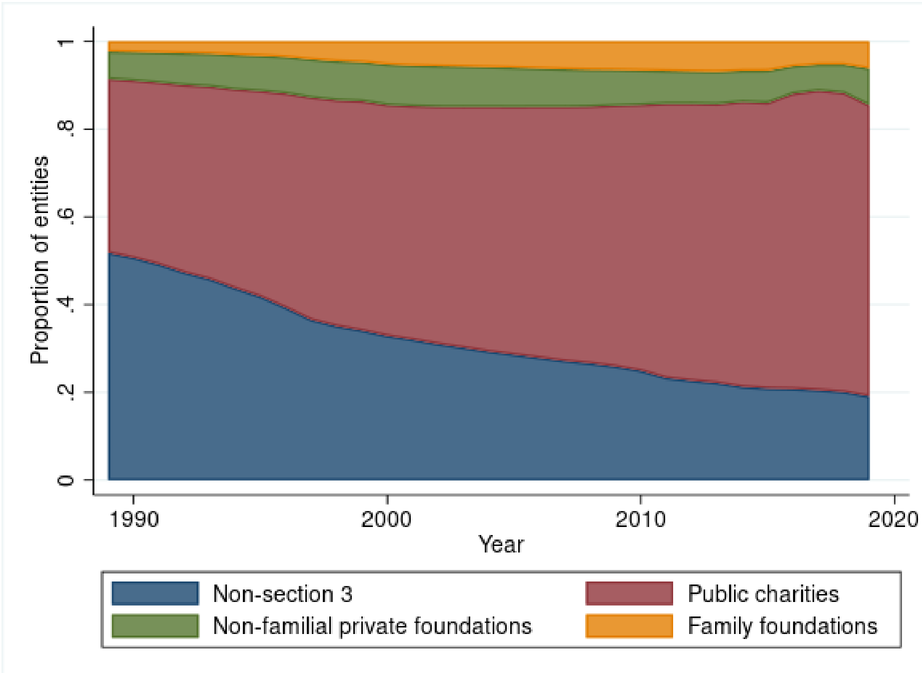
This table displays mean and median values of select summary stats for non-section 3 nonprofit organizations and public charities computed using a panel of annual financial declarations (as reported in IRS form 990) for between 1989 and 2015. Age corresponds with the maximum difference between most recent reporting year and founding year achieved by each EIN (with summary statistics computed from a separate cross-sectional dataset). Standard deviations are reported in parentheses; hard brackets indicate the difference between the 95th and 5th percentiles. Dollar values are expressed in terms of real USD 2015.

Table 2.3.1: Panel (b): Summary statistics by organization type (1989-2015)

	Non-familial private foundations		Family foundations	
	Mean	Median	Mean	Median
Age	17.87	13	21.33	19
	(16.35)	[52.00]	(14.00)	[48.00]
Contributions	450000	0	630000	0
	(1.0e+07)	[6.6e+05]	(2.3e+07)	[1.3e+06]
Revenue	1000000	36000	1.300e+06	77946
	(1.6e+07)	[2.0e+06]	(3.1e+07)	[3.1e+06]
Expenses	680000	36923	730000	64939
	(1.0e+07)	[1.4e+06]	(2.5e+07)	[1.7e+06]
Assets	6.900e+06	310000	8.200e+06	620000
	(2.8e+08)	[1.3e+07]	(2.6e+08)	[1.8e+07]
Cont. / assets	14600	0	220.0	0
	(2.8e+06)	[4.09]	(22256.09)	[2.17]
Revenue / assets	15706	0.0900	308.4	0.110
	(2.8e+06)	[6.90]	(27281.79)	[2.84]
Expense / assets	16610	0.0800	505.6	0.0800
	(2.8e+06)	[9.39]	(38062.98)	[3.21]
Contributions / revenue	0.290	0	0.340	0
	(0.41)	[1.00]	(0.42)	[1.00]
Revenue / expense	70.79	1	98.55	1.030
	(10147.61)	[8.34]	(9283.43)	[14.05]
Distinct EINs	93976		46512	
Observations	1.0e+06		7.0e+05	

This table displays mean and median values of select summary stats for non-familial private foundations and family foundations computed using a panel of annual financial declarations (as reported in IRS form 990-PF) for between 1989 and 2015. Age corresponds with the maximum difference between most recent reporting year and founding year achieved by each EIN (with summary statistics computed from a separate cross-sectional dataset). Standard deviations are reported in parentheses; hard brackets indicate the difference between the 95th and 5th percentiles. Dollar values are expressed in terms of real USD 2015.

Figure 2.3.2: Share of broad organization types over time



This figure displays the evolution in relative shares of each of the four nonprofit organization types I identify. This time series is computed using a within-lifespan rectangularized panel of EINs so that an EIN-year is included if the year falls within the range of the EIN's founding year and its most recently reported year. Note that the group of all private foundations is comprised of the sum of non-familial and familial private foundations.

Estate tax variation

In spite of the public knowledge nature of state estate and inheritance tax variation over time, this information is not well-compiled in a publicly available format. I make use of modifications to state-year indicators for the presence of an estate tax or an inheritance tax that operates similarly to an estate tax as compiled by Moretti and Wilson (2019). These authors compile their indicators using prior legislative investigations by Conway and Rork (2014) and Michael (2015) for the presence of state estate and inheritance taxes and their year of repeal if applicable. I supplement the Moretti and Wilson indicators with information from state legislative texts and estate/inheritance tax schedules to 1) account for a wider range of years and include Washington D.C., 2) introduce greater precision for the top marginal state tax rates,[19] and 3) sharpen the timing of the exact repeal and introduction of state estate taxes.

Many state estate taxes involve a progressive gradation at lower estate valuations level, but reach their maximum rates at or below the federal estate tax threshold at a nearly uniform rate of 16% across the states that feature these taxes. For the reason that the average estate tax rate approaches

[19]The modal top marginal tax rate across states with an estate tax is 16%. Because of the combined minimal deviations from this top rate across states and the typical complexity of the tax code when such deviations are present, Moretti and Wilson (2019) and similar works conceive of the presence of an estate tax as a binary variable (or as a uniform top rate of 16%)

the top marginal rate for estates high above the threshold, I focus on the binary presence of estate taxes for the state setting.

2.3.2 Legislative background

On end-of-life wealth taxation

Estate, generation-skipping, gift, and inheritance taxes[20] represent the primary forms of individual high-wealth taxation in the US. These taxes are typically levied upon the transferral of an asset from a decedent to an inheritor (or originating from a living individual in the case of inter vivos gifts). Depending on whether one's state-of-residence levies an end-of-life or gift tax separately from the federal level, individuals may face tax obligation on wealth transferrals from both the federal and state level. The legal regime for end-of-life taxation sees many complications, so I explain only the most relevant ones here.

Federal estate taxation: The federal estate tax uses a progressive rate gradation, with a top marginal rate that has seen substantial movement over time, mainly beginning with the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA). The evolution of the top marginal rate is pictured in Panel (a) of Figure 2.3.3. The exemption threshold and gradation have also seen change over time, but these changes are incremental and less relevant for high-valued estates.[21] Namely, in the years leading up to EGTRRA, only estates valued at above approximately USD 650,000 (nominal) faced estate tax obligation. The exemption level rose gradually following EGTRRA until indexation to the inflation rate in 2011 (and doubling in 2018). The gradation of estate tax varies less and becomes substantially less important relative to the exemption threshold, starting at 18% and reaching the top marginal rate at USD 2.5 million until 2002 and at USD 1 million above the exemption threshold starting in 2013 (varying non monotonically between those two years, reaching a low of USD 500,000 between 2010 and 2012).

State estate taxation, simplified: The history of state-level end-of-life wealth taxation in the US is somewhat complicated. From most of the 20th century until 2001, a state estate tax credit allowed individuals to credit up to 16% of their federal estate tax obligations for state end-of-life taxes. Thus, all states and Washington D.C. made use of "pick-up" taxes that effectively diverted

[20]The nominal distinction between these taxes typically lies in the identity of the taxpayer. Estate taxes are levied on the estate of a decedent, whereas inheritance taxes are levied upon receipt of an estate, with rates that often differ based on the relationship of the inheritance recipient and the decedent. Gift taxes apply to inter vivos transfers, and generation-skipping taxes apply to the transferral of assets from a decedent to a non-spousal party at least 37.5 years younger. I focus primarily on estate taxation, but aspects of the other end-of-life taxes behave similarly to the estate tax, and some state end-of-life taxes effectively operate as estate taxes, for which reason I include them as estate taxes.

[21]Figure 2.3.3 also highlights year 2010 as within federal estate taxation. EGTRRA originally provided for a repeal of federal estate and generation skipping taxes for 2010 specifically. However, in December 2010 US Congress retroactively reinstated the decided the estate tax for that year while allowing the estates of 2010 decedents to elect between facing a 35% versus paying no estate tax and applying EGTRRA's modified carryover basis rules. In broad, the modified basis regime was interpreted to typically result in a "step-down" in the basis of inherited assets, which would result in greater income taxation upon inheritance (treated as gift income). The decision as to which estate tax regime to elect into relatively trivial except for large estates, with electing to pay the 35% estate tax as the dominant strategy for most smaller estates. See Ransome and Schafer (2011) and Nuckolls (2010) for more detailed discussions on the 2010 federal estate tax election from estate planning and accounting perspectives.

income from the federal government to state governments. These taxes are less formally referred to as pick-up or *sponge* taxes. States designed their estate taxes to fit the gradation of the tax credit, so that there was no geographic distortion in state end-of-life taxation obligation across the US.[22]

While all states made use of state estate tax creditation against the federal estate tax, states varied in the legal implementation of their specific end-of-life taxes with respect to the credit; this detail is important for understanding the post-EGTRRA variation in state estate taxation. Most states designed their estate taxes as explicitly tied to the existence of the credit, whereas others ratified their estate taxes as statutorily independent of the tax credit (albeit often designed to match the credit's exact gradation). Regardless, under the pre-EGTRRA regime, state estate taxation generally effected no additional tax burden to decedents beyond the federal income tax rate.

With the passage of EGTRRA in 2001, the federal government phased out the state estate tax credit linearly between 2002 and 2005 (decreasing its generosity by 25 percentage points each consecutive year) and replacing it with a smaller deduction that resulted in additional net estate tax obligation from states that imposed estate taxes.[23]

The removal of the state estate tax credit meant that all states effectively had to decide whether to impose a separate estate tax—referred to as *decoupling* from the state estate tax credit. By default, the states that designed their pick-up taxes as explicitly tied to the credit would have no estate tax unless they explicitly decided to decouple and pass a separate tax; those states that designed their estate taxes as separate from the state estate tax credit would decouple by default and have a separate estate tax unless they explicitly ratified legislation to *not* have a state estate tax.

This decision effectively created three mutually exclusive groups of states: 1) states that did not feature an estate tax following the repeal of the state estate tax credit, 2) states that had a separate estate tax *immediately* following the repeal of the estate tax credit, 3) states that installed a state estate tax only *after* the repeal of the state estate tax credit. Among the latter two groups, some of these states later repealed their state estate taxes. Among states featuring separate estate taxes, these state estate taxes saw a modal top marginal rate of 16%, with no states implementing a greater top marginal rate.

One can thus broadly understand the geographic heterogeneity of state estate taxation as follows. 1) prior to EGTRRA, there was nearly no additional overall estate tax burden imposed by state estate taxation due to the state estate tax credit. 2a) With the passage of EGTRRA, state estate taxes induced additional estate tax burden to the federal estate tax. 2b) Based on the structure of the pre-existing sponge taxes, states had to decide whether to keep or install their estate taxes; but due to the limited revenue-raising capacity of end-of-life-taxes, this decision was largely contingent on state political environments and the ability of state legislatures to ratify legislation in a relatively small amount of time. 3) Some states later repealed or installed their estate taxes following the full-replacement of the state estate tax credit. Panel (b) illustrates the evolution in state estate

[22] The state of New York is the sole exception to this rule, having installed a top marginal state estate tax rate of 21%, so that estates with tax basis far above the approximately USD 10 million top bracket location would face on average 5 percentage points additional estate tax obligation to New York as compared to decedents in other states.

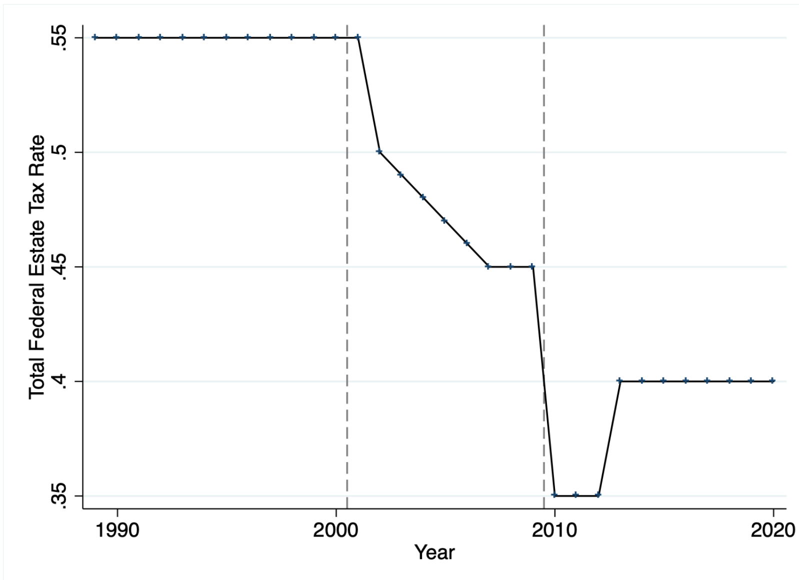
[23] One can understand the change in estate tax rate from the replacement of the state estate tax credit with a deduction as an above-threshold rate change from $\tau_f + \tau_s - \tau_s = \tau_f$ under the credit regime to $\tau_f + \tau_s - \tau_f \tau_s$ under the deduction regime.

taxation, distinguishing between *de jure* state estate taxes as separate from the pick-up taxes, and *de facto* estate taxes that effected additional tax burden in to the federal estate tax (pictured for a hypothetical estate of sufficiently high valuation).

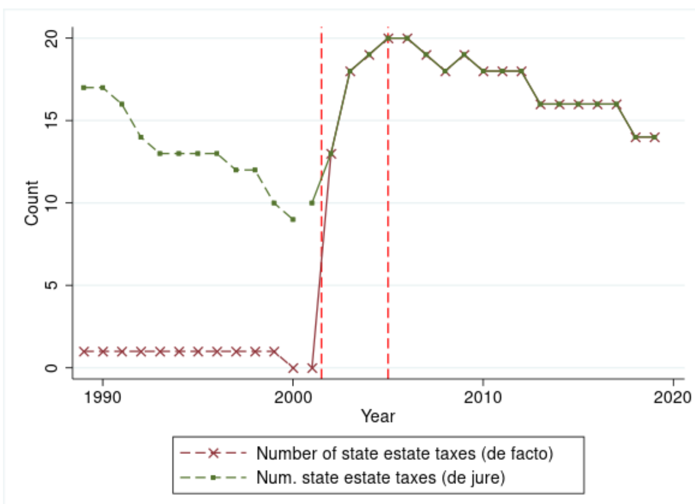
Unlike with income taxes, these end-of-life transfer taxes see no charitable deductions limits. That is, individuals and estates can entirely mitigate their estate tax obligations through engaging in bequests-at-death or carrying over near-end-of-life giving to nonprofit entities organized under US Code § 501(c)(3). Individuals can mitigate both their estate tax burden and a portion of their income tax obligations through during-life charitable estate donations, but the income tax deduction is generally trivial compared to the estate tax obligation.

Figure 2.3.3: Estate taxation in the US

(a) Top federal estate tax rate



(b) Number of state estate taxes



This figure illustrates the evolution of federal- and state-level estate taxation in the US. Panel (a) displays the top marginal federal estate tax rate over time. The dashed gray line signifies the ratification of the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA). EGTRRA originally specified a repeal of the federal estate tax for 2010, and in December 2010, the US Congress decided to allow the estates of 2010 decedents to elect between facing a 35% estate tax rate versus paying no estate tax and applying EGTRRA's modified carryover basis rules. Panel (b) counts the number of states with separate estate taxes over time, distinguishing between *de jure* taxes per legislative statute (generally effecting no additional estate tax burden due to the state estate tax credit) and *de facto* taxes that induced geographic heterogeneity in overall estate tax obligation (pictured for a hypothetical estate of sufficiently high valuation). The dashed red lines signify the federal-state estate tax credit repeal period under EGTRRA.

On charitability and tax incentives

The US government has shaped its tax code considerably to incentivize nonprofit activity. Most nonprofit entities organize under one of the 29 subsections of Internal Revenue Code 501(c) which determine their eligibility for federal and state income tax exempt status.

While most 501(c) corporations do not pay income taxes,[24] generally only donations (deemed *contributions*) to entities organized under subsection (3) generate tax deductions for donees. The corporations under subsection (3) operate with primarily either religious, charitable, scientific, literary or educational purpose, whereas those organized under outside of subsection (3) tend to operate as social, professional, political, union, and insurance-pooling entities.

The US tax code distinguishes between two main kinds of 501(c)(3) organizations. The two groups, *public charities* and *private foundations* differ on a largely nominal basis, where the former are attributed public charity status by the IRS based on deriving at least 10% of their revenue from the general public and the government, whereas the latter status is granted based on deriving its funding mainly from individuals, families, and corporations.

The two groups see largely similar legal and tax treatment, albeit with some important distinctions. Many of the most important differences stem from the Tax Reform Act of 1969, which aimed to limit tax fraud through private foundations. Some of the reforms to private foundation operation include: 1) the limitation of the donor income tax deduction to 30% of adjusted gross income (AGI) (set at 50% for public charities),[25] 2) a 1.39% tax on investment and endowment income and corporate income tax treatment of unrelated business income, and 3) restrictions on *self-dealing:* direct transactions with foundation leadership and prominent donors and their families (deemed *disqualified* persons).

There are a priori reasons to suspect that the declared contributions response to changes in estate taxation may differ between public charities and private foundations. As a first order, the private foundations are nominally defined by their more relatively concentrated contributor/donor base. Mechanically, bequests out of estates from wealthier individuals likely comprise a greater share of contributions for private foundations than do those for public charities that may receive a greater proportion of their contributions from government grants and smaller donors. Second, while anti-self-dealing laws prohibit most transactions that result in untaxed cash-flow to disqualified individuals, individuals may circumvent these restrictions via indirect, “round-tripping” transactions. Moreover, affiliation with a private foundation via relation to a prominent donor or manager may provide both non-pecuniary and pecuniary benefits to normally disqualified persons through entirely legal means. For example, association with a private foundation may afford related individuals additional social capital. In this manner, donations to private foundations can effectively serve as a less-liquid intra-generational asset similar to an estate.

[24] Certain kinds of activities do generate tax liability for nonprofit entities, such as generating investment income or making payments to disqualified parties.

[25] The income tax charitable deduction also sees a five-year carry-forward basis; that is, for a charitable deduction in excess of the relevant AGI limit, the excess can be applied for up to five years after the initial donation.

2.4 Conceptual model

This section presents and develops a simple model environment that illustrates the incentives and tradeoffs of charitable tax expenditures out of within a wealth taxation framework, demonstrating justification for why private foundation giving might response more strongly to changes in the estate tax schedule than giving to other charity types. The purpose of the model is conceptual in foundation. I model the end-of-life estate planning and bequesting decision as an implicitly two-generation problem, in which a parent-decedent allocates her estate between taxed bequests and charitable giving between organizations of different benefit to her child-recipient. This taxpayer maximizes her utility, which considers the present-day warm-glow value of one of thee kinds of charitable giving and the vicarious, discounted utility of her child's future consumption.[26]

The taxpayer allocates wealth between four different kinds of end-of-life giving to activities that generate warm-glow utility or vicarious second-generation utility. Three kinds of charitable giving generate warm-glow utility: tax-dispreferred giving to a non-charitable entity and tax-preferred giving to a public charity or to a private foundation. The bequest motive considers both direct bequesting (subject to the estate tax) as well as private foundation giving, where the central implication is that private foundation giving may reflect interest in generating a form of consumption for future generations.

The conceptual results of this model are straightforward. The tax preference against direct non-charitable bequests and non-charitable giving induces substitution toward private foundation giving and unrelated charitable giving in response to an estate tax increase. However, negative income effects from additional taxation on direct bequests and non-charitable giving mitigate the positive substitution toward private foundation giving and unrelated charitable giving, so that the net effect of an estate tax increase on both of these latter activities depends on the relative magnitudes of income and substitution effects.

A parent has exogenous wealth $w \geq 0$ that she is allocating for end-of-life estate planning purposes. She derives utility based on the allocation of her wealth between four different sources that either benefit her child or that provide her warm glow utility: 1) she can bequest wealth b to her child that is subject to estate tax τ; 2) she can donate g_c that is exempt from wealth taxation to an unrelated charitable cause; 3) she can donate g_n to a non-tax-deductible cause; 4) she can donate g_p exempt from estate taxation to a related charitable entity that generates some privately-accruing benefit to her child. This donation activity g_p serves as a stand-in for giving to a related private foundation. All three donation options provide the parent with some warm glow utility. The parent maximizes an objective function that considers directly the warm glow benefits of donating and vicariously the well-being of her child:

$$U(b, g_c, g_n, g_p) = \sum_{l \in \{c,n,p\}} u_l(g_l) + \beta v(b, g_p), \tag{2.1}$$

for a discount factor β of her child's utility in bequested wealth b and privately-benefiting charitable donation g_p. All of these value functions increase concavely in their arguments. Here, I heuristically consider a bequest motive $v(b, g_p)$ that is additively separable in direct bequests b and private

[26] I refrain from modeling lifetime giving and its income-tax deduction implications for simplicity and because of the significantly greater magnitude of potential estate tax mitigation of charitable bequests compared to that for the income tax.

foundation giving g_p, but Appendix subsection B.2.1 considers some of the complexities introduced by removing this specification.

The parent maximizes this objective subject to the end-of-life resource constraint:

$$w = \frac{b}{1-\tau} + g_c + \frac{g_n}{1-\tau} + g_p, \tag{2.2}$$

with $b, g_c, g_n, g_p \geq 0$.[27]

An interior solution with strictly positive intergenerational bequesting and giving of all three described types satisfies the first order conditions:

$$\begin{aligned} v_b &= \left(\frac{1}{\beta} u_p' + v_{g_p}\right) \frac{1}{1-\tau} && (2.3) \\ &= u_c' \cdot \frac{1}{\beta} \cdot \frac{1}{1-\tau} && (2.4) \\ &= u_n' \cdot \frac{1}{\beta} && (2.5) \end{aligned}$$

and that at an interior optimum, the marginal value of alleviating the budget constraint can be expressed as $\lambda = u_c'|_{x^*}$ for optimal $x^* = (b^*, g_c^*, g_n^*, g_p^*) \in \mathbb{R}_+^4$.[28]

The first order conditions implicitly define an interior optimum with mapping $f : \mathbb{R}^8 \to \mathbb{R}^5$

$$f(x^*, \lambda, \beta, \tau, w) = \begin{bmatrix} \beta v_b - \frac{\lambda}{1-\tau} \\ \frac{\partial u_c}{\partial g_c} - \lambda \\ u_n' - \frac{\lambda}{1-\tau} \\ \beta v_{g_p} + u_p' - \lambda \\ w - \frac{b}{1-\tau} - \frac{g_n}{1-\tau} - g_c - g_p \end{bmatrix} = \vec{0} \in \mathbb{R}^5 \tag{2.6}$$

We can study the comparative statics associated with local perturbations of the interior optimum defined here by applying the implicit function theorem. The proof demonstrating this application and the full partial derivative matrix are presented in appendix section subsection B.2.1.

The simple case with additive separability between private foundation giving and direct transfers for the bequest-motive component of the utility function gives straightforward intuition for the incentive responses to a change in the tax rate. Income effects decrease each component of an optimum $(b^*, g_c^*, g_n^*, g_p^*)$ given a non-zero counterfactual $(b^* + g_n^*)$, and substitution effects draw funds from the tax-dispreferred bequesting and non-charitable giving toward tax-preferred private foundation giving and charitable giving. The sign of $\frac{\partial g_p}{\partial \tau} - \frac{\partial g_c}{\partial \tau}$ is given based on the specific curvatures of the value functions. But, assuming symmetric charitability motive for private foundation

[27] Each argument $l \in \{b, g_c, g_n, g_p\}$ is associated with complementary slackness value multiplier λ_l.

[28] One can also consider the case with binding non-negativity constraints on non-deductible donations and/or unrelated charitable donation (with other partial/full corner solutions generalizing accordingly): $g_c = g_n \equiv 0$. In these cases, the unconstrained optimum would attribute negative values to these consumption choices so as to free up additional budget to allocate to intergenerational bequests and related private foundation donations with marginal benefit $-\lambda_n, -\lambda_c > 0$ for a small decrease below zero in g_n or g_c respectively.

and public charity giving, the bequest motive channel of private foundation giving generates an asymmetric response:

$$\frac{\partial g_p}{\partial \tau} - \frac{\partial g_c}{\partial \tau} \geq 0.$$

The empirical section focuses primarily on estimating the declared contributions response of nonprofit entities to changes in the effective federal and state estate tax rate. We can understand this parameter as it relates to prior literature on the estate tax rate elasticity of charitable bequests as

$$\varepsilon_{T,\tau} = S_B \varepsilon_{B,\tau} + S_{NB} \varepsilon_{NB,\tau} = S_B(\varepsilon_{B,\tau} - \varepsilon_{NB,\tau}) + \varepsilon_{NB,\tau},$$

for bequest and non-bequest shares of declared contributions S_B and S_{NB} respectively and overall estate tax rate elasticity of declared contributions $\varepsilon_{T,\tau}$. Assuming that the estate tax rate has no bearing on non-estate-related donations, this net elasticity reduces to the standard bequesting elasticity (with respect to the estate tax rate) multiplied by the share of overall contributions resulting in an estate tax deduction.

This additional structure along with the above incentive responses also motivate the design of counterfactual giving estimation strategies in the empirical section. Namely, non-charitable entities can serve as a counterfactual group for studying the impact of estate tax changes on charitable entities and private foundations if, in addition to satisfying parallel trends assumptions, non-charitable donations demonstrate zero response to estate tax changes—i.e. estate tax changes do not also affect non-charitable donation behavior. This condition is satisfied either if the share of non-charitable contributions out of estates $S_{NB} = 0$ or if $\frac{\partial g_n^*}{\partial \tau} = 0$.

In addition to using non-501(c)(3) contributions to inform the counterfactual evolution of charitable and private foundation giving, I design counterfactuals using state-level changes that do not affect charitable entities in other states[29]. I also also allocate focus on quantifying the differential responses between vehicle types in response to federal reform.

2.5 Responses to federal estate tax reform

This section estimates the differential contributions response along 501(c) vehicle type to the 2001 federal estate tax rate decrease. EGTRRA, introduced in the US legislature in May 2001 and ratified the following month, reduced the top federal estate tax rate from 55% to 50% followed by an additional one percentage point reduction per year until 2007 (settling at a top rate of 45%).

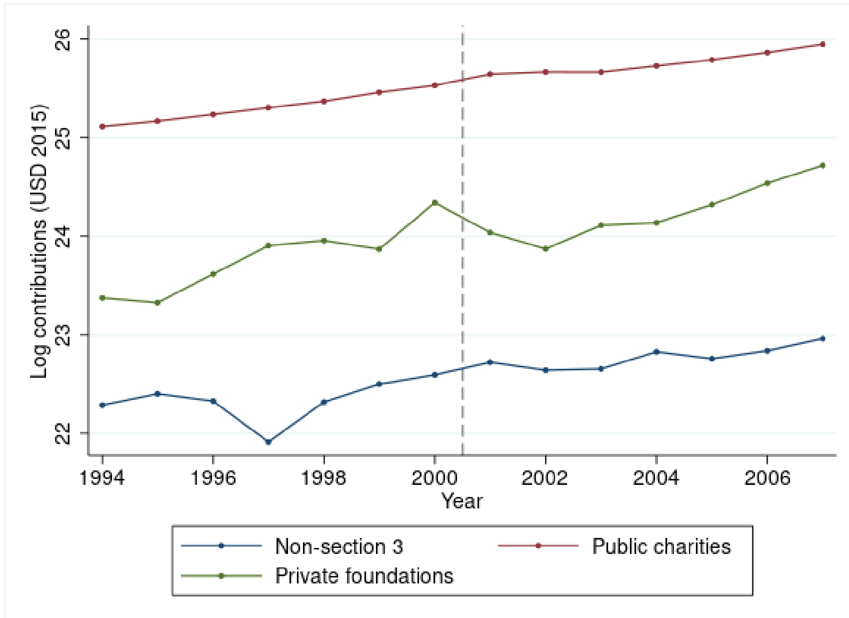
Figure 2.5.1 plots the evolution over years in aggregate reported contributions by nonprofit vehicle type. Panel (a) illustrates parallel evolution in aggregate contributions, whereas following the reform, aggregate giving to private foundations visibly falls with respect to trends in public charity and non-section-3 reported contributions. Panel (b) focuses on private foundations, disaggregating between family-operated and non-familial entities; however, while pre-reform giving exhibits some fluctuation, there appears no significant break in trend contributions reported along a family-ownership margin.

[29] This approach relies on other assumptions that preclude the possibility of inter-state mobility responses of the domicile of charitable entities in response to state-level estate tax changes. I describe these restrictions in greater detail in Section 6.

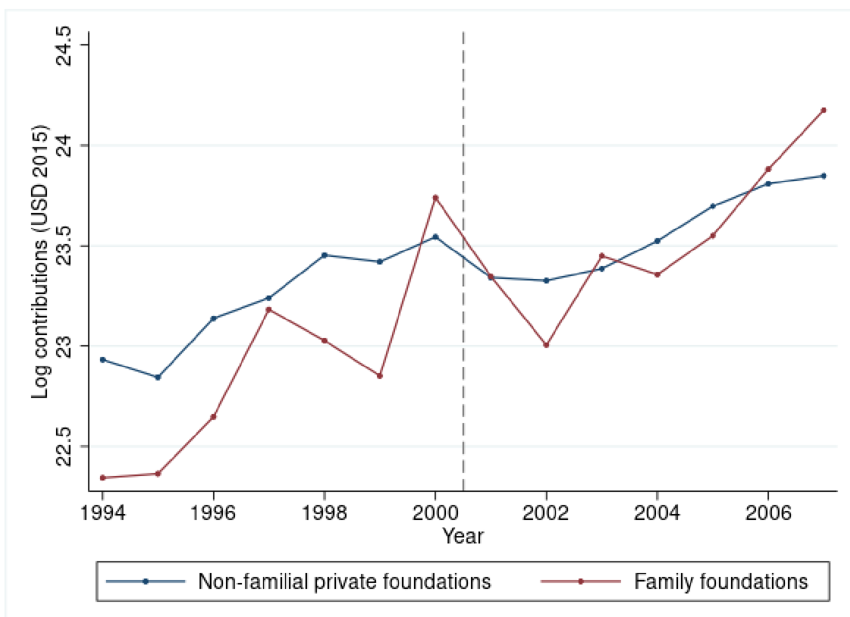
Figures Figure B.1.1 and Figure B.1.2 display these disaggregations for entry and exit rate, respectively. They illustrate that private foundation entry, while exhibiting substantial noise prior to EGTRRA, substantially decreased in the post-reform period, and that familial private foundations experienced an ostensibly larger decrease in entry rates than did non-familial private foundations. The plot of aggregate exits demonstrates there was no substantial movement in aggregate exit rates among any disaggregation by vehicle type following EGTRRA (and that public charities exhibited a substantial decrease in exit rates from the early to mid-1990s).

Figure 2.5.1: Log aggregate reported contributions by nonprofit vehicle type

(a) Public charities, private foundations, and 501(c)-non(3)s



(b) Familial v. non-familial private foundations



These figures plot annual values of log aggregate reported contributions by nonprofit vehicle type between 1994 and 2007. Panel (a) disaggregates total annual contributions between private foundations, public charities, and nonprofit entities organized outside of subsection 501(c)(3). Panel (b) disaggregates total annual contributions between non-familial private foundations and familial private foundations.

The baseline empirical design estimates a difference-in-differences model in reported contributions between different tax-exempt vehicles in response to the federal estate tax changes introduced by EGTRRA:

$$y_{i,t} = \beta_0 + \sum_{l \in \{c,n,p\}} \gamma_l 1\{\theta_i = l\} + \sum_{k=1994}^{2007} \delta_k 1\{Year_t = k\} + \sum_{l \in \{c,n,p\}} \sum_{k=1994}^{2007} \beta_{lk} 1\{\theta_i = l\} 1\{Year_t = k\} + \varepsilon_{it}, \quad (2.7)$$

for organization i in year t. Each organization is of some time-invariant vehicle type $\theta_i \in \{c, n, p\}$, corresponding with 501(c) non-(3) type, public charities, and private foundations respectively. Outcome variables include various parameterizations of reported contributions: levels, logs, binary indicators for positive contributions, and binary indicators for whether contributions increased for a given entity between years (expressed as $1\{contributions_{i,t} > contributions_{i,t-1}\}$). Other outcome variables focus on the operating, entry, and exit decisions of nonprofit organizations.[30]

In my main specifications for contributions response, I include two-way fixed effects as well as covariates that vary on the time-id level.[31] The data only include entities during their years of operation (e.g. the contributions for entity i in year t prior to market entry or subsequent to exit is missing rather than zero).

I use 501(c) non-(3) organizations and the year 2000 as baselines for comparison. Tax strategic estate planning is a key component of estate planning. Because death is typically an unforeseen event, changes to estate planning occur in responses to expected future estate taxation parameters (Bakija and Heim 2011). For the purposes of studying the estate planning behavior, although federal estate tax rate changes only began in 2002, taxpayers likely began to alter their post-death estate allocation plans upon the passage of EGTRRA in 2001. In the respect that I therefore expect *a priori* a contributions response beginning in 2001, I use the year 2000 as the baseline year in my preferred specifications. I end the federal-level time frame just prior to the onset of the 2008 Financial Crisis.

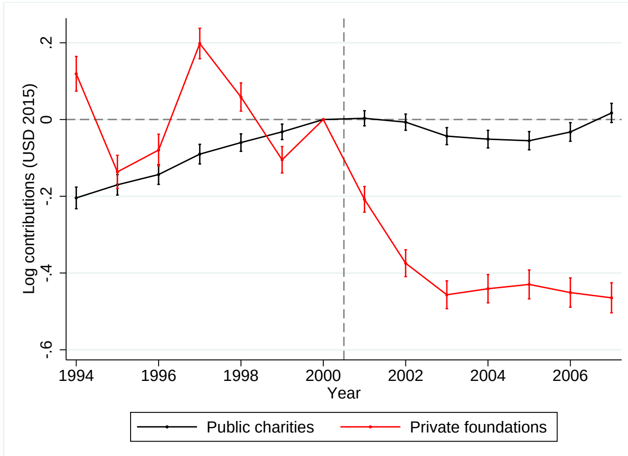
The results of this estimation demonstrate a significant, largely asymmetric response of private foundation activity relative to public charity activity. Figure 2.5.2 illustrates a sharp post-reform decline in reported contributions by private foundation by around 40%. While public charity giving is characterized by an sizeable increasing pre-trend relative to non-section-3 giving, accounting for this pre-reform movement depicts a modest decline of around 10% in line with a decrease in giving incentives. The results of the reform present no evidence of an asymmetric response between familial and non-familial private foundations.

[30] I define the variable $entry_{it} = 1\{Year_t \geq founding\ year_i\}$, with the founding year of entity i defined as the minimum of the self-reported founding year of entity i and the minimum year observed for i in the data after 1991 (two years after the earliest year observed in the data). I define $exit_{it} = 1\{Year_t > last - year_i\}$, where the last year of entity i is defined as the maximum year observed for i prior to 2013 (two years before the latest year observed in the data). I define $operating_{i,t} := entry_{i,t} - exit_{i,t}$.

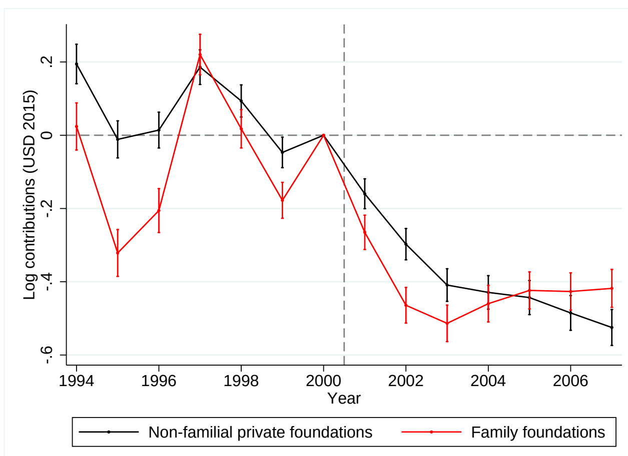
[31] In my main specification, I include only the following covariates: assets, liabilities, state- and federal-level corporate income tax rates, state-level unemployment insurance (payroll) tax rates, and state- and federal-level top personal income tax rates. I exclude other financial accounting covariates on the id-year level, such as expenses and non-contribution-sourced revenue, out of endogeneity concerns.

Figure 2.5.2: Federal reform difference-in-differences: log contributions

(a) Private foundations and public charities relative to non-section-3 entities



(b) Familial v. non-familial private foundations



These figures plots the annual difference-in-differences coefficients for the two-way fixed effect specification: $y_{i,t} = \alpha_i + \sum_{k=1994}^{2007} 1\{Year_t = k\} + \sum_{l \in \{c,n,p\}} \sum_{k=1994}^{2007} \beta_{lk}\{\theta_i = l\}1\{Year_t = k\} + \varepsilon_{it}$. Panel (a) displays the difference-in-differences coefficients for private foundations relative to public charities, and panel (b) compares family foundations and non-familial private foundations against 501(c)-non(3) entities. The 95% confidence bands use standard errors clustered on the EIN-level.

Table 2.5.1 displays the post-reform difference-in-differences estimates for various parameterizations of nonprofit activity, controlling for vehicle-specific linear time trends.[32] The asymmetric response between private foundations and public charities appears in all parameterizations of contributions and is robust to the inclusion/exclusion of nonprofit fixed effects. Columns (1) and (2) illustrate that the response of contributions reported by charities to variation in the estate tax rate

[32]Because there is no significant time trend for private foundations, Table 2.5.1 Panel (b) does not include linear time trends.

is entirely driven by the response of private foundations, as opposed to public charities. Following EGTRRA, contributions reported by private foundations decreased by USD 237k per year relativel to non-tax-exempt nonprofits (a 43% decline relative to a baseline of USD 540k per year). This finding implies that the long-standing documented positive relationship between the estate tax rate and charitable giving is largely driven by giving to private foundations.

Columns (3) - (6) illustrate similar responses on the purely intensive and extensive margins separately. Proportionately, private foundation contributions decreased by 33% on average, and within-nonprofit contributions declined by 24%; public charity contributions decreased by 5% on average, corresponding with a within-nonprofit average decline of 3%. Taking into account the approximately 18.2% decline in the net estate tax rate post-reform (55% to 45%), private foundations exhibit an aggregate contributions elasticity of between 1.8 and 2.2, whereas public charities see an elasticity of approximately .285. However, this latter elasticity for public charities corresponds with a purely intensive-margin response. The within-nonprofit response for private foundations implies an elasticity of 1.3.

The reform also induced differential extensive margin responses by organization type. Private foundations demonstrated a 6.5 percentage point (15%) decline in the probability of reporting non-zero contributions, whereas this probability declined by 0.5-1 percentage points (1.5-3%) for public charities. Additionally, private foundations entry slowed by 5 percentage points versus a 1.7 percentage point decline in public charity entry. However, private foundation exit demonstrated no change, while public charity exit increased by 0.23 percentage points, in line with the incentives at play.

Table 2.5.1 Panel (b) displays the difference-in-difference results for family foundations expressed relative to non-familial private foundations. Columns (1) and (2) illustrate no significant difference in the overall contributions response of the two vehicle types to the estate tax rate. The intensive- and extensive-margin parameterizations suggest a slightly outsized response of family foundations relative to non-familial private foundations.

Table 2.5.1: Federal reform difference-in-differences

Panel (a): Private foundation and public charities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Contributions	Contributions	Log cont.	Log cont.	Cont. bin.	Cont. bin.	Entry	Exit
Private foundation × Post	-236.8***	-202.8***	-0.40***	-0.27***	-0.066***	-0.065***	-0.048***	-0.0012
	(55.8)	(49.2)	(0.02)	(0.015)	(0.0019)	(0.0019)	(0.0018)	(0.00074)
Public charity × Post	5.9	-3.3	-0.054***	-0.029***	-0.0045***	-0.0097***	-0.017***	0.0023***
	(10.7)	(12.6)	(0.014)	(0.0096)	(0.0013)	(0.0012)	(0.0014)	(0.00056)
Private foundation	478.6***		1.39***		0.18***		0.031***	-0.016***
	(48.2)		(0.018)		(0.0018)		(0.0011)	(0.00047)
Public charity	409.2***		1.99***		0.11***		-0.012***	-0.024***
	(18.5)		(0.014)		(0.0013)		(0.00085)	(0.00036)
Post	4.0		0.038***		0.017***		0.019***	-0.0024***
	(6.5)		(0.013)		(0.0011)		(0.0013)	(0.00050)
Constant	59.1***	381.0***	9.58***	11.1***	0.23***	0.34***	0.061***	0.038***
	(6.5)	(6.0)	(0.012)	-0.0045	(0.0011)	(0.0005)	(0.00082)	(0.00032)
Observations	6,254,220	6,206,490	2045649	1,969,142	6,254,220	6,206,490	5793780	6,389,919
Adjusted R^2	0.000	0.591	0.089	0.792	0.02	0.638	0.008	0.012
ID		X		X		X		X
Year		X		X		X		X
Vehicle × Linear time trend	X	X	X	X	X	X	X	X

EIN-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

This table displays select coefficients estimated from the difference-in-differences model:

$$y_{it} = \beta_0 + \delta 1\{Year_t \geq 2001\} + \sum_{l\in\{n,c,p\}} \gamma_l 1\{\theta_i = l\} + \sum_{l\in\{n,c,p\}} \tau_l Year_t + \sum_{l\in\{n,c,p\}} \beta_l 1\{\theta_i = l\} 1\{Year_t \geq 2001\} + \varepsilon_{it}$$

with non-section (3) charities in the year 2000 as the baseline. "Cont" abbreviates "contributions". Levels contributions are expressed in 1000s USD 2015. The dependent variable in columns (5) and (6) is defined as $1\{Contributions_{i,t} > 0\}$. The variable "entry" is populated only for observations including and prior to entry; the variable "exit" is populated only for observations during a nonprofit's operating lifetime.

2.6 Responses to state-level estate tax reform

This section studies the differential responses of charitable giving vehicles to state-level variation in the estate tax schedule. Prior to the replacement of the state estate tax credit with a less generous deduction as part of EGTRRA, there existed nearly no geographic heterogeneity in the total top marginal estate tax rate. This replacement occurred at a constant annual rate between 2002 and 2005. I use the new state-level estate tax variation induced by EGTRRA to demonstrate an additional asymmetric margin of response between different kinds of charitable giving vehicles. I show that in spite of the geographic disconnect between state estate tax liability based on state-of-residence and the full deductibility of charitable bequests regardless of state, private foundations

Table 2.5.1: Panel (b): Family foundations versus non-familial private foundations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Contributions	Contributions	Log cont.	Log cont.	Cont. bin.	Cont. bin.	Entry	Exit
Family foundation × Post	4.4	64.7	-0.13***	0.063***	-0.017***	-0.033***	0.030***	-0.0073***
	(43.5)	(43.0)	(0.022)	(0.019)	(0.0027)	(0.0025)	(0.0012)	(0.00046)
Family foundation	195.4***		0.89***		0.16***		0.016***	-0.022***
	(58.6)		(0.023)		(0.0030)		(0.00063)	(0.00033)
Post	39.0*		-0.044***		-0.00041		0.020***	0.0076***
	(23.5)		(0.015)		(0.0015)		(0.00064)	(0.00041)
Constant	317.2***	394.2***	10.4***	10.7***	0.33***	0.39***	0.052***	0.025***
	(20.8)	(9.8)	(0.017)	(0.0054)	(0.0017)	(0.00058)	(0.00035)	(0.00029)
Observations	976,708	970,819	377,793	359,981	976,708	970,819	906,119	996,472
Adjusted R^2	0.000	0.203	0.023	0.611	0.023	0.469	0.006	0.008
ID		X		X		X		
Year		X		X		X		

EIN-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

This table displays select coefficients from the difference-in-differences model:

$$y_{it} = \beta_0 + \delta \cdot 1\{Year_t \geq 2001\} + \gamma \cdot 1\{\theta_i = family\ foundation\} + \beta \cdot 1\{\theta_i = family\ foundation\}1\{Year_t \geq 2001\} + \varepsilon_{it}$$

estimated on the sample of all private foundations with non-familial private foundations in the year 2000 as the baseline. "Cont" abbreviates "contributions". Levels contributions are expressed in 1000s USD 2015. The dependent variable in columns (5) and (6) is defined as $1\{Contributions_{i,t} > 0\}$. The variable "entry" is populated only for observations including and prior to entry; the variable "exit" is populated only for observations during a nonprofit's operating lifetime.

contributions respond to a change in the same-state estate tax rate with an within-nonprofit elasticity between .25 and .5, and an overall elasticity of around one. Public charities respond with an elasticity between .05 and .1.

By the limited geographic scope of the new state-level legislative variation, the responses elicited in this section do not perfectly map onto the contributions responses and broader changes in charitable activity documented in response to federal-level reform. Instead, taxpayers generally only incur estate, inheritance, gift, and generation-skipping tax obligation on the state-level based on state-of-residence at death. I.e., ex-ante, a change in state-level end-of-life wealth taxation may not necessarily result in a commensurate change in contributions received reported by nonprofit entities in that state, as reflecting optimal tax strategy. For example, a high-worth decedent from a state with a state estate tax, say New York, can receive equal tax benefit from making an end-of-life donation to a nonprofit entity domiciled in New York as in California (which features no end-of-life taxation). Ultimately, while an increase in end-of-life wealth taxation for a single state *will* incentivize additional bequests originating from that state, those incentives will not necessarily generate additional contributions accruing to nonprofit entities in that state relative to to those domiciled in other states.

I ask: does there exist a measurable state-level charitable contributions response to changes in end-of-life wealth taxation? While there is no preferential tax treatment based on the *location* of donation recipiency, contributions may change disproportionately within the state of tax change if either: 1) individuals exhibit substantial same-state preferences for donating behavior, 2) if private benefits to donating accrue based on location (e.g. the incentives charities give to donors, say a benefit dinner) are not fungible across geography, or 3) in-line with the result that individuals practice greater tax strategy in dealing with private foundations (which may host considerable related-giving or facilitate quasi-self-dealing), individuals incorporate nonprofit entities (namely private foundations) in proximity to their legal residence and engage in tax strategic charitable donating to their own nonprofits.

I study whether reforms to state-level estate taxation following the ratification of EGTRRA and the replacement of the state estate tax federal credit with a less-generous deduction resulted in a significant change in charitable activity on the state-level and whether there exists a disproportionate response between private foundations versus public charities as well as between family foundations and non-familial private foundations.

The ratification of EGTRRA effectuated considerable estate tax variation within and across states. Section 3.2 details this variation, which can be described simply as follows. Prior to EGTRRA, there existed nearly no geographic variation in estate taxation due to the presence of a federal-level tax credit generated from state-level estate tax payment. EGTRRA replaced this tax credit with a significantly less generous deduction. In the presence of the tax credit, total estate tax obligation can be understood, for an estate of sufficiently high-valuation P, approximately as $T_0 = \tau_s \cdot P + (\tau_f \cdot P - \tau_s \cdot P) = \tau_f \cdot P$ for federal- and state-level tax rates τ_f and τ_s respectively. Replacing this creditation with a deduction results in the following approximation of overall estate tax obligation: $T_1 = P(\tau_s + \tau_f - \tau_f \tau_s)$, an additional estate obligation of $\tau_s(1 - \tau_f)$ relative to the credit regime for a estate domiciled in a state with a separate state estate tax.

This repeal represented an unanticipated shock to state-level estate tax policy, and resulted in four mutually exclusive groups of states in terms of their tax-policy responses: 1) states that had no legislation providing for an independent state-level estate tax in the absence of the federal credit (and never installing an estate tax since EGTRRA) saw no additional state-level estate taxation following EGTRRA and are referred to as *"dormant"* or *"non-decouplers"* (29 states), 2) states that installed legislation either prior to or at the beginning of the phase-out of the federal credit repeal imposed commensurately higher total estate tax rates, but with a gradual increase aligning with the federal credit phaseout and are referred to as *"decouplers"*,[33] (12 states plus Washington DC) 3) states that installed an estate tax following the full phase-out of the federal credit by 2005 generated a sharp increase in their overall estate tax obligation and are referred to as *"post-EGTRRA decouplers"* (3 states), further split between those decoupling in 2005 (1 state) and those decoupling after 2005 (2 states), and 4) states that installed a separate estate tax at the beginning of, during, or following the federal credit phase-out that later repealed their state-level estate tax are referred

[33] Those decoupling in 2002 (7 states) are referred to as *"immediate decouplers"*, whereas those states decoupling after 2002 but prior to the full replacement of the federal credit by 2005 are referred to as *"late decouplers"* (6 states).

to as "repealers" (6 states, all initially installing their estate taxes in 2002).[34][35] States generally define their estate tax base using residence-based criteria, typically including all intangible assets and in-state tangible assets of taxpayers (sometimes exempting out-of-state physical assets included in the estate).

State-level estate taxes generally graduate progressively at identical thresholds as does the federal-estate tax, maxxing out at a top marginal rate of 16%, although mild variation exists in this top rate. Figure 2.6.1 displays the hypothetical evolution in the top marginal total estate tax rates for estates of sufficiently high valuation domiciled in dormant states (e.g. Arkansas) and immediate-decoupling states (e.g. Washington D.C.). With the full replacement of the credit with a deduction, states with a separate estate tax effectively impose an additional (approximately) 10 percentage points on estates of sufficiently high valuation.

The replacement of the federal-state estate tax credit with the deduction in the post-EGTRRA era lends itself to several distinct quasi-experimental designs in studying the different kinds of responses of charitable giving to state-level estate taxation. Due the new possibility to make counterfactual comparisons of identical charitable giving vehicle types of across states with different tax policies, I now constrain my sample to the universe of public charities and private foundations.

2.6.1 Difference-in-differences surrounding the repeal of the federal-state estate tax credit

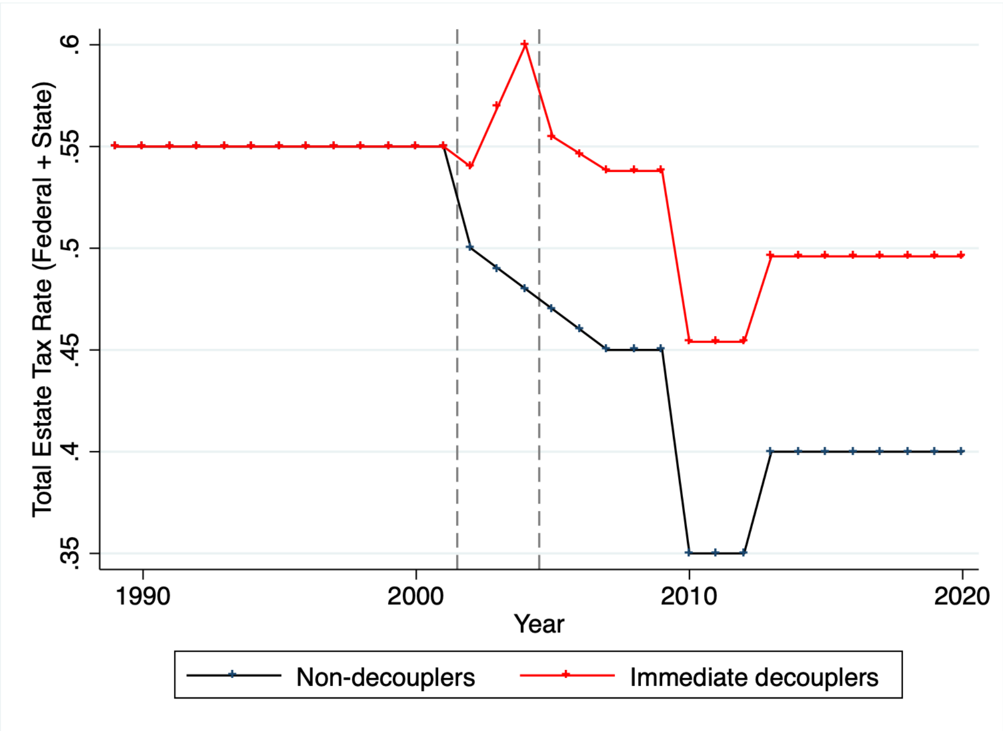
I first turn my attention to the differential contributions and activity responses of nonprofits between states that installed a separate state-level estate tax and those that did not along the federal-state estate tax credit phased-out on part of EGTRRA.

Because of the important role of forward-looking optimization and forecasting future estate taxation in estate planning, I exclude states that either install an estate tax subsequent to the full phase-out of the federal-state estate tax credit (and thereby could in principle serve as initially "dormant" states) or those that initially decoupled from the federal estate tax, but later repealed their state estate taxes (and thereby could in principle serve as initially "decoupling" states). These states may feature substantial anticipation responses to expected future changes to state estate tax regimes. For example, while Wisconsin decoupled from the federal estate tax immediately in 2002, the specific state political environment might have signalled clearly to taxpayers that the state estate tax would be repealed as soon as possible (which occurred in 2007). Wisconsin taxpayers likely planned out their estates with dynamic consideration of this possibility, so that the behavior of these taxpayers would differ considerably from those in an immediately decoupling state that did not later repeal their estate tax.

[34] While New Jersey and Delaware repealed their estate taxes in 2018, the sample timeframe ends in 2015 so that I categorize these states based on the timing of the state-estate tax installation.

[35] These groups are (presently, as of 2022) mutually exclusive insofar as no states have either repealed or installed a state-level estate tax at least twice in the post-EGTRRA era. Other states, such as Delaware, North Carolina, and Wisconsin have featured estate taxes with intermittent periods of repeal when considering *de jure* state-level estate taxation (absorbed by the federal credit pre-EGTRRA), but are not considered as such on a *de facto* basis, having initial periods of estate taxation occurring during the pre-EGTRRA era in the presence of the federal credit.

Figure 2.6.1: Illustration of evolution in top total estate tax rate



This figure illustrates the evolution of the top total (state + federal) marginal estate tax rate for two hypothetical estates of sufficiently high valuation: one domiciled in a state never featuring a separate estate tax (non-decoupler, e.g. Arkansas) and another domiciled in a state with an separate estate tax in operation starting in 2002 (immediate decoupler, e.g. Washington D.C.). The first vertical dashed gray line marks the passage of EGTRRA and the beginning of the federal-state estate tax credit phase-out. The second vertical dashed gray line demarcates the end of the federal-state estate tax credit phase-out, after which state estate tax payments generate a less generous deduction against federal estate tax obligations.

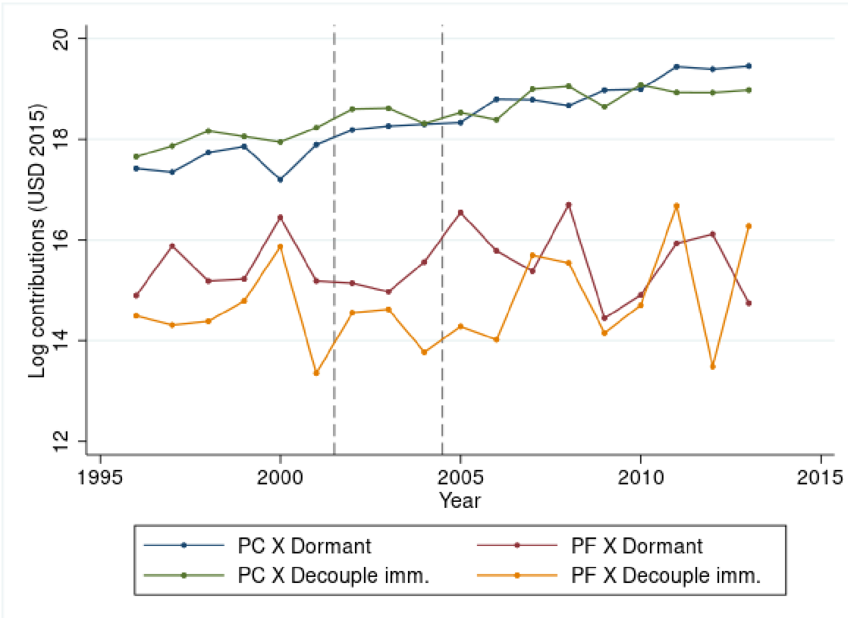
For this analysis I focus on nonprofits in two groups of states. I view nonprofits in immediate- and late-decoupling-states as treated and those domiciled in permanently dormant states as control.[36] The component of EGTRRA repealing the state estate tax credit represents an quasi-randomly assigned shock to state estate tax policy. Whereas the primary concern in this setting may lie in potential endogeneity of state-level estate tax policy to the evolution of future within-state economic outcomes, states typically committed to the dependency of their state estate taxes on the federal-state estate tax credit in prior political regimes. Moreover, while some states quickly made an immediate post-EGTRRA effort to reverse their preset state-level estate tax, because the estate tax generates a tiny portion of state tax collections, this decision fell on largely partisan lines in a manner unrelated to the operation of nonprofits.

Figure 2.6.2 displays the evolution in aggregate reported contributions by nonprofits along the margins of vehicle type and state type. Panel (a) illustrates a modest increase in aggregate private foundation giving in immediately decoupling states—compared both to public charities in dormant and decoupling states as well as to private foundations in non-decoupling states. The aggregates in Panel (b) are more erratic, but suggest that more of the increase documented in Panel (a) is more driven by giving to family foundations in decoupling states. Reported contributions by both familial- and non-familial private foundations in dormant states remains relatively constant. Figure B.1.4 illustrates a similar aggregate trend for the number of nonprofits in operation, however also showing a proportional increase in private foundations operating in dormant states relative to those in treated states.

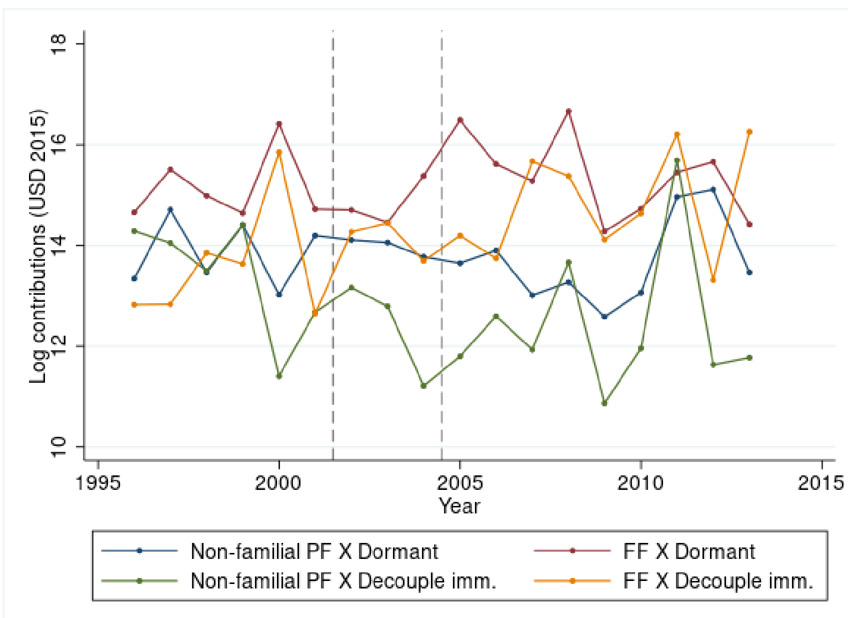
[36] I exclude from this analysis any nonprofit entities changing their state of domicile.

Figure 2.6.2: Log aggregate reported contributions by nonprofit vehicle type

(a) Public charities and private foundations



(b) Familial v. non-familial private foundations



These figures plot annual values of log aggregate reported contributions by nonprofit vehicle type between 1996 and 2013. Panel (a) disaggregates total annual contributions between private foundations and public charities. Panel (b) disaggregates total annual contributions between non-familial private foundations and familial private foundations. The years between the dashed gray lines indicate the phase-out period of the federal-state estate tax credit.

To more finely parse these aggregates, I estimate the response in reported contributions and other measures of activity for nonprofits based on the de facto state estate tax policy of their state of domicile. While I am interested in estimating the responses for all nonprofits, I also estimate the differential responses along the public charity v. private foundation and non-familial private foundation v. family foundation margins using a triple difference (DDD) specification:

$$
\begin{aligned}
y_{i,t} = \alpha_i &+ \sum_{k=1996}^{2013} \delta_k 1\{Year_t = k\} \\
&+ \sum_{s\in\mathcal{S}} \sum_{k=1996}^{2013} \gamma_{s,k} 1\{Year_t = k\} \cdot 1\{State_i = s\} + \sum_{\theta\in\Theta} \sum_{k=1996}^{2013} \xi_{\theta,k} 1\{Year_t = k\} \cdot 1\{\theta_i = \theta\} \\
&+ \sum_{\theta\in\Theta} \sum_{s\in\mathcal{S}} \sum_{k=1996}^{2013} \beta_{\theta,k,s} 1\{Year_t = k\} \cdot 1\{State_i = s\} \cdot 1\{\theta_i = \theta\} + \varepsilon_{i,t}.
\end{aligned}
$$

Here, subscript s represents the state-type as pertaining to federal-state estate tax credit decoupling policy, and dormant states serve as the baseline. Because nonprofits changing states are dropped from the sample, EIN-level fixed effects are perfectly collinear with the state-level and nonprofit type θ-level fixed effects. I also estimate a similar specification that excludes EIN-level fixed effects to correspond with more aggregated averages, as opposed to within-entity responses. Under the assumption of parallel trends[37] $\beta_{\theta,k,s}$ represents the triple difference estimator: e.g. the average treatment effect on the treated in year t for private foundations located in states immediately decoupling from the federal-state estate tax credit and instituting its own separate state-level state tax relative to public charities located in dormant states in the year 2000.

I estimate regressions of these forms to demonstrate the asymmetric response of public charities and private foundation to changes in state-level estate tax policy along the same outcome variables as in previous sections. I also isolate the two by-charitable-giving-vehicle-type difference-in-difference estimators implicit in the above specification (e.g. the difference-in-difference estimator comparing private foundations in decoupling and dormant states pre-and post- reform, and the same analogous estimator for the other non-profit vehicle types).

Figure 2.6.3 displays these coefficients, largely illustrating an asymmetric giving response between private foundations and public charities and an indistinguishable difference between familial- and non-familial private foundations. When controlling for EIN fixed effects, compared to contributions reported by year 2000 public charities in dormant states, private foundation giving in treated states increases by between 7- and 8%, rising following the full phase-out of the estate tax credit.

Figure 2.6.4 disaggregates this triple difference between its two component difference-in-difference estimates, finding that this effect is mainly driven by an increase in giving to private foundations in treated states relative to those in dormant states. Public charities in treated states do exhibit some average increase in giving relative to the pre-period, but their evolution is noisy and of a significantly smaller scale than for private foundations. Importantly, this emerges when including firm-level fixed effects or controlling for firm size, as indicated by Figure B.1.5. Lastly, Figure 2.6.5

[37] Olden and Møen 2022 demonstrate that an alternate parallel trends assumption—identical bias between both corresponding component difference-in-differences estimators—satisfies the identifying assumptions of the triple difference estimator.

illustrates an analogous response along nonprofit entry: private foundation entry in decoupling states by 1 percent, relative to public charity entry in dormant states. This specification also illustrates a decrease in familial foundation entry on the order of half of one percentage point, albeit only jointly significant across years.[38]

The results affirm the view that private foundation activity exhibits much greater sensitivity to the tax environment than do public charities. Similarly as with the federal reform, there is little statistically distinguishable difference in observed behavior between familial and non-familial private foundations, albeit a stronger entry response of non-familial private foundations relative to family foundations.

Table 2.6.1 summarizes these results. Column (1) illustrates that state-level estate taxation induces an increase in state-level giving that accrues entirely to private foundations, as opposed to to public charities. Namely, private foundation contributions increased by USD 130k per year (a 23% increase against a baseline counterfactual of USD 560k per year) for nonprofits domiciled in states with a separate state estate tax relative to those domiciled in states without an estate tax. While I cannot sharply distinguish the precise mechanism that generates the asymmetry between the two vehicle types, this difference likely suggests either that private foundations see a greater concentration of non-related donors within their state of domicile, or that private foundations see greater donations from their owners, who are domiciled in the same state.

However, column (2) shows that this overall contributions response loses significance on the within-nonprofit level. Columns (3)-(6) illustrate the pure intensive- and extensive-margin responses separately. The attenuation of the overall contributions response on the within-nonprofit level appears to be driven by conflicting responses on these margins, where on the intensive margin, charitable contributions reported by private foundations within states with an estate tax increased by 5% but also saw a 1 percentage point decline in probability of any positive contribution. The population-average intensive margin response, illustrated in column (3), also shows that while giving did not strictly increase among private foundations along the intensive margin, private foundations on average saw 7 percent greater contributions than did public charities (driven entirely by a decrease in public charity contributions).

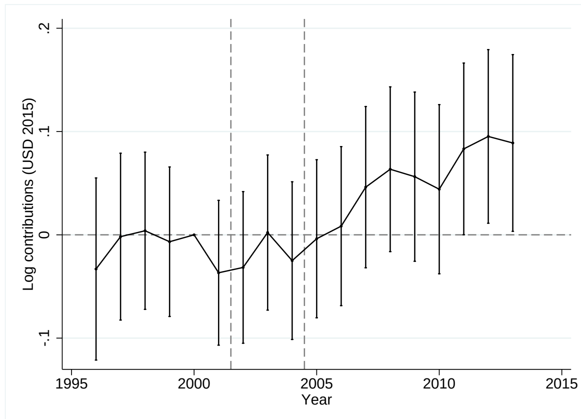
Given the proportion change in the top marginal estate tax rate for the post-credit repeal period,[39] the intensive margin response corresponds with a reported contributions elasticity with respect to the state-level top estate tax rate of approximately .25, albeit nearly double when considering solely the post-repeal response. The overall contributions elasticity for private foundations with respect to the overall estate tax rate is approximately unity. Contributions to public charities respond with an aggregate elasticity indistinguishable from zero but with a within-nonprofit elasticity between 0.1 and 0.5.

[38] Figure B.1.6 finds commensurate results while using repealing states as the state-level treatment group.

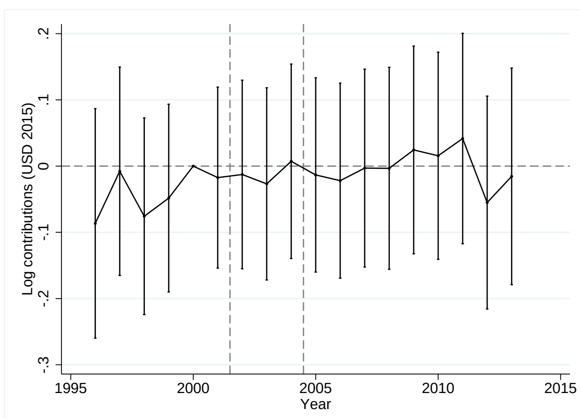
[39] $\frac{\Delta\tau_{2007}}{\tau_{2007}} = \frac{.16 \cdot 0.6}{.45} \approx 0.213.$

Figure 2.6.3: Triple differences in state × vehicle type: log contributions

(a) Public charities and private foundations



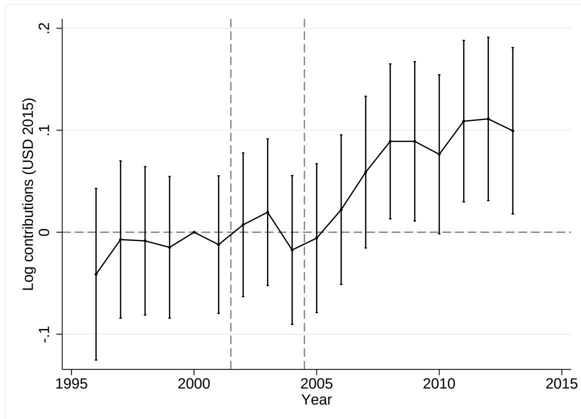
(b) Familial v. non-familial private foundations



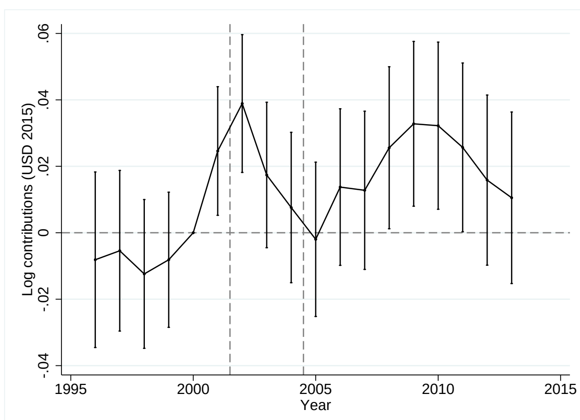
These figures plot annual values of the triple difference coefficients for log aggregate reported contributions comparing between vehicle type and state estate tax treatment status, using the year 2000 as a baseline. The specifications includes two-way fixed effects on the EIN-year-level. Panel (a) compares private foundations with public charities. Panel (b) isolates private foundations and compares familial foundations against non-familial foundations. The years between the dashed gray lines indicate the phase-out period of the federal-state estate tax credit. Error bars represent 95% confidence intervals with standard errors clustered on the EIN-level.

Figure 2.6.4: Difference-in-differences by state-type: log contributions

(a) Private foundations



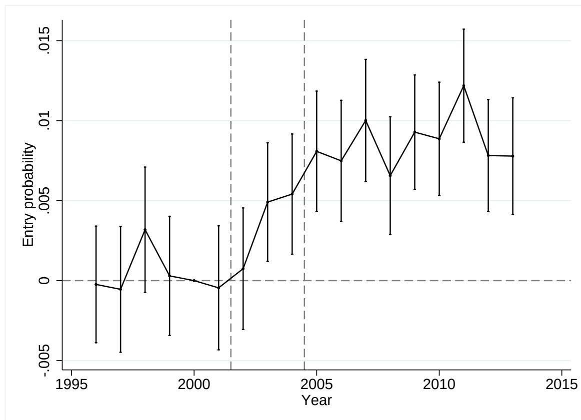
(b) Public charities



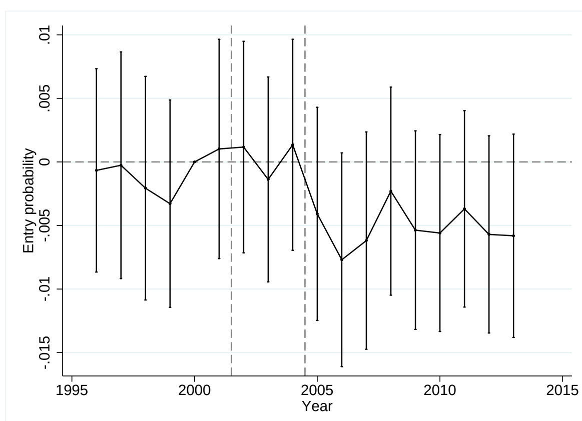
These figures display the difference-in-differences coefficients estimated from reduced forms stratified by charity vehicle type compare log aggregate reported contributions based on state-level tax policy, using the year 2000 as a baseline. The specifications includes two-way fixed effects on the EIN-year-level. Panel (a) compares private foundations across state types, and panel (b) compares public charities. Panel (b) isolates private foundations and compares familial foundations against non-familial foundations. The years between the dashed gray lines indicate the phase-out period of the federal-state estate tax credit. Error bars represent 95% confidence intervals with standard errors clustered on the EIN-level.

Figure 2.6.5: Triple differences in state × vehicle type: entry

(a) Private foundations v. public charities



(b) Familial v. non-familial private foundations



These figures display the difference-in-differences coefficients estimated from reduced forms stratified by charity vehicle type compare log aggregate reported contributions based on state-level tax policy, using the year 2000 as a baseline. Panel (a) compares private foundations across state types, and panel (b) compares public charities. Panel (b) isolates private foundations and compares familial foundations against non-familial foundations. The years between the dashed gray lines indicate the phase-out period of the federal-state estate tax credit. Error bars represent 95% confidence intervals with standard errors clustered on the EIN-level.

Table 2.6.1: State-level reform triple differences

Panel (a): Private foundation versus public charities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Contributions	Contributions	Log cont.	Log cont.	Cont. bin.	Cont. bin.	Entry	Exit
PF × Decouplers × Post	131.2**	80.8	0.0025	0.051***	-0.016***	-0.0092***	0.00059	-0.0031***
	(60.3)	(62.3)	(0.024)	(0.019)	(0.0029)	(0.0027)	(0.0016)	(0.00070)
PC × Decouplers × Post	-5.85	105.0***	-0.068***	0.0100	-0.10***	-0.044***	-0.0099***	-0.0051***
	(28.2)	(36.2)	(0.011)	(0.0071)	(0.0012)	(0.0010)	(0.00061)	(0.00027)
Constant	223.9***	548.6***	11.4***	11.3***	0.21***	0.45***	0.041***	0.0091***
	(14.0)	(7.81)	(0.012)	(0.0030)	(0.0010)	(0.00029)	(0.00018)	(0.00010)
Difference	137.01	-24.14	0.07	0.04	0.09	0.03	0.01	0.00
	[2.06]	[-0.34]	[2.74]	[2.01]	[27.41]	[11.94]	[6.22]	[2.66]
Year		X		X		X		
ID		X		X		X		
Adj. R-squared	0.00	0.61	0.02	0.78	0.07	0.60	0.01	0.00
N	5554613	5523273	2357161	2268512	5554613	5523273	4259788	5670925

Ein-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

This table displays select coefficients estimated from the triple-differences model along 1) state estate tax treatment status, 2) charitable giving vehicle type, and 3) pre/post status. The first two rows correspond to the difference-in-differences coefficients by state estate tax treatment status and pre/post status, stratifying by charitable giving vehicle type. The "Difference" row displays the triple difference estimator, and the number immediately below in hard brackets represents the associated t-statistic. Levels contributions is measured in 1000s USD (2015). The dependent variable in columns (5) and (6) is defined as $1\{Contributions_{i,t} > 0\}$. The variable "entry" is populated only for observations including and prior to entry; the variable "exit" is populated only for observations during a nonprofit's operating lifetime. The specification uses observations from between 1998 and 2012. The state estate tax policy treatment group includes states decoupling from the federal-state estate tax credit prior to 2005 as treated, and the control group includes dormant states. The specification treats states decoupling from the federal-state estate tax credit prior to 2005 as treated. The post period begins in 2001.

2.6.2 Event studies of post-credit phase-out estate tax repeals

Over one-fifth of states either added on or repealed state-level estate taxes in the post-EGTRRA period. Because they did so in a decentralized and uncoordinated manner, the tax change policy events stagger and lend to estimating the effects of state-level estate tax policy in an event study setting.

However, a central difficulty with eliciting the response of nonprofit activity in this setting deals with the potential anticipation responses by taxpayers in states having reversed their state estate tax policy. Because estate planning involves dynamic optimizing over the expected path of of future state-level estate tax rates, if states' initial estate tax policies are not perceived as credible, taxpayers will neither respond to the initial estate tax policy stance nor the subsequent reversal in anticipation of an expected future estate tax level. As an example, Kansas immediately decoupled

Table 2.6.1: Panel (b): Family foundations versus non-familial private foundations

	(1)	(2)	(3)	(4)	((5)	(6)	(7)	(8)
	Contributions	Contributions	Log cont.	Log cont.	Cont. bin.	Cont. bin.	Entry	Exit
FF × Decouplers × Post	83.8	81.0	0.029	0.067**	-0.015***	-0.00076	-0.00054	-0.000024
	(95.5)	(117.1)	(0.032)	(0.028)	(0.0045)	(0.0044)	(0.0037)	(0.00052)
Non-familial PF × Decouplers × Post	186.3**	86.1	-0.029	0.046*	-0.020***	-0.012***	0.0026	-0.0055***
	(82.0)	(65.0)	(0.034)	(0.027)	(0.0036)	(0.0034)	(0.0016)	(0.0011)
Constant	322.1***	464.2***	10.3***	10.6***	0.33***	0.42***	0.059***	0.033***
	(38.4)	(26.0)	(0.025)	(0.010)	(0.0027)	(0.0012)	(0.00064)	(0.00051)
Difference	-102.54	-5.04	0.06	0.02	0.01	0.01	-0.00	0.01
	[-0.81]	[-0.04]	[1.26]	[0.56]	[0.94]	[2.09]	[-0.79]	[4.51]
Year		X		X		X		
ID		X		X		X		
Adj. R-squared	0.00	0.48	0.02	0.62	0.02	0.48	0.02	0.01
N	973344	969130	395324	380735	973344	969130	641574	1001245

Ein-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

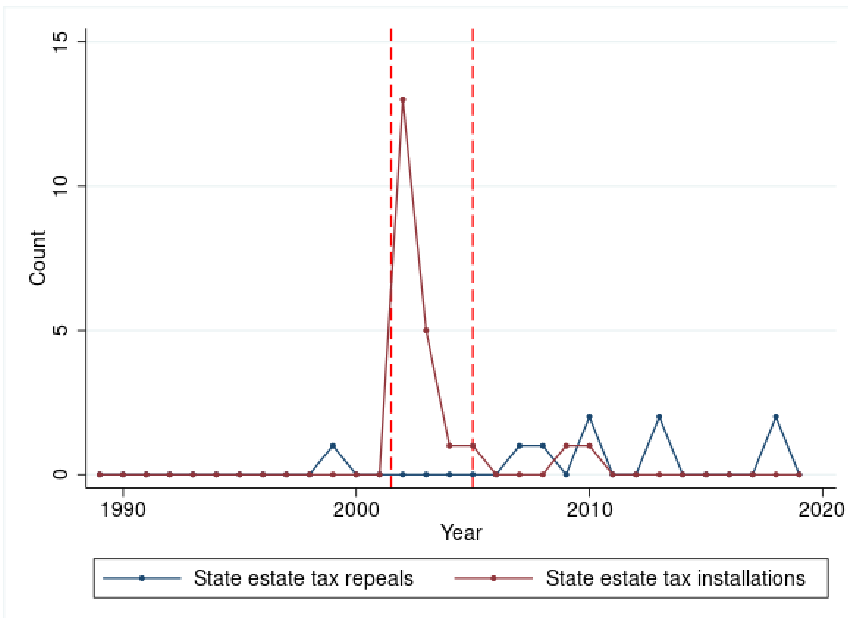
This table displays select coefficients estimated from the triple-differences model along 1) state estate tax treatment status, 2) charitable giving vehicle type, and 3) pre/post status. The regressions are estimated on the sample of private foundations from between 1998 and 2012. The specification treats states decoupling from the federal-state estate tax credit prior to 2005 as treated. The post period begins in 2001. The first two rows correspond to the difference-in-differences coefficients by state estate tax treatment status and pre/post status, stratifying by charitable giving vehicle type. The "Difference" row displays the triple difference estimator, and the number immediately below in hard brackets represents the associated t-statistic. "Cont." abbreviates reported contributions, and is measured in 1000s USD (2015). The dependent variable in columns (5) and (6) is defined as $1\{Contributions_{i,t} > 0\}$. The variable "entry" is populated only for observations including and prior to entry; the variable "exit" is populated only for observations during a nonprofit's operating lifetime. The state estate tax policy treatment group includes states decoupling from the federal-state estate tax credit prior to 2005 as treated, and the control group includes dormant states.

from the federal state estate tax credit upon the first year EGTRRA took effect—having a fully decoupled estate tax from 2002 until the state decided to repeal the tax in 2009. If Kansan taxpayers anticipated a repeal of the estate tax, they would neither increase estate tax deductible donations upon the installation of the Kansas state estate tax nor relatively decrease donations upon the subsequent repeal of the estate tax. Analogous limitations hold for states that only installed separate state-level estate taxes well after the full replacement of the federal state estate tax credit with a deduction in 2005.

Figure 2.6.6 illustrates the timing of the repeals and installations of state-level estate taxes. There are 8 states that ratified their own state-level estate taxes in the post-EGTRRA era, and 3 states that had imposed separate state-level estate taxes that subsequently repealed their estate taxes following the full replacement of the federal-state estate tax credit with the deduction.

Figures Figure 2.6.7 and Figure 2.6.8 display the aggregate responses of charitable contributions by nonprofit vehicle type surrounding these events. In all cases, overall contributions evolves according to the tax incentives posed by each respective state estate tax event. In all four specifications, all differential aggregate changes between charitable giving vehicle types are accompanied by substantial violations to parallel pre-trends, suggesting the role for differential anticipation responses. In the aggregate, private foundation giving decreases more than public charity giving following repeal events; however, the response appears reversed for installation events (albeit with substantial aggregate movement in the pre-period). Distinguishing between familial and non-familial private foundations, the gaps between these vehicle types close prior to each state tax event, with giving to familial foundations responding respectively less and more than giving to non-familial private foundations following estate tax repeal and installation events.

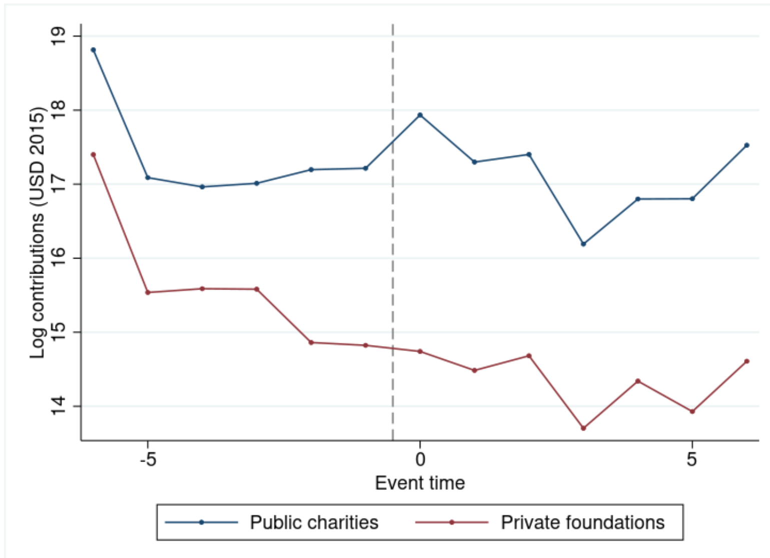
Figure 2.6.6: De facto state estate tax repeals and installations



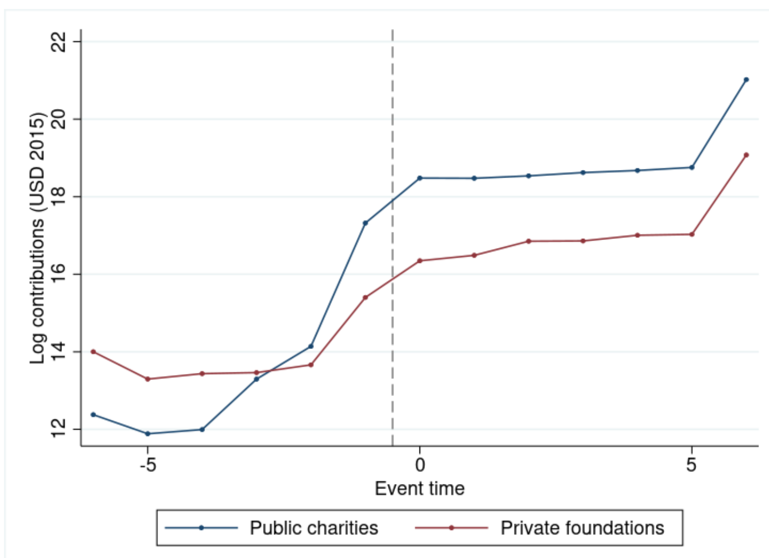
This figure illustrates the number of repeals and installations of state-level estate taxes over time. Only de facto state-estate taxes are considered here, as prior to the 2002 passage of EGTRRA, all state-level estate taxes with top marginal rates under 16% were fully creditable against the federal estate tax, rendering no additional estate tax obligation. The dashed red lines indicates the beginning and end of the replacement period of the federal-state estate tax credit with a less generous deduction that generates additional estate tax obligation on top of the federal estate tax.

Figure 2.6.7: Event study aggregates (Private foundations v. public charities)

(a) Repeal events



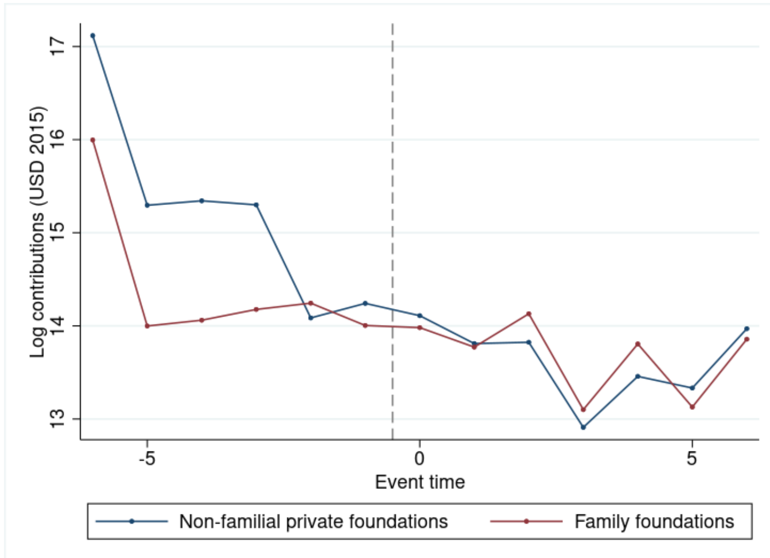
(b) Installation events



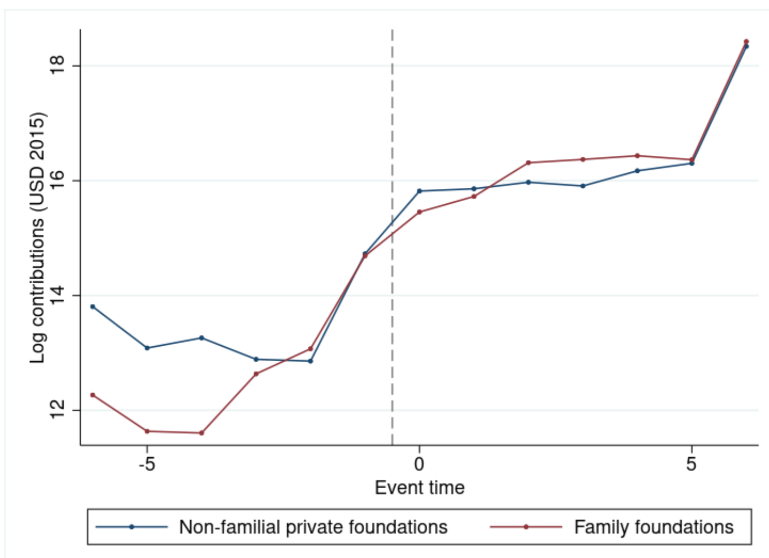
These figures display the aggregate responses of reported contributions disaggregated by nonprofit vehicle type surrounding a de facto state estate tax repeal or installation event after 2005. Panel (a) displays the aggregate evolution of contributions within states repealing their estate tax. Panel (b) focuses on states installing a new state estate tax. All contributions are aggregated over all states and nonprofits for each specification.

Figure 2.6.8: Event study aggregates (Family foundations v. non-familial private foundations)

(a) Repeal events



(b) Installation events



These figures display the aggregate responses of reported contributions disaggregated by nonprofit vehicle type surrounding a de facto state estate tax repeal or installation event after 2005. Both of these figures focus only on private foundations, distinguishing between familial and non-familial private foundations. Panel (a) displays the aggregate evolution of contributions within states repealing their estate tax. Panel (b) focuses on states installing a new state estate tax. All contributions are aggregated over all states and nonprofits for each specification.

To quantify the response in nonprofit activity in response to these policy changes activity I estimate event studies with two-way fixed effects on the nonprofit-year level:

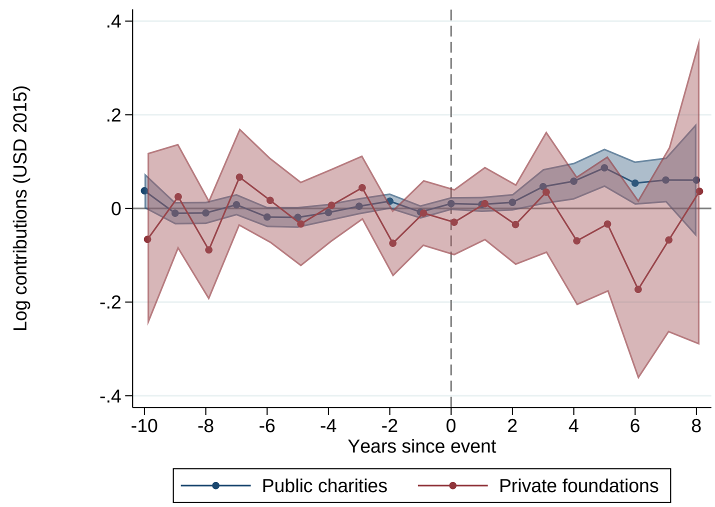
$$y_{it} = \alpha_i + \sum_{k=2002}^{2015} \delta_k 1\{Year_t = k\} + \sum_{j=-8}^{8} \beta_j 1\{EventTime_{s(i),t} = j\} + \varepsilon_{it}.$$

I compute event study coefficients $\{\beta_j\}$ using the estimation procedure developed by Callaway and Sant'Anna 2020 in order to account for dynamic and heterogeneous treatment effects in this setting.[40] I estimate this specification separately by each charitable giving vehicle type. Causal identification of coefficients $\{\beta_j\}$ in this setting arises from the quasi-random variation event timing.

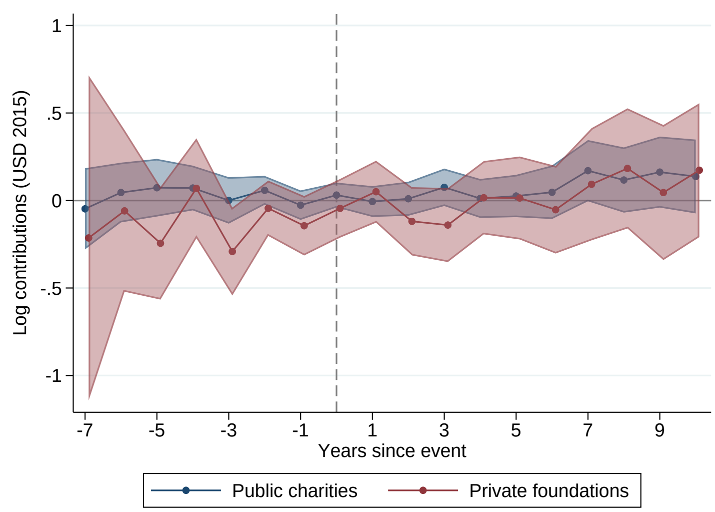
[40]Figures Figure B.1.8-Figure B.1.11 display the Goodman-Bacon decompositions associated with the standard event studies with two-way fixed effects of this same specification.

Figure 2.6.9: Event studies (Private foundations v. public charities)

(a) Repeal events



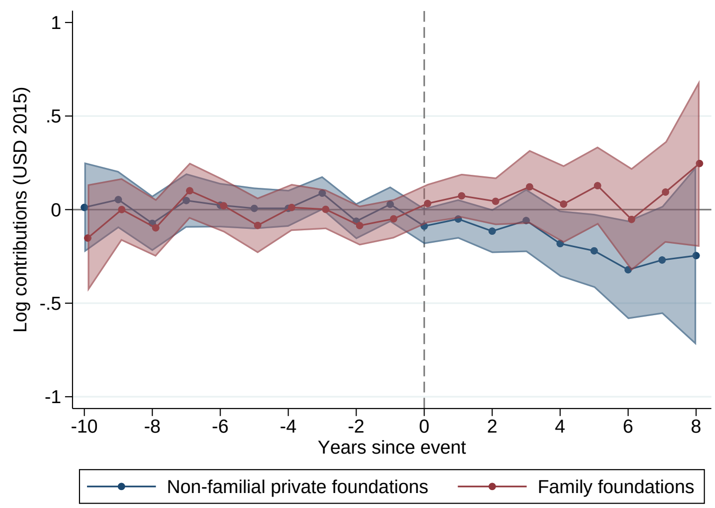
(b) Installation events



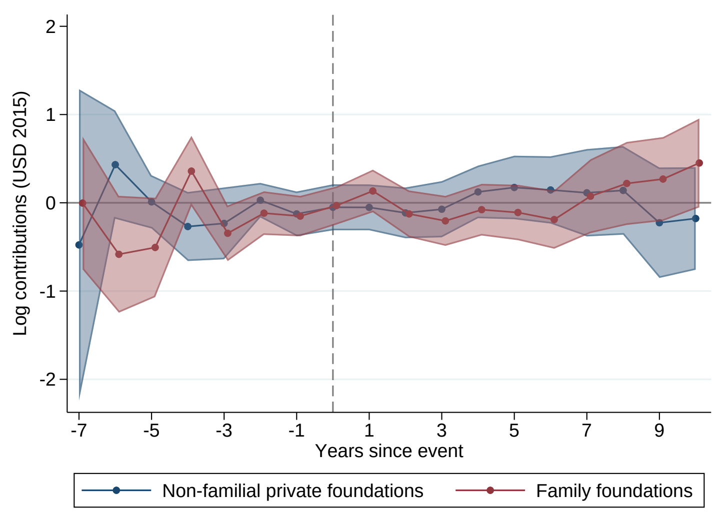
This figure estimates the two-way fixed effect event study $y_{it} = \alpha_i + \sum_{k=2002}^{2015} \delta_k 1\{Year_t = k\} + \sum_{j=t_0}^{t'} \beta_j 1\{EventTime_{s(i),t} = j\} + \varepsilon_{it}$ around de facto state estate tax installation and repeal events. The event study coefficients $\{\beta_j\}$ are estimated using the procedure from Callaway and Sant'Anna 2020 to account for heterogeneous and dynamic treatment effects. Panel (a) studies the responses of nonprofits domiciled in states repealing their state estate taxes starting 2005. Panel (b) focuses on nonprofits domiciled in states installing separate estate taxes starting 2005. For each panel, each series of coefficients are computed on the universe of public charities and private foundations excluding nonprofits domiciled in "always-treated" states (i.e. for repeal events the states never having a separate estate tax and for installation events the states always having an estate tax during the sample period) and stratified by charitable giving vehicle type on nonprofits between 2002 and 2015.

Figure 2.6.10: Event studies (Family foundations v. non-familial private foundations)

(a) Repeal events



(b) Installation events



These figures estimate the two-way fixed effect event study $y_{it} = \alpha_i + \sum_{k=2002}^{2015} \delta_k 1\{Year_t = k\} + \sum_{j=t_0}^{t'} \beta_j 1\{EventTime_{s(i),t} = j\} + \varepsilon_{it}$ around de facto state estate tax installation and repeal events. The event study coefficients $\{\beta_j\}$ are estimated using the procedure from Callaway and Sant'Anna 2020 to account for heterogeneous and dynamic treatment effects. Panel (a) studies the responses of nonprofits domiciled in states repealing their state estate taxes starting 2005. Panel (b) focuses on nonprofits domiciled in states installing separate estate taxes starting 2005. For each panel, each series of coefficients are computed on the universe of non-familial private foundations and family foundations excluding nonprofits domiciled in "always-treated" states (i.e. for repeal events the states never having a separate estate tax and for installation events the states always having an estate tax during the sample period) and stratified by charitable giving vehicle type on nonprofits between 2002 and 2015.

Figures Figure 2.6.9 and Figure 2.6.10 display the results of these event studies. The response for both nonprofit entity comparisons and both event types (state estate tax repeals and installations) are largely muted compared to as observed for the previous designs. For all specifications, repeal and installation events induce no significant differential response by charitable giving in the years immediately following each event.

However, starting four years following repeal events, private foundations appear to report marginally less in contributions than do public charities on the order of 5-10% relative to the pre-period baseline—although no single year coefficients attain individual significance. Figure 2.6.10(b) demonstrates a decrease in giving to non-familial private foundations relative to family foundations, corroborating results from the main state-level specifications that non-familial private foundations may exhibit more tax strategic behavior than do family foundations. The individual year coefficients here exhibit substantial noise and do not demonstrate individual statistical significance, but gap in reported contributions between the two groups expands to nearly 40 percentage points.[41]

State estate tax installation events appear to only elicit at-most muted differential responses in charitable activity by nonprofit vehicle type. However, both aggregate and two-way fixed effect event studies demonstrate a stronger decrease in giving to private foundations than to public charities following state estate tax repeal events. This muted response is likely attributable to the role of taxpayers anticipating state-level policy reversals. The observation that estate tax repeal events elicit stronger responses than installation events suggests that post-EGTRRA installation events saw greater anticipation.

[41] Figures Figure B.1.7 illustrate similar results for event studies surrounding repeals using levels.

2.7 Conclusion

This work has documented the systematic differences in charitable giving responses to changes in the estate tax schedule by nonprofit vehicle type. I study the distinction between private foundations and public charities, leverage new variation in federal and state estate taxation in the post-EGTRRA era, and make use of novel data distinguishing familial and non-familial private foundations. In brief, I find that individual private foundations respond much more strongly to the estate tax rate than do public charities. I also find that the colloquial distinction between family foundations and non-familial private foundations reflects no significantly differential response in reported contributions to changes in the estate tax rate.

First, I have demonstrated that much of the positive relationship between the estate tax rate and charitable giving is driven by additional giving to private foundations over public charities. This result holds for changes in the estate tax schedule both on the federal and state levels. I find that aggregate giving responds in an asymmetric manner for private foundations in the case of both federal and state estate tax reform, reflecting that the estate tax charitable deduction induces a reallocation in charitable giving in net toward private foundations. For federal-level reform, aggregate contributions to private foundations responds with an elasticity with respect to the top marginal estate tax rate of around 2, and between zero and 0.285 public charities. Within-nonprofit contributions respond on average with an elasticity with respect to the top marginal estate rate of between 1.3 and 2; fixed individual public charities respond with an elasticity between zero and 0.15.

Second, I show that in spite of the disconnect between state estate tax base and full deductibility of charitable contributions regardless of recipient location, private foundation giving responds significantly more than does public charity giving in response to state estate tax changes. The reported contributions elasticity of private foundations with respect to the top *overall* marginal estate tax rate for changes in *state* estate tax policy is around 1, where as the within-nonprofit contributions elasticity for private foundations is between .25 and .5. The response for public charities is indistinguishable from zero in the aggregate, where the within-nonprofit response for public charities corresponds with an elasticity between 0.1 and 0.5.

I also make use of a novel dataset that allows me to distinguish between family and non-familial private foundations. Although a purely colloquial distinction entailing no legal implications, little is known about whether these two groups behave differently. I provide the first evidence that these two groups behave similarly. Overall, evidence here suggests that non-familial private foundations respond perhaps slightly more to incentives posed by the estate tax charitable deduction. This result may appear counterintuitive, as ex-ante one might associate family foundations as facilitating estate planning for intragenerational asset management purposes. However, descriptive evidence on the distinction between familial and non-familial private foundation suggests that family foundations are associated with greater opacity in terms of their charitability subject matter and demonstrate greater ownership interest in private businesses and are more likely to make distributions to the donor advised funds of disqualified persons.

These results have important implications for how we understand estate tax avoidance via charitable giving. Much work has demonstrated the positive relationship between estate taxation and charitable donations out of bequests. However, by demonstrating the outsized role of private foundations in driving the overall positive causal relationship between the estate tax rate and charitable giving, this work calls into question the net optimality of the charitable giving estate tax deduction and to what extent the deduction facilitates tax avoidance while subsidizing potentially privately benefiting “charitable” activity. I also demonstrate that, compared to public charities, private foundations are associated with significantly greater subject matter opacity. I show that they 1) allocate significantly greater shares of their expenses to officer compensation and administrative activities 2) demonstrate a higher likelihood of engaging in compensation of disqualified individuals or maintaining relations with disqualified donor advised funds, and 3) exhibit greater substantial ownership interest in private businesses and investment securities. To the extent that the activity of private foundations demonstrates less public benefit, private foundations undermine the social optimality of the charitable bequest estate tax deduction.

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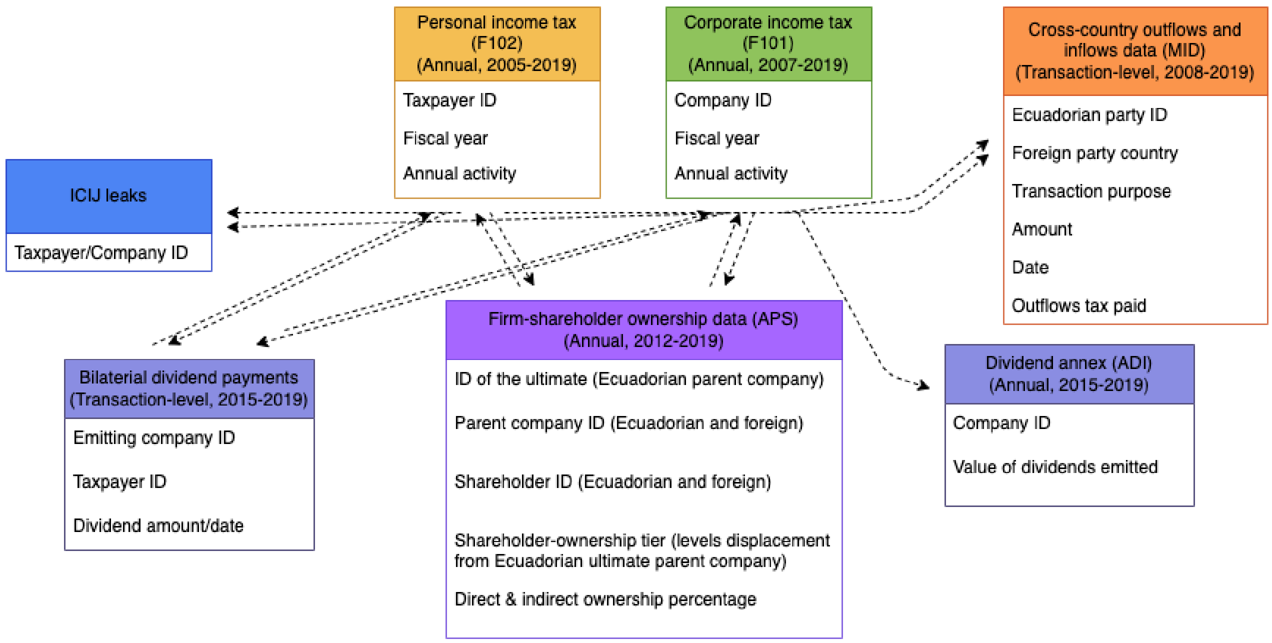
Appendix A

Can countries unilaterally mitigate tax haven usage? Evidence from Ecuadorian transaction tax data

A.1 Additional graphs and tables to main text

A.1.1 Data and legislative environment

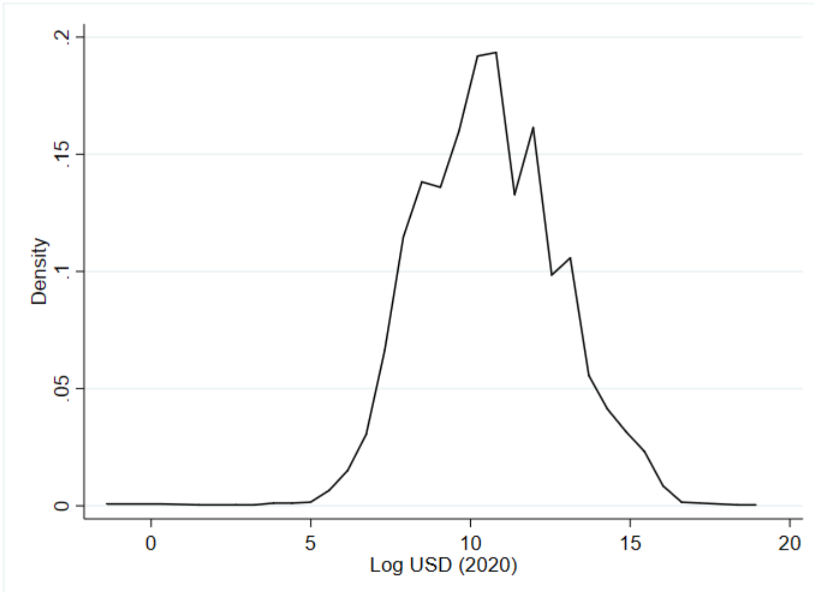
Figure A.1.1: Datasets of the Ecuadorian tax administrative environment



This figure illustrates the linkages between select Ecuadorian administrative datasets.

A.1.2 Dividend and profit distribution reform

Figure A.1.2: Distribution of dividend transaction amounts



This figure displays the distribution of log USD sent as dividends or profit distributions to parties abroad by Ecuadorian companies between 2008 and 2011.

Table A.1.1: Descriptive statistics on bank account deposit abroad
Manual Personal Income Tax filers

	Tax havens (56)	Non-havens (125)
Volume (1000s USD 2020m1)		
Mean amount per transaction	13.14	41.98
Median amount per transaction	1.22	1.25
Mean amount per id-quarter	87.74	132.52
Median amount per id-quarter	10.33	3.98
Mean amount per quarter	119598.5	1153760
Median amount per quarter	129030.2	1161983
Total volume	68040.91	1615177
Total volume per country		
Number of transactions		
Mean no. transactions per id-quarter	6.68	3.15
Median no. transactions per id-quarter	1	1
Mean no. transactions per quarter	9104.73	27480.6
Median no. transactions per quarter	33	243
Total no. of transactions		
Total no. of transactions per country		
Number of unique transactors		
Mean no. transactors per quarter	15.93	124.47
Median no. transactors per quarter	15	132
Total no. of transactors		

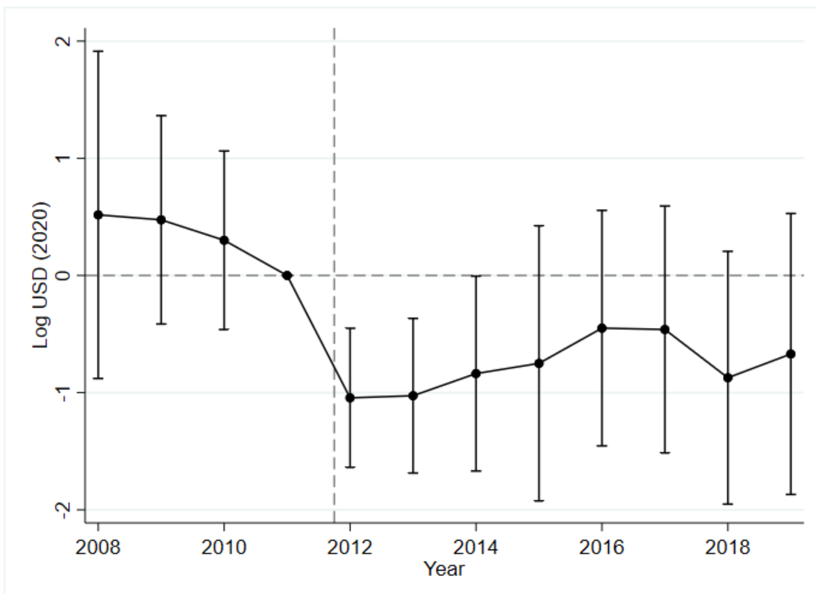
This table shows descriptive statistics aggregated from between 2008q1 and 2011q3 pertaining to how Ecuadorian taxpayers made bank account deposits abroad by tax haven status. Tax haven status refers whether a country was recognized in 2011 as a tax haven by the Ecuadorian government. The number in parentheses accompanying the labels "Havens" and "Non-havens" refer to the number of such countries receiving at least one transaction in the sample time frame.

Table A.1.2: Descriptive statistics on bank account deposit abroad
Corporate Income Tax filers

	Tax havens (40)	Non-havens (106)
Volume (1000s USD 2020m1)		
Mean amount per transaction	6.82	5.57
Median amount per transaction	1.21	0.49
Mean amount per id-quarter	38.45	15.22
Median amount per id-quarter	6.87	2.57
Mean amount per quarter	29978.12	70668.61
Median amount per quarter	26487.57	61253.13
Total volume	449671.9	1060029
Total volume per country	11241.80	10000.28
Number of transactions		
Mean no. transactions per id-quarter	5.63	2.73
Median no. transactions per id-quarter	1	1
Mean no. transactions per quarter	4839.47	12686
Median no. transactions per quarter	3429	8594
Total no. of transactions	65842	190290
Total no. of transactions per country	1646.05	1795.19
Number of unique transactors		
Mean no. transactors per quarter	779.73	4643.27
Median no. transactors per quarter	841	3786
Total no. of transactors	4667	30319

This table shows descriptive statistics aggregated from between 2008q1 and 2011q3 pertaining to how Ecuadorian taxpayers sent dividend payments and similar profit distributions abroad. Tax haven status refers whether a country was recognized in 2011 as a tax haven by the Ecuadorian government. The number in parentheses accompanying the labels “Havens” and “Non-havens” refer to the number of such countries receiving at least one transaction in the sample time frame.

Figure A.1.3: Dividend reform (log USD), transaction-level



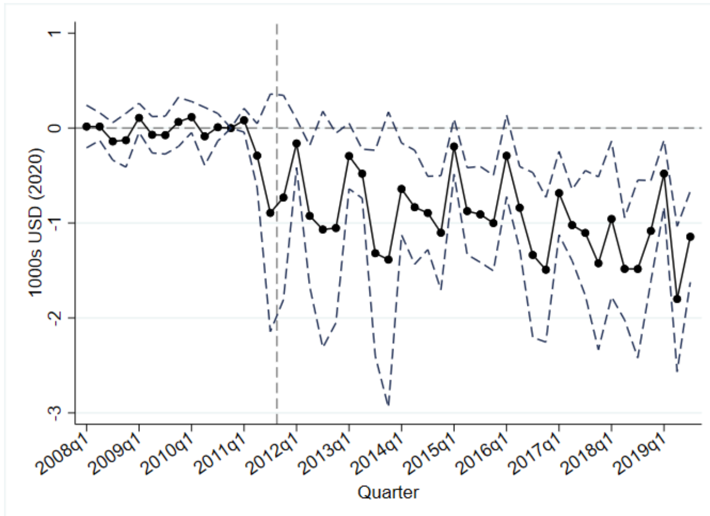
This figure displays the simple annual difference-in-difference coefficients $\{\beta_k\}$ estimated from the reduced form

$$\log y_{ijt} = \beta_0 + \gamma 1\{Haven_j\} + \sum_{k=2008}^{2019} \delta_k 1\{Year_t = k\} + \sum_{k=2008}^{2019} \beta_k 1\{Year_t = k\} Haven_j + \varepsilon_{ijt},$$

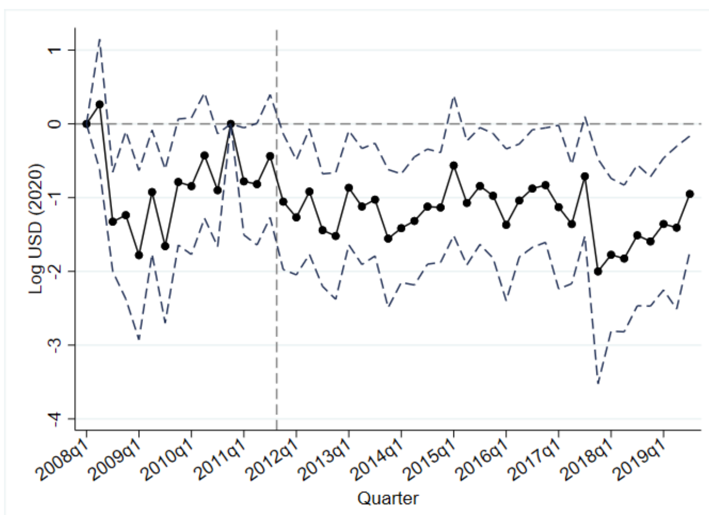
with 2011 as the base period. Error bars represent 95% confidence intervals based on firm-clustered standard errors.

Figure A.1.4: Dividend reform: tax havens versus non-havens (Volume)
Two-way fixed effects

(a) Levels USD



(b) Log USD



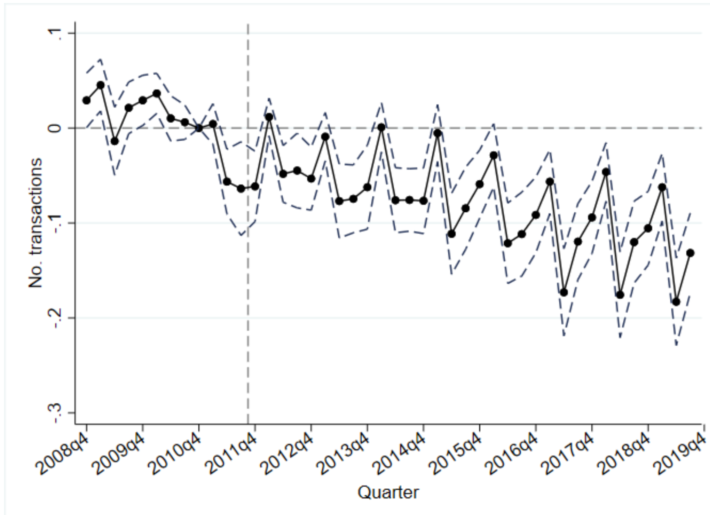
These figures display the difference-in-differences coefficients $\{\hat{\beta}_k\}_{k=2008q1}^{2019q4}$ from the reduced form with two-way fixed effects

$$y_{ijt} = \alpha_i + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot 1\{Haven_j\} + \varepsilon_{ijt},$$

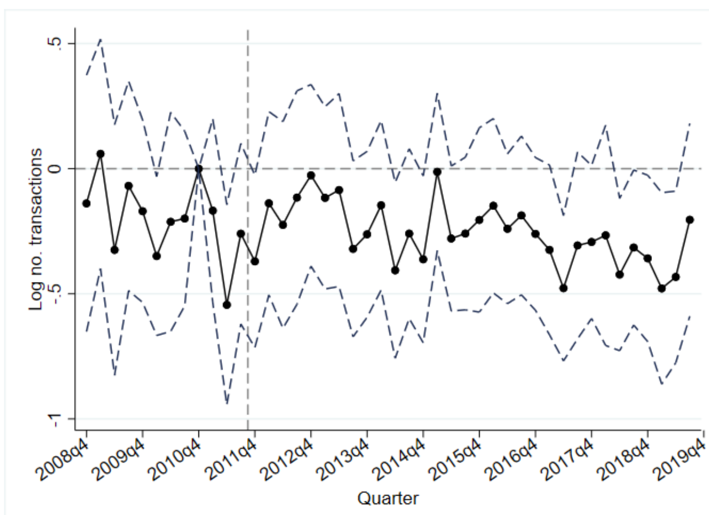
where y_{ijt} represents firm i's profit distributions to country j aggregated within quarter t. This specification uses 2010 quarter 4 as the base period. Dividend transactions are winsorized above the 99th percentile in transaction amount prior to aggregation. Panel (a) uses levels USD as the dependent variable; Panel (b) uses log USD. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors.

Figure A.1.5: Dividend reform: tax havens versus non-havens (no. transactions)
Two-way fixed effects

(a) Number of transactions



(b) Log number of transactions



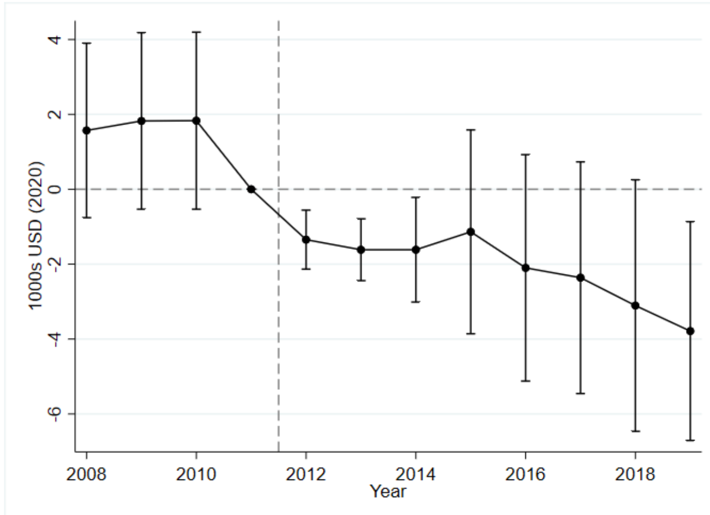
These figures display the difference-in-differences coefficients $\{\hat{\beta}_k\}_{k=2008q1}^{2019q4}$ from the reduced form with two-way fixed effects

$$y_{ijt} = \alpha_i + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot 1\{Haven_j\} + \varepsilon_{ijt},$$

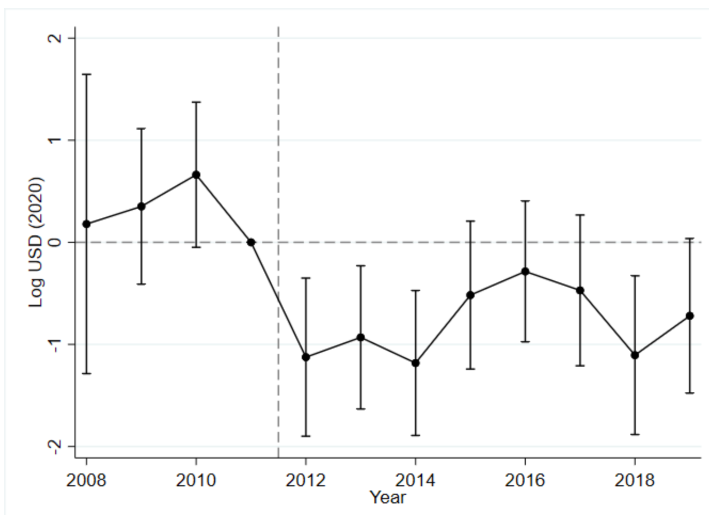
where y_{ijt} represents firm i's number of profit distribution transactions to entities domiciled in country j aggregated within quarter t. This specification uses 2010 quarter 4 as the base period. Panel (a) uses the number of transactions as the dependent variable; Panel (b) uses the log number of transactions. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors.

Figure A.1.6: Dividend reform: tax havens versus non-havens (Volume)

(a) Levels USD



(b) Log USD



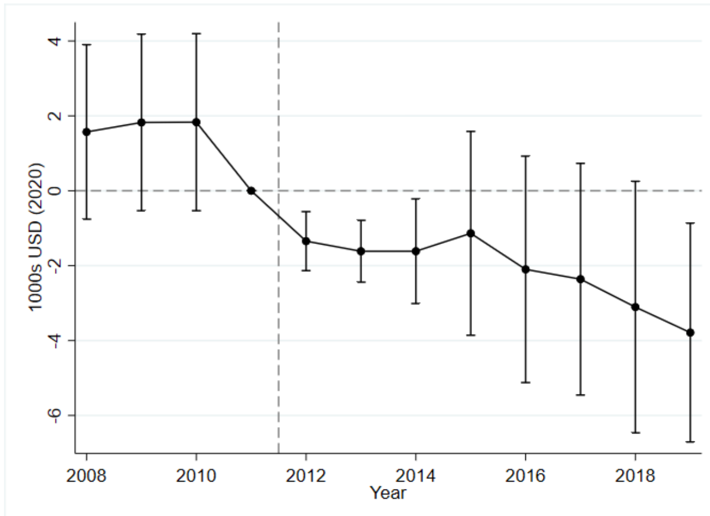
These figures display the difference-in-differences coefficients $\{\hat{\beta}_k\}_{k=2008}^{2019}$ from the reduced form

$$y_{ijt} = \beta_0 + \gamma 1\{Haven_j\} + \sum_{k=2008}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2008}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot 1\{Haven_j\} + \varepsilon_{ijt},$$

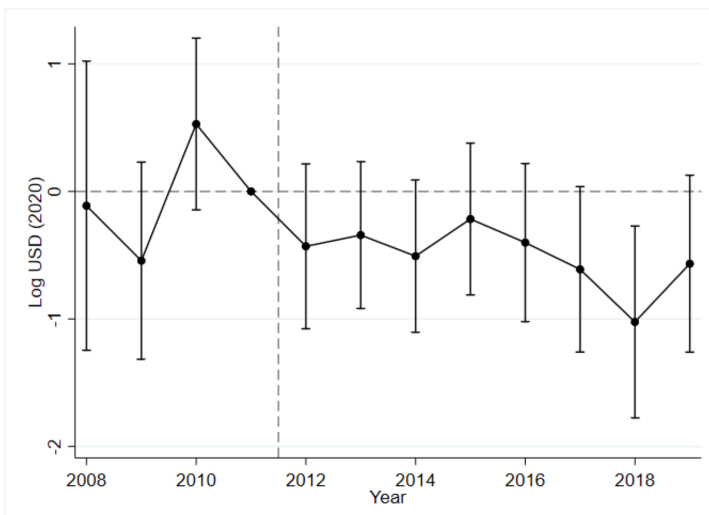
where y_{ijt} represents firm i's profit distributions to country j aggregated within year t. This specification uses 2011 as the base period. Dividend transactions are winsorized above the 99th percentile in transaction amount prior to aggregation. Panel (a) uses levels USD; Panel (b) uses log USD as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors.

Figure A.1.7: Dividend reform: tax havens versus non-havens (Volume)
Two-way fixed effects

(a) Levels USD



(b) Log USD



These figures display the difference-in-differences coefficients $\{\hat{\beta}_k\}_{k=2008}^{2019}$ from the reduced form

$$y_{ijt} = \alpha_i + \sum_{k=2008}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2008}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot 1\{Haven_j\} + \varepsilon_{ijt},$$

where y_{ijt} represents firm i's profit distributions to country j aggregated within year t. This specification uses 2011 as the base period. Dividend transactions are winsorized above the 99th percentile in transaction amount prior to aggregation. Panel (a) uses levels USD; Panel (b) uses log USD as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors.

Triple differences design

As an additional "intensive" margin of dividend transaction behavior, I study how individual tax haven dividend transactions respond to the reform. I implement a simple triple-differences design that introduces non-dividend transactions as a third difference group.[1] Including non-dividend and non-financial transactions as a baseline group—two groups that both saw outflows tax rate increases from 2% to 5% regardless of tax haven status of destination—allows the design to further compare with the evolution in non-dividend transactions between tax havens versus non-havens.

I use all other non-dividend transactions as the third baseline group in this design, estimating the triple differences specification

$$\begin{aligned}\log y_{iejt} = \alpha_0 + \beta Div_e + \gamma Haven_j + \sum_{k=2008}^{2019} \delta_k \{Year_t = k\} \\ + \xi Div_e Haven_j + \sum_{k=2008}^{2019} \pi_k 1\{Year_t = k\} Div_e + \sum_{k=2008}^{2019} \theta_{k,e} 1\{Year_t = k\} Haven_{jt} + \\ \sum_{k=2008}^{2019} \beta_{ddd,k} 1\{Year_t = k\} Div_e Haven_{jt} + \varepsilon_{iejt},\end{aligned}$$

for a transaction of purpose e between taxpayer i to country j at time t. Under the more flexible parallel trends assumption of identical bias between both corresponding component difference-in-differences estimators (here, the difference-difference coefficients for 1) the evolution in dividend transactions between haven and non-haven countries versus 2) the evolution in non-dividend transactions between haven and non-haven countries), coefficients $\{\hat{\beta}_{ddd,k}\}$ estimate the effect of the reform on tax haven dividend transaction volume (Olden and Møen (2022)). Because the outflows tax on all non-dividend transactions increases from 2% to 5% regardless of destination, the inclusion of the non-dividend transactions nets out bias introduced by secular, differential trends in the use of tax havens versus non-havens regardless of transaction purpose.

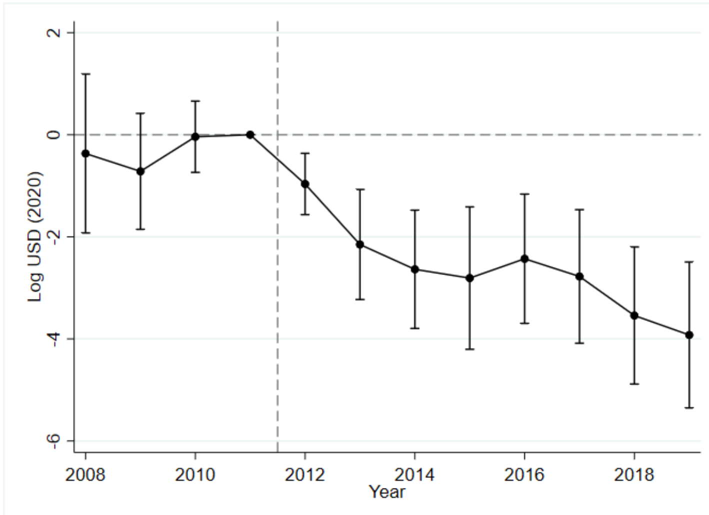
Figure A.1.8 displays the coefficients $\{\hat{\beta}_{ddd,k}\}$ from this specification, showing that individual transaction amount dropped significantly, by around 80% relative to dividend transactions to non-havens (around two log points). Including individual- and firm-level fixed effects in Panel (b) shows a slightly smaller decline of around two-thirds.[2]

[1] This kind of design is implemented frequently in transfer pricing studies that compare the prices of corporate transactions along intragroup status, country, and tax-rate differential (e.g. Liu, Schmidt-Eisenlohr, and Guo (2020))

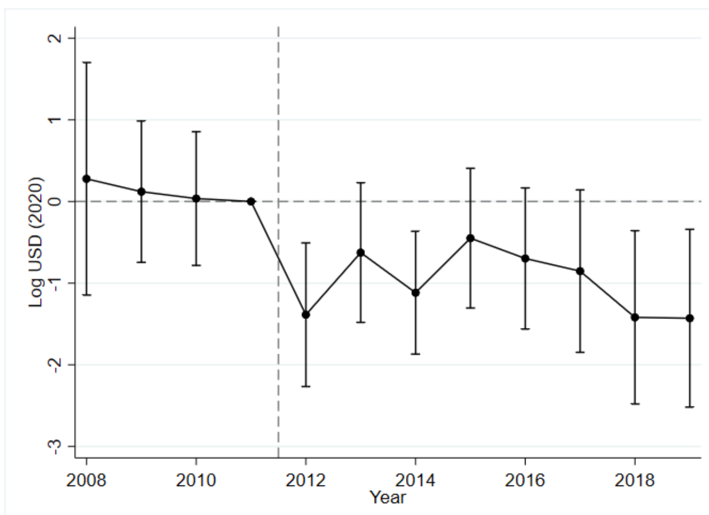
[2] Figure A.1.9 replicates the central difference-in-differences specification using a triple differences design, finding similar results that confirm the large drop in dividends and profit distributions paid to shareholder based in tax havens.

Figure A.1.8: Dividend reform: Volume per transaction
Triple differences specification (Tax haven × Dividend × Year)

(a) Unsaturated model



(b) Two-way fixed effects



These figures show the triple difference coefficients from the model comparing the change in log transaction amount for 1) tax havens versus non-havens, 2) dividend/profit distribution transactions versus other transactions, and 3) before and after the reform that raised the transaction price to 5% for dividends to tax havens, 0% for dividends to non-havens, and 5% for all other transactions regardless of destination. The sample consists of the universe of corporate transactions exiting the Ecuadorian economy between 2008 and 2019. The dashed gray vertical lines correspond with the outflows tax rate policy change. Panel (a) displays the coefficients estimated from the model without any fixed effects; Panel (b) displays the coefficients estimated from the model with two-way fixed effects on the firm- and year-level. Error bars represent 95% confidence intervals based on firm-clustered standard errors.

Table A.1.3: Triple difference results

Panel (a): Firm-quarter aggregated responses

	(1) Amt.	(2) Amt.	(3) Log amt.	(4) Log amt.	(5) Transactions	(6) Transactions	(7) Log trans.	(8) Log trans.
Taxhaven × Div. × Post	-0.096	-0.096	-1.02**	-0.71**	0.13**	0.13**	-0.057	-0.0028
	(0.12)	(0.12)	(0.21)	(0.22)	(0.0037)	(0.0037)	(0.091)	(0.094)
Taxhaven × Post	0.037	0.037	0.11**	0.12**	-0.13**	-0.13**	-0.11**	-0.088**
	(0.12)	(0.12)	(0.038)	(0.034)	(0.0037)	(0.0037)	(0.014)	(0.015)
Taxhaven × Div.	3.24**	3.24**	1.25**	1.04**	0.085**	0.085**	0.42**	0.39**
	(0.15)	(0.15)	(0.18)	(0.19)	(0.0031)	(0.0031)	(0.096)	(0.089)
Div. × Post.	-0.18^{+}	-0.18^{+}	1.09**	0.86**	-0.14**	-0.14**	-0.036	0.027
	(0.093)	(0.093)	(0.079)	(0.080)	(0.0033)	(0.0033)	(0.029)	(0.031)
Taxhaven	-3.26**	-3.26**	-0.82**	-0.85**	-0.085**	-0.085**	-0.35**	-0.47**
	(0.15)	(0.15)	(0.039)	(0.034)	(0.0031)	(0.0031)	(0.014)	(0.014)
Dividend	-4.13**	-4.13**	if 1.40**	0.42**	-0.11**	-0.11**	-0.74**	-0.93**
	(0.16)	(0.16)	(0.076)	(0.081)	(0.0027)	(0.0027)	(0.030)	(0.031)
Post	0.24*		-0.78**		0.14**		0.15**	
	(0.094)		(0.015)		(0.0033)		(0.0054)	
Constant	4.16**	4.33**	9.88**	9.34**	0.11**	0.21**	1.33**	1.48**
	(0.16)	(0.089)	(0.020)	(0.0019)	(0.0027)	(0.0021)	(0.0063)	(0.00085)
Observations	100076736	100076736	603007	589662	100076736	100076736	603007	589662
Adjusted R^2	0.000	0.008	0.025	0.381	0.000	0.005	0.014	0.137
TWFE		X		X		X		X

Firm-clustered standard errors in parentheses

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

This table shows the coefficients estimated from the triple difference model that compares the change in transaction outflows activity by 1) tax havens versus non-havens, 2) dividend/profit distribution transactions versus other transactions, and 3) before and after the reform that raised the ad valorem transaction tax to 5% for dividends to tax havens, 0% for dividends to non-havens, and 5% for all other transactions regardless of destination. The sample consists of the universe of corporate transactions exiting the Ecuadorian economy between 2008 and 2019 aggregated up to and rectangularized at the firm-country-purpose-year level. Columns (1) and (2) use 1000s USD (2020) as the dependent variable. The coefficients correspond with levels of firm-quarter-tax haven status-purpose activity.

Panel (b): Transaction-level responses

	(1) Amt.	(2) Amt.	(3) Log amt.	(4) Log amt.
Taxhaven × Div. × Post	-61444.7**	-42169.6**	-2.74**	-1.15**
	(19711.6)	(14944.6)	(0.34)	(0.31)
Taxhaven × Post	18288.8**	5353.4**	1.85**	0.71**
	(2929.1)	(1551.5)	(0.24)	(0.056)
Taxhaven × Div.	-11480.3	-23897.2	0.99*	0.17
	(19503.0)	(16926.0)	(0.43)	(0.32)
Div. × Post.	43346.5**	37247.9**	2.13**	1.13**
	(11532.4)	(8637.0)	(0.13)	(0.13)
Taxhaven	-4944.6	4375.9*	-0.57	-0.042
	(3522.1)	(1907.2)	(0.36)	(0.067)
Dividend	88808.2**	80586.2**	2.39**	1.75**
	(15366.5)	(11347.5)	(0.17)	(0.15)
Post	-19544.2**		-2.00**	
	(835.9)		(0.055)	
Constant	37088.7**	21257.9**	7.98**	6.37**
	(1107.1)	(66.1)	(0.062)	(0.0027)
Observations	8723833	8715009	8723573	8714749
Adjusted R^2	0.022	0.258	0.059	0.528
TWFE		X		X

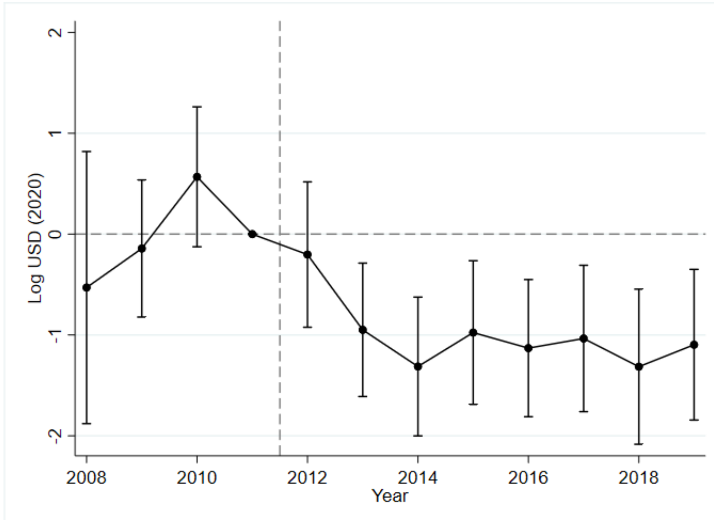
Firm-clustered standard errors in parentheses

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

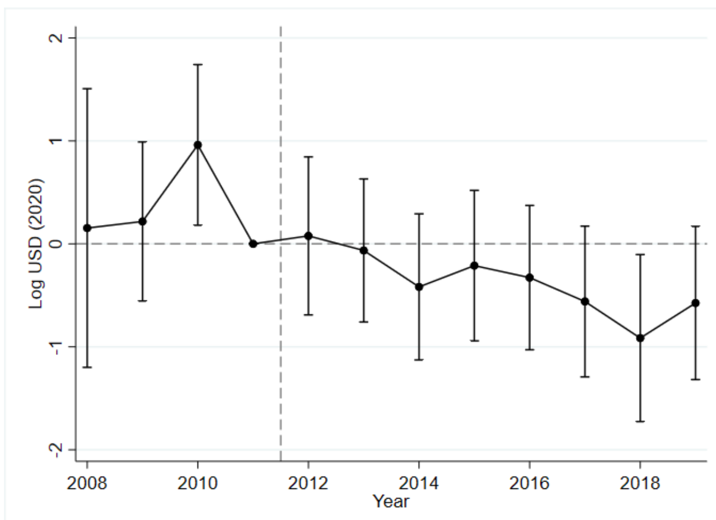
This table shows the coefficients estimated from the triple difference model that compares the change in volume per transaction along the margins: 1) tax havens versus non-havens, 2) dividend/profit distribution transactions versus other transactions, and 3) before and after the reform that raised the ad valorem transaction tax to 5% for dividends to tax havens, 0% for dividends to non-havens, and 5% for all other transactions regardless of destination. The sample consists of the universe of corporate transactions exiting the Ecuadorian economy between 2008 and 2019. The coefficients correspond with levels of firm-quarter-tax haven status-purpose activity.

Figure A.1.9: Triple difference design: log transaction volume (USD 2020)

(a) Unsaturated model



(b) Two-way fixed effects

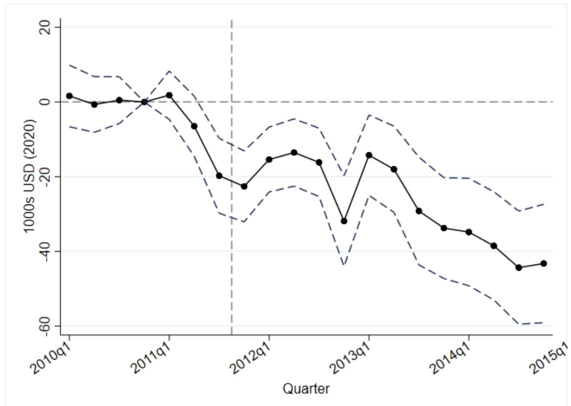


These figures show the triple difference coefficients from the model comparing the change in log transaction volume for 1) tax havens versus non-havens, 2) dividend/profit distribution transactions versus other transactions, and 3) before and after the reform that raised the transaction price to 5% for dividends to tax havens, 0% for dividends to non-havens, and 5% for all other transactions regardless of destination. The sample consists of the universe of corporate transactions exiting the Ecuadorian economy between 2008 and 2019 aggregated up to the firm-country-purpose-year level. The dashed gray vertical lines correspond with the outflows tax rate policy change. Panel (a) displays the coefficients estimated from the model without any fixed effects; Panel (b) displays the coefficients estimated from the model with two-way fixed effects on the firm- and year-level. Error bars represent 95% confidence intervals based on firm-clustered standard errors.

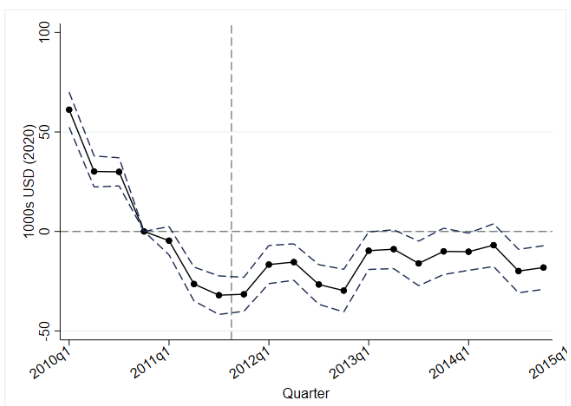
Exempt imports counterfactual

Figure A.1.10: Dividend reform (tax havens):
Exempt imports counterfactual

(a) USD (2020) (tax havens)



(b) Log number of transactions



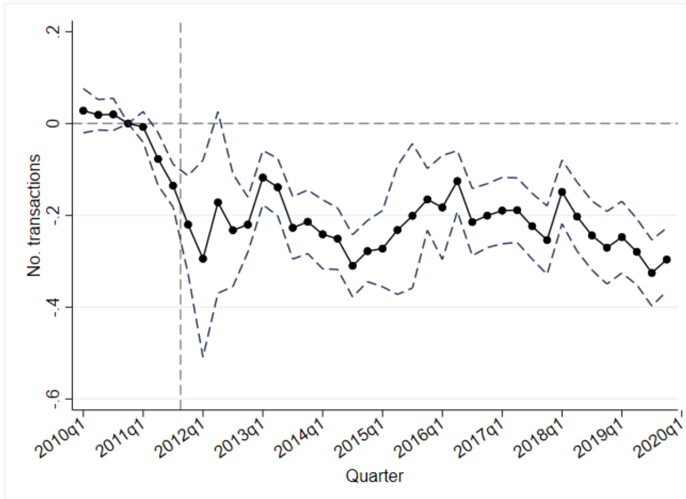
These figures show the difference-in-differences coefficients from the model:

$$y_{iet} = \beta_0 + \gamma Div_{ie} + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Div_{ie} + \varepsilon_{iet},$$

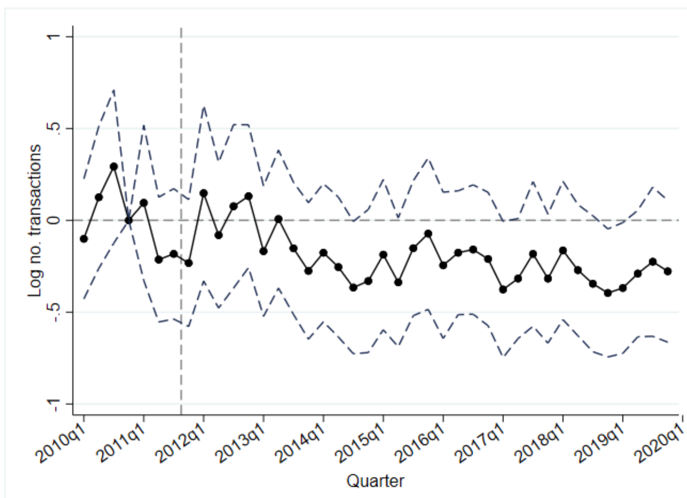
that compares the change in the number of dividend payments to the change in the number of corporate import payments for primary and secondary goods. Panel (a) isolates activity within tax havens, which saw an increase in the dividends outflows tax from 2% to 5% (while import payments remained exempt); Panel (b) isolates activity within non-havens, which saw an exemption of dividend paymets from the outflows tax. This model is estimated on the universe of corporate import and dividend transactions to tax havens aggregated to the firm-quarter level. Coefficients are estimated relative to 2010 quarter 4. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors. The dashed vertical line represents the date of the policy change.

Figure A.1.11: Dividend reform (tax havens):
Exempt imports counterfactual

(a) Number of transactions



(b) Log number of transactions



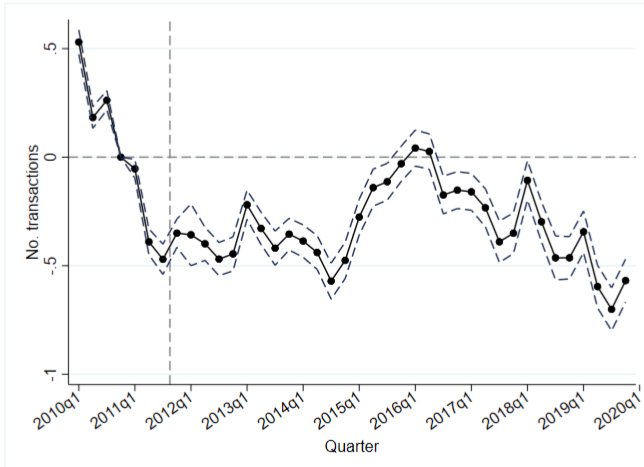
These figures show the difference-in-differences coefficients from the model:

$$y_{iet} = \beta_0 + \gamma Div_{ie} + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Div_{ie} + \varepsilon_{iet},$$

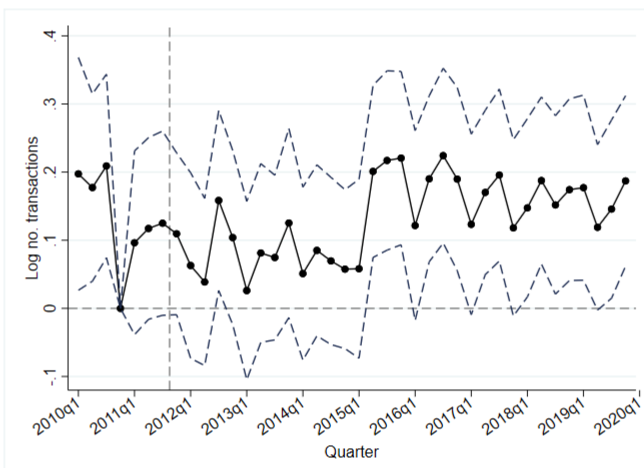
that compares the change in the number of tax haven dividend payments to the change in the number of corporate import payments for primary and secondary goods in response to an increase in the dividends outflows tax from 2% to 5% (while import payments remained exempt). This model is estimated on the universe of corporate import and dividend transactions to tax havens aggregated to the firm-quarter level. Coefficients are estimated relative to 2010 quarter 4. Panel (a) uses number of transactions as the dependent variable; Panel (b) uses the log number of transactions as the dependent variable. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors. The dashed vertical line represents the date of the policy change.

Figure A.1.12: Dividend reform (non-havens):
Exempt imports counterfactual

(a) Number of transactions



(b) Log number of transactions



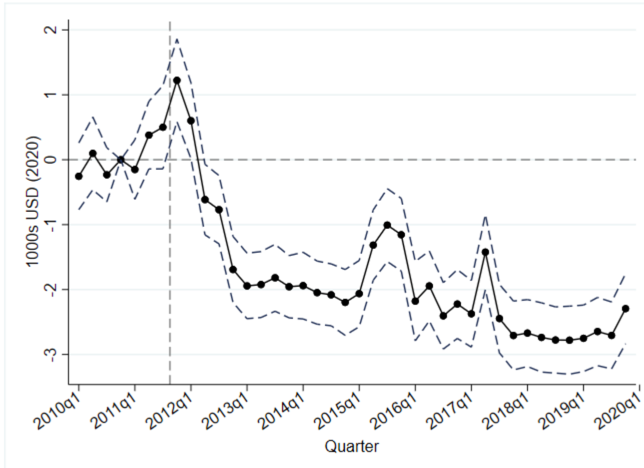
These figures show the difference-in-differences coefficients from the model:

$$y_{iet} = \beta_0 + \gamma Div_{ie} + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Div_{ie} + \varepsilon_{iet},$$

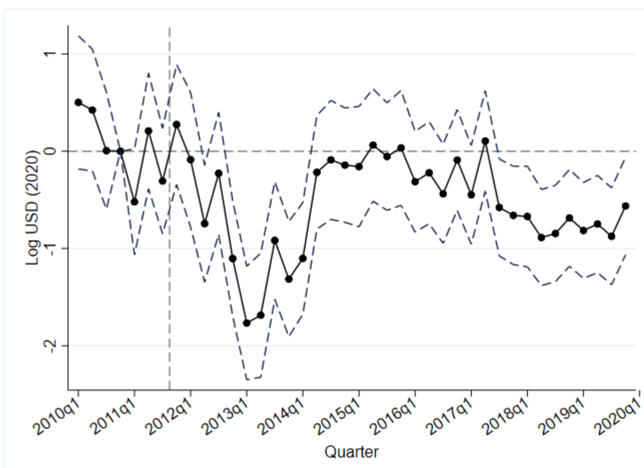
that compares the change in non-haven dividend payments to the change in corporate import payments for primary and secondary goods in response to a decrease in the dividends outflows tax to non-havens from 2% to 0% (while import payments remained exempt). This model is estimated on the universe of corporate import and dividend transactions to non-havens aggregated to the firm-quarter level. Coefficients are estimated relative to 2010 quarter 4. Panel (a) uses levels USD (2020) as the dependent variable; Panel (b) uses log number of transactions as the dependent variable. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors. The dashed vertical line represents the date of the policy change.

Figure A.1.13: Personal bank account deposits reform (tax havens):
Exempt imports counterfactual

(a) Levels USD (2020)



(b) Log USD (2020)



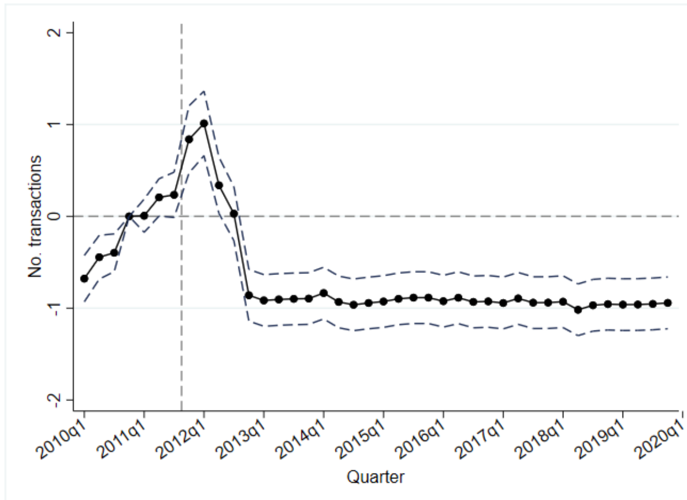
These figures show the difference-in-differences coefficients from the model:

$$y_{iet} = \beta_0 + \gamma Deposit_{ie} + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Deposit_{ie} + \varepsilon_{iet},$$

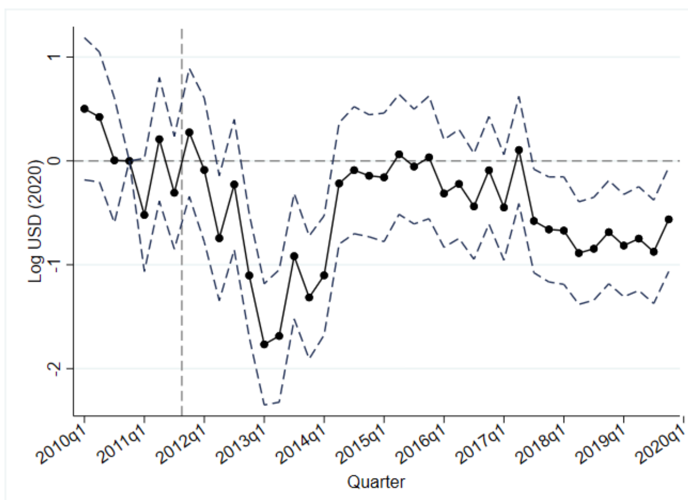
that compares the change in the volume of tax haven bank account deposits to the change in the volume of anticipated import payments for primary and secondary goods in response to an increase in the bank account deposit outflows tax from 2% to 5% (while import payments remained exempt). This model is estimated on the universe of personal (i.e. individual) foreign-sourced consumption transactions and bank account deposits on tax havens aggregated to the ID-quarter level. Coefficients are estimated relative to 2010 quarter 4. Panel (a) uses USD (2020) as the dependent variable; Panel (b) uses log USD (2020) as the dependent variable. Dashed navy lines represent 95% confidence intervals based on ID-clustered standard errors. The dashed vertical line represents the date of the policy change.

Figure A.1.14: Personal bank account deposits reform (non-havens):
Exempt imports counterfactual

(a) Number of transactions



(b) Log number of transactions



These figures show the difference-in-differences coefficients from the model:

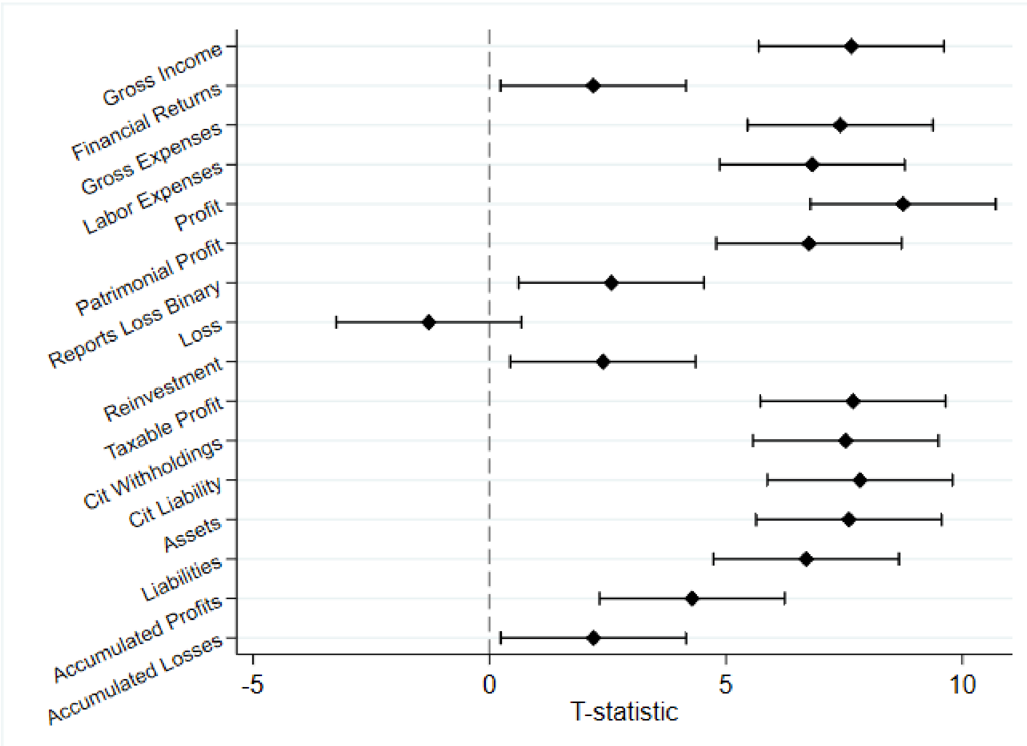
$$y_{iet} = \beta_0 + \gamma Deposit_{ie} + \sum_{k=2008q1}^{2019q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2019q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Deposit_{ie} + \varepsilon_{iet},$$

that compares the change in the volume of tax haven bank account deposits to the change in the volume of anticipated import payments for primary and secondary goods in response to an increase in the bank account deposit outflows tax from 2% to 5% (while import payments remained exempt). This model is estimated on the universe of personal (i.e. individual) foreign-sourced consumption transactions and bank account deposits on tax havens aggregated to the ID-quarter level. Coefficients are estimated relative to 2010 quarter 4. Panel (a) the number of transactions as the dependent variable; Panel (b) uses log number of transactions as the dependent variable. Dashed navy lines represent 95% confidence intervals based on ID-clustered standard errors. The dashed vertical line represents the date of the policy change.

A.1.3 Firm-level responses to the dividend reform

Figure A.1.15: Pre-reform covariate balance:

Exposure measure: Sending dividends to havens in all pre-reform years



This figure displays the balance on pre-reform period covariates based on the share of years from 2008 to 2010 in which firm i directed profit distribution payments to shareholders domiciled in tax havens. Each covariate represents an average across years 2007 to 2010. Error bars represent 95% confidence intervals based on heteroskedasticity-robust standard errors.

Table A.1.3: Pre-reform covariate balance:
Exposure measure: Sending dividends to havens in all pre-reform years

	Connected	Non_connected	Difference
Gross income	2.120e+07	544552	2.060e+07
	(2.19e+07)	(3394188)	(2263008)
Financial returns	121793	3716	118077
	(445577.5)	(75556.73)	(45956.01)
Gross expenses	1.830e+07	506813	1.780e+07
	(1.93e+07)	(3048812)	(1987716)
Labor expenses	1.929e+06	44402	1.885e+06
	(2227792)	(292008.6)	(229769)
Profit	1.727e+06	12806	1.714e+06
	(1706474)	(650731.4)	(176009.6)
Patrimonial profit	7.211e+06	205789	7.005e+06
	(8576223)	(2416814)	(884550.8)
Reports loss (binary)	0.425	0.351	0.0750
	(.196)	(.336)	(.02)
Loss	11854	12713	-859.1
	(65974.41)	(101798.5)	(6810.39)
Reinvestment	684659	3419	681240
	(2557354)	(139818.1)	(263757.9)
Taxable profit	1.868e+06	26679	1.841e+06
	(2080306)	(234910.5)	(214557.4)
CIT withholdings	190042	3788	186254
	(217445)	(27207.14)	(22426.74)
CIT liability	439331	6374	432957
	(482284.4)	(55089.59)	(49741.59)
Assets	1.780e+07	530731	1.720e+07
	(1.89e+07)	(3259738)	(1947100)
Liabilities	1.110e+07	317359	1.080e+07
	(1.32e+07)	(2146070)	(1357468)
Accumulated profits	891805	23133	868673
	(1790578)	(249392)	(184676.1)
Accumulated losses	93	259586	162680
	(753439.5)	(252993)	(77710.7)
No. units	106	259480	

This table displays the balance on pre-reform period covariates based on the share of years from 2008 to 2010 in which firm i directed profit distribution payments to shareholders domiciled in tax havens. Each covariate represents an average across years 2007 to 2010.

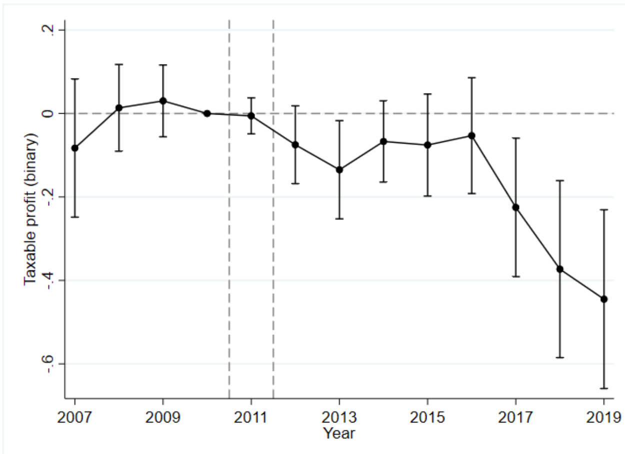
Firm avoidance responses

I estimate another series of analogous regressions to my main specification that focus on measures of corporate tax strategy and profit shifting. While Ecuador's personal income tax system is residence based, the Ecuadorian has a generally territorial corporate income tax system that taxes corporate profits at 25%. Therefore, in response to the anti-tax haven dividend reform of 2011, exposed firms engaging in multinational corporate income tax strategy saw changes to their incentives to use offshore tax havens to mitigate their global and domestic Ecuadorian corporate income tax liabilities.

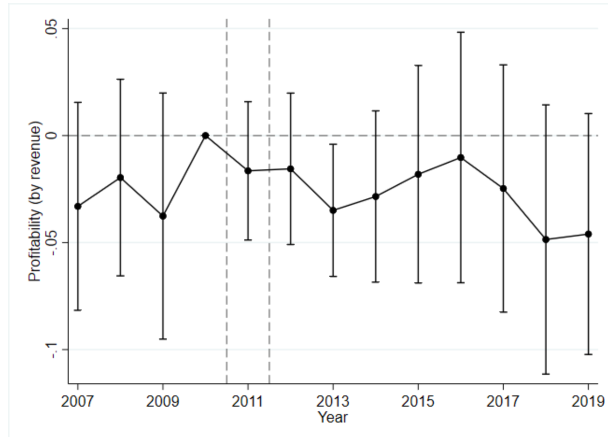
However, I find relatively little indication of any change in behavior in terms of the typical measures of international tax strategy and profit shifting, such as domestic pre-tax profits, profitability, and corporate income taxes paid. Figure A.1.16 shows minimal response in terms of pre-tax profits declared and corporate income tax liability, although both decline toward the end of the timeframe.

Exposed firms demonstrate a more decisive response in terms of whether they declare positive taxable income. In spite of the relatively minimal response documented in terms of overall corporate income taxes paid, Figure A.1.16 Panel (a) shows how affected firms demonstrated a relative drop of around 10 percentage points in the years immediately following the reform in their probability of reporting positive taxable profits, resonating with findings from Bilicka (2019) that multinational corporations exhibit higher probabilities of reporting precisely zero taxable income in the UK. This response intensifies toward the end of the sample period, driving some of the decline in corporate income tax payments observed in Panel (c). However, this decrease in levels CIT payments appears muted in the short-run following the reform, contrasting with the proportion response documented in Panel (d), depicting a more immediate half-of-one log point decline (40%) in intensive-margin corporate income tax payments. Panel (b), however, depicts no response in terms of overall firm profitability in terms of the ratio of taxable profits-to-revenues.

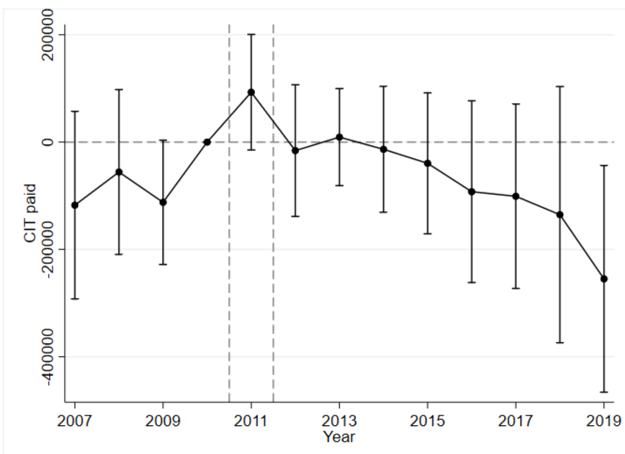
Figure A.1.16: Firm response to the tax haven dividend reform:
Profit shifting measures



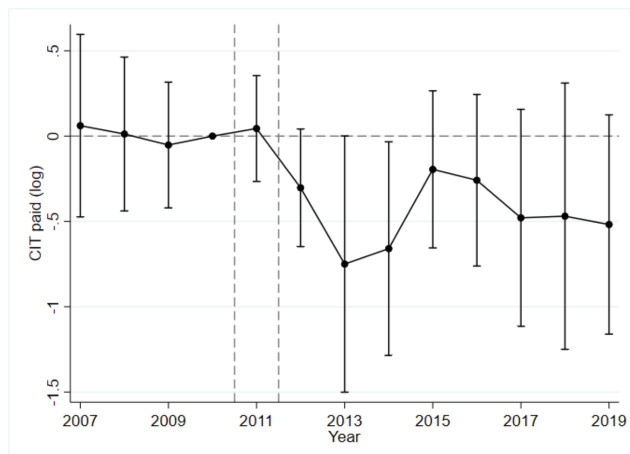
(a) Positive taxable income



(b) Profitability (by revenue)



(c) CIT obligation (USD 2020)



(d) Log CIT obligation (USD 2020)

These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i + \gamma HavenDividends_i + \sum_{k=2007}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2007}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot HavenDividends_i + \varepsilon_{it},$$

that evaluates the change in firm-year-level reinvestment behavior between firms “exposed” and “unexposed” to the tax haven dividend reform of 2011. $HavenDividends_i$ is defined as the share of years from 2008 to 2010 in which firm i directed profit distribution payments to shareholders domiciled in tax havens. Coefficients are estimated relative to 2010. Panel (a) uses a binary indicator for whether a firm declares positive taxable profits as the dependent variable; Panel (b) uses profitability defined as taxable profits divided by total revenues as the dependent variable; Panel (c) uses levels corporate income tax obligation as the dependent variable; Panel (d) uses a log corporate income tax obligation as the dependent variable as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully “untreated” year.

A.1.4 Individual level responses

Descriptive results on individual tax haven users

In this section I develop descriptive results on the characteristics of individuals associated with tax haven usage. Figure A.1.18 plots effective tax rates by selected taxable income percentile tranches.[3] Panel (a) displays the striking result that the income tax appears generally progressive until the very top of the income distribution, after which I document a sharp decline in the income tax rate. I find that while individuals between taxable income percentiles 99.95 and 99.99 pay an average rate of about 20%, the top 1 percent of 1 percent of Ecuadorian personal income tax filers (about 60 individuals) pay a rate of about 15%. Panel (b) illustrates the joint distribution of taxable income and my preferred measure of individual-level exposure to the tax haven reform: the probability is near zero for low earners, and rises sharply within the top .5 percent to the point where my measure classifies twenty percent of the top 1 percent of 1 percent of earners as exposed and connected to tax havens.

Figure A.1.19 plots the difference in funds sent directly to tax havens (regardless of purpose) by income percentile tranche relative to the center of the income distribution displayed. The charts illustrate a substantial increase in funds sent to tax havens as income increases. Panel (a) illustrates that the top one percent of earners sent around USD 7,000 per person to tax havens in 2010, but Panel (b) finds an even steeper incline in funds sent toward the very top of the income distribution: the top 5% of the top 1% sent around USD 50,000 per person on average to tax havens in 2010.

I also plot the probability of being named in one of the ICIJ leaks datasets by income rank. Figure A.1.20 shows how the unconditional probability of individual affiliation with the ICIJ leaks data evolves within the income distribution. Compared to analogous plots in Alstadsæter, Johannesen, and Zucman (2019), Individuals in the top percentile of income are several-fold more likely to have been named directly in one of the ICIJ leaks datasets.

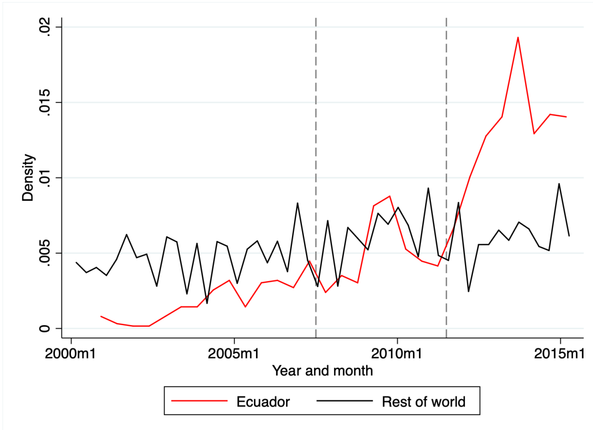
As an additional descriptive exercise, I exploit the unique structure of my data to learn about the correlative relationship between income and tax haven use. Because I observe individuals' use of tax havens every year in my sample time frame, I can estimate a uniquely structured regression that includes individual-level fixed effects so as to quantify the correlation between tax haven use and income. Figure A.1.21 plots this relationship, estimating the equation

$$1\{HavenAmount_{it} > 0\} = \alpha_i + \sum_{r=0}^{100} \gamma_{r(it)} + \varepsilon_{it},$$

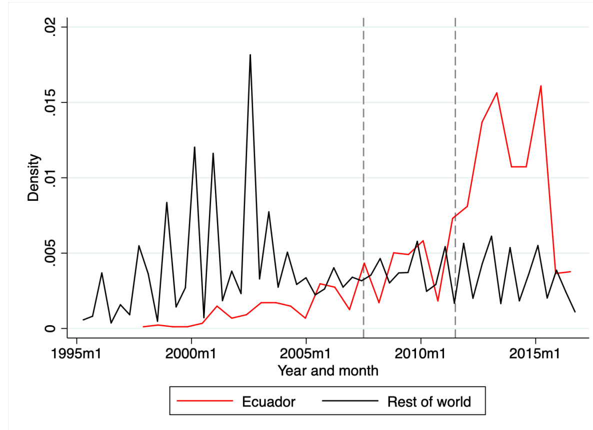
for a binary variable indicating any tax haven usage in year t by person i, $1\{HavenAmount_{it} > 0\}$. The coefficients $\{\gamma_r\}$ identify the correlative within-taxpayer effect of moving income rank on using a tax haven for any purpose. Importantly, the coefficients plotted are not causally identified due to the potential endogeneity between tax haven usage and income rank, but they very clearly illustrate an increase in the probability of using a tax haven as an individual's income rank increases (holding the individual-fixed).

[3] I calculate effective tax rate as the quotient of personal income taxes paid and taxable income. Taxable income refers to gross income following labor and business allowances (a feature of the Ecuadorian personal income tax environment) but before the application of any tax credits, personal allowances, and exemptions.

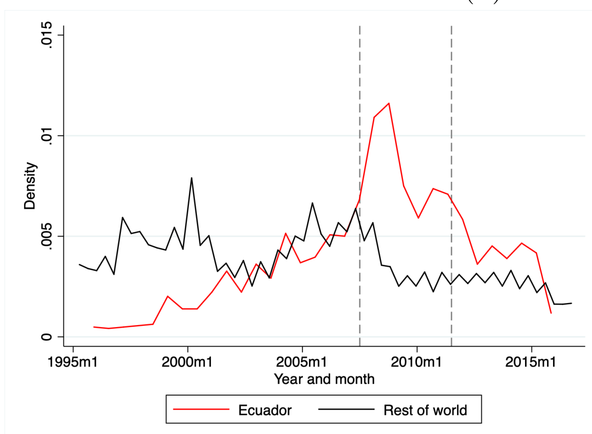
Figure A.1.17: Account openings and closures in the ICIJ leaks data



(a): Accounts deactivated



(b): Accounts struck off

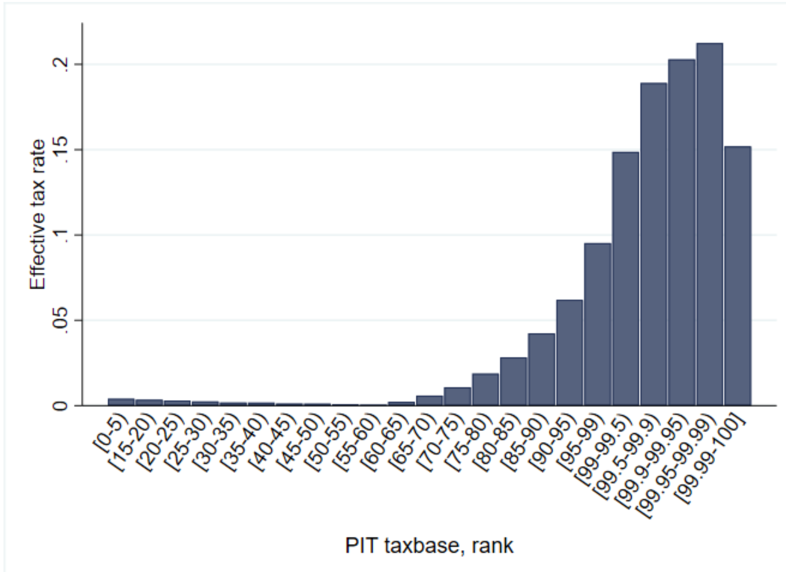


Panel (c): Account openings

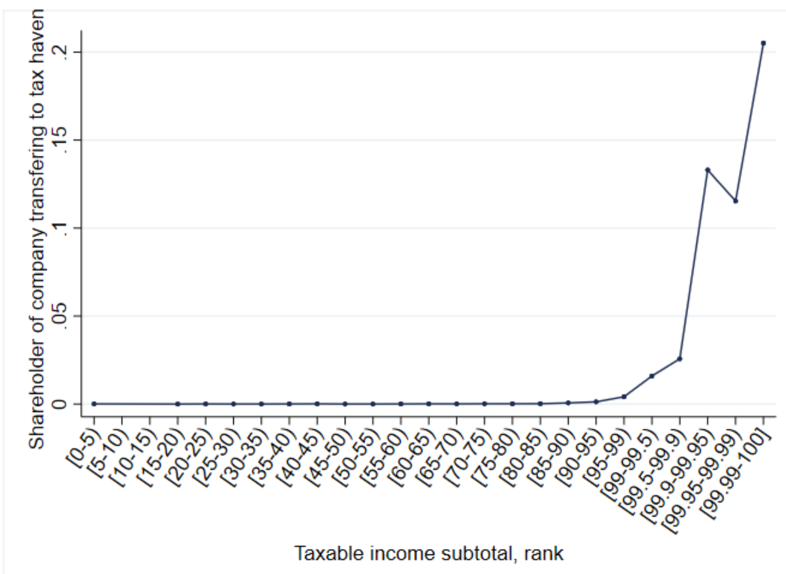
These figures plot the occurrence of openings and closings of accounts named in the Panama and Pandora Papers by beneficiary country. Panel (a) shows the deactivations of accounts by beneficiairies; Panel (b) shows the incidence of accounts becoming delinquent (and thereby unusable); Panel (c) shows account openings. The first dashed gray line indicates the passage of the currency outflows tax and the second dashed gray line indicates the increase of the outflows tax rate to 5%.

Figure A.1.18: Individuals ranked by taxable income

(a) Effective tax rate



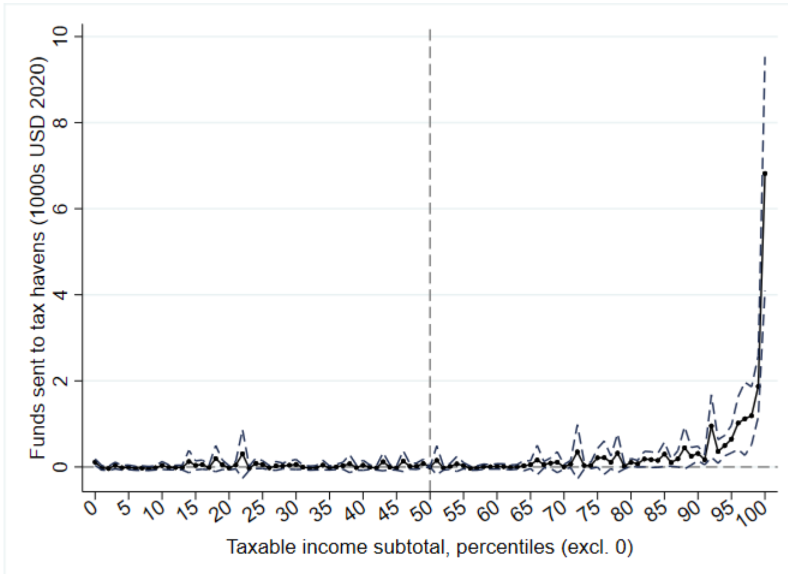
(b) Prob. of being a $\geq 10\%$ direct shareholder of a firm sending dividends to tax havens



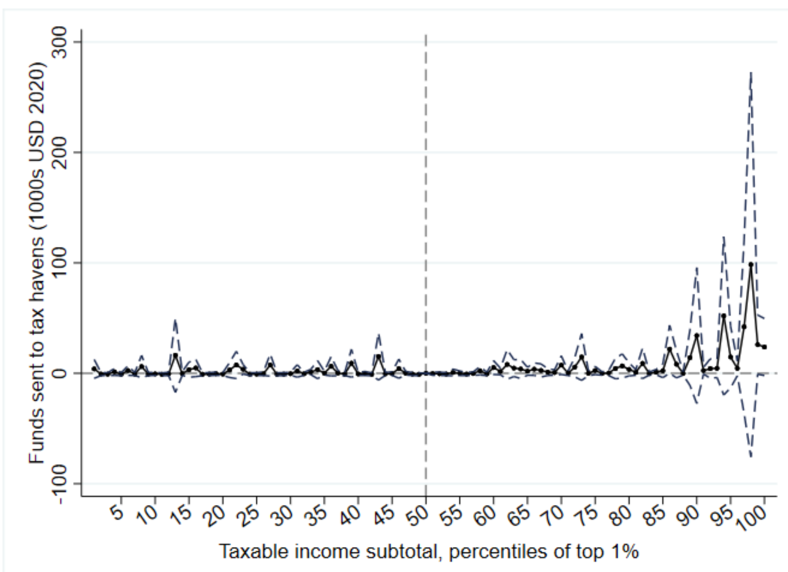
These figures display the joint distributions of taxable income with select characteristics calculated on a cross section of personal income tax filers in 2010. The dependent variable in Panel (a) is effective tax rate, defined as taxes paid divided by taxable income. Taxable income refers to gross income less business and labor expense allowances, but before the application of personal allowances and tax credits. Panel (b) uses as dependent variable the probability of being tagged as a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period.

Figure A.1.19: Tax haven use by taxable income rank

Percentiles



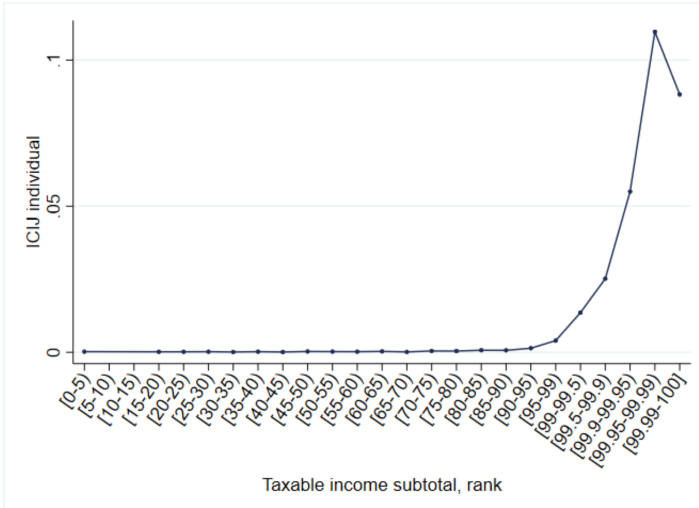
Percentiles of top 1%



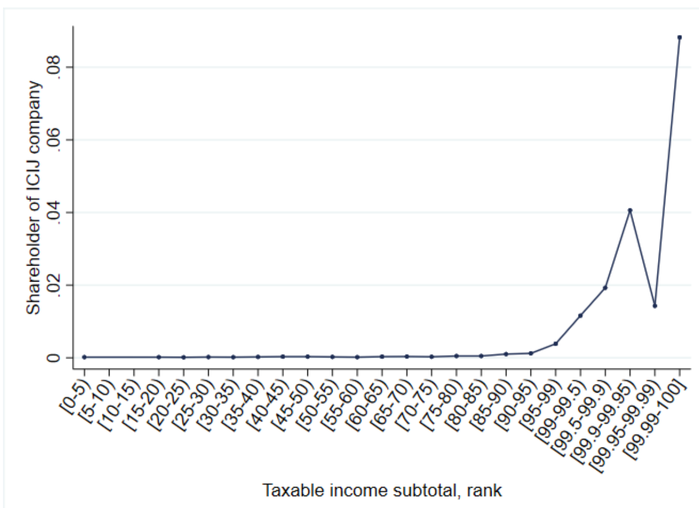
These figures display the joint distributions of individuals' taxable income with the total amount sent to tax havens in 2010. Total amounts sent to tax havens are calculated as averages within taxable income rank bins for a cross section of personal income tax filers in 2010. The x-axis in Panel (a) ranks individuals by taxable income percentile rank excluding individuals claiming zero taxable income; Panel (b) ranks individuals by taxable income percentile within the top 1% of taxable income (calculated on the sample including individuals declaring zero income). Coefficient estimates are calculated relative to the 50th percentile of x-axis, marked by a dashed horizontal line. In Panel (a), the 50th percentile point estimate is USD 50.1 (in USD 2020). In Panel (b), the 99.5th percentile point estimate is USD 988. Dashed navy lines represent 95% confidence intervals calculated using heteroskedasticity-robust standard errors.

Figure A.1.20: Affiliation with ICIJ leaks

(a) Probability of being named in ICIJ leaks



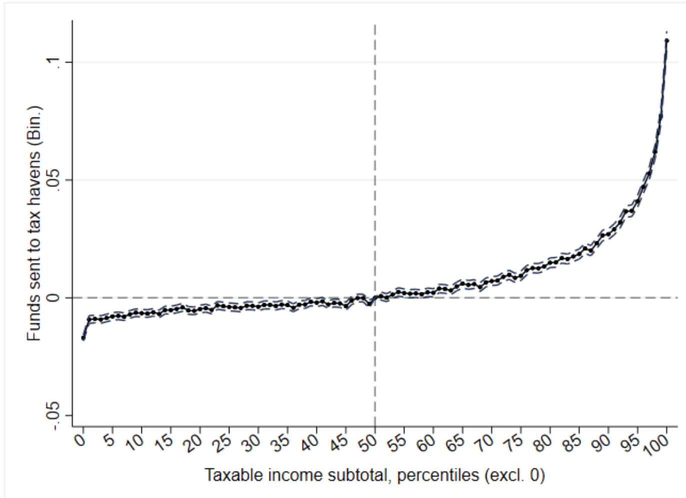
(b)Probability of being $\geq 10\%$ shareholder of an ICIJ company



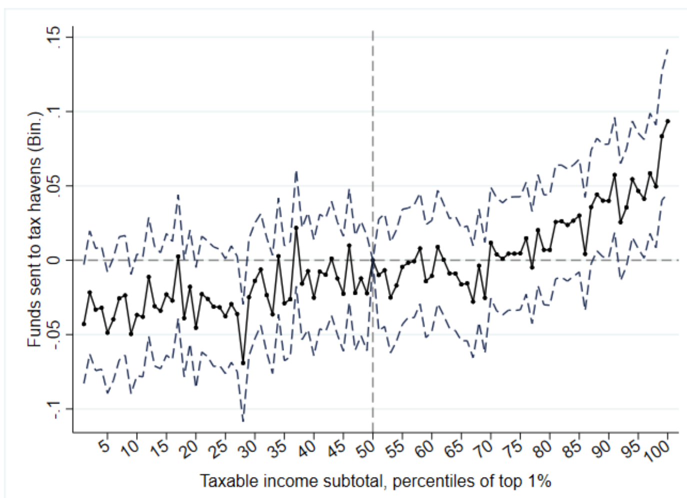
These figures display the within-income rank bin share of taxpayers with affiliation with the ICIJ leaks datasets. The dependent variable in Panel (a) is whether an individual was named in one of the ICIJ leaks datasets; the dependent variable in Panel (b) is whether an individual is identified as a 10% or greater direct shareholder of a company named in one of the ICIJ leaks datasets (as identified in the Ecuadorian company-shareholder ownership data).

Figure A.1.21: Within-ID joint distribution of tax haven use and taxable income

(a) Percentiles



(b) Percentiles of top 1%



These figures display the coefficients estimated from the regression

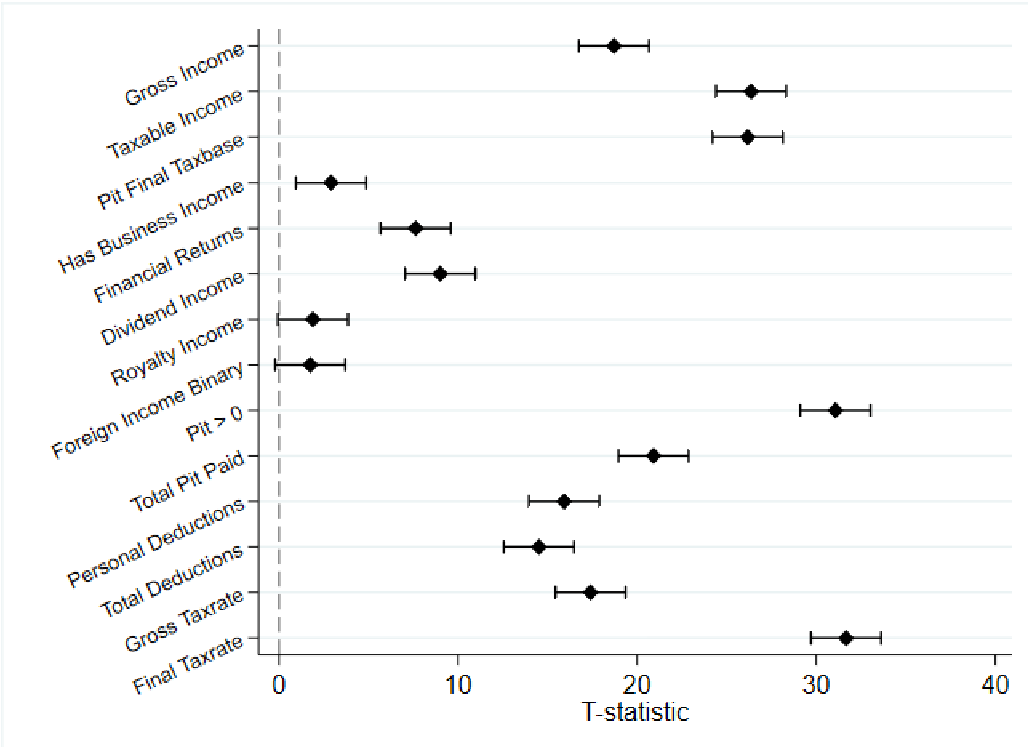
$$1\{HavenAmount_{it} > 0\} = \alpha_i + \sum_{r=0}^{100} \gamma_{r(it)} + \varepsilon_{it},$$

for rank r of individual i at time t. The dependent variable in both panels is an indicator for whether an individual sent any money directly to a tax haven for any purpose in a given year. The above figures estimate this regression on the population of personal income tax filers for between 2008 and 2019. Coefficient estimates are calculated relative to the 50th percentile of x-axis, marked by a dashed horizontal line. In Panel (a), the 50th percentile point estimate is 0.44% (in USD 2020). In Panel (b), the 99.5th percentile point estimate is 25.1%. Dashed navy lines represent 95% confidence intervals calculated using standard errors clustered on the ID-level.

Individual quasiexperimental responses: main specification

Figure A.1.22: Pre-reform covariate balance:

Exposure measure: $\geq 10\%$ direct shareholder of a firm sending dividends to tax havens



This figure displays the balance on pre-reform period covariates based on whether an individual is identified as a 10% or greater direct shareholder of a company sending dividends to tax havens prior to 2010. Each covariate represents an average across years 2006 to 2010. The graph displays the balance on the sample of 400 deemed "exposed" individuals and the universe of "unexposed" individual personal income taxpayers. Error bars represent 95% confidence intervals based on heteroskedasticity-robust standard errors.

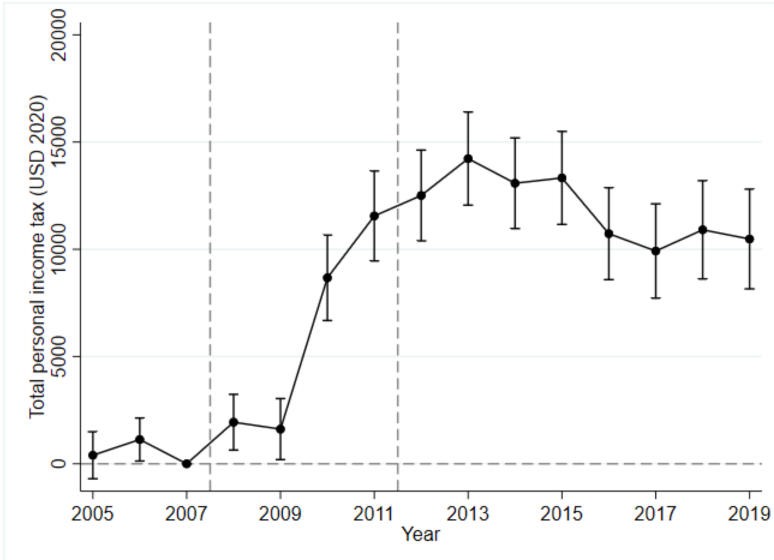
Table A.1.4: Pre-reform covariate balance by exposure measures

	Sh. Firm in Haven	Sh. Firm Haven Sh.	ICIJ Sh.	ICIJ Ind.	ICIJ Match	Haven Transf.	Sh. Haven Transf.	Sh. Haven Div. Transf.	**None**
Gross inc.	117580	96625	84315	88335	76646	67978	83658	119933	28132
	(90559.96)	(89735.63)	(87839.17)	(82346.73)	(78910.36)	(73127.25)	(81216.63)	(92976.2)	(37023.95)
Taxable inc.	88818	69104	56519	63946	52836	49546	62344	83058	16064
	(49257.07)	(50901.91)	(47940.63)	(49875.52)	(48523.77)	(42720.13)	(46436.25)	(48143.84)	(18584.72)
PIT taxbase	82707	64961	51857	60108	49154	46840	58252	77747	14164
	(48077.25)	(49245.03)	(44903.36)	(48199.54)	(46541.57)	(41332.08)	(45095.42)	(46028.25)	(17073.34)
Has bus. inc.	0.0400	0.0800	0.0600	0.0600	0.0500	0.150	0.0900	0.0700	0.0400
	(.17)	(.24)	(.21)	(.21)	(.2)	(.32)	(.26)	(.22)	(.16)
Fin. returns	483.2	376.2	239.9	275.7	195.6	253.1	351.8	585.8	19.24
	(1190.9)	(1090.6)	(897.44)	(860.65)	(730.92)	(900.27)	(1061)	(1405.33)	(242.34)
Div. inc.	718.6	513.9	352.5	582.6	421.6	189.1	721.3	1167	12.30
	(1921.61)	(1874.46)	(1462.71)	(2031.33)	(1716.16)	(977.7)	(1992.64)	(2427.84)	(290.59)
For. inc. (bin.)	0.0300	0.0200	0.0500	0.0200	0.0200	0.0100	0.0100	0.0100	0
	(.12)	(.12)	(.04)	(.13)	(.11)	(.06)	(.09)	(.07)	(.03)
PIT ≥ 0	0.890	0.790	0.730	0.770	0.680	0.710	0.790	0.870	0.400
	(.25)	(.33)	(.37)	(.35)	(.4)	(.37)	(.33)	(.28)	(.43)
Total PIT paid	13331	9746	21876	8931	6904	5981	8147	11956	720.5
	(11089.37)	(10547.96)	(8865.24)	(10280.05)	(9499.55)	(8140.88)	(9432.48)	(10177.09)	(2468.18)
Personal ded.	6440	5166	4794	5148	4601	4476	5423	5888	2089
	(4668.42)	(4651.38)	(4390.55)	(4688.06)	(4641.54)	(4733.03)	(4629.09)	(4518.86)	(3594.25)
Total ded.	8100	7750	6236	6674	5869	6753	7447	7920	2720
	(7062.62)	(7836.2)	(6491.77)	(7137.38)	(6921)	(7924.27)	(7289.71)	(6786.33)	(5120.72)
Gross taxrate	0.100	0.0800	0.0600	0.0800	0.0600	0.0700	0.0800	0.100	0.0100
	(.08)	(.09)	(.07)	(.09)	(.08)	(.1)	(.1)	(.1)	(.04)
Final taxrate	0.120	0.100	0.160	0.0900	0.0800	0.0700	0.0900	0.110	0.0200
	(.06)	(.07)	(.06)	(.07)	(.07)	(.06)	(.06)	(.06)	(.04)
No. units	113	409	524	627	996	5302	1827	418	1.969e+06

This table displays the balance on pre-reform period covariates for all individual-level exposure variables. Each covariate represents an average across years 2006 to 2010.

Figure A.1.23: Individual difference-in-differences design:

Empirical personal income tax payments



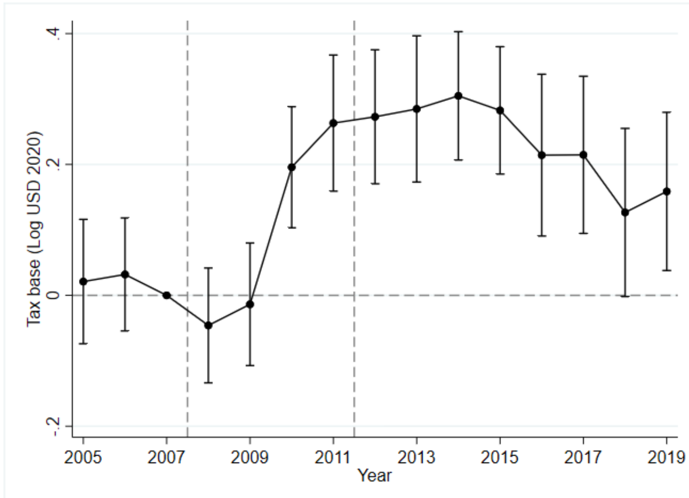
This figure shows the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

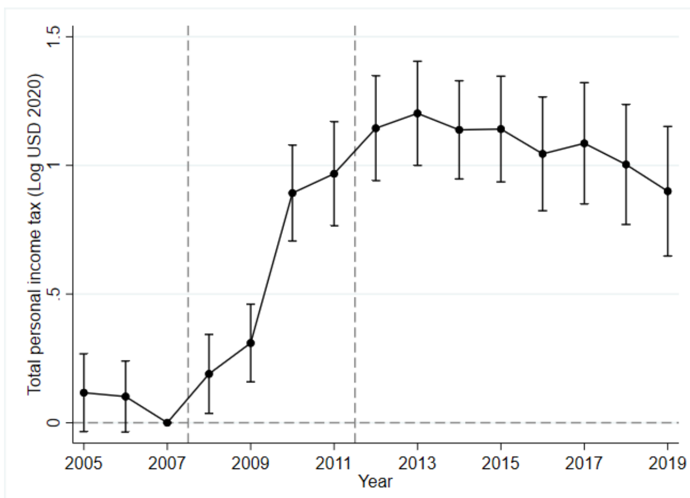
that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2007. The dependent variable is empirically realized personal income tax payments. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

Figure A.1.24: Log declared taxable income and personal income taxes

(a) Log taxable income



(b) Log personal income taxes



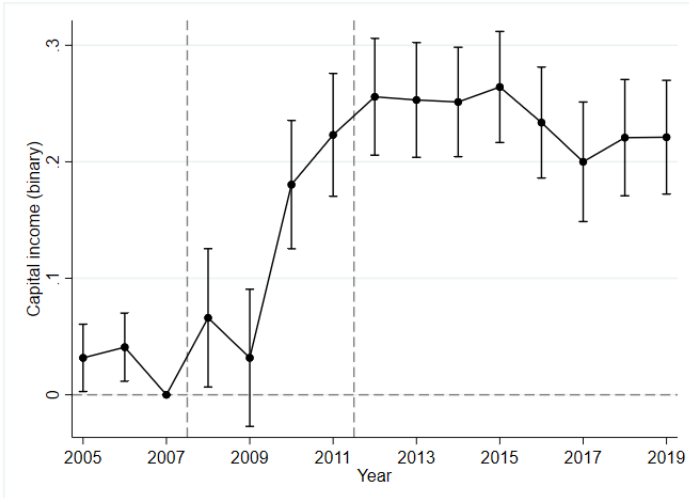
These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

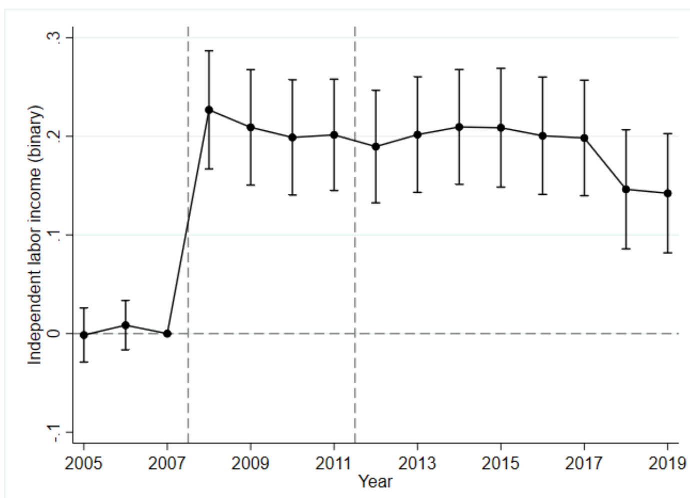
that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2007. Panel (a) uses log taxable income as the dependent variable; Panel (b) uses log personal income tax payments as the dependent variable, with years 2005-2007 using income tax imputations based on a top marginal rate of 35%. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

Figure A.1.25: Income breakdown (binaries)

(a) Capital income



(b) Independent labor income



These figures show the difference-in-differences coefficients estimated from the reduced form:

$$1\{y_{it} > 0\} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2007. Panel (a) uses a binary variable for nonzero reported capital income as the dependent variable; Panel (b) uses a binary variable for nonzero reported independent labor income as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

Individual response: matching design

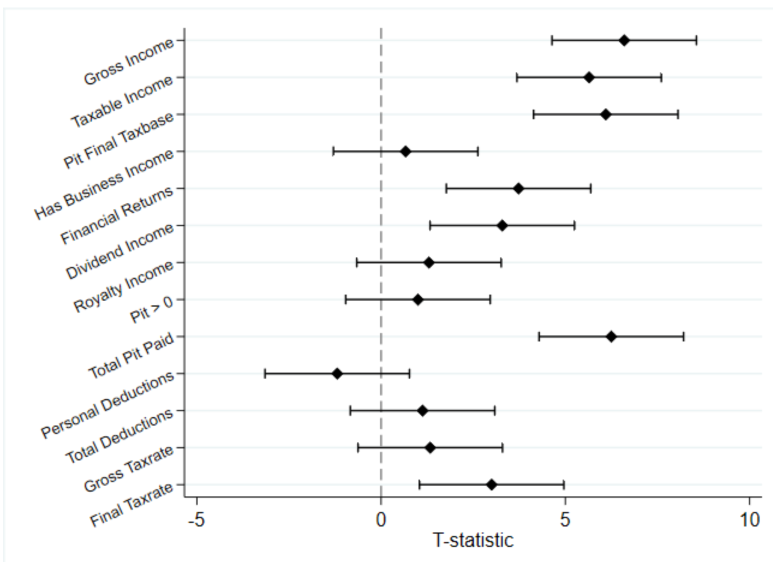
To further corroborate the responses documented in Section 1.5.1, I focus on the final sub-reform to the outflows tax and employ a 5-nearest neighbor Mahalanobis matching procedure. This matching procedure connects individual shareholders of companies sending dividends to tax havens in the pre-reform period with individuals with similar pre-period characteristics. I draw the control match population from the population of personal income tax filers that t I that I identify as unconnected to tax havens.

I match each "treated" individuals to five control individuals (with replacement) from my sample of personal income tax filers unconnected to tax havens based on a series of pre-reform period average characteristics from between 2006 and 2010. These characteristics include gross income, taxable income, certain types of capital income disaggregations, and personal income tax payments.[4]

Figure A.1.26: Pre-reform covariate balance:

Exposure measure: $\geq 10\%$ direct shareholder of a firm sending dividends to tax havens

Mahalanobis matching (5 nearest neighbors)



This figure displays the balance on pre-reform period covariates based on whether an individual is identified as a 10% or greater direct shareholder of a company sending dividends to tax havens prior to 2010. Each covariate represents an average across years 2006 to 2010. The graph displays the balance on the sample of 400 deemed "exposed" individuals and their five nearest neighbors matched with replacement based on a Mahalanobis distance on these covariates. Error bars represent 95% confidence intervals based on heteroskedasticity-robust standard errors.

[4]The twelve match variables include pre-reform period averages (i.e. averages across returns from 2006 to 2010) of 1) gross income, 2) taxable income, 3) final personal income tax base, 4) financial returns, 5) dividend income, 6) royalty income, 7) a binary variable for positive foreign income declaration, 8) a binary variable for positive business income, 9) a binary variable for whether an individual paid positive income taxes in a given year, 10) income tax obligation, 11) personal deductions taken, and 12) total deductions taken.

Table A.1.5: Pre-reform covariate balance (5 nearest neighbor Mahalanobis matching): Exposure measure: $\geq$ 10% direct shareholder of a firm sending dividends to tax havens

	Exposed	Control	Difference
Gross income	119933	110353	9581
	(92976.2)	(87273.55)	(1452.03)
Taxable income	83058	80165	2893
	(48143.84)	(47504.81)	(512.468)
PIT final taxbase	77747	74976	2771
	(46028.25)	(45281.51)	(454.543)
Has business income	0.0670	0.0650	0.00200
	(.217)	(.216)	(.003)
Financial returns	585.8	555.5	30.26
	(1405.332)	(1381.571)	(8.113)
Dividend income	1167	1135	31.46
	(2427.836)	(2417.23)	(9.566)
Royalty income	7.131	6.745	0.386
	(67.179)	(62.447)	(.297)
Foreign income (binary)	0.00800	0.00800	0
	(.067)	(.065)	(0)
PIT ≥ 0	0.871	0.867	0.00400
	(.279)	(.283)	(.004)
Total PIT paid	11956	11343	613.8
	(10177.09)	(9967.228)	(98.241)
Personal deductions	5888	5997	-108.5
	(4518.857)	(4558.312)	(91.154)
Total deductions	7920	7781	139.0
	(6786.333)	(6937.36)	(123.583)
Gross taxrate	0.101	0.0920	0.00400
	(.103)	(.081)	(.003)
Final taxrate	0.113	0.110	0.00300
	(.063)	(.063)	(.001)
No. units	358	1556	

Heteroskedasticity-robust standard errors in parentheses

+ $p < .10$, * $p < .05$, ** $p < .01$

This table displays the balance on pre-reform period covariates based on whether an individual is identified as a 10% or greater direct shareholder of a company sending dividends to tax havens prior to 2010. Each covariate represents an average across years 2006 to 2010. The control group consists of five unexposed individual taxpayers matched with replacement to a treatment unique using a Mahalanobis distance metric on the included covariates.

Figure A.1.26 displays the balance on pre-period observable characteristics based on whether an individual is a 10% or greater direct shareholder of a company that sent dividends to tax havens in the pre-reform period. Individuals connected to tax havens by this measure are quite different from the remaining population of unconnected personal income tax filers. Panel (b) shows that matching the group of around 400 taxpayers connected to tax havens to unconnected individuals results in a better covariate balance. However, the exposed individuals still remain substantially different in terms of their income reporting and overall personal income tax obligation.[5] Nonetheless, the matched control group can be construed as largely similar to exposed individuals—even international in the scope of their economic activity—however demonstrably not connected to tax havens. In this way, comparing exposed units to the matched control sample isolates the role of exposure to tax haven usage.

To address some of the limitations of Section 1.5.1, I primarily focus on outcome variables dealing with disaggregations of capital income I focus on exposed individuals' income declared, taxed paid, and types of income and deductions declared. To quantify the response of exposed individuals to the anti-tax haven reform, I estimate equations of the form:

$$\begin{aligned} y_{it} = \beta_0 + \gamma Exposure_i + &\sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} \\ &+ \sum_{k=2006}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2006}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it}, \end{aligned}$$

for personal income tax filer i in year t; $g(i)$ function that maps an individual i to its nearest-neighbor group defined by treated unit j (via a Mahalanobis covariate distance) for the set treated units $\mathcal{J}$. Control units are sampled with replacement so that the function $g(i)$ is well-defined. Under assumptions of parallel trends, coefficients $\{\hat{\beta}_k\}$ identify the average treatment effect of the tax haven reform on the exposed individuals for outcome y.[6]

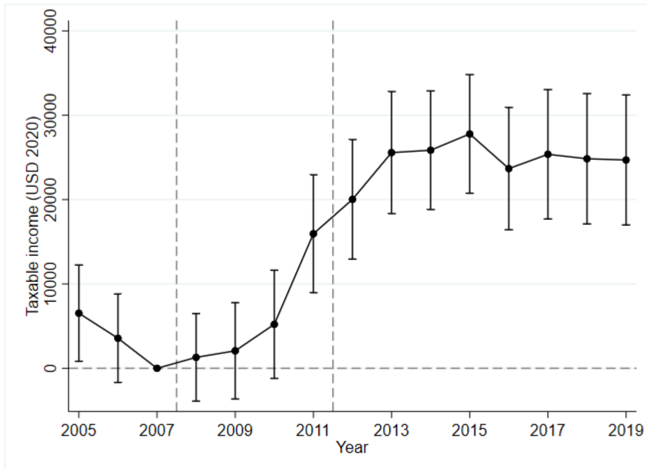
Results. Before proceeding to the central matching design, I replicate the central findings from the main empirical design in Section 1.5.1. Figure A.1.27 displays the results of this estimation strategy, replicating the central result from the main text.

[5] Table A.1.4 displays the raw covariate balance for all exposure variables.

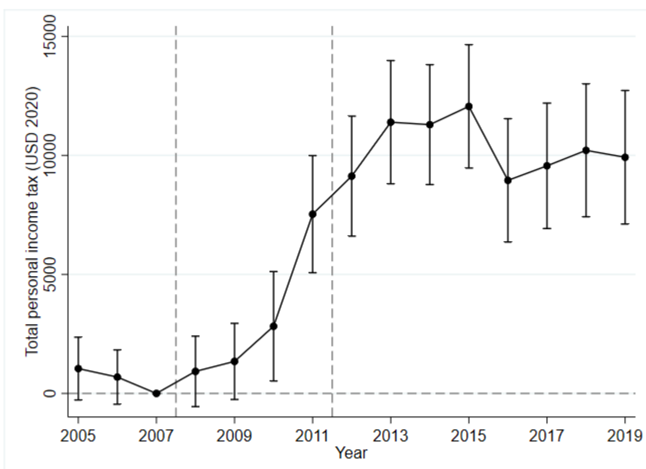
[6] See Section A.1.4 for the replication of these results using ICIJ shareholder status and ICIJ officer status as the main independent variables for individual-level exposure to the tax haven reform.

Figure A.1.27: Declared taxable income and personal income taxes
Matching design (2007 base year)

(a) Taxable income



(b) Personal income taxes



These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2007. Panel (a) uses taxable income as the dependent variable; Panel (b) uses personal income tax payments as the dependent variable, with years 2005-2007 using income tax imputations based on a top marginal rate of 35%. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

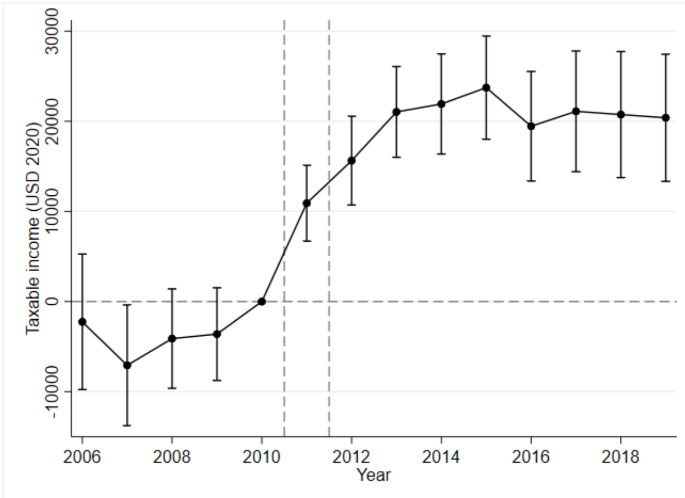
Figure A.1.28 displays the first results of this estimation strategy focused around the final outflows tax rate increase, illustrating a sharp increase in pre-deduction taxable income. Panel (a) in levels shows a post-period increase in reporting by around USD 20,000 per year. This response increase corresponds with an increase by about 0.35 log points similar in shape to the evolution in levels USD, indicating a relatively homogeneous response.

Figure A.1.29 illustrates some of the income types underlying this response as well as changes in deductions that may alter the final tax base. The figure illustrates similarly sharp increases in reported dividend and other financial income, both accounting for around 40% of the overall increase in taxable income. Self-employment and freelance income increase more slowly, picking up more drastically starting in 2013 and accounting for an addition 25% of the increase by then. Evolution in deductions demonstrates a similarly muted response, picking up more strongly in 2013, but only to around USD 1000 per year. Weighing these responses together suggests a substantial increase in reported tax base as well as personal income tax collections.

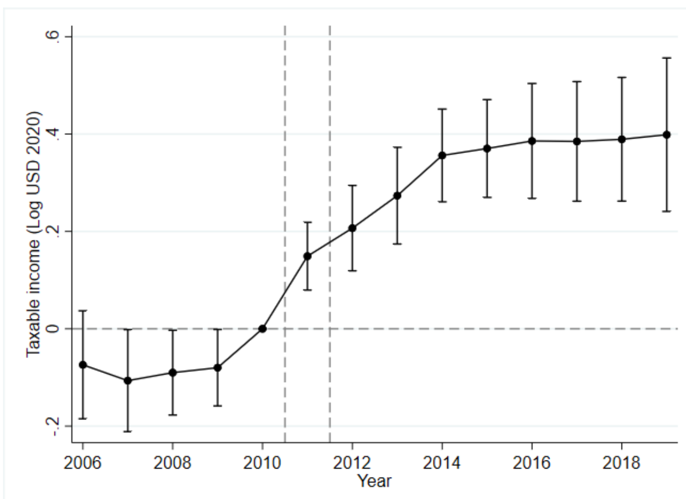
Figure A.1.30 shows the evolution in overall income tax payments by exposed individuals, illustrating a sharp increase in line with the previous declared income responses. Immediately following the reform, personal income tax payments rise by around USD 4,000 per year. This increase is mirrored in the log specification, indicating a relatively homogeneous response corresponding with a half-log-point increase (65%) increase in overall income tax payments. Both of these responses demonstrate relatively stability over time during the post-reform period.

Figure A.1.28: Declared taxable income

(a) USD (2020)



(b) Log USD (2020)

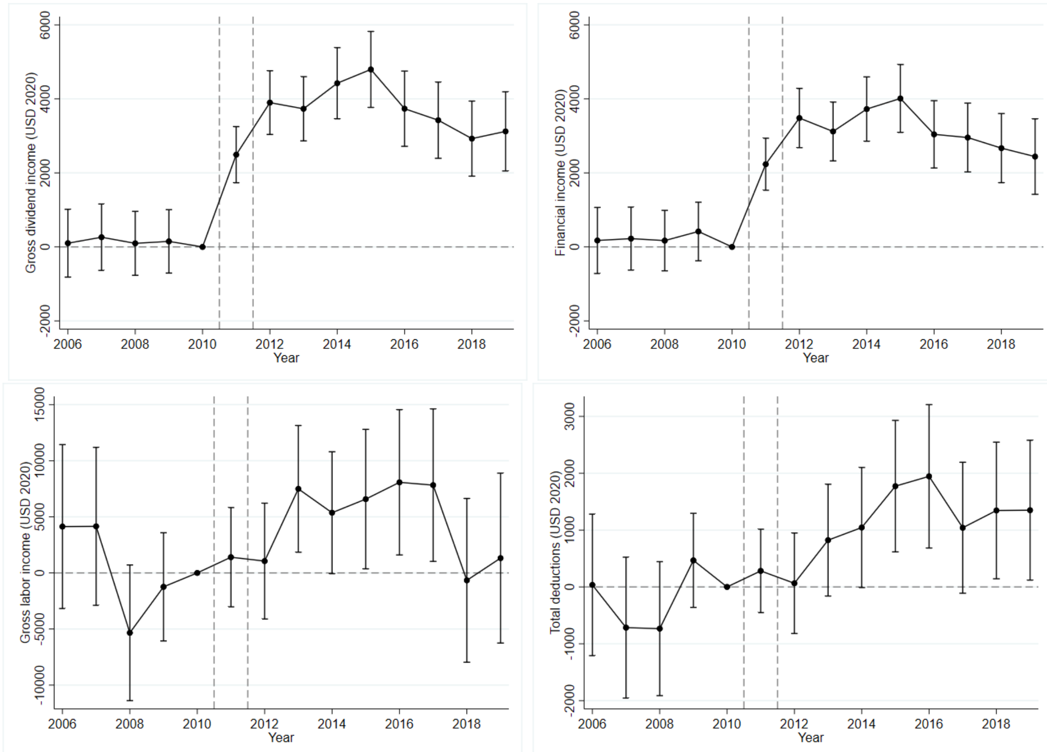


These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \sum_{k=2006}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2006}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2010. Panel (a) uses Log USD (2020) as the dependent variable; Panel (b) uses a binary variable for whether a firm made a profit distribution to shareholders as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Figure A.1.29: Evolution in specific income tax declaration items



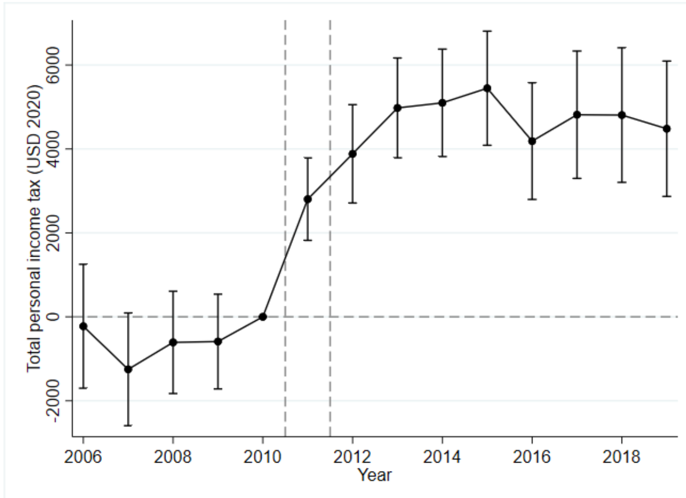
These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \sum_{k=2006}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2006}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

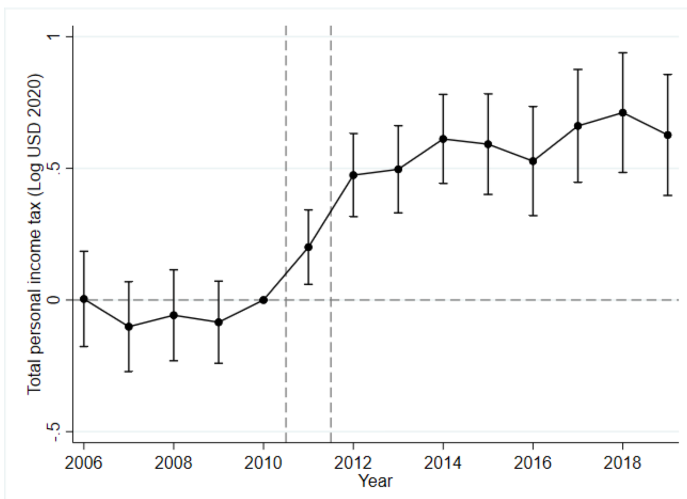
that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2010. Panel (a) uses dividend income as the dependent variable. Panel (b) uses other financial income as the dependent variable. Panel (c) uses contract wage income as the dependent variable. Panel (d) uses total deductions as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Figure A.1.30: Personal income tax payments

(a) USD (2020)



(b) Log USD (2020)



These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \sum_{k=2006}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2006}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2010. Panel (a) uses Log USD (2020) as the dependent variable; Panel (b) uses a binary variable for whether a firm made a profit distribution to shareholders as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Table A.1.6: Exposed individuals' income and personal income tax response
Panel (a): Tax base and income taxes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tax. inc.	Tax. inc.	Tax base	Tax base	PIT	PIT	$\frac{PIT}{Tax.inc.}$	$\frac{PIT}{Tax.inc.}$
Exposure × Post	22452.3**	21927.6**	22258.5**	22143.8**	4967.3**	4931.5**	0.029**	0.028**
	(2303.9)	(2405.3)	(2205.6)	(2295.2)	(516.2)	(540.2)	(0.0031)	(0.0033)
Exposure	3490.4**		3288.3**		748.8**		0.0039*	
	(1074.1)		(999.2)		(228.2)		(0.0017)	
Post	-7458.5**	-12043.1**	-13493.0**	-27481.8**	-857.0**	-1331.3**	-0.0088**	-0.0087**
	(1132.0)	(2073.8)	(1097.1)	(1905.6)	(263.6)	(452.3)	(0.0016)	(0.0030)
Constant	84732.0**	80567.3**	79787.3**	84744.5**	12153.6**	11019.5**	0.11**	0.095**
	(553.9)	(1472.5)	(511.8)	(1246.0)	(123.3)	(287.0)	(0.00088)	(0.0022)
Observations	24298	24259	24298	24259	24298	24259	23080	23032
Adjusted R^2	0.537	0.649	0.544	0.664	0.541	0.656	0.494	0.611
TWFE		X		X		X		X

Panel (b): Log and binary outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log tax. inc.	Log tax. inc.	Log PIT	Log PIT	PIT (bin.)	PIT (bin.)	$\log\left(\frac{PIT}{Tax.inc.}\right)$	$\log\left(\frac{PIT}{Tax.inc.}\right)$
Exposure × Post	0.38**	0.36**	0.58**	0.57**	0.091**	0.084**	0.34**	0.32**
	(0.039)	(0.040)	(0.065)	(0.067)	(0.014)	(0.014)	(0.041)	(0.042)
Exposure	0.049**		0.090**		0.0060		0.050*	
	(0.019)		(0.031)		(0.0069)		(0.021)	
Post	-0.25**	-0.44**	-0.19**	-0.33**	-0.087**	-0.16**	-0.11**	-0.14**
	(0.020)	(0.043)	(0.033)	(0.061)	(0.0069)	(0.014)	(0.021)	(0.040)
Constant	11.2**	11.1**	8.91**	8.80**	0.90**	0.90**	-2.42**	-2.53**
	(0.0094)	(0.023)	(0.015)	(0.035)	(0.0032)	(0.0080)	(0.010)	(0.024)
Observations	23102	23054	20689	20624	24298	24259	20394	20323
Adjusted R^2	0.453	0.580	0.479	0.583	0.280	0.393	0.399	0.511
TWFE		X		X		X		X

ID-clustered standard errors in parentheses

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

This table shows the coefficients estimated from the difference-in-differences model

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \delta \cdot 1\{Year_t \geq 2011\} + \beta_k \cdot 1\{Year_t \geq 2011\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in activity of exposed individuals relative to control individuals within nearest neighbor groups constructed via a Mahalanobis distance matching procedure with replacement. $Exposure_i$ is an indicator for whether an individual is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period.

Table A.1.6 summarizes these results. In addition to substantial increases in declared income and taxes paid, I find modest increases in the probability that exposed individuals face positive personal income obligation in a given year by around 10% (from a baseline of .9). Columns (7) and (8) of both Panels (a) and (b) demonstrate that through the progressivity of the income tax schedule, individuals' increased declared income induces a net increase in their effective personal income tax rate by around 3 percentage points—an increase by around 30%. This result implies that the reform likely demonstrated some success in reversing the personal income tax regressivity at the top of the income distribution documented in Figure A.1.18 Panel (a).

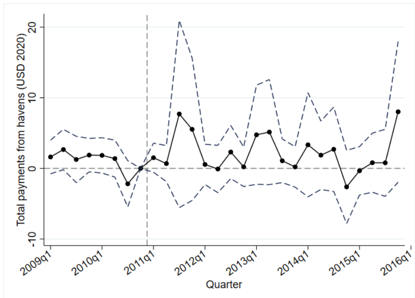
These results suggest a very high level of individuals' responsiveness to incentives to locate income offshore. Interpreting the reform to having induced a 3 percentage point increase in the net-of-tax cost of locating funds offshore from a baseline of 2%, the 80% increase in personal income tax payments implies an elasticity of domestic income tax payments with respect to the net-of-tax cost of locating funds in tax havens of 26. This elasticity, while large in magnitude, is in line with the responsiveness documented of firms sending profit distributions to tax havens.

Repatriation and currency entrance responses. As an additional object of inquiry, I turn to studying any change in repatriation behavior among exposed individuals. Are some of the changes in increased declared income sustained by increases in currency entrances from abroad?

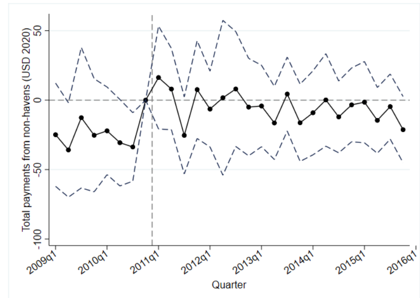
I use the MID data on currency entrances to answer this question. As discussed in Section 1.2.2, while MID data on currency *exits* demonstrates reliability, there does not exist substantial incentive for the government to maintain reliable data on currency entrances, as such entrances do not generate any outflows tax revenue. For this reason, the entrances data sees substantial reporting gaps by subject matter and by time period (but *not* strictly by foreign country of the transaction-originating party). Despite these limitations, if these instances of censoring occur in a manner orthogonal to individuals' connectedness to tax havens, the inflows data can inform to what extent changes in individual reporting are driven by repatriation behavior.

To speak to whether thee results are driven by repatriation behavior, I run regressions of identical structure as in Section 1.5.1.

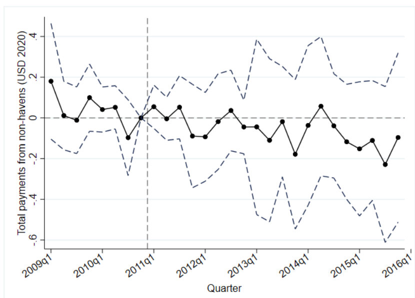
Figure A.1.31: Total currency entrances (by tax haven status)



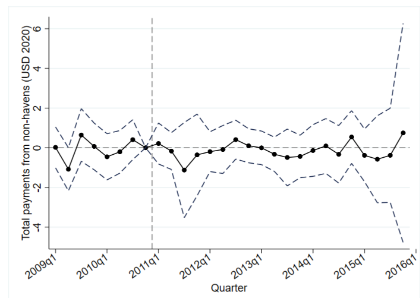
(a): Havens USD (2020)



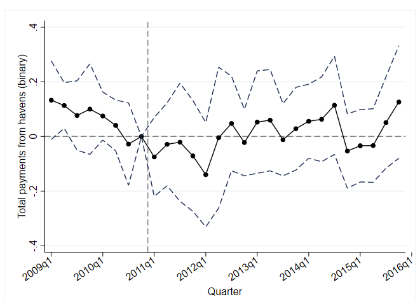
(b): Non-havens USD (2020)



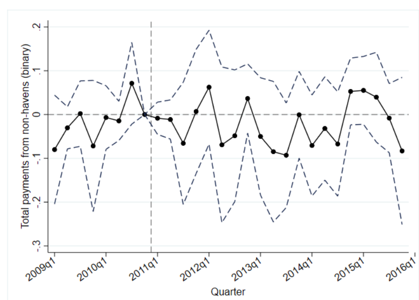
(c): Havens no. transactions



(d): Non-havens no. transactions



(e): Any haven transaction



(f): Any non-haven transaction

These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \sum_{k=2008q1}^{2015q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2015q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-quarter-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual personal income tax filer is a 10% or greater shareholder of a company sending dividends to tax havens in the pre-reform period (as identified in the earliest year of the firm-shareholder linkages data, 2012). Coefficients are estimated relative to 2010. Panels (a) and (b) use levels USD (2020) from as the dependent variable. Panels (c) and (d) use the number of currency entrances as the dependent variable. Panels (e) and (f) use a binary variable indicating the presence of *any* currency entrance as the dependent variable. All of the dependent variables are constructed from the MID entrance data aggregated to the taxpayer-quarter level. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Exposure measure: Identified as an officer in the ICIJ leaks datasets

In this section I replicate results from Section 1.5.1, however, as a demonstration of robustness, implementing an alternate definition of tax haven connectedness as a measure of personal exposure to the outflows tax. This section uses individuals tagged as officers in either the Panama or Pandora Papers as a measure of individual-level connectedness to tax havens. Thus, the empirical design in this section compares the evolution in income tax reporting behavior of exposed individuals to the universe of unexposed individuals (individuals demonstrating no connection to tax havens via any other measures).

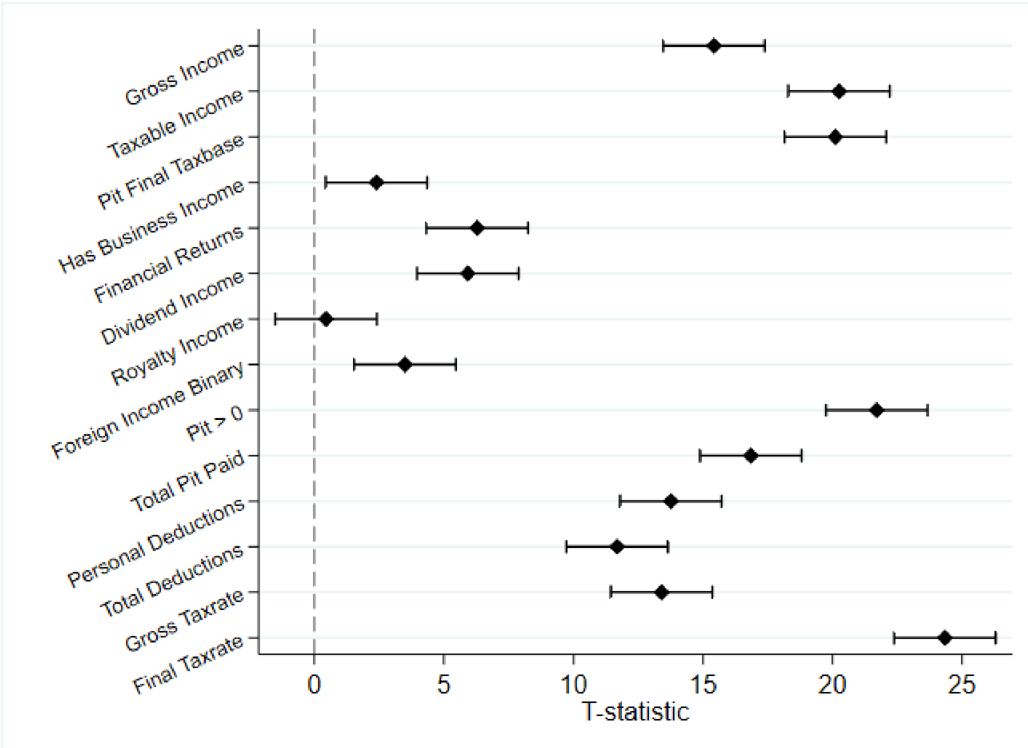
I estimate a differences-in-differences design that compares the annual personal income tax declarations of these two groups against the year 2007 as a baseline:

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

The following graphs and tables replicate those from the main text using this alternate measure of exposure.

Figure A.1.32: Pre-reform covariate balance:

Exposure measure: Named as officer in ICIJ leaks datasets

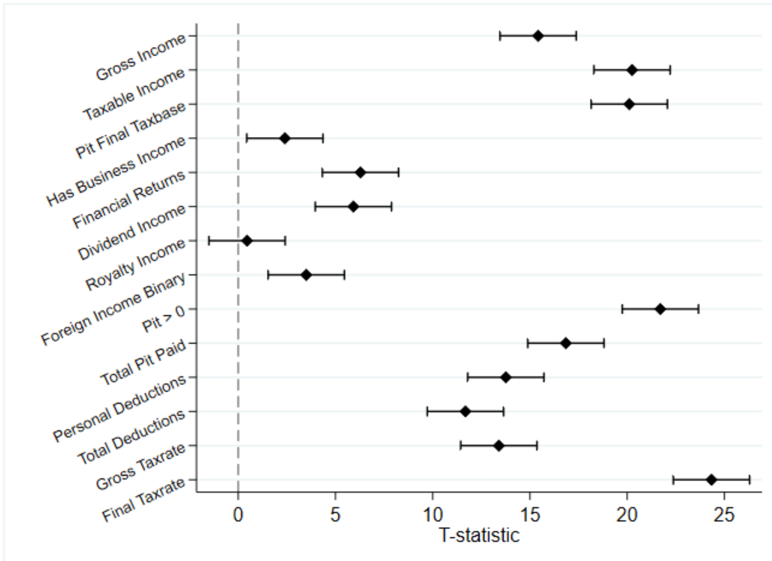


This figure displays the balance on pre-reform period covariates based on whether an individual is named directly as an officer in one of the ICIJ leaks datasets. Each covariate represents an average across years 2006 to 2010. The graph displays the balance on the sample of 400 deemed "exposed" individuals and the universe of "unexposed" individual personal income taxpayers. Error bars represent 95% confidence intervals based on heteroskedasticity-robust standard errors.

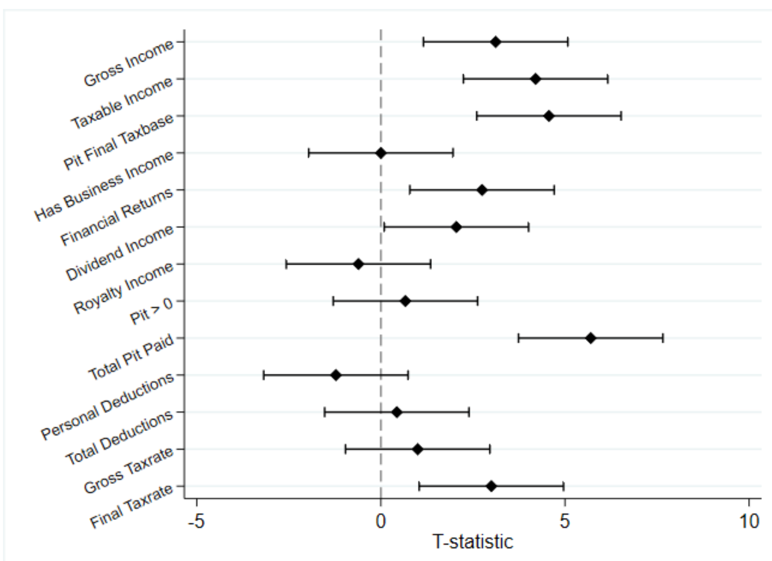
Figure A.1.33: Pre-reform covariate balance:

Exposure measure: Named as officer in ICIJ leaks datasets

(a) Unmatched sample



(b) Mahalanobis matching (5 nearest neighbors)



These figures display the balance on pre-reform period covariates based on whether an individual is named directly as an officer in one of the ICIJ leaks datasets. Each covariate represents an average across years 2006 to 2010. Panel (a) displays the balance on the full sample; Panel (b) displays the balance on the sample of 400 deemed "exposed" individuals and their five nearest neighbors matched with replacement based on a Mahalanobis distance on these covariates. Error bars represent 95% confidence intervals based on heteroskedasticity-robust standard errors.

Table A.1.6: Exposed individuals' income and personal income tax response
Tax base and income taxes

	(1) Tax base	(2) Tax base	(3) Empl. inc.	(4) Empl. inc.	(5) Indep. inc.	(6) Indep. inc.	(7) PIT	(8) PIT rate	(9) PIT	(10) PIT rate
Exposure × Post	7050.0**	14319.0**	7771.9**	10973.9**	37411.8**	44814.3**	6020.1**	8946.0**	0.029**	0.052**
	(2434.1)	(2317.6)	(1727.7)	(1807.6)	(2029.3)	(2712.6)	(735.8)	(838.9)	(0.0051)	(0.0057)
Exposure × Phase-in	-876.7	1799.5	2058.0	4543.2**	30039.3**	32201.0**	2116.7**	3173.2**	0.0059	0.017**
	(1975.7)	(1853.9)	(1453.8)	(1421.6)	(2046.2)	(2436.6)	(586.1)	(658.2)	(0.0046)	(0.0048)
Post	-1182.5**	537.2**	4764.8**	4052.9**	6923.9**	12128.6**	-305.2**	217.3**	-0.011**	-0.0080**
	(26.5)	(39.0)	(17.5)	(26.1)	(12.8)	(35.3)	(4.95)	(8.60)	(0.000078)	(0.00012)
Phase-in	-781.5**	-261.8**	3435.9**	1730.3**	7802.8**	11535.3**	-217.0**	35.5**	-0.0064**	-0.0069**
	(23.0)	(35.1)	(16.2)	(21.8)	(18.5)	(34.8)	(4.31)	(7.46)	(0.00010)	(0.00014)
Exposure	44049.9**		14524.5**		715.3+		9233.8**		0.090**	
	(2648.6)		(1781.0)		(408.3)		(653.5)		(0.0047)	
Constant	13209.5**	11959.5**	3447.9**	4771.0**	602.4**	-3446.3**	1042.6**	634.3**	0.026**	0.023**
	(28.3)	(32.7)	(16.7)	(20.8)	(5.18)	(29.8)	(5.15)	(7.09)	(0.000082)	(0.00011)
Observations	10287561	9847065	10287561	9847065	10287561	9847065	10287561	9847065	8777520	8363508
Adjusted R^2	0.006	0.578	0.013	0.723	0.024	0.478	0.010	0.552	0.007	0.302
TWFE		X		X		X		X		X

ID-clustered standard errors in parentheses
$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

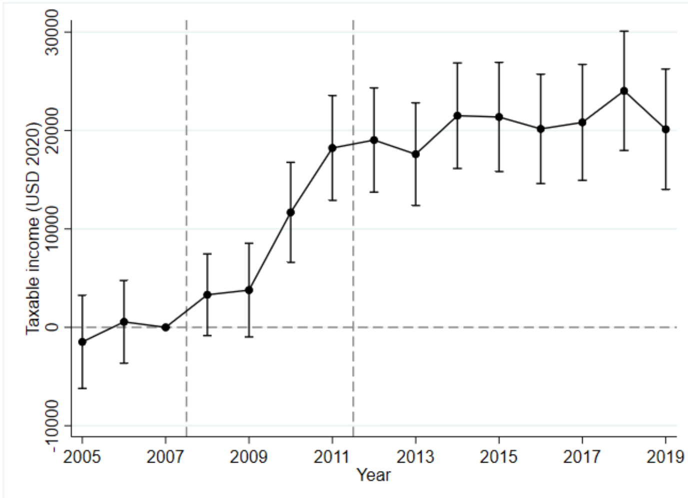
This table shows the coefficients estimated from the difference-in-differences model

$$y_{it} = \beta_0 + \gamma Exposure_i + \delta_1 Phase\text{-}in_t + \delta_2 Post_t + \beta_1 Exposure_i \cdot Phase\text{-}in_t + \beta_2 Exposure_i Post_t + \varepsilon_{it},$$

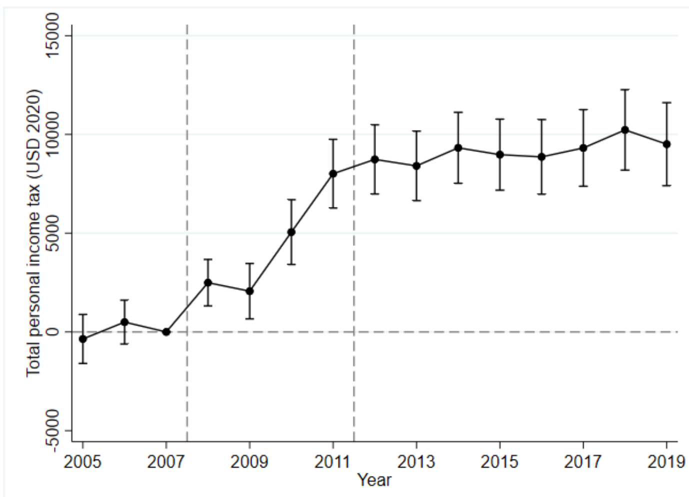
that evaluates the change in activity of exposed individuals relative to the universe of unexposed individuals. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. $Phase\text{-}in$ indicates $Year_t \geq 2008 \cap Year_t \leq 2010$. $Post$ indicates $Year_t \geq 2011$. "Empl. inc." represents income earned from contract employment. "Indep. inc" indicates the aggregation of capital income and self-employment income.

Figure A.1.34: Declared taxable income and personal income taxes

(a) Taxable income



(b) Personal income taxes

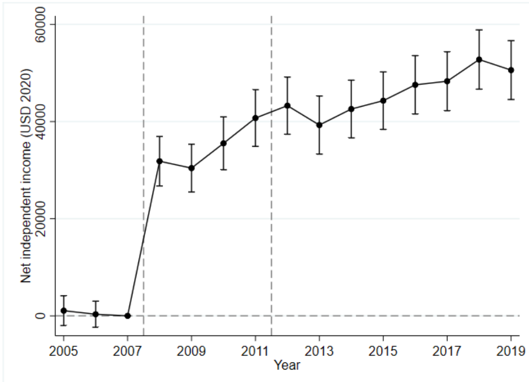


These figures show the difference-in-differences coefficients estimated from the reduced form:

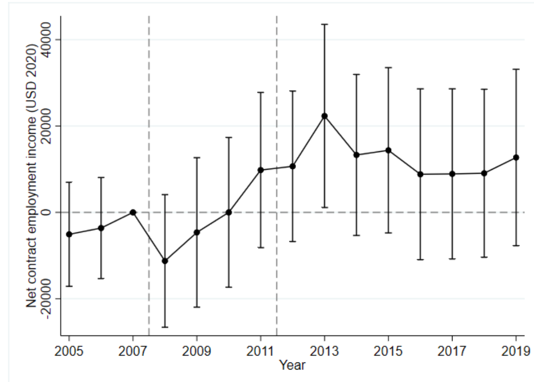
$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. Coefficients are estimated relative to 2007. Panel (a) uses taxable income as the dependent variable; Panel (b) uses personal income tax payments as the dependent variable, with years 2005-2007 using income tax imputations based on a top marginal rate of 35%. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

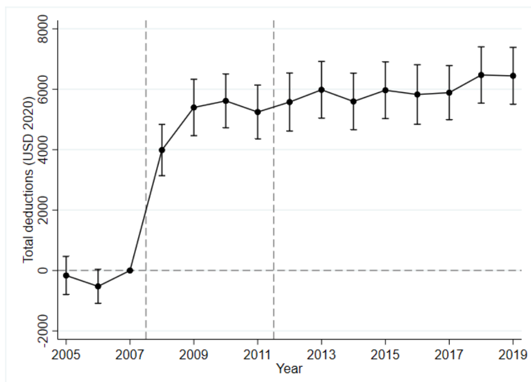
Figure A.1.35: Evolution in specific income tax declaration items



(a): Net independent income



(b): Contract labor income



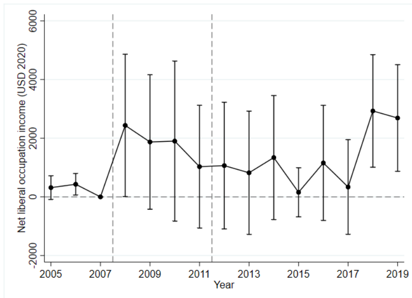
(c): Deductions

These figures show the difference-in-differences coefficients estimated from the reduced form:

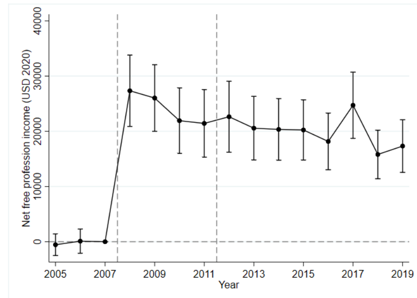
$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. Coefficients are estimated relative to 2010. Panel (a) uses independent income (an aggregation of capital income and self-employment income) as the dependent variable. Panel (b) uses contract employment income as the dependent variable. Panel (c) uses total income tax base deductions as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

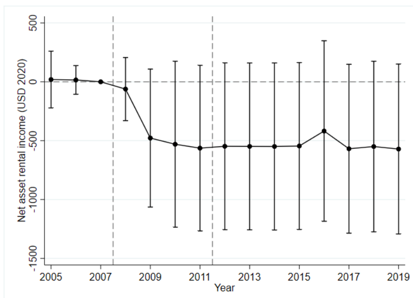
Figure A.1.36: Net independent income breakdown



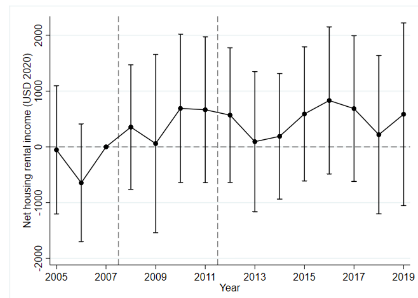
(a): Net free practice income



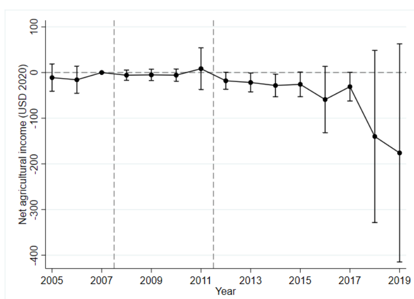
(b): Net self-employment income



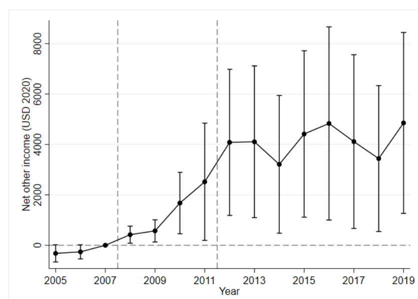
(c): Net asset rental income



(d): Net housing rental income



(e): Net agricultural income



(f): Net other income

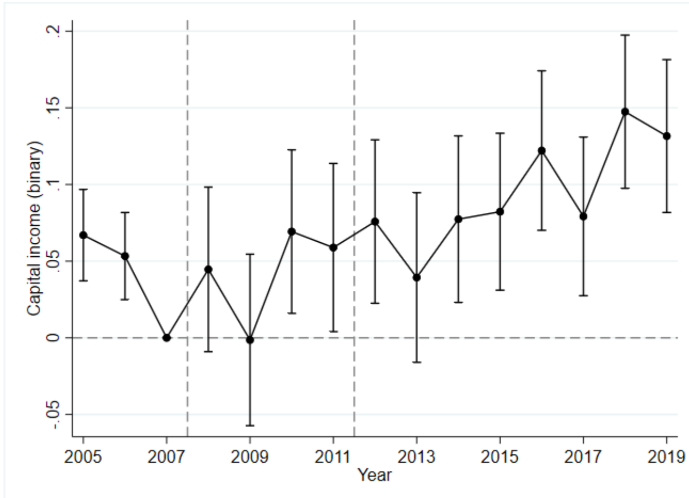
These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

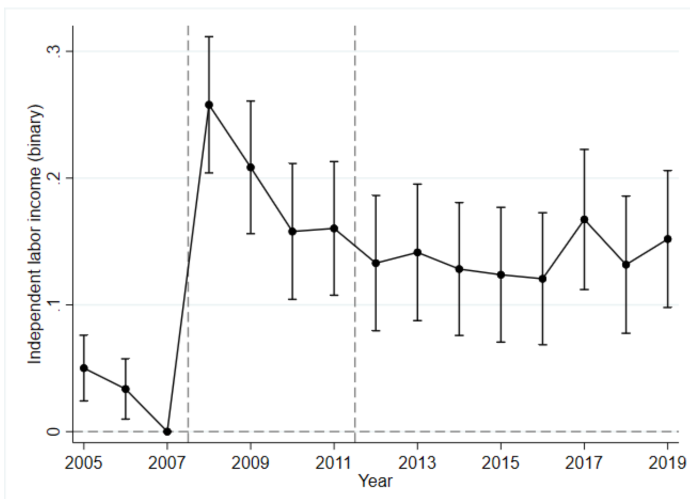
that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. Coefficients are estimated relative to 2010. All of dependent variables here compose the tax base category of "Net taxable income" less the aggregation of capital income. Panel (a) uses independent practice income (called "liberal occupation"). Panel (b) uses self-employment income (called "free profession"). Panel (c) uses net asset rental income. Panel (d) net housing rental income. Panel (e) uses net agricultural income. Panel (f) uses net income from "other" sources. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

Figure A.1.37: Income breakdown (binaries)

(a) Capital income



(b) Independent labor income



These figures show the difference-in-differences coefficients estimated from the reduced form:

$$1\{y_{it} > 0\} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. Coefficients are estimated relative to 2007. Panel (a) uses a binary variable for nonzero reported capital income as the dependent variable; Panel (b) uses a binary variable for nonzero reported independent labor income as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

Table A.1.7: Exposed individuals' income and personal income tax response

Panel (a): Tax base and income taxes

	(1) Taxable inc.	(2) Taxable inc.	(3) Exempt inc.	(4) Exempt inc.	(5) Deductions total	(6) Deductions total	(7) PIT	(8) PIT	(9) Avg. tax rate	(10) Avg. tax rate
Exposed × Post	13465.3**	20473.7**	2982.1**	4551.5**	5633.0**	6075.6**	3418.1**	6255.0**	0.038**	0.060**
	(2555.7)	(2428.0)	(987.4)	(1027.7)	(345.8)	(415.5)	(909.3)	(910.5)	(0.0060)	(0.0061)
Exposed × Phase-in	3734.2+	6585.5**	2504.6**	3569.2**	4599.2**	5226.5**	-485.3	486.4	0.016**	0.025**
	(2157.7)	(2033.4)	(880.1)	(893.3)	(362.9)	(400.1)	(684.7)	(676.2)	(0.0052)	(0.0050)
Post	3820.9**	7633.3**	1186.6**	2510.6**	3414.2**	5935.6**	-388.3**	137.1**	-0.0039**	-0.00012
	(26.1)	(41.9)	(4.39)	(11.0)	(6.71)	(12.0)	(6.13)	(9.61)	(0.000089)	(0.00015)
Phase-in	3353.6**	4663.9**	171.2**	112.6**	2596.0**	3276.4**	-300.1**	-44.8**	0.00047**	0.00076**
	(24.7)	(38.8)	(4.07)	(7.58)	(6.92)	(11.5)	(5.27)	(8.48)	(0.000089)	(0.00015)
Exposed	42500.7**		5160.1**		447.8+		11835.8**		0.081**	
	(2755.5)		(968.0)		(262.2)		(987.4)		(0.0062)	
Constant	11920.2**	9870.7**	172.2**	-29.2**	655.4**	-351.8**	1125.7**	716.4**	0.019**	0.015**
	(26.7)	(35.2)	(3.68)	(7.07)	(5.81)	(10.0)	(6.44)	(8.13)	(0.000090)	(0.00014)
Observations	10287561	9847065	10287561	9847065	10287561	9847065	10287561	9847065	8778067	8364056
Adjusted R^2	0.008	0.601	0.010	0.193	0.032	0.557	0.010	0.549	0.007	0.480
TWFE		X		X		X		X		X

ID-clustered standard errors in parentheses

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

Panel (b): Income type breakdown

	(1) Indep. lab. inc.	(2) Indep. lab. inc.	(3) Contract lab. inc.	(4) Contract lab. inc.	(5) Capital inc.	(6) Capital inc.	(7) Indep. oth. inc.	(8) Indep. oth. inc.	(9) Exempt inc.	(10) Exempt inc.
Exposed × Post	16492.0**	21410.2**	7771.9**	10973.9**	57158.3**	71066.0**	19704.9**	26353.0**	2982.1**	4551.5**
	(1751.9)	(2555.0)	(1727.7)	(1807.6)	(3686.8)	(5084.4)	(2154.4)	(3037.9)	(987.4)	(1027.7)
Exposed × Phase-in	25212.6**	27037.2**	2058.0	4543.2**	55471.4**	60045.9**	25558.9**	28023.0**	2504.6**	3569.2**
	(2691.2)	(3063.6)	(1453.8)	(1421.6)	(4460.6)	(5184.9)	(2750.6)	(3167.5)	(880.1)	(893.3)
Post	2421.1**	4043.2**	4764.8**	4052.9**	9814.7**	17221.4**	2640.0**	4727.0**	1186.6**	2510.6**
	(8.52)	(24.1)	(17.5)	(26.1)	(20.4)	(55.4)	(10.9)	(29.4)	(4.39)	(11.0)
Phase-in	3300.7**	4500.8**	3435.9**	1730.3**	11317.8**	16588.7**	3307.7**	4768.7**	171.2**	112.6**
	(15.3)	(26.4)	(16.2)	(21.8)	(30.4)	(55.3)	(15.9)	(28.3)	(4.07)	(7.58)
Exposed	361.6		14524.5**		3303.8**		2541.3**		5160.1**	
	(304.2)		(1781.0)		(912.6)		(728.7)		(968.0)	
Constant	266.8**	-1175.1**	3447.9**	4771.0**	1300.0**	-4578.1**	678.6**	-1104.7**	172.2**	-29.2**
	(3.19)	(20.8)	(16.7)	(20.8)	(9.19)	(47.4)	(6.29)	(24.3)	(3.68)	(7.07)
Observations	10287561	9847065	10287561	9847065	10287561	9847065	10287561	9847065	10287561	9847065
Adjusted R^2	0.007	0.379	0.013	0.723	0.019	0.447	0.005	0.271	0.010	0.193
TWFE		X		X		X		X		X

ID-clustered standard errors in parentheses

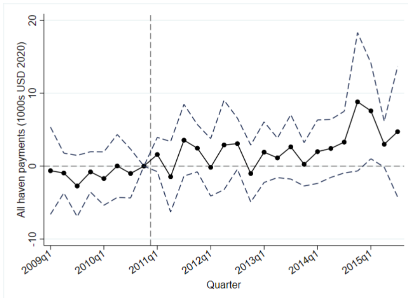
$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

This table shows the coefficients estimated from the difference-in-differences model

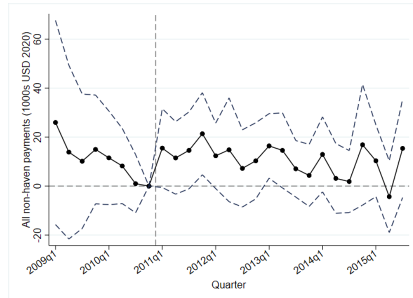
$$y_{it} = \beta_0 + \gamma Exposure_i + \delta_1 Phase\text{-}in_t + \delta_2 Post_t + \beta_1 Exposure_i \cdot Phase\text{-}in_t + \beta_2 Exposure_i Post_t + \varepsilon_{it},$$

that evaluates the change in activity of exposed individuals relative to the universe of unexposed individuals. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. $Phase\text{-}in$ indicates $Year_t \geq 2008 \cap Year_t \leq 2010$. $Post$ indicates $Year_t \geq 2011$. Panel (b) uses as outcome variables levels of specific income disaggregations. "Empl. inc." represents income earned from contract employment. "Indep. inc" indicates the aggregation of capital income and self-employment income.

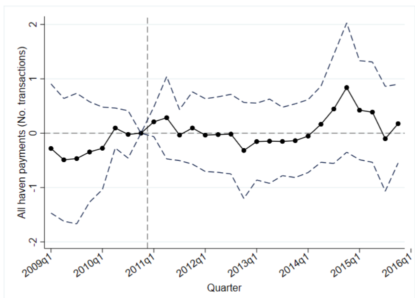
Figure A.1.38: Total currency entrances (by tax haven status)



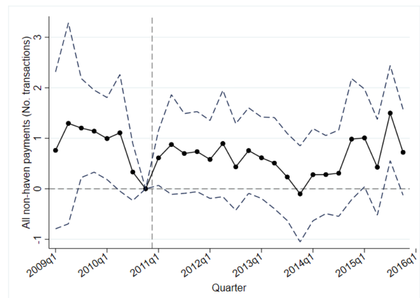
(a): Havens USD (2020)



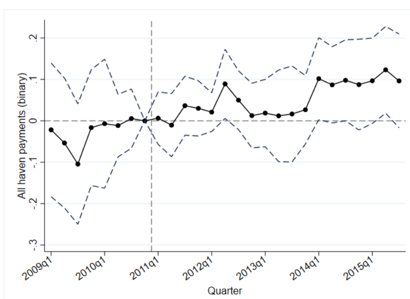
(b): Non-havens USD (2020)



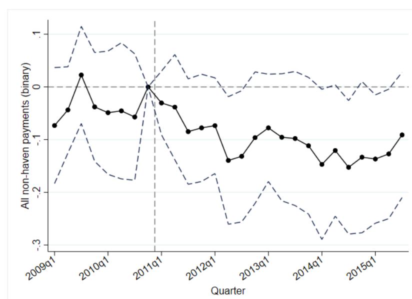
(c): Havens no. transactions



(d): Non-havens no. transactions



(e): Any haven transaction



(f): Any non-haven transaction

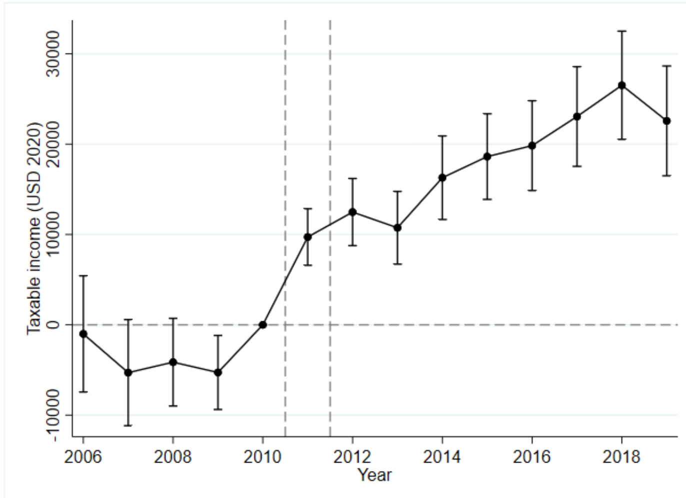
These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i \sum_{k=2009q1}^{2015q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2009q1}^{2015q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

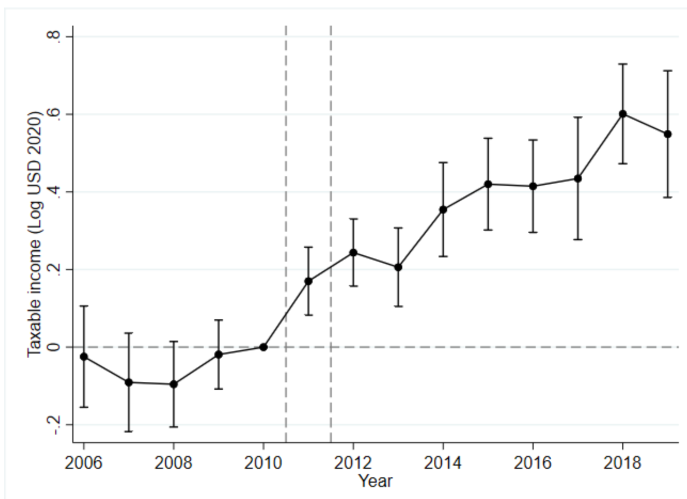
that evaluates the change in individual-quarter-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. Coefficients are estimated relative to 2010. Panels (a) and (b) use levels 1000s USD (2020) from as the dependent variable. Panels (c) and (d) use the number of currency entrances as the dependent variable. Panels (e) and (f) use a binary variable indicating the presence of *any* currency entrance as the dependent variable. All of the dependent variables are constructed from the MID entrance data aggregated to the taxpayer-quarter level. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Figure A.1.39: Declared taxable income

(a) USD (2020)



(b) Log USD (2020)

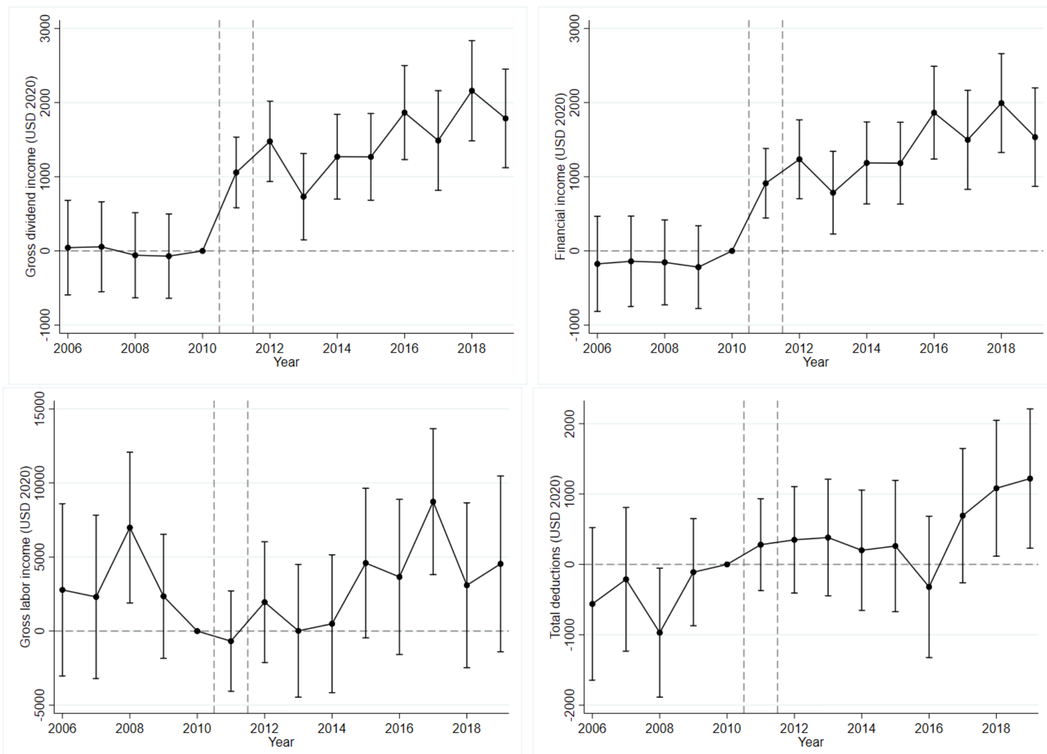


These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \sum_{k=2006}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2006}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. Coefficients are estimated relative to 2010. Panel (a) uses Log USD (2020) as the dependent variable; Panel (b) uses a binary variable for whether a firm made a profit distribution to shareholders as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Figure A.1.40: Evolution in specific income tax declaration items



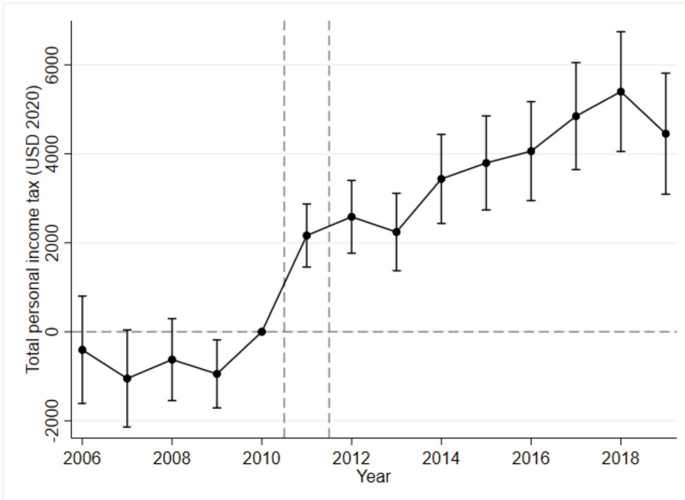
These figures show the difference-in-differences coefficients estimated from the reduced form:

$$\mathrm{y}_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \sum_{k=2006}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2006}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

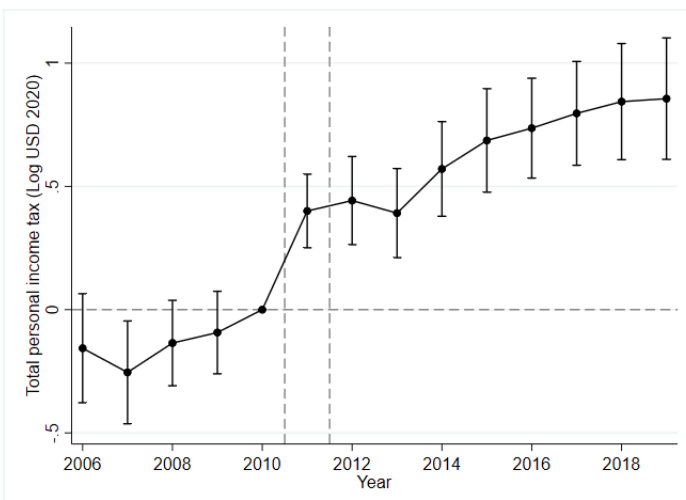
that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. Coefficients are estimated relative to 2010. Panel (a) uses dividend income as the dependent variable. Panel (b) uses other financial income as the dependent variable. Panel (c) uses self-employment income as the dependent variable. Panel (d) uses total deductions as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Figure A.1.41: Personal income tax payments

(a) USD (2020)



(b) Log USD (2020)



These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \sum_{k=2006}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2006}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. Coefficients are estimated relative to 2010. Panel (a) uses Log USD (2020) as the dependent variable; Panel (b) uses a binary variable for whether a firm made a profit distribution to shareholders as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Table A.1.7: Exposed individuals' income and personal income tax response
(a): Tax base and income taxes

	(1) Tax. inc.	(2) Tax. inc.	(3) Tax base	(4) Tax base	(5) PIT	(6) PIT	(7) $\frac{PIT}{Tax.inc.}$	(8) $\frac{PIT}{Tax.inc.}$
Exposure × Post	20502.7**	20118.2**	20056.0**	19893.6**	4187.5**	4122.7**	0.029**	0.027**
	(1913.7)	(1992.4)	(1826.9)	(1892.8)	(413.8)	(429.1)	(0.0027)	(0.0029)
Exposure	1457.9+		1487.4+		406.8*		0.0030*	
	(821.5)		(768.6)		(172.6)		(0.0015)	
Post	-7378.0**	-11245.9**	-13044.3**	-26141.6**	-1293.9**	-1788.6**	-0.010**	-0.0099**
	(844.5)	(1645.9)	(795.0)	(1526.6)	(178.2)	(337.6)	(0.0012)	(0.0024)
Constant	68378.1**	66332.1**	64371.3**	71032.5**	9482.9**	8973.8**	0.087**	0.078**
	(399.6)	(1217.0)	(365.0)	(1091.2)	(82.1)	(240.0)	(0.00063)	(0.0019)
Observations	27400	27337	27400	27337	27400	27337	25446	25357
Adjusted R^2	0.624	0.704	0.628	0.716	0.622	0.708	0.580	0.668
TWFE		X		X		X		X

(b): Log and binary outcomes

	(1) Log tax. inc.	(2) Log tax. inc.	(3) Log PIT	(4) Log PIT	(5) PIT (bin.)	(6) PIT (bin.)	(7) $\log\left(\frac{PIT}{Tax.inc.}\right)$	(8) $\log\left(\frac{PIT}{Tax.inc.}\right)$
Exposure	0.41**	0.39**	0.74**	0.74**	0.11**	0.10**	0.45**	0.44**
	(0.039)	(0.039)	(0.065)	(0.068)	(0.015)	(0.015)	(0.042)	(0.044)
Exposure	0.034+		0.055+		0.0017		0.040+	
	(0.019)		(0.029)		(0.0074)		(0.022)	
Post	-0.23**	-0.46**	-0.23**	-0.42**	-0.086**	-0.15**	-0.13**	-0.22**
	(0.018)	(0.044)	(0.029)	(0.061)	(0.0068)	(0.014)	(0.020)	(0.043)
Constant	10.8**	10.8**	8.47**	8.43**	0.81**	0.81**	-2.68**	-2.75**
	(0.0093)	(0.023)	(0.014)	(0.038)	(0.0032)	(0.0085)	(0.011)	(0.027)
Observations	25468	25379	21032	20863	27400	27337	20703	20536
Adjusted R^2	0.531	0.624	0.564	0.647	0.349	0.429	0.478	0.576
TWFE		X		X		X		X

ID-clustered standard errors in parentheses

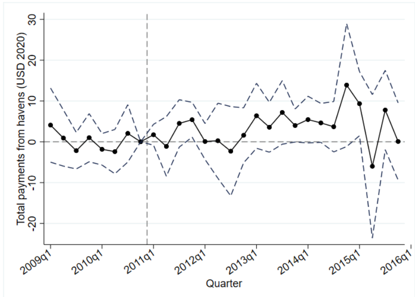
$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

This table shows the coefficients estimated from the difference-in-differences model

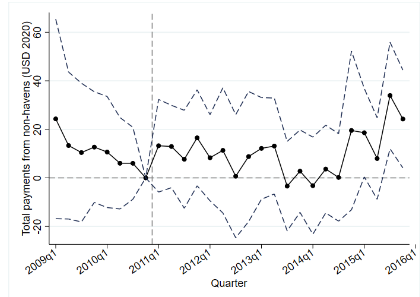
$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \delta \cdot 1\{Year_t \geq 2011\} + \beta_k \cdot 1\{Year_t \geq 2011\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in activity of exposed individuals relative to control individuals within nearest neighbor groups constructed via a Mahalanobis distance matching procedure with replacement. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets.

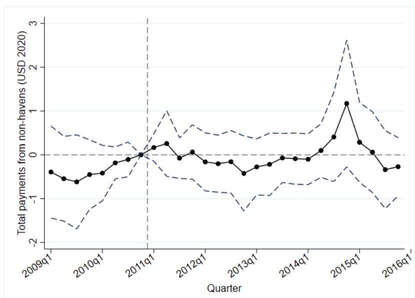
Figure A.1.42: Total currency entrances (by tax haven status)



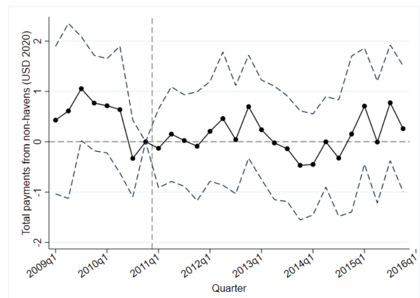
(a) Havens USD (2020)



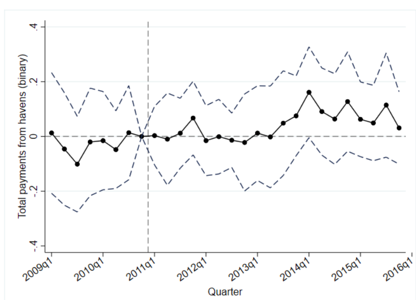
(b) Non-havens USD (2020)



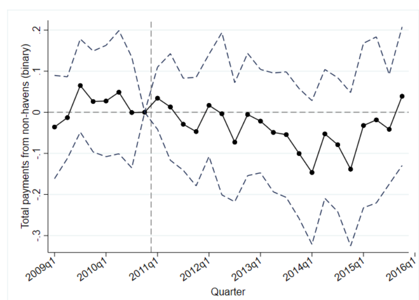
(c) Havens no. transactions



(d) Non-havens no. transactions



(e) Any haven transaction



(f) Any non-haven transaction

These figures show the difference-in-differences coefficients estimated from the reduced form:

$$\text{y}_{it} = \beta_0 + \gamma Exposure_i + \sum_{j \in \mathcal{J}} \theta_{g(j)} 1\{g(i) = g(j)\} + \sum_{k=2008q1}^{2015q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2008q1}^{2015q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-quarter-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual is identified by name directly in one of the ICIJ leaks datasets. Coefficients are estimated relative to 2010. Panels (a) and (b) use levels USD (2020) from as the dependent variable. Panels (c) and (d) use the number of currency entrances as the dependent variable. Panels (e) and (f) use a binary variable indicating the presence of *any* currency entrance as the dependent variable. All of the dependent variables are constructed from the MID entrance data aggregated to the taxpayer-quarter level. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

Table A.1.7: Pre-reform covariate balance:
Exposure measure: Named as officer in in ICIJ leaks datasets

	Exposed	Control	Difference
Gross income	88335	85291	3043
	(82346.73)	(80223.08)	(976.327)
Taxable income	63946	62631	1314
	(49875.52)	(49356.82)	(312.823)
PIT final taxbase	60108	58754	1354
	(48199.54)	(47495.48)	(296.716)
Has business income	0.0600	0.0590	0
	(.209)	(.208)	(.001)
Financial returns	275.7	257.7	18.04
	(860.654)	(826.84)	(6.564)
Dividend income	582.6	566.9	15.74
	(2031.326)	(2033.269)	(7.676)
Royalty income	0.719	0.747	-0.0280
	(15.145)	(15.805)	(.046)
Foreign income (binary)	0.0220	0.0220	0
	(.126)	(.125)	(0)
PIT ≥ 0	0.774	0.772	0.00200
	(.35)	(.352)	(.003)
Total PIT paid	8931	8581	350.3
	(10280.05)	(10014.03)	(61.482)
Personal deductions	5148	5227	-79.48
	(4688.061)	(4748.735)	(65.097)
Total deductions	6674	6631	42.79
	(7137.382)	(6946.569)	(98.766)
Gross taxrate	0.0810	0.0750	0.00200
	(.093)	(.083)	(.002)
Final taxrate	0.0910	0.0880	0.00300
	(.069)	(.069)	(.001)
No. units	444	2069	

Heteroskedasticity-robust standard errors in parentheses
+ $p < .10$, * $p < .05$, ** $p < .01$

This table displays the balance on pre-reform period covariates based on whether an individual is identified by name directly in one of the ICIJ leaks datasets. Each covariate represents an average across years 2006 to 2010.

Exposure measure: Is a 10% or greater direct shareholder of an ICIJ company

In this section I replicate results from Section 1.5.1, however, as a demonstration of robustness, implementing an alternate definition of tax haven connectedness as a measure of personal exposure to the outflows tax. This section uses individuals identified as 10% or greater direct shareholders of companies named as intermediaries in either the Panama or Pandora Papers as a measure of individual-level connectedness to tax havens. Thus, the empirical design in this section compares the evolution in income tax reporting behavior of exposed individuals to the universe of unexposed individuals (individuals demonstrating no connection to tax havens via any other measures).

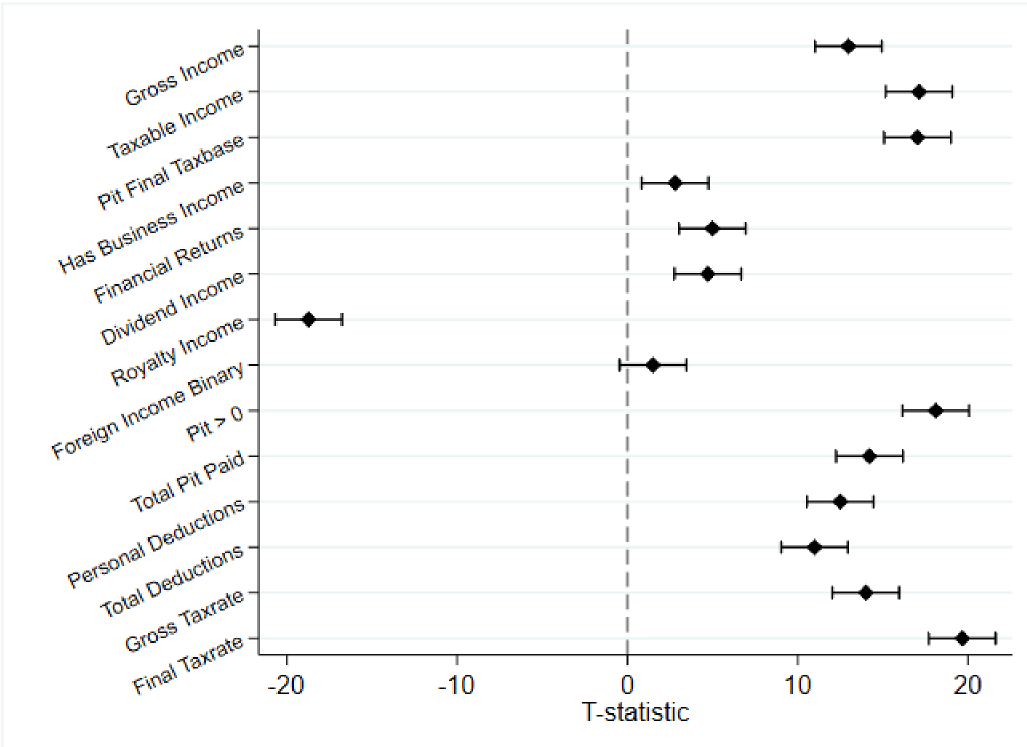
I estimate a differences-in-differences design that compares the annual personal income tax declarations of these two groups against the year 2007 as a baseline:

$$y_{it} = \beta_0 + \gamma Exposure_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

The following graphs and tables replicate those from the main text using this alternate measure of exposure.

Figure A.1.43: Pre-reform covariate balance:

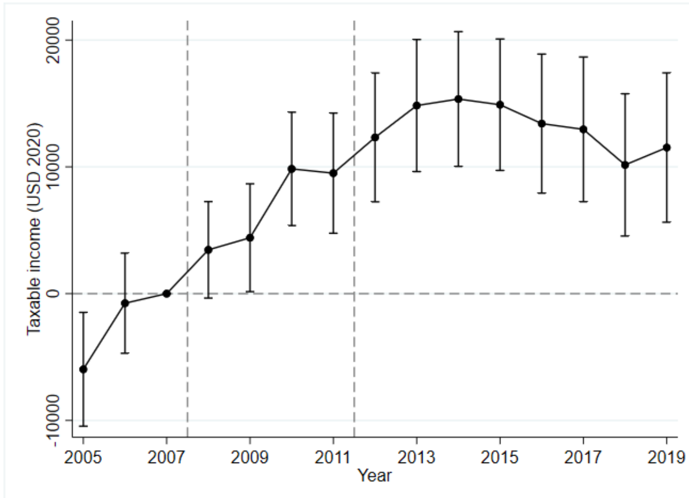
Exposure measure: 10% or greater direct shareholder of a company named in ICIJ leaks datasets



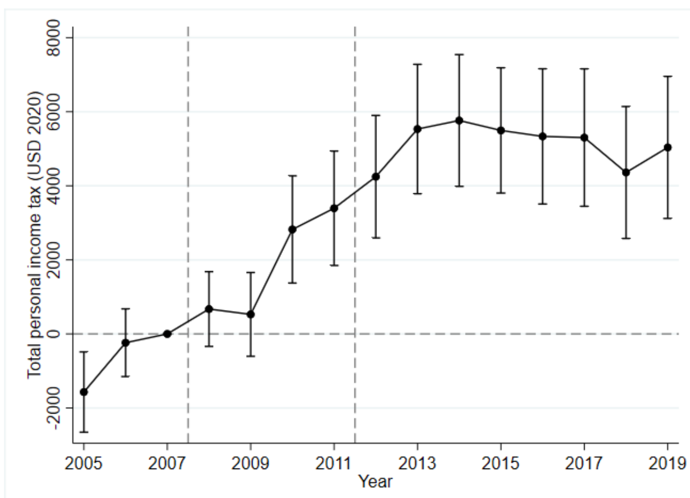
This figure displays the balance on pre-reform period covariates based on whether an individual is identified as a 10% or greater direct shareholder of a company named directly in one of the ICIJ leaks datasets. Each covariate represents an average across years 2006 to 2010. The graph displays the balance on the sample of 400 deemed "exposed" individuals and the universe of "unexposed" individual personal income taxpayers. Error bars represent 95% confidence intervals based on heteroskedasticity-robust standard errors.

Figure A.1.44: Declared taxable income and personal income taxes

(a) Taxable income



(b) Personal income taxes

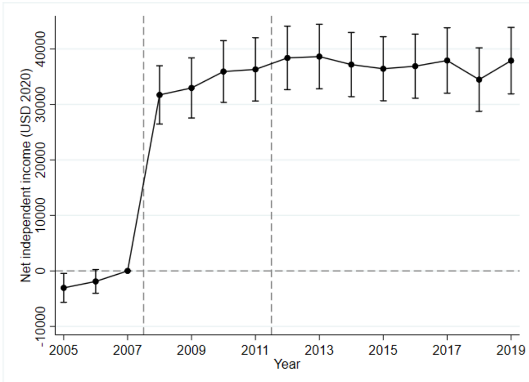


These figures show the difference-in-differences coefficients estimated from the reduced form:

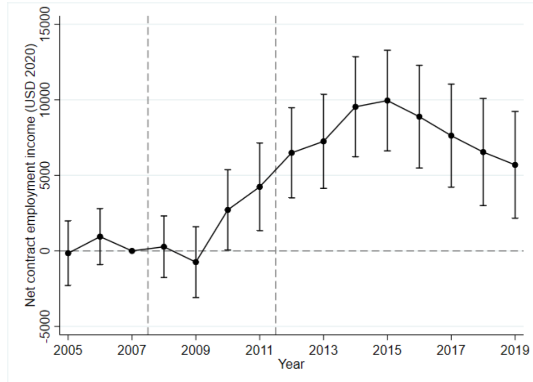
$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual is identified as a 10% or greater direct shareholder in a company named as an intermediary or officer in either the Panama or Pandora Papers. Coefficients are estimated relative to 2007. Panel (a) uses taxable income as the dependent variable; Panel (b) uses personal income tax payments as the dependent variable, with years 2005-2007 using income tax imputations based on a top marginal rate of 35%. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

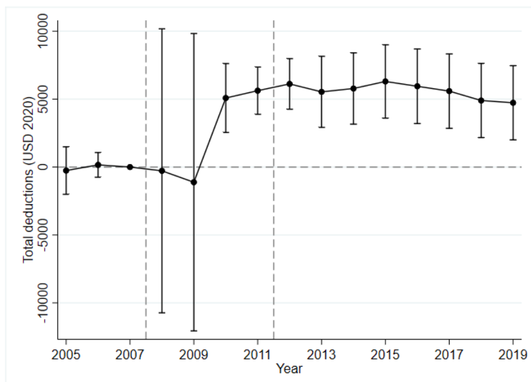
Figure A.1.45: Evolution in specific income tax declaration items



(a): Net independent income



(b): Contract labor income



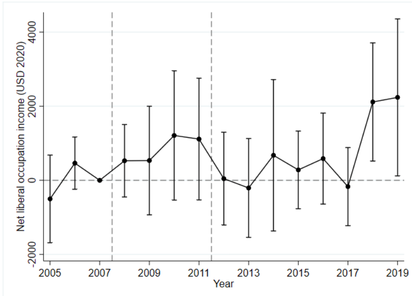
(c): Deductions

These figures show the difference-in-differences coefficients estimated from the reduced form:

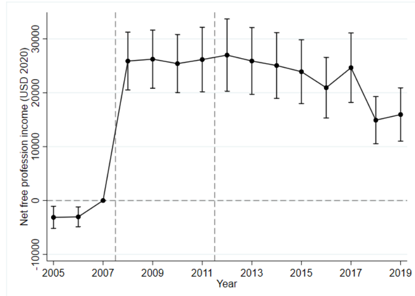
$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual is identified as a 10% or greater direct shareholder in a company named as an intermediary or officer in either the Panama or Pandora Papers. Coefficients are estimated relative to 2010. Panel (a) uses independent income (an aggregation of capital income and self-employment income) as the dependent variable. Panel (b) uses contract employment income as the dependent variable. Panel (c) uses total income tax base deductions as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

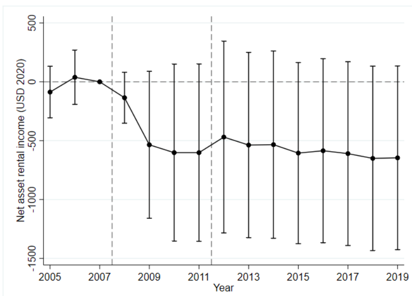
Figure A.1.46: Net independent income breakdown



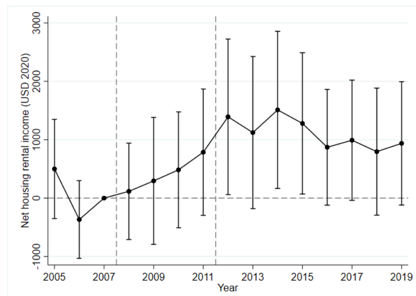
(a): Net free practice income



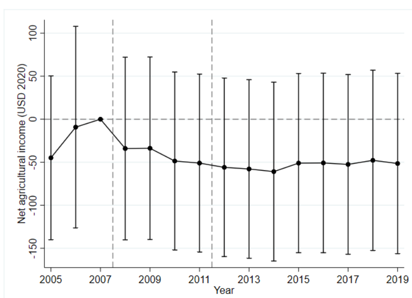
(b): Net self-employment income



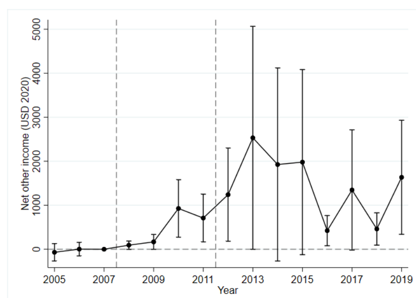
(c): Net asset rental income



(d): Net housing rental income



(e): Net agricultural income



(f): Net other income

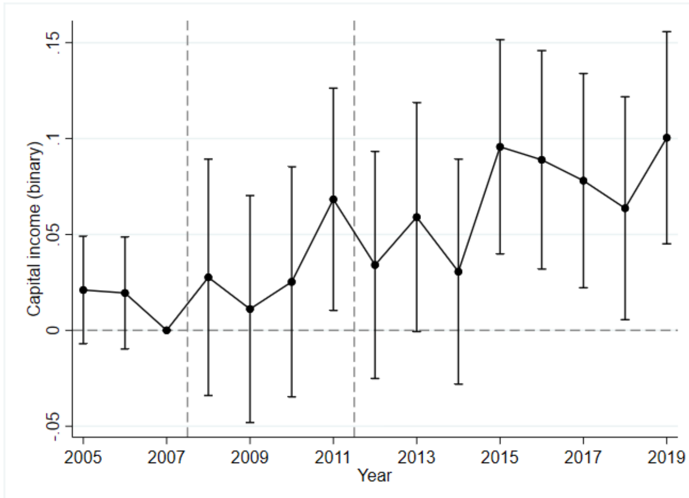
These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

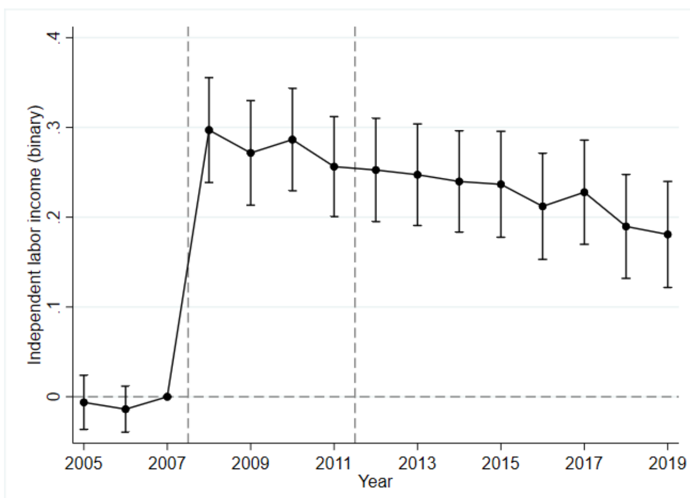
that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual is identified as a 10% or greater direct shareholder in a company named as an intermediary or officer in either the Panama or Pandora Papers. Coefficients are estimated relative to 2010. All of dependent variables here compose the tax base category of "Net taxable income" less the aggregation of capital income. Panel (a) uses independent practice income (called "liberal occupation"). Panel (b) uses self-employment income (called "free profession"). Panel (c) uses net asset rental income. Panel (d) net housing rental income. Panel (e) uses net agricultural income. Panel (f) uses net income from "other" sources. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

Figure A.1.47: Income breakdown (binaries)

(a) Capital income



(b) Independent labor income



These figures show the difference-in-differences coefficients estimated from the reduced form:

$$1\{y_{it} > 0\} = \alpha_i + \sum_{k=2005}^{2019} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=2005}^{2019} \beta_k \cdot 1\{Year_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-year-level activity between individuals "exposed" and "unexposed" to the installation of the outflows tax in 2008. $Exposure_i$ is an indicator for whether an individual is identified as a 10% or greater direct shareholder in a company named as an intermediary or officer in either the Panama or Pandora Papers. Coefficients are estimated relative to 2007. Panel (a) uses a binary variable for nonzero reported capital income as the dependent variable; Panel (b) uses a binary variable for nonzero reported independent labor income as the dependent variable. Error bars represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the evolution of the outflows tax rate from 0% to 5%.

Table A.1.8: Exposed individuals' income and personal income tax response

Panel (a): Tax base and income taxes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Taxable inc.	Taxable inc.	Exempt inc.	Exempt inc.	Deductions total	Deductions total	PIT	PIT	Avg. tax rate	Avg. tax rate
Exposed × Post	10618.4**	14831.0**	-709.9	-122.3	5748.7**	5655.0**	3152.1**	4446.2**	0.027**	0.043**
	(2340.8)	(2171.2)	(1062.0)	(1086.9)	(354.1)	(395.6)	(762.1)	(791.8)	(0.0055)	(0.0058)
Exposed × Phase-in	4714.7**	8048.1**	362.0	1102.9	4888.7**	5287.0**	107.0	909.1	0.010*	0.022**
	(1823.0)	(1739.0)	(753.7)	(755.7)	(352.9)	(382.7)	(517.1)	(555.2)	(0.0042)	(0.0044)
Post	3820.9**	7634.8**	1186.6**	2508.1**	3414.2**	5935.0**	-388.3**	137.7**	-0.0039**	-0.00012
	(26.1)	(41.9)	(4.39)	(11.0)	(6.71)	(12.0)	(6.13)	(9.60)	(0.000089)	(0.00015)
Phase-in	3353.6**	4665.1**	171.2**	112.3**	2596.0**	3276.4**	-300.1**	-44.3**	0.00047**	0.00076**
	(24.7)	(38.7)	(4.07)	(7.57)	(6.92)	(11.5)	(5.27)	(8.48)	(0.000089)	(0.00015)
Exposed	35326.6**		5526.6**		239.7		8042.5**		0.063**	
	(2495.5)		(1037.5)		(254.0)		(726.6)		(0.0050)	
Constant	11920.2**	9862.5**	172.2**	-28.3**	655.4**	-351.8**	1125.7**	713.3**	0.019**	0.015**
	(26.7)	(35.1)	(3.68)	(7.06)	(5.81)	(10.0)	(6.44)	(8.12)	(0.000090)	(0.00014)
Observations	10286733	9846249	10286733	9846249	10286733	9846249	10286733	9846249	8777356	8363357
Adjusted R^2	0.006	0.600	0.009	0.191	0.032	0.556	0.005	0.546	0.005	0.478
TWFE		X		X		X		X		X

ID-clustered standard errors in parentheses

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

Panel (b): Income type breakdown

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Indep. lab. inc.	Indep. lab. inc.	Contract lab. inc.	Contract lab. inc.	Capital inc.	Capital inc.	Indep. oth. inc.	Indep. oth. inc.	Exempt inc.	Exempt inc.
Exposed × Post	19753.7**	25628.0**	6961.9**	7076.0**	54846.0**	66450.7**	21498.6**	27940.5**	-709.9	-122.3
	(1883.6)	(2687.2)	(1433.5)	(1440.9)	(3729.9)	(5056.3)	(2071.2)	(2928.0)	(1062.0)	(1086.9)
Exposed × Phase-in	25635.9**	28506.7**	-861.5	541.3	57651.4**	63614.8**	25511.9**	28837.2**	362.0	1102.9
	(2168.7)	(2591.7)	(1169.3)	(1154.3)	(4153.1)	(4893.6)	(2191.5)	(2627.9)	(753.7)	(755.7)
Post	2421.1**	4042.5**	4764.8**	4055.3**	9814.7**	17218.4**	2640.0**	4725.3**	1186.6**	2508.1**
	(8.52)	(24.1)	(17.5)	(26.1)	(20.4)	(55.4)	(10.9)	(29.4)	(4.39)	(11.0)
Phase-in	3300.7**	4504.7**	3435.9**	1729.2**	11317.8**	16593.9**	3307.7**	4772.0**	171.2**	112.3**
	(15.3)	(26.4)	(16.2)	(21.8)	(30.4)	(55.3)	(15.9)	(28.3)	(4.07)	(7.57)
Exposed	729.2		8461.1**		2493.2*		1820.0**		5526.6**	
	(505.7)		(1351.0)		(991.9)		(687.7)		(1037.5)	
Constant	266.8**	-1176.3**	3447.9**	4767.4**	1300.0**	-4579.9**	678.6**	-1105.7**	172.2**	-28.3**
	(3.19)	(20.8)	(16.7)	(20.8)	(9.19)	(47.4)	(6.29)	(24.3)	(3.68)	(7.06)
Observations	10286733	9846249	10286733	9846249	10286733	9846249	10286733	9846249	10286733	9846249
Adjusted R^2	0.007	0.379	0.012	0.722	0.018	0.447	0.005	0.272	0.009	0.191
TWFE		X		X		X		X		X

ID-clustered standard errors in parentheses

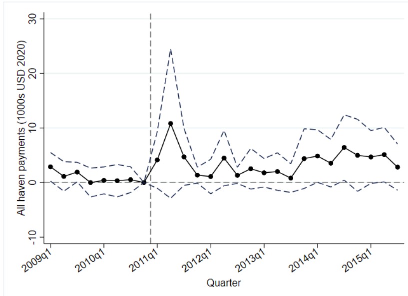
$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$

This table shows the coefficients estimated from the difference-in-differences model

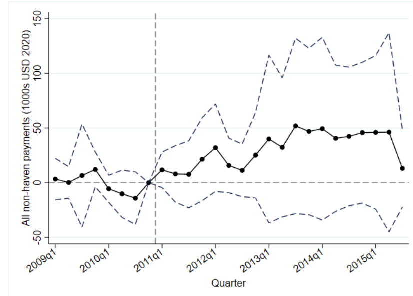
$$y_{it} = \beta_0 + \gamma Exposure_i + \delta_1 Phase\text{-}in_t + \delta_2 Post_t + \beta_1 Exposure_i \cdot Phase\text{-}in_t + \beta_2 Exposure_i Post_t + \varepsilon_{it},$$

that evaluates the change in activity of exposed individuals relative to the universe of unexposed individuals. $Exposure_i$ is an indicator for whether an individual is identified as a 10% or greater direct shareholder in a company named as an intermediary or officer in either the Panama or Pandora Papers. *Phase-in* indicates $Year_t \geq 2008 \cap Year_t \leq 2010$. *Post* indicates $Year_t \geq 2011$. Panel (b) uses as outcome variables levels of specific income disaggregations. "Empl. inc." represents income earned from contract employment. "Indep. inc" indicates the aggregation of capital income and self-employment income.

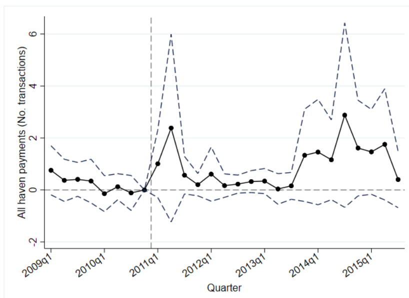
Figure A.1.48: Total currency entrances (by tax haven status)



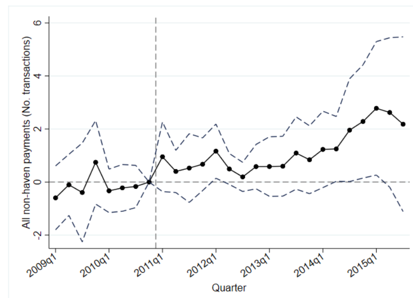
(a): Havens USD (2020)



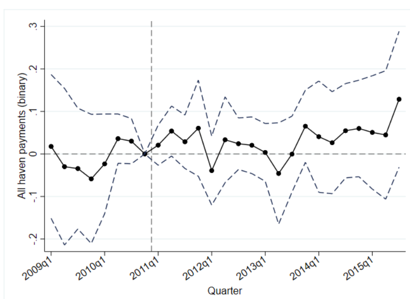
(b): Non-havens USD (2020)



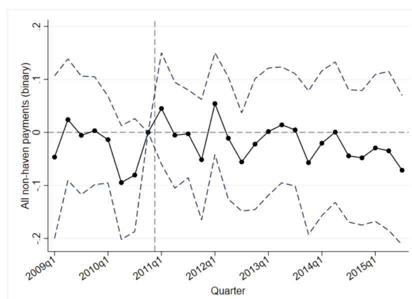
(c): Havens no. transactions



(d): Non-havens no. transactions



(e): Any haven transaction



(f): Any non-haven transaction

These figures show the difference-in-differences coefficients estimated from the reduced form:

$$y_{it} = \alpha_i \sum_{k=2009q1}^{2015q4} \delta_k \cdot 1\{Quarter_t = k\} + \sum_{k=2009q1}^{2015q4} \beta_k \cdot 1\{Quarter_t = k\} \cdot Exposure_i + \varepsilon_{it},$$

that evaluates the change in individual-quarter-level activity between individuals "exposed" and "unexposed" to the tax haven dividend reform of 2010. $Exposure_i$ is an indicator for whether an individual is identified as a 10% or greater direct shareholder in a company named as an intermediary or officer in either the Panama or Pandora Papers. Coefficients are estimated relative to 2010. Panels (a) and (b) use levels 1000s USD (2020) from as the dependent variable. Panels (c) and (d) use the number of currency entrances as the dependent variable. Panels (e) and (f) use a binary variable indicating the presence of *any* currency entrance as the dependent variable. All of the dependent variables are constructed from the MID entrance data aggregated to the taxpayer-quarter level. Dashed navy lines represent 95% confidence intervals based on firm-clustered standard errors. The dashed lines vertical surround the date of the policy change, with 2010 as the latest fully "untreated" year.

A.2 Model appendix

A.2.1 Additional results for optimal underreporting income tax rate (à la Piketty and Saez (2013))

Solving Equation 1.12 and Equation 1.14 completely for τ and γ yields joint optima:

$$\gamma^* = \nabla \cdot \left(\tau^*_{\chi=0} \cdot \left(1 + \frac{Y}{\chi} \frac{\varepsilon_{Y,p_n} \tilde{e}_{p_n,\gamma}}{\tilde{e}_{\chi,\tau-\gamma}}\right) - \frac{1}{\tilde{e}_{\chi,\tau-\gamma}} \cdot \left(\frac{\mathcal{C}_n}{\chi} \tilde{e}_{p_n,\gamma} \bar{g}_{c_n} + \lambda g_2 - 1\right)\right), \tag{A.1}$$

$$\nabla = \frac{1 - \bar{g} + e}{1 - \bar{g} + e - \left(e - \frac{Y}{Z} e_Y\right) \cdot \left(1 + \frac{\varepsilon_{Y,p_n} \tilde{e}_{p_n,\gamma}}{\tilde{e}_{\chi,\tau-\gamma}}\right)} \tag{A.2}$$

$$\tau^* = \tau^*_{\chi=0} + \frac{e - \frac{Y}{Z} e_Y}{1 - \bar{g} + e} \cdot \gamma^*, \tag{A.3}$$

where $\tau^*_{\chi=0} = \frac{1-\bar{g}}{1-\bar{g}+e}$ refers to the social welfare maximizing linear income tax rate in the absence of income underreporting. The intuition underlying these formulae remains largely identical, with some additional insight. The optimal outflows tax γ^* sees an inflation factor ∇ based on the difference between the aggregate reported income elasticity and an adjusted aggregate earnings elasticity. The inflation factor ∇ also increases in the ratio of the net labor supply elasticity (with respect to the outflows tax rate) to the underreporting semi-elasticity (with respect to the tax rate differential). Additionally, the optimal outflows tax rate(i.e. prior to welfarist considerations) begins at $\tau^*_{\chi=0}$ as a baseline adjusted by a factor that considers the relative fiscal importance of labor supply responses and underreporting responses to the outflows tax.

A.2.2 The outflows tax and optimal tax administration

In this section I develop a model based on Keen and J. Slemrod (2017) and Chetty (2009) to understand the optimality of an outflows tax aimed at mitigating tax haven outflows and its interactions with other revenue-raising mechanisms at the disposal of a tax authority.

The results of the optimal tax administration model reveals important insights into the desirability and optimality of an outflows tax. The magnitude of the optimal outflows tax is large and in excess of the optimal proportional income tax when ignoring the non-tax-strategic consumer/producer welfare effects of an outflows tax. The tax serves dual purposes of 1) inducing positive domestic reporting externalities in disincentivizing tax strategic outflows and 2) raising revenues off of funds located offshore, so that the outflows tax accomplishes the tax base widening goals of additional tax administration without the associated costs.[7] Calibrating this model to consider the negative welfare effects due to price spillover externalities implies that the current outflows tax rate of 5% can only be rationalized by very low shares of consumption sourced from industries exposed to the outflows tax.

In ignoring the welfare and revenue impacts of the outflows tax on non-tax-strategic outflows, the baseline model yields an optimal outflows tax in excess of the income tax. This result of course implies that optimally, no individuals will engage in tax-strategic outflows. The welfare and

[7] I have modeled the outflows tax as without variable administrative expenses.

revenue-raising impacts on non-tax-strategic activity serve as dampening forces that drive down the optimal outflows tax. Additionally, the revenue-maximizing rate derived in an Allingham and Sandmo (1972) setting imply that penalty revenues collected from successfully audited evaders also drive down optimal outflows tax rate.

Baseline model

I adapt the framework in Keen and J. Slemrod (2017) to my setting.[8] However, in addition to the privately-borne non-compliance costs explored in their model, my environment features individuals that also face a linear outflows tax, so as to reflect my empirical environment. This outflows tax raises public funds.[9]
For the simplest version of the model, consider a representative individual with quasi-linear preferences:

$$U = x - \psi(l) + v(g),$$

for private consumption x, convexly increasing disutility of labor $\psi(e)$, and concavely increasing valuation $v(g)$ of public goods g (provided out of revenue raised by the tax authorities). Individuals finance consumption out of income subject to a linear tax t. However, individuals can underreport their labor earnings wl by an amount e at a cost $c(e, \alpha) + \gamma \cdot e$:

$$x = wl - t(wl - e) - c(e, \alpha) - \gamma \cdot e.$$

This setup is nearly identical to setup in Keen and J. Slemrod (2017) framework, except the explicit specification that the non-compliance cost parameter explicitly includes a linear term in amount underreported.[10] Instead, here the function $c(e, \alpha)$ can be considered a privately-accruing resource cost (see Chetty (2009) versus Feldstein (1999) for further development of the distinction on the social costs of underreporting).

The function $c(e, \alpha)$ captures the costs of concealing income e given a continuous tax enforcement parameter α that increases the private costs of misreporting income to the tax authorities.[11]
The first-order interior conditions for the individual's labor- and underreporting-allocation problems are $(1 - t)w - \psi'(l) = 0$ and $t - c_e(e, \alpha) - \gamma = 0$, with the labor-supply decision determined independently of underreporting in this specification. These first order conditions implicitly define optimal labor supply and underreporting functions $l(t, w)$ and $e(t, \alpha, \gamma)$.[12][13] An application of the implicit function theorem yields partial derivatives of optimal underreporting behavior with respect to the policy parameters: $e_t = 1/c_{ee} > 0$ and $e_\alpha = -c_{e\alpha}/c_{ee} < 0$ and $e_\gamma = -1/c_{ee} < 0$.

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[8] My model framework differs from Keen and J. Slemrod (2017) and Chetty (2009) in the consideration of the government transfer cost as a policy parameter at the disposal of the tax authorities.

[9] Extensions of the model 1) consider the welfare and revenue-raising effects of pass-through of the havens outflows tax to non-strategic haven-sourced consumption x_h, 2) considers a heterogeneous agent economy with individuals engaging in offshore consumption and underreporting and those that do not.

[10] The individuals' problem so far is entirely nested by the Keen and J. Slemrod (2017) framework with a general non-compliance cost function.

[11] Regularity conditions of this cost function to induce positive concealment require $c_\alpha, c_{e\alpha}, c_e$, and $c_{ee} > 0$.

[12] I presently preclude any effect of the outflows tax on the individual's labor supply.

[13] Keen and J. Slemrod (2017) show the second order conditions of this program, demonstrating that the solutions yielded maximize the utility function under the constraints.

The government collects funds from the income tax and the outflows tax and spends funds on the public good g and tax enforcement. I denote administrative costs of tax compliance enforcement as the function $a(\alpha)$, with $a_\alpha > 0$.[14] The government's budget constraint is

$$g + a(\alpha) = t(wl - e) + \gamma e.$$

The social planner perceives the social welfare function

$$W(t, \alpha, \gamma) = wl - t(wl - e) - c(e, \alpha) - \gamma \cdot e - \psi(l) + v(t(wl - e) + \gamma e - a(\alpha)). \tag{A.4}$$

The government sets optimal policy for each of its three instruments. Let taxable income $z(t, \alpha, \gamma) := wl(t, w) - e(t, \alpha, \gamma)$. For the government's choice of tax rate, differentiating Equation A.4 and combining the envelop properties yields:

$$W_t = -z + v' \cdot (z + tz_t + \gamma e_t) = 0.$$

Rearranging this condition yields the condition:

$$\frac{t^*}{1 - t^*} = \left(\frac{v' - 1}{v'} \right) \frac{1}{E(z, 1 - t) + \frac{\Gamma}{T} E(e, 1 - t)}, \tag{A.5}$$

where $E(m, n)$ denotes the elasticity of m with respect to n. Here, $\frac{\Gamma}{T} = \frac{\gamma e}{tz}$ represents the ratio of outflows tax collections to income tax collections. This result nests the classical inverse elasticity rule for the case $\gamma = 0$.[15] However, as the revenue raised by outflows grows relative to income tax collections, the optimal tax rate increases in the income tax rate with greater sensitivity through the channel of encouraging outflows. We can alternatively express this condition as

$$\frac{t^*}{1 - t^*} = \left(\frac{v' - 1}{v'} + \frac{\Gamma}{T^*} E(e, t) \right) \frac{1}{E(z, 1 - t^*)} \tag{A.6}$$

$$= \left(\frac{v' - 1}{v'} + \frac{\gamma e_t}{z} \right) \frac{1}{E(z, 1 - t^*)}, \tag{A.7}$$

with the optimal income tax rate increasing in additional revenue raised by increased outflows (relative to overall income) as induced by an income tax rate increase.

The government's interior optimal enforcement decision is characterized by the first order condition:

$$W_\alpha = -c_\alpha + v' \cdot (tz_\alpha + \gamma e_\alpha - a_\alpha) = 0.$$

Again, this condition is near identical to its analogue in Keen and J. Slemrod (2017): additional revenue gain from from stricter enforcement is equated to the additional compliance and administrative costs, with administrative costs weighed more than compliance costs because such costs are funded through distortionary taxation. However, the social benefits of enforcement are reduced by decreases to outflows tax collections, since $e_\alpha < 0$. Rearranging this equation yields:

[14] I denote derivatives of functions of several variables with subscripts and of functions of a single variable with a prime.

[15] I assume that $v' > 1$ and that the optimal income tax is positive.

$$E(z,\alpha^*) = \frac{\alpha^*(c_\alpha/v') + \alpha^* a_\alpha - \alpha^*\gamma e_\alpha}{tz} \tag{A.8}$$

At an optimal level of enforcement, the enforcement elasticity of taxable income is equal to the ratio of marginal cost to income tax revenue, with the numerator as a linear approximation of the sum of compliance costs, administrative costs, and costs through decreased outflows tax revenues.[16]. As in Keen and J. Slemrod (2017), it is useful to write

$$\phi = E(z,\alpha). \tag{A.9}$$

For the tax authority's optimal choice of outflows tax, the first order conditions and the individual's envelope conditions require that

$$W_\gamma = -e + v' \cdot (tz_\gamma + e + \gamma e_\gamma) = 0$$

$$\frac{\gamma^*}{1-\gamma^*} = \Big(\frac{v'-1}{v'}\Big)\frac{1}{E(e,1-\gamma) + \frac{T}{\Gamma^*}E(z,1-\gamma)} \tag{A.10}$$

$$= \left(\frac{v'-1}{v'} + \frac{tz_\gamma}{e}\right)\frac{1}{E(e,1-\gamma)} \tag{A.11}$$

Equation A.10 generates some simple intuition: the optimal outflows tax rate decreases with the sensitivity of outflows to the outflows tax rate, and increases with the sensitivity of taxable income to the outflows tax rate, weighted by the relative importance of the income tax to the outflows tax in generating tax collections.

Alternatively, re-expressing the first order condition using the differential between the outflows tax rate and the income tax rates yields an interesting insight:

$$W_\gamma = -e + v' \cdot ((\gamma - t)e_\gamma + e) = 0,$$

and that

$$\frac{t-\gamma^*}{\gamma^*} = \Big(\frac{v'-1}{v'}\Big)\frac{1}{E(e,\gamma)}. \tag{A.12}$$

The interpretation of Equation A.12 yields both standard and striking intuition: as an inverse elasticity rule, as the sensitivity of outflows the outflows tax rate increases, the optimal outflows tax rate decreases. However, this result also implies that $\gamma^* > t$, which violates the conditions for an interior solution to the individual's underreporting problem: at this optimum, individuals would choose zero underreporting, as the cost of the outflows tax exceeds the benefits of not paying income tax. In this framework, the intuition is simple: insofar as the social planner ignores the deadweight loss of taxing outflows and can engage in this kind of taxation without administrative

[16]This optimum condition can also be interpreted as $\frac{\alpha^*(c_\alpha/v') + \alpha^* a_\alpha - \Gamma E(e,\alpha)}{tz}$, where the outflows tax component of marginal cost is replaced by the enforcement elasticity of underreporting weighted by the size of outflow tax revenues (i.e. the original Keen and J. Slemrod (2017) marginal cost-revenue ratio plus the magnitude of the enforcement elasticity of underreporting weighted by the size of outflow tax revenues relative to income tax collections).

cost, the optimal policy disincentivizes *all* outflows.

The analogues of the complementarity and substitutibility results from Keen and J. Slemrod (2017) are straightforward. Because the outflows tax implicates no direct administrative costs in its modeling, the positive domestic reporting externalities of the outflows tax imply substitutibility with increased administrative expenses that increase reporting.

A.2.3 Haven-sourced consumption with two types of agents

I now consider an extension of the model that considers the welfare loss induced by this kind of tax through price spillovers onto domestic industry. For brevity, and because the optimality results for the income tax and administrative expenses are largely unchanged, I focus on the optimal outflows tax under these additional considerations. Consider an economy with two kinds of taxpayers: 1) consumers that have no interaction with tax havens, making up a share of the population $1 - \lambda$, and 2) consumers that do engage with tax havens with share λ. The social planner weigh the welfare of each group as ω_1 and ω_2 respectively (where $\omega_1(1-\lambda) + \omega_2\lambda = 1$). The former group is unaffected by the outflows tax except for the spillover effects it has on the price of non-haven-sourced consumption. The utilities of these two consumer types can be describes as follows:

$$U_1 = u_1(x_{1d}, x_{1n}) - \psi(l_1) + v(g),$$

and

$$U_2 = u_1(x_{2d}, x_{2n}) - \psi(l_2) + v(g),$$

where x_d denotes domestic consumption unaffected by international prices and x_n denotes consumption affected by international prices at price p_n. Prices are denoted in units x_d. For simplicity, I suppress the roles of haven-sourced consumption for both consumer-welfare purposes and tax-revenue raising purposes (considering the excise-tax-like behavior of the outflows tax in including haven-sourced non-tax-strategic in its base).

Agents consume such that

$$u_1(x_{1d}) = \frac{u_{1n}}{p_n(\gamma)}$$

and

$$u_2(x_{2d}) = \frac{u_{2n}}{p_n(\gamma)},$$

where the price of x_n expressed as a function of the outflows tax to reflect price spillovers to either tradeable industries or industries with tradeable intermediate inputs.[17]

Agents face budget constraints:

$$BC_1 : x_{1d} + p_n(\gamma)x_{1n} = (1 - t_1)w_1 l_1$$

$$BC_2 : x_{2d} + p_n(\gamma)x_{2n} = w_2 l_2 - t_2(w_2 l_2 - e_2) - c(e_2, \alpha) - \gamma e_2.$$

[17]I refrain from modeling the microfoundations of the pass-through of the outflows tax to producers of x_n. See Fajgelbaum et al. (2019) and Edmond, Midrigan, and Xu (2015).

Given these constraints, agents of type 1 and 2 supply labor and engage in underreporting so that

$$\mu_1(1-t_1)w_1 - \psi'(l_1) = 0,$$
$$\mu_2(1-t_2)w_2 - \psi'(l_2) = 0,$$
$$t - c_e(e,\alpha) - \gamma = 0,$$

with underreporting costs $c(e,\alpha)$ characterized by identical functional regularity conditions as before.

The government's budget constraint is described as:

$$g + a(\alpha) = t_1 w_1 l_1 + t_2(w_2 l_2 - e_2) + \gamma(e_2),$$

and considering this budget constraint, a social planner maximizes:

$$W(t_1,t_2,\alpha,\gamma) = \omega_1(1-\lambda)U_1 + \omega_2\lambda U_2 =$$
$$\omega_1(1-\lambda)(u_1(x_{1d},x_{1n}) - \psi(l_1)) + \omega_2\lambda(u_2(x_{2d},x_{2n}) - \psi(l_2)) + v'\big(t_1 w_1 l_1 + t_2(w_2 l_2 - e_2) + \gamma e_2 - a(\alpha)\big).$$

As an additional simplification, assume that the social planner places no weight on the welfare of agents of type 2. The social planner thus maximizes

$$(1-\lambda)(u_1(x_{1d},x_{1n}) - \psi(l_1)) + v'\big((1-\lambda)t_1 w_1 l_1 + \lambda(t_2(w_2 l_2 - e_2) + \gamma\cdot e_2) - a(\alpha)\big).$$

Differentiating this objective with respect to γ yields the first order condition

$$W_\gamma = -\frac{(1-\lambda)2E(p_n(\gamma),\gamma)\chi_{1n}}{\gamma}\cdot\mu_1 + \lambda v'\cdot(t_2 z_{2\gamma} + \gamma e_{2\gamma} + e_2) = 0,$$

where χ_{1n} represents total expenditures by consumers of type 1 on x_n. Rearranging this equation yields two expressions for the optimal outflows tax rate:

$$\frac{t_2-\gamma^*}{\gamma^*} = \frac{1}{E(e_2,\gamma)}\Big(1 - \frac{2\mu_1(1-\lambda)E(p_n(\gamma),\gamma)\chi_{1n}}{\lambda\Gamma_2 v'}\Big) \tag{A.13}$$
$$\frac{\gamma^*}{1-\gamma^*} = \frac{1}{E(e_2,1-\gamma)}\Big(1 + \frac{T_2}{\Gamma_2}E(z_2,\gamma) - \frac{2\mu_1(1-\lambda)E(p_n(\gamma),\gamma)\chi_{1n}}{\lambda\Gamma_2 v'}\Big). \tag{A.14}$$

This simplified model yields interesting, yet straightforward intuition for understanding the optimality of an outflows tax. First, the optimal outflows tax adheres to an inverse elasticity rule, decreasing with greater responsiveness of concealed outflows with respect to the net-of-tax price of sending funds abroad. This force reflects the decrease in direct revenue collections from outflows base erosion. Second, the optimal rate increases in the tax base elasticity with respect to the outflows tax (weighed by the ratio of income tax collections to outflows tax collections), reflecting the positive fiscal externalities of the outflows tax. Finally, the optimal rate decreases in the welfare loss on part of tax-compliant individuals induced by positive price spillovers to other industries.

Calibration

I conclude by performing of a simple calibration of Equation A.13 of this model in order to evaluate the magnitude of an optimal outflows tax and gauge how the Ecuadorian outflows tax adheres to the model's prescriptions. I adopt the following values for model parameters:

1. I document a proportion personal income tax by 55% among individuals connected to tax havens following a net-of-tax cost change in sending funds abroad from 1 to .95. Given that this change ultimately must be borne from a commensurate change in base and that this base would have otherwise been concealed, this response corresponds with a net-of-tax outflows elasticity of tax haven users of 24 and price elasticity of concealed outflows of approximately -1.25.

2. Based on Figure A.1.19, I use values of $\lambda = .005$ and $\Gamma_2 = .02 \cdot USD\ 50,000 = USD\ 1,000$ (recalling $\gamma = .02$ in 2010, the year corresponding with the figure).

3. Keen and J. Slemrod (2017) use a value of $v' = 1.2$ for the marginal value of public funds, which I also employ here.

4. The log-linear utility benchmark used by Keen and J. Slemrod (2017) corresponds with a budget shadow price of $\mu_1 = 1$.

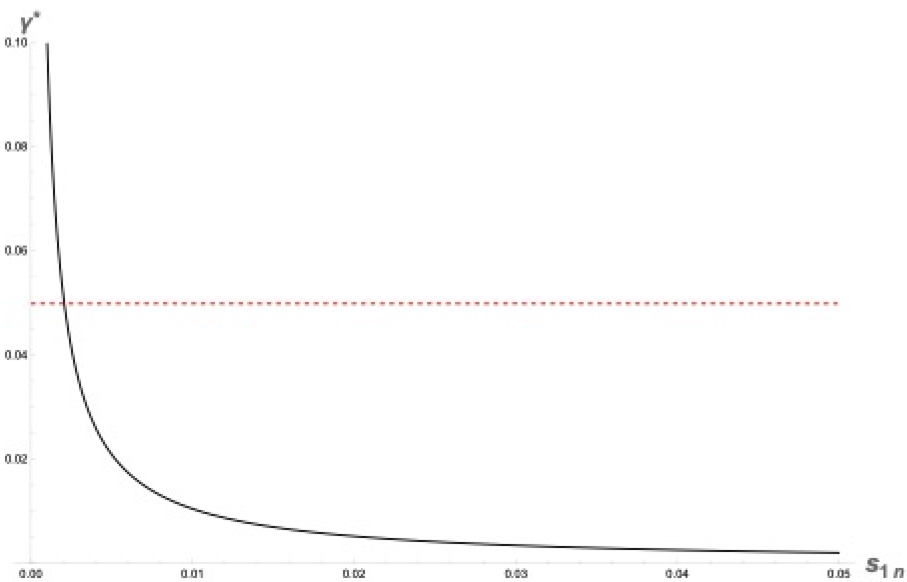
5. I estimate $\chi_{1n} = p_n x_{1n}$ as $I_1 \cdot \frac{p_n x_{1n}}{I_1} = I_1 \cdot s_{1n}$, where s_{1n} represents the x_n expenditure budget share of agents of type 1. Columns (1) and (2) of Table 1.5.1 suggest an average income of around USD 12,500 among individuals not using tax havens.

6. Fajgelbaum et al. (2019) document full pass-through of tariffs to exposed import prices. I therefore use a value of $E(p_n(\gamma), \gamma) = 1$, although 1) industries using exposed goods as an inputs likely only see a proportion of their costs affected so that the overall pass-through to final prices is likely less than one, and 2) general equilibrium effects may result in changes to competition that could result in pass-through greater than one in absolute value.

Figure A.2.1 plots the optimal outflows tax against non-evaders' budget shares allocated to the consumption of tradable goods. The figure demonstrates that the optimal outflows tax rate in this framework is only generally on the same order of magnitude as the outflows tax observed in Ecuador for small values of s_{1n}. The empirical outflows tax rate of 5% is would be rationalized with a tradable industry expenditure share of non-evaders of around 0.2%—quite low. As an upper bound, Ecuadorian imports share of GDP in 2019 was approximately 18%. This figure likely serves as an upper bound for s_{1n} as, 1) *a priori* one might expect only a portion of industrial production exposed to the outflows tax (or tariffs, as a benchmark), and 2) the non-evading group, likely having less income than the evading group, would demonstrate less tradable industry-sourced sourced consumption as a share of income. However, using a value of $s_{1n} \approx 0.2$ implies an optimal outflows tax of 0.05%—one twentieth of one percentage point, suggesting the likelihood that the Ecuadorian outflows tax is suboptimally high.[18] While this calibration excludes more general equilibrium considerations and other fiscal externalities (e.g. corporate income tax collections or excise-tax-like behaviors of a tax havens outflows tax), the exercise demonstrates the welfarist considerations of the outflows tax and the model's alignment with that its empirical value in Ecuador.

[18] A straightforward, but perhaps indirect way of more rigorously informing the value of s_{1n} would involve using consumer expenditure survey data to determine the consumption share consisting of of purely domestically produced goods.

Figure A.2.1: Optimal outflows tax calibration



This figure calibrates the optimal income outflows tax to a stylized model environment (based on Keen and J. Slemrod (2017)) that considers the positive income tax externalities, direct revenue raising roles, and negative welfare effects from price spillovers of the outflows tax. The independent variable is non-evaders' budget share expense on goods and services from tradable industries, denoted s_{1n}, as the independent variable. The dashed red horizontal lines indicate the empirical values of the dependent variables following the final outflows tax reform in 2011.

A.2.4 Optimal tax administration with haven-sourced consumption

Consider a consumer deriving utility described as

$$U = u(x_n, x_h) - \psi(l) + v(g),$$

where x_n represents consumption sourced from non-havens (i.e. domestically and from foreign non-havens) and x_h represents haven-sourced consumption, at price p_h relative to non-haven consumption. The individual consumes out of post-tax income, with the price of haven-sourced consumption expressed in units non-haven consumption. However, individuals can underreport their labor earnings wl by an amount e at a cost $c(e, \alpha) + \gamma \cdot e$, where γ represents a linear tax havens outflows tax. This tax is passed on entirely to haven-sourced consumption, so that she faces the budget constraint:

$$x_n + (1+\gamma)p_h x_h = wl - t(wl - e) - c(e, \alpha) - \gamma \cdot e.$$

I assume that the imposition of the tax haven outflows tax affects no general equilibrium response in the pre-tax pricing of haven-sourced consumption (i.e. that domestic consumers bear the entire incidence of the tax). This framing can be interpreted akin to a small open economy assumption for the domestic economy, as exemplified by the relationship between Ecuador and various tax havens.

Individuals therefore source consumption such that

$$u_{x_n} = \frac{u_{x_h}}{(1+\gamma)p_h}.$$

The individual simultaneously decides her allocation of labor, consumption, and underreporting to maximize. Defining disposable income $I = wl - t(wl-e) - c(e,\alpha) - \gamma \cdot e$ and the Lagrange multiplier on the individual's budget constraint μ yields the conditions:

$$I_l \underbrace{(u_{x_n}\frac{\partial x_n}{\partial I} + u_{x_h}\frac{\partial x_h}{\partial I})}_{\frac{\partial U}{\partial I}=\mu} - \psi'(l) + \mu\Big((1-t)w - I_l \underbrace{(\frac{\partial x_n}{\partial I} + (1+\gamma)p_h\frac{\partial x_h}{\partial I})}_{=1}\Big) = 0$$

$$\implies (1-t)w\mu - \psi'(l) = 0$$

and

$$I_e \underbrace{(u_{x_n}\frac{\partial x_n}{\partial I} + u_{x_h}\frac{\partial x_h}{\partial I})}_{\frac{\partial U}{\partial I}=\mu} + \mu\Big((t - c_e - \gamma) - I_e \underbrace{(\frac{\partial x_n}{\partial I} + (1+\gamma)p_h\frac{\partial x_h}{\partial I})}_{=1}\Big) = 0$$

$$\implies (t - c_e - \gamma)\mu = 0,$$

with the same functional regularity conditions carry over from the baseline model.

The government faces a similar budget constraint, but also considers the excise-tax-like revenue raised from haven-sourced consumption:

$$g + a(\alpha) = t(wl - e) + \gamma \cdot (e + p_h x_h)$$

so that the central planner's social welfare function can be described as

$$W(t,\alpha,\gamma) = u(x_n,x_h) - \psi(l) + v(t(wl-e) + \gamma\cdot(e+p_h x_h) - a(\alpha)).$$

Differentiating the social welfare function with respect to the outflows tax rate and substituting in the individual's envelope conditions yields the first order condition:

$$\left(u_{x_n}\Big(\frac{\partial x_n}{\partial\gamma} + \frac{\partial x_n}{\partial I}\frac{\partial I}{\partial\gamma}\Big) + u_{x_h}\Big(\frac{\partial x_h}{\partial\gamma} + \frac{\partial x_h}{\partial I}\frac{\partial I}{\partial\gamma}\Big)\right) + v'\cdot(tz_t + e + p_h x_h + \gamma e_\gamma + \gamma p_h\frac{\partial x_h}{\partial\gamma}) = 0$$

$$\implies W_\gamma = \underbrace{-\mu((e+(1+p_h)x_h)}_{\substack{:=\mathcal{W}_\gamma \\ \text{Consumer welfare effects}}} + v'\cdot\underbrace{((\gamma-t)e_\gamma + e + p_h x_h(1+E(x_h,\gamma))}_{\text{Effect on tax collections}} = 0,$$

Rearranging this equation yields the relationship between γ and t:

$$\frac{t-\gamma^*}{\gamma^*} = \left(1 + \frac{\mathcal{W}_\gamma/v' + p_h x_h\Big(1+E(x_h,\gamma)\Big)}{e}\right)\frac{1}{E(e,\gamma)}. \tag{A.15}$$

Rearranging this expression yet again yields an equation for the optimal outflows tax rate:

$$\frac{\gamma^*}{1-\gamma^*} = \frac{(\mathcal{W}_\gamma/v' - 1) + tz_\gamma + p_h x_h\Big(1+E(x_h,\gamma)\Big)}{eE(e,1-\gamma)}. \tag{A.16}$$

The intuition for these results is straightforward. Previously, outflows served no direct welfare-enhancing purpose other than facilitating income underreporting (which itself would in turn finance consumption). Here, both the welfare effects of discouraging offshore, non-tax-strategic consumption and the negative effects on the excise-like tax on such consumption bring the optimal tax rate down such that the income tax may be greater than the outflows tax.[19]

A.2.5 Income tax evasion and the outflows tax

To what extent does the tax outflows tax reduce outflows to tax havens? What are the effects of an outflows tax on consumer behavior when there are multiple underreporting mechanisms? To what extent does this reduction in outflows result in increased domestic reporting and tax collections versus substitution to other underreporting channels?

To answer these questions start, I augment the Allingham and Sandmo framework by incorporating a pecuniary cost of sheltering funds, analogous to as induced by the ISD foreign transaction tax. This pecuniary cost structure generalises the framework in Guyton et al. (2021) where taxpayers face a fixed cost to concealing income. This model also shares similarities with the model of optimal income shifting with pecuniary costs in Agostini et al. (2018); however, my framework incorporates a stochastic risk of detection that varies between reporting vehicles and well as an environment where individuals can engage in an income-concealing activity with more general cost that varies in funds concealed.[20] My framework also allows for multiple underreporting channels.

[19]Note that consumers face different wage rates and proportional income tax rates. Different proportional income tax rates approximate the different average tax rates faced by the two groups.

[20]This framework can be modified by incorporating bilateral tax rate differentials so as to nest the model setting of corporate profit shifting in Huizinga and Laeven (2008), and thus can be equally applied to studying profit shifting (both legal and evasive) on part of Ecuadorian corporations.

Baseline model

Consider a taxpayer that earns exogenous income z, normalized here to one. The individual generates utility linear in consumption and pay taxes on their reported income at a linear rate τ.

However, taxpayers can underreport income in two ways: by sending money to tax havens or by other means. Each of these underreporting mechanisms is associated with a cost as function of the underreporting amount, normalized here to the underreporting share of their true income $e_i = \chi_i/z$ for amount underreported $0 \leq \chi_i \leq z$: $\xi_i(e_i)$ convexly increasing in e_i, for $i \in \{h, o\}$ for tax-haven and other evasion respectively.[21] Denote $0 \leq e = e_h + e_o \leq 1$.

Let γ represent an outflows tax to tax havens, so that the costs of evading a proportion of income e_i can be expressed as

$$c_h(e_h) = \xi_h(e_h) + \gamma \cdot e_h$$

and

$$c_o(e_o) = \xi_o(e_o).$$

However, there is a probability $\rho(e_h, e_o)$ that an individual will be audited (denoted event $E = 1$), increasing in both arguments. In the audited state, the tax authorities will discover the entirety of the underreported income and require the individual to pay the full tax plus a fine $\pi > 0$.

In the unaudited state $E = 0$, an individual consumes

$$c = 1 - \tau \cdot (1 - e) - (\xi_h(e_h) + \gamma e_h + \xi_o(e_o)),$$

and in the audited state $E = 1$, an individual consumes

$$c = 1 - \tau - \pi \cdot e - (\xi_h(e_h) + \gamma e_h + \xi_o(e_o)).$$

Taxpayers optimize over underreporting amounts e_h and e_o to maximize expected utility:

$$(1 - \rho(e_h, e_o))\Big(1 - \tau \cdot (1 - e) - \xi_h(e_h) - \gamma e_h - \xi_o(e_o)\Big) + \rho(e_h, e_o)\Big(1 - \tau - \pi \cdot e - \xi_h(e_h) - \gamma e_h - \xi_o(e_o)\Big),$$

subject to a non-negative consumption requirement for the audited state:

$$1 - \tau - \pi \cdot e - (\xi_h(e_h) - \gamma e_h - \xi_o(e_o)) \geq 0$$

and the requirement that individuals cannot underreport more than their income

$$0 \leq e_h + e_o \leq 1,$$

[21] Relatively little is known about these costs from a systematized, empirical perspective. Anecdotal evidence from websites marketing offshore banking services domiciled in tax havens suggests offshore sheltering costs may be linear in funds sheltered with a variable cost less than parity and a substantial fixed cost. Other sources suggest only a fixed cost associated with sheltering; indeed, this is the cost structure modeled in Guyton et al. (2021) and strongly suggested by zero-profit bunching among UK multinational firms in Bilicka (2019). An alternate setup to this model would rely on the concavity of the utility function in consumption and risk aversion in order to rationalize an interior optimum underreporting behavior.

with $e_h,\ e_o \geq 0$. The first order conditions for each type of underreporting are associated with the first order conditions:

$$\underbrace{(1-\rho(e_h^*, e_o^*))\tau - \rho(e_h^*, e_o^*)\pi - (\xi_h'(e_h^*)+\gamma)}_{\text{Expected marginal net benefit}} \quad = \quad \underbrace{\frac{\partial \rho(e_h^*, e_o^*)}{\partial e_h} \cdot (\tau+\pi)e^*}_{\text{Marginal net penalty-weighted audit probability inc.}}$$

and

$$\underbrace{(1-\rho(e_h^*, e_o^*))\tau - \rho(e_h^*, e_o^*)\pi - \xi_o'(e_o^*)}_{\text{Expected marginal net benefit}} \quad = \quad \underbrace{\frac{\partial \rho(e_h^*, e_o^*)}{\partial e_o} \cdot (\tau+\pi)e^*.}_{\text{Marginal net penalty-weighted audit probability inc.}}$$

Given equal marginal benefits to each underreporting channel (the decrease in tax payments), the agent optimizes by setting equal their effective marginal costs:

$$\xi_h'(e_h^*) + \gamma + \frac{\partial \rho(e_h^*, e_o^*)}{\partial e_h} \cdot (\tau+\pi)e^* = \xi_o'(e_o^*) + \frac{\partial \rho(e_h^*, e_o^*)}{\partial e_o} \cdot (\tau+\pi)e^*. \tag{A.17}$$

The intuition for the first-order responses of the two evasion margins is straightforward. Agents optimize the two evasion channels so as to equilibrate the sums of their marginal pecuniary costs and penalty-weighted marginal probabilities of detection associated with each channel.

The specific level of each evasion channel 1) decreases with the purely pecuniary costs of evasion, 2) increases with the expected marginal gross benefit of evasion, and 3) decreases with marginal detection probability. The expected marginal net benefit is the difference between the expected marginal gross benefit (the savings on unpaid taxes) less the pecuniary costs of evasion. The marginal net penalty-weighted audit probability increase corresponds with the increase in detection probability associated with a marginal increase in evasion weighted by the penalty under detection.[22]

As a heuristic, we can take detection probability functions with shape restrictions $\rho(0,0) = 0$, $\rho(e_h, 1-e_h) = \rho(1-e_o, e_o) = 1$, and $\frac{\partial \rho(e_h, 1-e_h)}{\partial e_h} = \frac{\partial \rho(1-e_o, e_o)}{\partial e_o} = 0$, giving regularity conditions:

$$\begin{aligned} \tau &\geq \xi_h'(0) + \gamma \\ \tau &\geq \xi_o'(0) \\ \pi + \xi_h'(e_h) + \gamma &\geq 0 \\ \pi + \xi_o'(e_o) &\geq 0. \end{aligned}$$

The implicit function theorem gives the comparative statics for an interior optimum:

$$\begin{bmatrix} \frac{\partial e_h^*}{\partial \gamma} \\ \frac{\partial e_o^*}{\partial \gamma} \end{bmatrix} = \frac{1}{\tau+\pi} \begin{bmatrix} \rho_{e_h e_h}^* e^* + 2\rho_{e_h}^* + \frac{\xi_h''(e_h^*)}{\tau+\pi} & \rho_{e_h e_o}^* e^* + \rho_{e_o}^* + \rho_{e_h}^* \\ \rho_{e_o e_h}^* e^* + \rho_{e_o}^* + \rho_{e_h}^* & \rho_{e_o e_o}^* e^* + 2\rho_{e_o}^* + \frac{\xi_o''(e_o^*)}{\tau+\pi} \end{bmatrix}^{-1} \cdot \begin{bmatrix} -1 \\ 0 \end{bmatrix} \tag{A.18}$$

Here I suppress arguments and Leibniz notation of derivatives for visibility. Finally, denote

$$\begin{aligned} \Lambda = \Big(\rho_{e_h e_h}^* \rho_{e_o e_o}^* - \rho^{*2}_{\ e_o e_h}\Big) e^{*2} \quad &+ \\ \Big(\frac{\rho_{e_h e_h}^* \xi_o^{*\prime\prime} + \rho_{e_o e_o}^* \xi_h^{*\prime\prime}}{\tau+\pi} + 2\big(\rho_{e_h e_h}^* \rho_{e_o}^* - \rho_{e_h e_o}^* (\rho_{e_h}^* + \rho_{e_o}^*) + \rho_{e_o e_o}^* \rho_{e_h}^*\big)\Big) e^* \quad &+ \\ \frac{\xi_h^{*\prime\prime} \xi_o^{*\prime\prime}}{(\tau+\pi)^2} + 2\Big(\rho_{e_h}^* \rho_{e_o}^* + \frac{\rho_{e_h}^* \xi_o^{*\prime\prime} + \rho_{e_o}^* \xi_h^{*\prime\prime}}{\tau+\pi}\Big) - ({\rho_{e_h}^*}^2 + {\rho_{e_o}^*}^2),& \end{aligned}$$

[22]See subsubsection A.2.5 for a demonstration of the solutions for rationalizing an interior solution to the individual optimal underreporting allocation problem.

so that

$$\begin{bmatrix} \frac{\partial e_h^*}{\partial \gamma} \\ \frac{\partial e_o^*}{\partial \gamma} \end{bmatrix} = \frac{1}{\Lambda \cdot (\tau + \pi)} \begin{bmatrix} -\frac{\xi_o^{*\prime\prime}}{\tau+\pi} - 2\rho_{e_o}^* - \rho_{e_o e_o}^* e^* \\ \rho_{e_h}^* + \rho_{e_o}^* + \rho_{e_o e_h}^* e^* \end{bmatrix}. \tag{A.19}$$

In the general case, the shape of the function $\rho(e_h, e_o)$ requires regularity conditions in order to ensure $\Lambda > 0$ and that an interior optimum is indeed a maximum. Imposing conditions on the shape of the audit probability function alleviates these regularity requirements: for example, by imposing linearity in both arguments (e.g. $\rho(e_h, e_o) = k_h e_h + k_o e_o$, for constants $k_i \geq 0$ and $\rho(0,0) = 0,\ \rho(e_h, 1 - e_h) = 1$). Otherwise, Λ represents a quadratic form in total optimal evasion, giving regularity conditions for an interior solution.

The interior optimum exhibits various responses to changes in the tax havens outflows tax rate γ. Given a marginal increase in γ, haven outflows change according to several forces. First, heuristically treating detection probability as constant, haven outflows decrease according to $-\xi_o^{*\prime\prime}/\Lambda = -\frac{1}{\nu \xi_h^{*\prime\prime}}$ for some positive constant ν; that is, an increase in γ enacts a greater decrease in tax evasive haven outflows given relatively lower curvature of the cost function at the initial optimum. The intuition is simple: at higher cost curvatures, the increase in the linear haven outflows tax matters less for determining overall costs and disincentivizing haven outflows. On a pragmatic level, this result suggests that adjustments to γ induce large changes if the tax haven usage cost schedule exhibits near-linearity. In this respect, greater net penalties $\tau + \gamma$ dampen this behavioral response.

Increases in γ also induce behavioral responses based on the shape of the detection probability function. The second and third terms here reflect substitution responses to non-haven-evasion. Making no restrictions on the relationship between the curvature of this function and the marginal audit probabilities, the substitution responses channeled through the marginal audit probability and the curvature of the detection probability function in non-haven evasion are approximately proportionate to the terms $\frac{1}{\rho_{e_o}^*}$ and to $\frac{1}{g(\rho_{e_h}^*, \rho_{e_h e_h}^*, \xi_h^{*\prime\prime})}$ for some function g increasing in all arguments. Greater marginal detection probability in non-haven evasion mitigates substitution, as do greater curvatures of the cost schedule and the audit probability function (as smaller responses can accommodate greater risk adjustments).

Substitution responses $\frac{\partial e_o^*}{\partial \gamma}$ are determined entirely based on the shape of the audit probability function. Namely, substitution responses are attenuated with greater marginal audit probability values as well as with greater mixed-term curvature associated with the audit probability function (i.e. the mixed second-order partial derivatives $\frac{\partial \rho_{e_o}^*}{\partial e_h}$ and $\frac{\partial \rho_{e_h}^*}{\partial e_o}$).

Overall, the net impact of a change in γ on evasion $\frac{\partial e^*}{\partial \gamma}$ is the sum of these two changes. The numerator of this sum is

$$-\frac{\xi_o^{*\prime\prime}}{\tau + \pi} - (\rho_{e_o}^* - \rho_{e_h}^*) - (\rho_{e_o e_o}^* - \rho_{e_o e_h}^*) e^*.$$

The interpretation is straightforward. The tax γ depresses **total** evasion e^* insofar as 1) a high curvature of the non-haven cost function mitigates absorption of displaced tax strategic haven outflows and the low curvature of the tax-haven-evasion cost function requires greater-magnitude responses to generate commensurate cost reductions, 2) the marginal audit probability increase for non-haven-evasion exceeds that for haven-evasion (indicating a net increase in the probability of detection given substitution to non-haven-evasion), and 3) the curvature of the detection probability in non-haven-evasion exceeds that for the mixed partial (substitution responses are on-net mitigated by the greater increase in marginal audit probability in non-haven-evasion than in haven-evasion).

Demonstration of interior solution conditions for individuals underreporting allocation

We see the conditions under which the taxpayer set optimal evasion to an interior solution. Take the marginal utilities at order pairs $(0,0)$ and $(e_h, 1-e_h)$.

At $(0,0)$, the agent exhibits marginal utilities:

$$U_{e_h}(0,0) = (1-\rho(0,0))\tau - \rho(0,0)\pi - \xi_h'(0) - \gamma$$

and

$$U_{e_o}(0,0) = (1-\rho(0,0))\tau - \rho(0,0)\pi - \xi_o'(0),$$

so that this corner solution is associated with positive marginal utility if

$$\tau \geq \rho(0,0)(\tau+\pi) + \xi_h'(0) + \gamma$$

or

$$\tau \geq \rho(0,0)(\tau+\pi) + \xi_o'(0).$$

On the other hand, individuals will settle on an evasion share less than their full income if their marginal utility at points corresponding with $e = 1$ is negative.

$$U_{e_h}(e_h, 1-e_h) = (1-\rho(e_h,1-e_h))\tau - \rho(e_h,1-e_h)\pi - \xi_h'(e_h) - \gamma - \frac{\partial\rho(e_h,1-e_h)}{\partial e_h}$$

and

$$U_{e_o}(1-e_o, e_o) = (1-\rho(1-e_o,e_o))\tau - \rho(1-e_o,e_o)\pi - \xi_o'(e_o) - \frac{\partial\rho(1-e_o,e_o)}{\partial e_o},$$

so that this corner solution is associated with negative marginal utility if either

$$(1-\rho(e_h,1-e_h))\tau \leq \rho(e_h,1-e_h)\pi + \xi_h'(e_h) + \gamma + \frac{\partial\rho(e_h,1-e_h)}{\partial e_h}$$

or

$$(1-\rho(1-e_o,e_o))\tau \leq \rho(1-e_o,e_o)\pi + \xi_o'(e_o) + \frac{\partial\rho(1-e_o,e_o)}{\partial e_o}.$$

Revenue maximizing rate

What is the revenue maximizing rate for tax havens outflows tax? First, I consider a simplified environment where the probability of an audit event $\mathbb{P}\Big(E=1\Big) \equiv \rho$.

The Rawlsian social planner seeks to set γ to maximize the revenue raised by the outflows tax. I set aside for now the role of non-tax-evasive activity implicated by the outflows tax. For a single taxpayer, the government maximizes the expected revenue raised as

$$\max_{\gamma} \quad \underbrace{(1-\rho)\cdot(\tau(z-\chi_h(z)-\chi_o(z)) + \gamma\chi_h(z))}_{\text{Unaudited}} + \underbrace{\rho\cdot(\tau z + \pi(\chi_h(z)+\chi_o(z)) + \gamma\chi_h(z))}_{\text{Audited}}.$$

This setup yields a simple solution for the optimal outflows tax:

$$\implies \gamma^* = \frac{((1-\rho)\cdot\tau - \rho\cdot\pi)(\varepsilon_{\chi_h,\gamma}(z) + \varepsilon_{\chi_o,\gamma}(z)\cdot\frac{\chi_o(z)}{\chi_h(z)})}{\varepsilon_{\chi_h(z),\gamma(z)}+1}. \tag{A.20}$$

A priori, we can think of $\varepsilon_{\chi_h,\gamma} \leq 0$ and $\varepsilon_{\chi_o,\gamma} \geq 0$. The formula for the Rawlsian optimal rate illustrates the important tradeoffs for the revenue-maximization problem. Namely, ex-ante, the own-price response (negative) and the substitution response (positive) mitigate one another, so that in the presence of full substitution to other evasion margins (weighted by the ratio of outside-channel evasion to direct tax haven evasion), the optimal rate is zero. Intuitvely, greater substitution responses mitigate the effectiveness of the tax. Second, the presence of successful audits at a fine also undermine the desirability of a higher outflows tax. While the tax enacts a weakly positive fiscal externality by increasing domestic reporting (and broadening the income tax base), increasing the outflows tax decreases revenues raised by successful audits, driving down the optimal rate.

For highly inelastic tax haven outflows, the optimal outflows tax maps to zero unless uniquely one of the following conditions holds: 1) the probability-weighted gross marginal revenue collection is negative, or 2) the substitution response weighted by the ratio of usages of each underreporting channel exceeds the own-price response. Intuitively, when substitution to the outside underreporting channel exceeds the decrease in haven outflows (i.e. the tax induces a net increase in underreporting), revenue is lost in net (thereby justifying a zero outflows rate) unless auditing yields sufficiently high revenues either through the combined audit rate and penalty.[23]

Calibration of the revenue-maximizing rate

I turn to calibrating the revenue-raising outflows tax γ^* according to Equation A.20:

$$\gamma^* = \frac{((1-\rho)\cdot\tau - \rho\cdot\pi)(\varepsilon_{\chi_h,\gamma}(z) + \varepsilon_{\chi_o,\gamma}(z)\cdot\frac{\chi_o(z)}{\chi_h(z)})}{\varepsilon_{\chi_h(z),\gamma}(z)+1}.$$

I have produced empirical estimates for all of the objects in Equation A.20 except the ratio of "other"-sourced income underreporting to haven-sourced income underreporting. Taking the following values, homogeneous over the population, for the other parameters and imposing produces a relationship between the optimal rate γ^* and this ratio $\frac{\chi_o(z)}{\chi_h(z)}$:

1. Guyton et al. (2021) document audit rates at approximately 5%, 10% and 20% for the top 1%, 0.1% and 0.01% of earners respectively.

2. The United States Internal Revenue Service applies a penalty rate of 20% in cases of disregard or negligence of reporting rules and regulations.[24]

3. The top marginal tax rate of top Ecuadorian earners has been set at 35% since 2008. I assume that this value represents the counterfactual approximately linear tax rate applying to domestically reported income.

4. I document an outflows elasticity of with respect to the cost of the outflows tax $\varepsilon_{\chi_h,\gamma} \approx -1.25$.

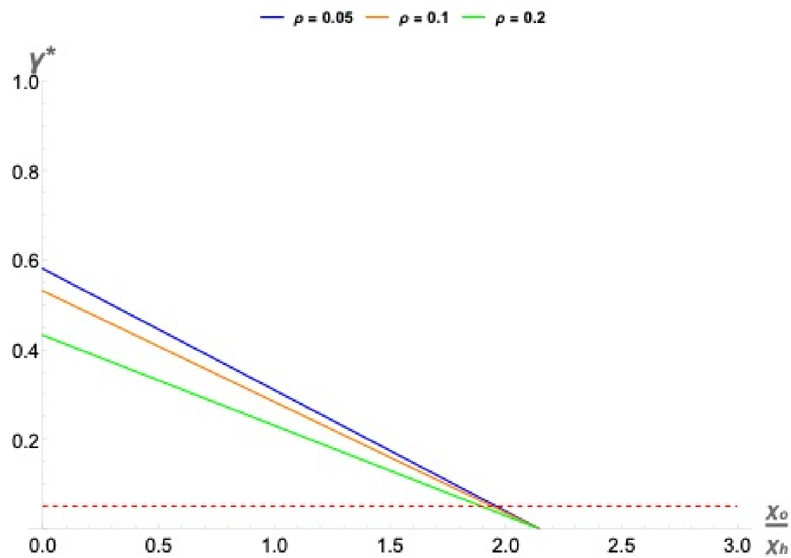
[23] See Section A.2.5 for a calibration of the revenue-maximizing outflows tax rate in this framework.

[24] See https://www.irs.gov/payments/accuracy-related-penalty

5. I document an proportion increase in gross income (pre-deduction) by 42%, corresponding with a net-of-outflows-tax elasticity of -8.6 (and an havens outflows tax rate elasticity of 0.45 as well as a tax base elasticity of 0.24. Considering the net tax base elasticity as the difference between the havens outflows elasticity and the other-channel elasticity (i.e. $\varepsilon_{z-\chi,\gamma} = -\varepsilon_{\chi_h,\gamma}(z) - \varepsilon_{\chi_o,\gamma})$, my results imply $\varepsilon_{\chi_o,\gamma} = .25$. As an alternative to imposing this structure, I also model the relationship between γ^* and the product $\varepsilon_{\chi_o,\gamma}\frac{\chi_o(z)}{\chi_h(z)}$.

Figure A.2.2: Revenue-raising haven outflows tax rate:

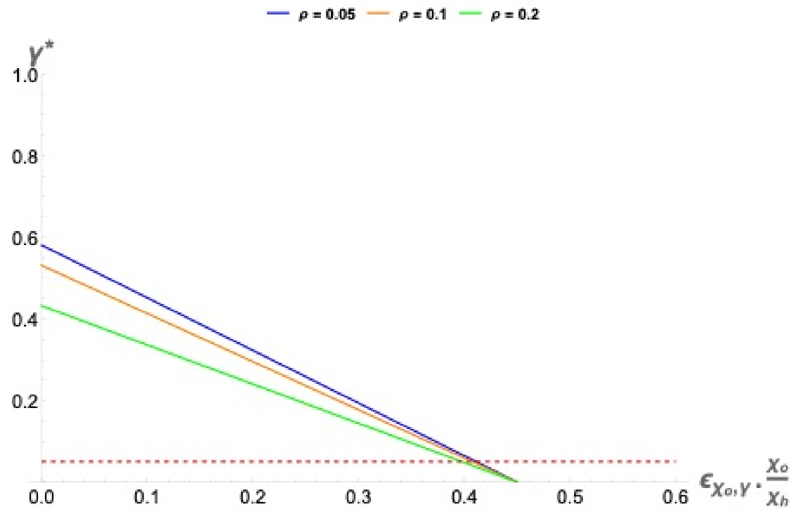
Calibration



This figure displays three calibrations for the revenue raising outflows tax rate from the augmented Allingham and Sandmo (1972) model framework. The three specifications vary by audit probability ρ. The dashed red horizontal line corresponds with the empirical outflows tax rate in Ecuador starting November 2011.

Figure A.2.3: Revenue-raising haven outflows tax rate:

Calibration in $\varepsilon_{\chi_o,\gamma} \cdot \frac{\chi_o}{\chi_h}$



This figure displays three calibrations for the revenue raising outflows tax rate from the augmented Allingham and Sandmo (1972) model framework. The three specifications vary by audit probability ρ. The dashed red horizontal line corresponds with the empirical outflows tax rate in Ecuador starting November 2011.

Figure A.2.2 displays three calibration plots of the revenue-raising havens outflows tax based on three different audit rate parameters. Guyton et al. (2021) report income underreporting by source and attribute values to the top 1%, 0.1% and 0.01% of offshore income evaded and income underreported (per the National Research Program) respectively as USD 53.7 B. versus USD 144 B., USD 39.9 B. versus USD 42.1 B., USD 22.5 B. versus USD 7.7 B (values of $\frac{\chi_o}{\chi_h} = 3,\ 1,\ 1/3$ respectively). Interpreting these figures as ratios of offshore income evaded to "other"-sourced underreporting, the calibration informs possible optimal revenue-raising haven outflow tax rates according to the income rank most representative of the evading demographic. If the evading demographic is mostly concentrated within the top 0.01%, the revenue-raising optimal rate is nearly 40%. For alternate cases where evaders are concentrated generally throughout the top 0.1% and 1%, the revenue-raising rates are around 30% and 0% respectively.

A.3 Additional data and environment descriptions

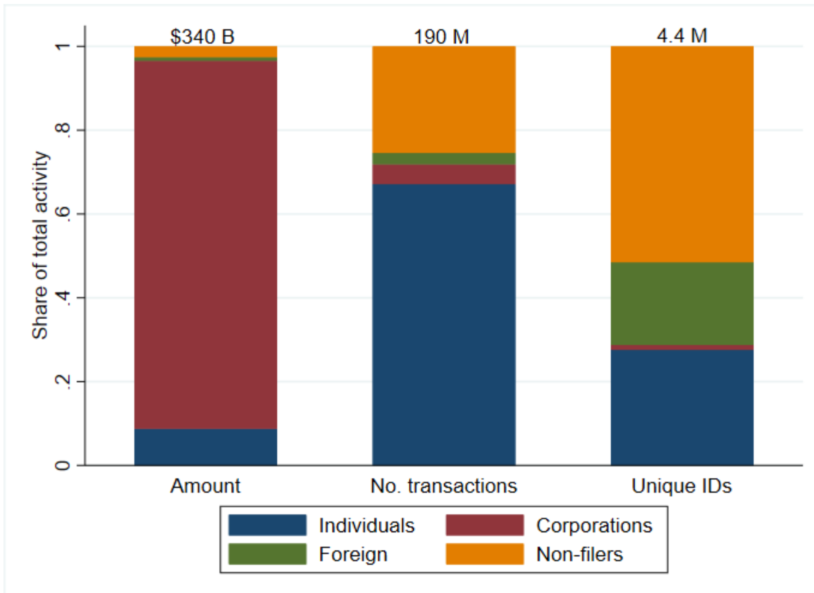
A.3.1 Additional figures and tables

Table A.3.1: List of transaction purpose categories in the MID foreign transaction data

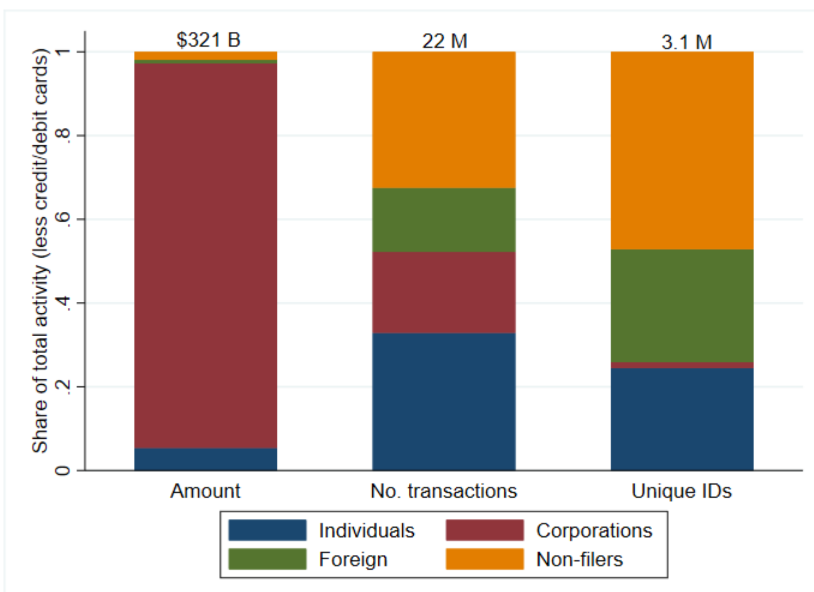
No.	Purpose	No.	Purpose
1	N/A	35	Workers' remittances
2	Imports	36	Donations
3	Anticip. imports	37	Compliance with laws and regulations
4	Int'l. Transport	38	Credit amortization abroad
5	Cargo Fleet Transport	39	Credit disbursements abroad
6	Ports and airports	40	Credit prepayment abroad
7	Business, health, education travel	41	Long term fin. inv. abroad
8	Reinsurance premia	42	Short term fin. inv. abroad
9	Insurance indemnization	43	Long term capital inv. abroad
10	Fin. services	44	Short term capital inv. abroad
11	Foreign currency guarantees	45	Overnight inv. abroad
12	Merchant leasing	46	Deposits in foreign bank accounts
13	Telecom service	47	Credit amort. (domestic)
14	IT services	48	Credit disbursement (domestic)
15	Brands and patents	49	Prepaid credit (domestic)
16	Archit., eng., and tech. services	50	Short term fin. inv. (domestic)
17	Agriculture and mining services	51	Long term fin. inv. (domestic)
18	Health services	52	Long term capital inv. (domestic)
19	Audiovisual services	53	Short term capital inv (domestic)
20	Rent	54	Overnight investments (domestic)
21	Construction	55	Bank account deposits (domestic)
22	R&D	56	Other
23	Legal, acc. services	57	Debit and credit cards
24	Publicity And market research	58	Collections from abroad
25	Repairs	59	Anticip. imports
26	Cultural services	60	Anticip. exports
27	Services To foreign gov't	61	Brands and patents
28	Subscriptions And membership Fees	62	Royalties and authorship rights
29	Education expenses	63	Trash and pollutant processing
30	Anticip. Foreign Trade	64	Trade and other business services
31	Wages	65	Intragroup trade
32	Dividends/profit distributions	66	Temporary operations
33	Credit interest	67	Consular collections
34	Return On fin. investment		

Figure A.3.1: MID statistics

(a) All currency exits



(b) All currency exits less card transactions



This figure illustrates various metadata surrounding currency exits registered in the MID disaggregated by taxpayer type. The top of each stacked bar graph displays its cumulative total from fiscal years 2008 to 2019. All nominal values are expressed in USD 2020. Panel (b) excludes credit card transactions.

A.3.2 Firm-year dividend imputation methodology

The Ecuadorian administrative data on firm-year dividend payments only begins in 2015. For this reason, in order to make inference pertaining to the effect of the tax haven reform of 2011 on exposed firms' dividend payout policies, I develop an imputation method to accommodate the administrative data environment.

I rely on three data sources for this imputation:

1. **Firm-shareholder dividend payment data** *(Anexo de Dividendos)* accurately reports annual firm-dividend payout policies starting in 2015. The dataset also reports individual dividend payments between firms and shareholders. All Ecuadorian firms making profit distributions to shareholders are required to register with the Ecuadorian tax authorities and are observable in this dataset.

2. **Foreign transaction data** *(Anexo - Movimiento Internacional de Divisas (MID))*: This dataset accurately reports profit distributions by Ecuadorian firms to shareholders abroad.

3. **Corporate income tax returns** *(F101)*. The corporate income tax returns report withholdings taxes on dividend payments. While the publicly available withholdings formula creates a bijection between funds withheld and dividend payments,[25] in practice the implied value of dividends to be paid poorly predicts realized dividend payments (as reported in the dividend payment registry between 2015 and 2019).

The steps to this imputation, in order, are as follows:

1. I use the accounting measures reported in the corporate income tax declarations to assign each firm-year a dividend imputation:

   $$Div_{it} = Profit_{it} - Tax_{it} - Reinvestment_{it} - (Retained\,Earnings_{it} - Retained\,Earnings_{it-t}).$$

   All of the right-hand-side variables are perfectly observed in the corporate income tax data.[26] However, data on retained earnings are actually observed with a one-year lag (i.e. year t's retained earnings for firm i are actually observed in firm i's corporate income tax declaration for year $t+1$). For this reason, I cannot perform this imputation for the last year in my data, 2019.

2. Ecuador has a law where firms cannot make profit distribution payments if they report non-positive pre-tax and pre-deduction profits (similar to an EBITDA concept) for two consecutive years. For all firms reporting two consecutive years of non-positive profits (i.e. $\pi_{it} \leq 0 \;\cap\; \pi_{it-1} \leq 0$), I map their dividends in year t to zero.

3. I check if a firm's corporate income tax declaration years coincide with the years of the dividend payment registry (2015-2019). If *both* a firm's corporate income tax filings intersects with the years of the dividend payment registry *and* the firm is not present in dividend payment registry, I map all years of the firm's dividend imputation to zero.

[25] The capital income tax dividend payment withholdings formula creates a bijection for values above USD 1,000 in withheld funds or USD 20,000 in dividends anticipated to be paid out. Values below USD 20,000 in dividend payments generate zero withholdings obligation.

[26] I perform this imputation on a version of the data winsorized above the 99.5% level.

4. If a firm is *both* present in the dividend payment registry *and* observed to never pay out dividends in the dividend firm registry, I map all years of the firm's dividend imputation to zero

5. If a firm i reports non-zero dividend withholdings in their annual corporate income tax declaration in year t, I map their dividend imputation in year t to the accounting identity in step 1.

6. If a firm i reports a profit distribution abroad in the foreign transaction data (MID) t, I map their dividend imputation in year t to the accounting identity in step 1.

7. If a firm ever makes positive dividend payments between years 2015 and 2019 (as observed in the dividend payment registry), I map their pre-2015 annual dividend payments to the accounting identity in step 1.

8. I inflate the dividend imputation by the factor difference between the mean of aggregate annual dividend payments between 2015 and 2018 and the mean of aggregate annual imputed dividend payments between 2015 and 2018. This factor is 1.03.

The imputation performs well. In addition to needing relatively little adjustment on the intensive margin, the above steps provide a satisfactory extensive-margin imputation. Between 2015 and 2018, around 4,000 firms (out of the universe of approximately 100,000 corporate income tax filing firms) report profit distribution payments in the dividend payment registry data.[27] The imputation method produces around 6000 firms making dividend payments in a given year.

A.4 Additional figures and tables on descriptive characteristics of tax haven use

A.4.1 Descriptive figures

The novelty of universal transaction data allows me to answer many basic, descriptive questions regarding tax haven use. However, the data do see important limitations in that they do not permit studying or directly diagnosing round-tripping behavior—i.e. the indirect use of tax havens by first sending funds to a non-haven country, which are eventually re-directed to a tax haven.[28] To this end, a central goal of this work will be to inform, through more indirect means, the prevalence of round-tripping behavior and diagnose whether such behavior responds to changes in the ISD that

[27] Around 40% of the 500 companies publicly listed on the Guayaquileño and Quiteño stock exchanges pay dividends, and around 2.5% of the remaining non-publicly-traded companies report dividend payments in the dividend payment registry in a given year,

[28] While the MID data records all transactions that leave and enter the country via automatic reporting in coordination between the Ecuadorian Central Bank (which, in absence of fulfilling monetary policy functions serves to study Ecuadorian macroeconomy and organise joint financial policy with the banking industry) and the universe of Ecuadorian financial intermediaries, there do exist means of evading the ISD and thus engaging in transactions that are not observed in the MID dataset. In particular, the Ecuadorian tax authorities identify physical transport of cash as a likely source of ISD evasion, although they do not cite specific amounts of evasion by such means nor have they expressed significant concern over the prevalence of this form of evasion. Moreover, the legal mandate of the ISD does target physical transport of cash beyond a certain threshold, but enforcement is limited by screening devices at airports and lack thereof at non-airport borders.

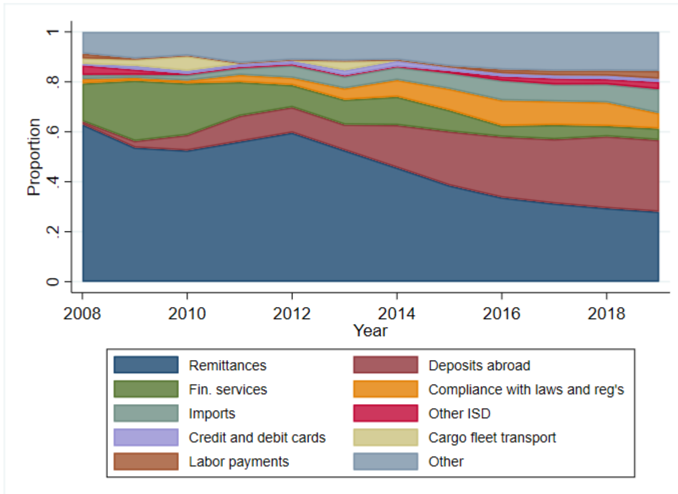
target tax havens.

First I present descriptive statistics constructed entirely from the transaction data. Then, I link the universal transaction data with income tax returns in order to characterise the joint distributions of income and other economic characteristics and fiscal haven use.

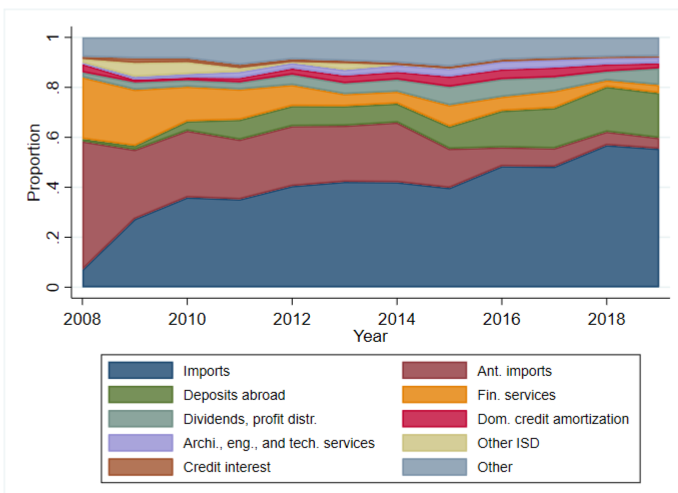
A.4.2 Transaction data

Figure A.4.1: Top outflows over time

(a) Corporations



(b) Personal income tax filers



This figure displays the evolution over time of the relative shares by volume of the top 9 purpose bins for corporations and individual income tax filers separately. The top 9 purpose bins are identified by summing and ranking activity all activity by purpose bin for 2008-2020. NB: The bin "Other ISD" refers to bin 56 in Table A.3.1 (constructed as an alternative to the other purpose bins in Table A.3.1), and the bin "Other" aggregates the activity in the purpose bins outside of the top 9 by volume.

The transaction data provides a unique opportunity to learn about the use of fiscal havens from a descriptive perspective. What amount of funds are sent to tax havens? What kinds of taxpayers are sending funds to tax havens and for what statutory purpose? For this exercise, I use the country-list of tax haven from Tørsløv, Wier, and Zucman (2022), which consists of the 53 countries listed in Hines and Rice (1994) plus Belgium and the Netherlands.

There are two important points of compromise for assessing the external and internal validity of these descriptive results. First, the Ecuadorian economic setting is not likely to generalize perfectly to the case of high-income or OECD countries. Second, the descriptive material here does not engage with the quasiexperimental changes in the tax environment dealing with outflows and tax havens: these results are purely correlative/descriptive.

Figure A.4.2 depicting Ecuadorian yearly outflows between tax havens and non-haven countries. As a proportion of GDP, funds sent to tax havens remain relatively constant throughout the time period, rising as a share of total funds sent abroad from approximately 10% to 15%. However, the transaction data allows to disaggregate these flows by purpose and taxpayer type. The two panels of Figure A.4.3 display the evolution of the most prominent uses of tax havens by Ecuadorian corporations and income tax filing individuals respectively.

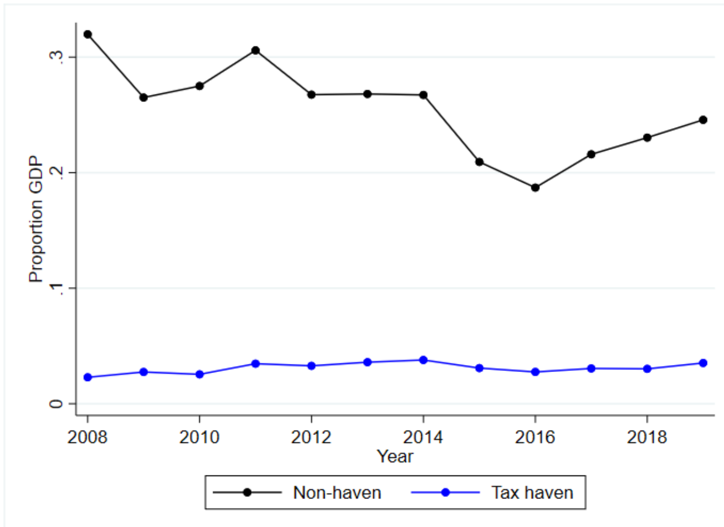
The figures illustrate a prominent role of deposits in bank accounts for both individuals and corporations as a share of their respective activity in tax havens, growing considerably over time namely for individuals. Other financial activities such dividend and profit distributions and financial service payment also assume a large proportion of Ecuadorian taxpayers' activity in fiscal havens that has grown to over 50% by 2019 for both corporations and manual income tax filers.

The data also allow the investigation of precisely *which* countries are the most important for hosting the prominent tax haven activities. With this information, we can identify Panama as the most important tax haven for offshore banking status (confirming similar findings in Bomaire and Le Guern Herry (2022))[29], followed by Luxembourg and Switzerland, and the Bahamas. These top havens absorbed over USD 200 million in bank deposit from Ecuador in 2019.

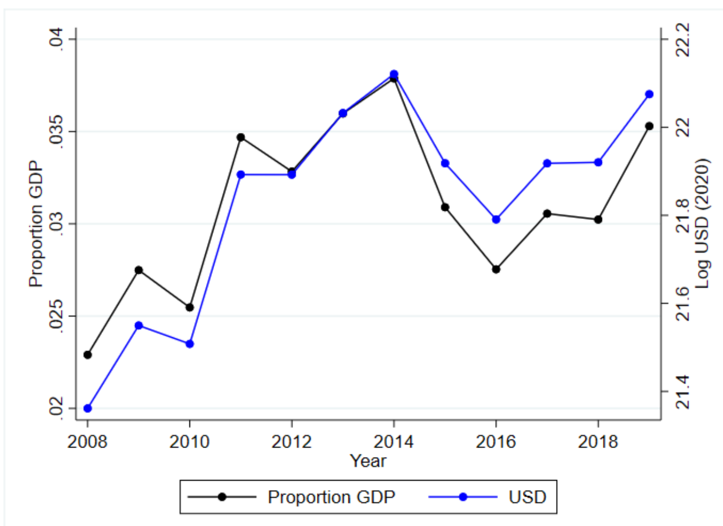
[29] Rose and Spiegel (2007) study on the determinants of bilateral offshore financial center status; the findings here replicate their importance of common language as a key determinant of an offshore tax strategic relationship.

Figure A.4.2: Currency exits over time

(a) By tax haven status



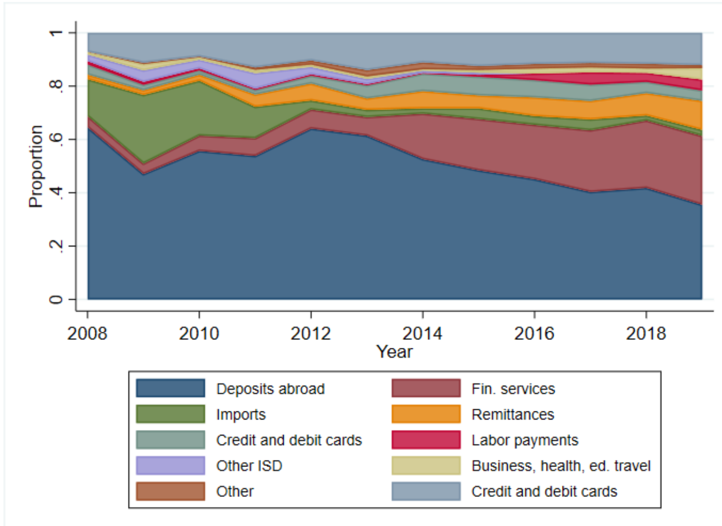
(b) Activity in tax havens



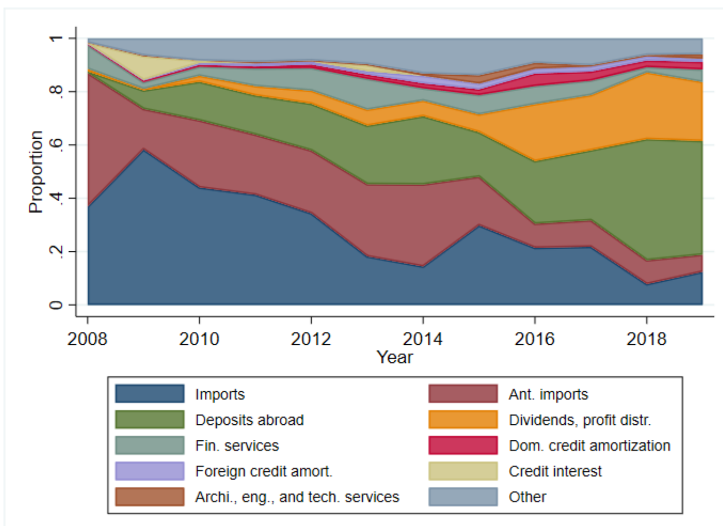
These figures show total currency exits by tax haven destination status. Proportion GDP variables for time t is defined as the ratio of the sum of all MID currency exits (by haven status) in year t divided by Ecuadorian GDP in year t. Currency values are presented in January 2020 USD.

Figure A.4.3: Top tax haven activities over time

(a) Corporations



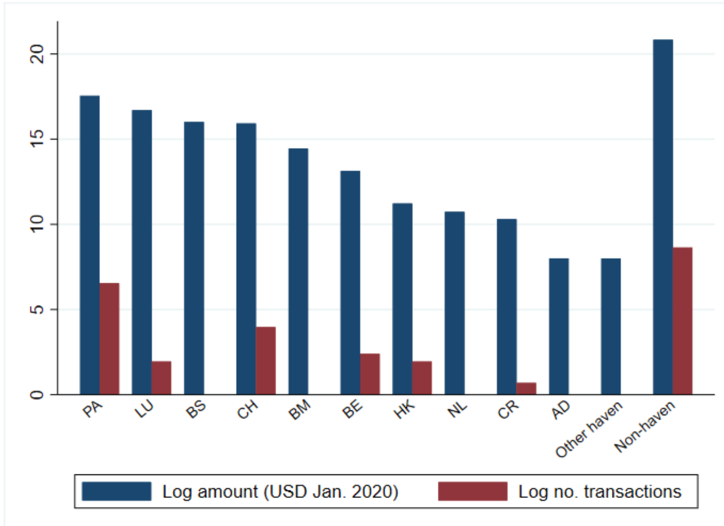
(b) Individuals



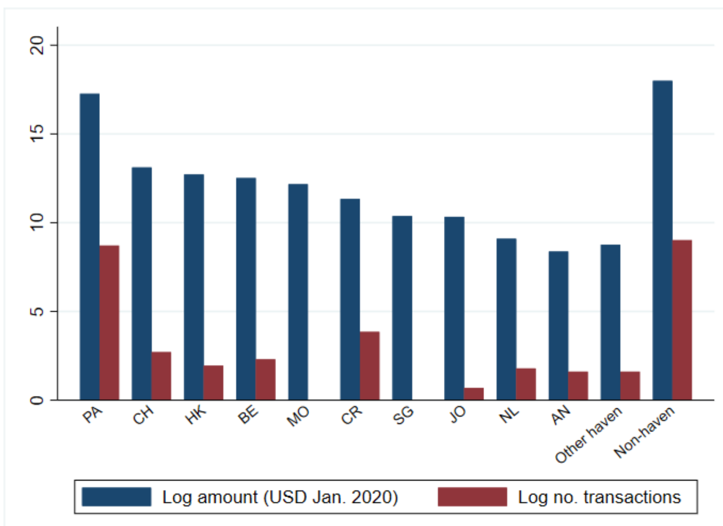
These figures show the evolution of top activities associated with currency exits to tax havens as recorded in the MID data. The bin "Other ISD" refers to the other-denominated MID purpose bin, and the bin "Other" aggregates the activity in the purpose bins outside of the top 9 by all-time transaction volume. Panel (a) depicts outflow purpose trends for corporations, and panel (b) shows this trend for manual personal income tax filers.

Figure A.4.4: Top haven locations for foreign account deposits (2019)

(a) Corporations



(b) Individuals



These figures show the top tax haven destinations of outflows by USD amount and number of transactions. Country categories are determined as the top 9 tax haven locations by total foreign account deposit volume in 2019 by taxpayer type. The "Other haven" group represents the aggregation of all of the remaining Tørsløv, Wier, and Zucman (2022) fiscal haven countries; "non-haven" represents the aggregation all foreign account deposits in non-haven countries. Panel (a) shows the top tax haven destinations for corporations, and panel (b) shows the top destinations for manual personal income tax filers.

As an additional descriptive activity of interest, I examine the share of outflows disaggregated by haven status and "avoidance" purpose. In this exercise, I assign 30 of the transaction buckets as potential tax strategic transactions in an ad hoc manner based on their reported purpose. These activities generally reflect financial flows and intangible corporate services that are understood to potentially facilitate multinational tax strategy.[30][31] While these activities do not necessarily reflect explicit tax strategic intent, this exercise illustrates the qualitative differences in the nature of outflows toward tax havens versus non-haven countries.

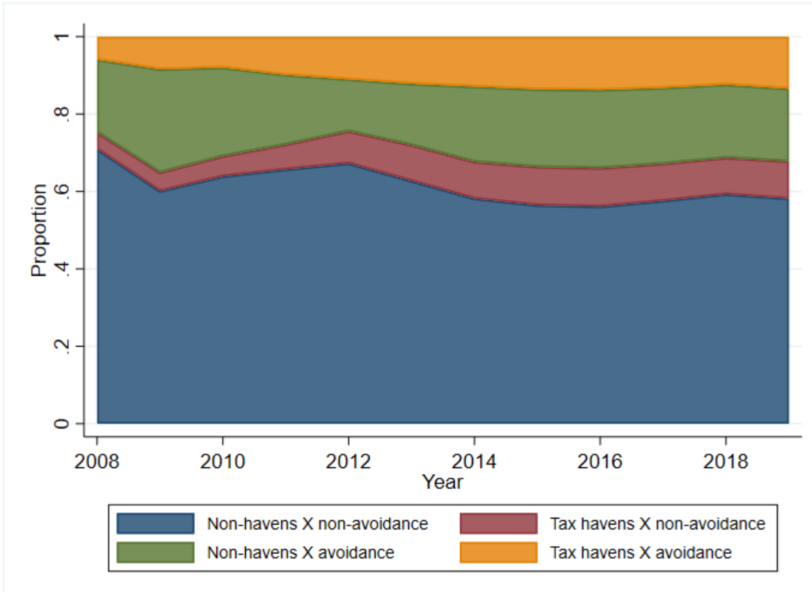
Figure A.4.5 illustrates the results of this descriptive exercise separately for corporations and manual personal income tax filers. Most notably, the relative shares of avoidance-labeled and non-avoidance activities switched between tax havens and non-havens. For both corporations and individuals, I categorise the majority of activity as with tax strategic intent, versus for non-havens where non-avoidance outflows greater outnumber tax-avoiding activity outflows by volume. Moreover, for individuals, one can observe a significant relative decline in the amount of avoiding activity outflows to non-tax havens that is largely absorbed by non-avoiding transactions with non-haven destinations. Lastly, the overall share of avoidance activity with tax-haven destinations appears relatively constant throughout the timeframe for individuals, but growing over time in relative share for corporations.

[30] In broad groups, the "avoidance" activities include: 1) reinsurance premia and insurance indemnization, 2) financial, telecom, IT, architectural, mining, audiovisual, legal/accounting, cultural, market research, and RD services, 3) brand, patent, and royalty payments, 4) credit, interest, and dividend payments/amortization, 5) capital gains sent abroad, 6) bank deposits and financial/capital investments broad, and 7) intra-group transactions.

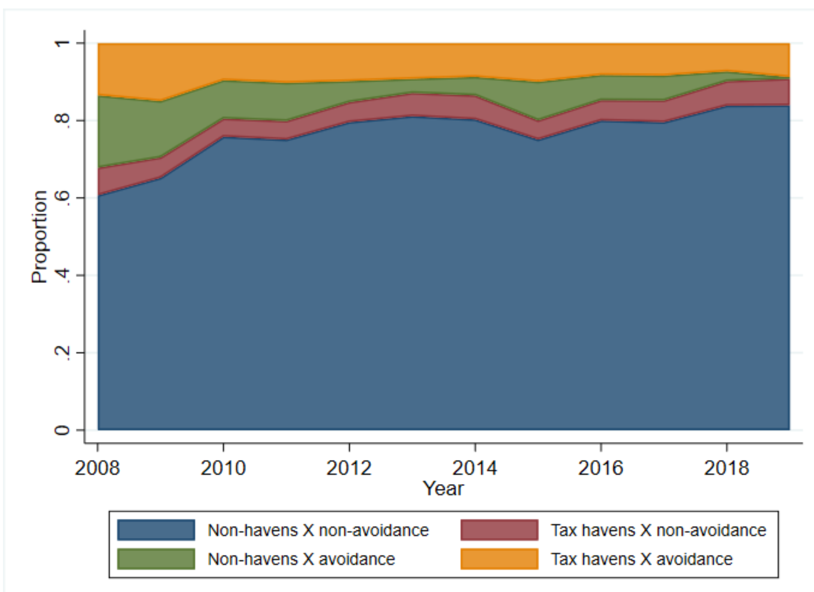
[31] Multinational tax strategic activity tends to focus on concentrating costs and financial obligations that result in increased domestic cost statements in tandem with increased funds located in low tax jurisdictions. For example, multinational profit often consists of intragroup price manipulations or intragroup lending at high interest rates.

Figure A.4.5: Use of tax havens and non-havens for avoidance purposes

(a) Corporations



(b) Individuals

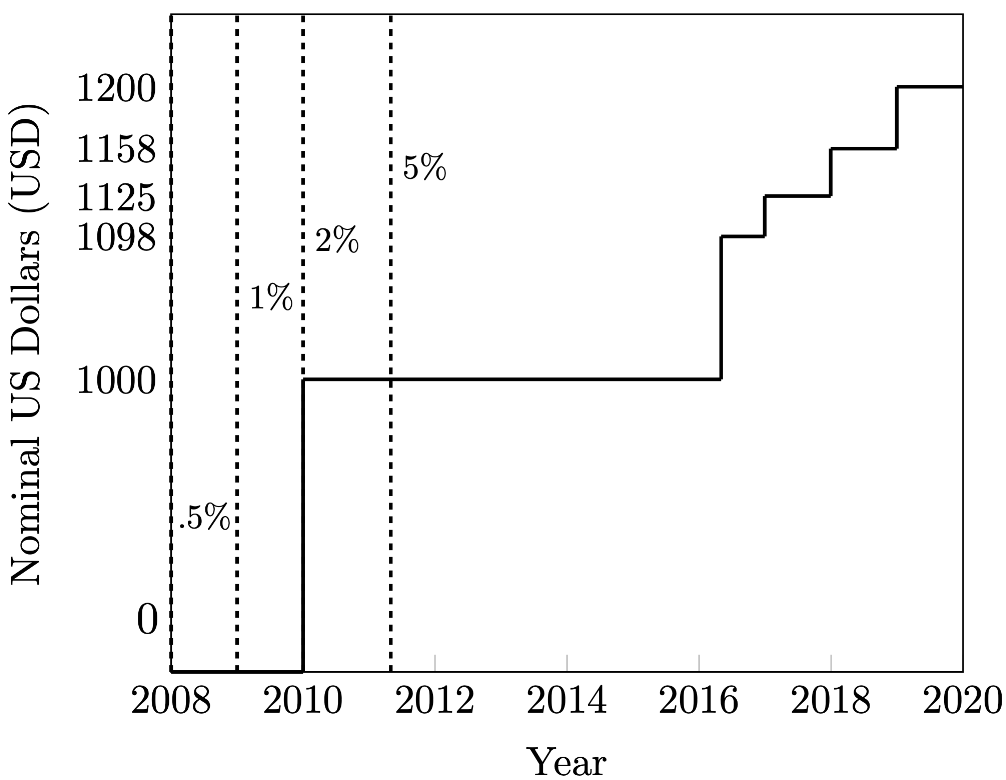


This chart shoes the disaggregation of outflows by tax-haven destination status and "avoidance" activity status separately for corporations and manual personal income tax filers in Ecuador. Tax haven designation is based on the 55 countries in Tørsløv, Wier, and Zucman (2022) The category of "avoidance activities" consist of the union of several transaction purpose bins reflecting kinds of financial flows and intangible service payments typically associated with multinational tax strategy.

A.5 Bunching design: the tax-price elasticity of demand for haven banking services

The ISD schedule has also seen considerable variation in the kink location and the rate change between under and above the obligation threshold. In terms of the ISD base, the threshold was initially installed at USD 1000, where it remained until the end of April 2016. Starting in May 2016, the tax authorities began indexing the threshold to an annual price index equal to three times the monthly minimum wage.[32]

Figure A.5.1: ISD exemption threshold (non-card transactions)



This figure displays the evolution of the ISD rate and exemption threshold location over time.

This feature of the ISD regime offers a setting in which to estimate the tax price elasticity of demand for banking services in tax havens. In particular, the panel structure of the data provides empirical counterfactual distributions for some of the bunching reforms, thus removing the necessity to interpolate a smooth counterfactual distribution as in classical bunching estimators (e.g. Saez (2010)). Moreover, in a setting where individuals face minimal frictions in setting their transaction amounts (by merit of choosing the amount their send), the setting is likely to be characterized by

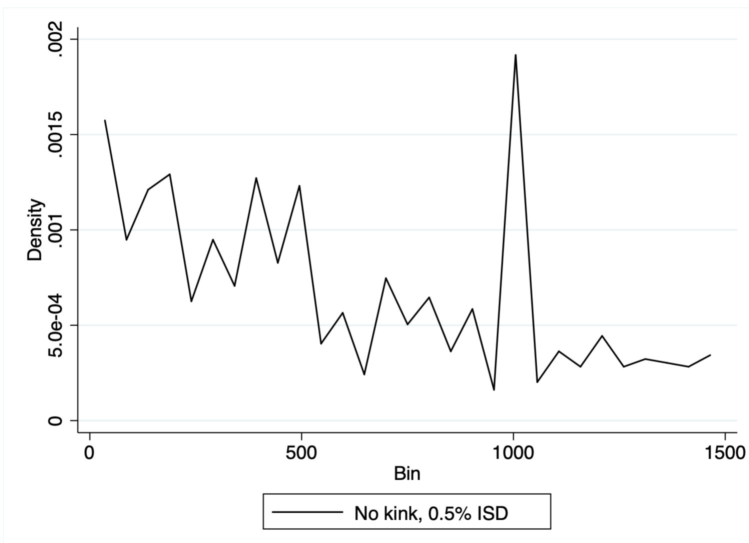
[32] The tax authorities apply this exemption schedule for all exits except credit and debit card transactions. Credit and debit card transactions use an alternate exemption regime based on the sum of annual activity by card, resulting in potentially high optimization frictions that may prevent bunching responses along this margin.

significant round-number bias (normally dealt with using a round-number binning procedure as in Kleven (2016)), which may be particularly severe for the initial kink located at USD 1000. The availability of prior empirical counterfactual distributions allows me to overcome this challenge as well.

A.5.1 Net-of-tax elasticities of tax haven bank account deposits

By focusing on the bunching at the threshold in the kinked outflows tax schedule among transactions involving deposits in foreign bank accounts, I turn to estimating the price reactivity of individuals making foreign bank account deposits. I start by isolating specifically bank account deposits transactions made by Ecuadorian manual personal income tax filers in tax havens.[33] Here, I use the Tørsløv, Wier, and Zucman (2022) list of tax havens, because the kinked tax obligation schedule does not have any legislative interaction with the list of government-recognized tax havens; that is, this exercise seeks to estimate the tax-price response of demand for foreign banking services in the countries more typically considered tax havens.[34]

Figure A.5.2: Empirical distribution of tax haven bank account deposits, no kink, $\tau = 0.5\%$



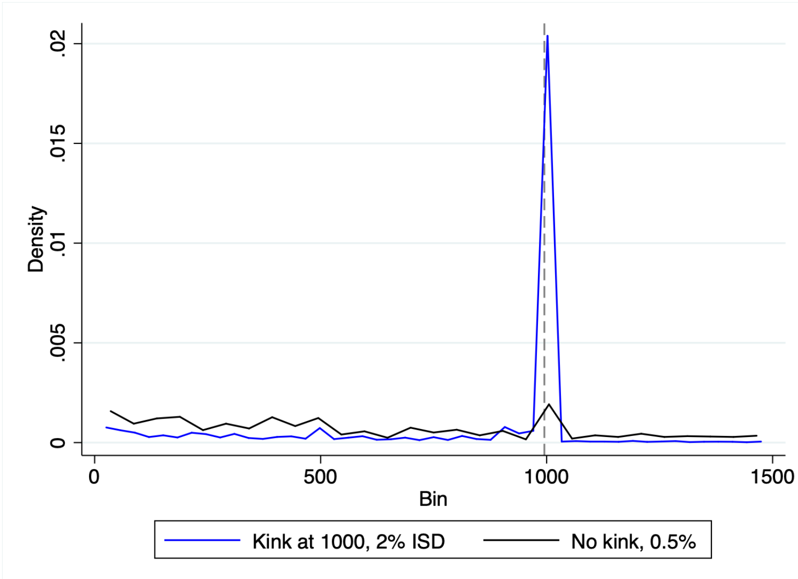
This figure displays the distribution of monthly aggregates of individual bank account deposits in tax havens. Transactions are aggregated from between January 2008 and December 2008.

[33]Since the specific kinked outflows tax obligation schedule is not specific to this group, there is some arbitrariness here. In principle, one can study other transaction-purposes on part of one of the other taxpayer groups.

[34]Importantly, net-of-tax-price elasticity estimates face some threat to internal validity using a bunching estimation procedure if individual transactors are actually splitting their transactions high above the threshold and locating the subsequently split transactions below the exemption threshold. The Ecuadorian tax authorities practice grouping repeated transactions by identical parties within a short timeframe (typically one month) together so as to mitigate taxpayers exploiting the kinked outflows tax schedule by "splitting" their transactions.

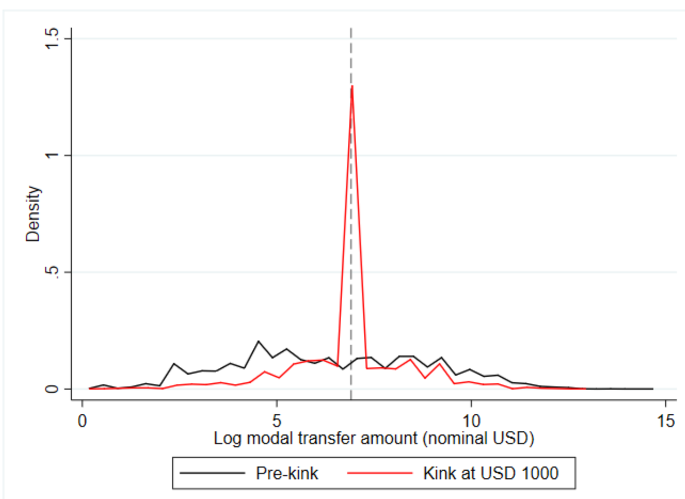
Figure A.5.2 displays the empirical distribution of bank account deposits in tax havens on part of individual manual income tax filers. The distribution exhibits significant bunching at precisely 1000 USD in spite of the ISD obligation schedule featuring no exemption threshold. This finding suggests the presence of round number preference as an important source of bias, thus further motivating the use of counterfactual distribution for elasticity estimation.

Figure A.5.3: Empirical distribution of tax haven bank account deposits, $K = 1000, \tau = 2\%$



This figure displays the empirical counterfactual distribution as observed during the no-kink, $\tau = 0.5\%$ regime. The dashed gray line illustrates the location of the post-reform kink at USD 1000.

Figure A.5.4: Empirical distribution of modal tax haven bank account deposit amounts $K = 1000, \tau = 0.5\%$



This figure displays the empirical distribution of individuals' modal foreign bank account deposit amounts as observed before and after the imposition of the outflows tax kink at USD 1000 during the application of the outflows tax rate at 0.5%. The dashed gray line illustrates the location of the post-reform kink at USD 1000. Monetary values are expressed in nominal USD.

Figure A.5.4 illustrates a substantial bunching to the imposition of a kinked exemption threshold. I identify net-of-tax-price elasticities of demand for offshore banking services in tax havens from the exemption schedule and changes in the location of the kink and in the ISD tax rate. The classical bunching estimator computes an elasticity based on the proportion of individuals bunching at a kink (as compared to an imputed counterfactual distribution) normalized by the proportion change in net-of-tax-price between above and below the kink:

$$\varepsilon = \frac{B/(K \cdot f(K))}{\ln\left(\frac{1-\tau_{K_-}}{1-\tau_{K_+}}\right)}.$$

To estimate the classical bunching elasticity in this setting, I estimate a degree 11 polynomial counterfactual and compare the empirical bunching to this smooth interpolation. I also implement three other estimation strategies. To account for round-number bias, my second specification includes round-number bins that ex-ante, may exhibit idiosyncratically high activity (Kleven (2016)). The challenge of this strategy is that is accounts for round-number bias in an overly coarse manner, possibly overcompensating. As such, my preferred estimates use the pre-kink distributions of tax haven bank account deposits as true counterfactual distributions. The key benefit of this method is that, in the absence of a kink, any bunching at USD 1000 can be attributed entirely to round-number, which can be accounted for tractably in a bunching setting.

Figure A.5.5 displays the distributions of tax haven bank account deposits on part of manual personal income tax filers under the subsequent ISD exemption schedules that are indexed to the annual inflation rate. The kink in each of these plots corresponds with three times the monthly minimum wage. This figure illustrates that while individuals do respond to the imposition of a new kink, via moving to each new exemption threshold location, a substantial mass of individuals inertially bunch at previous kink points. The optimization frictions seen here suggest that the elasticity estimates from bunching designs off of subsequent reforms will be somewhat attenuated.

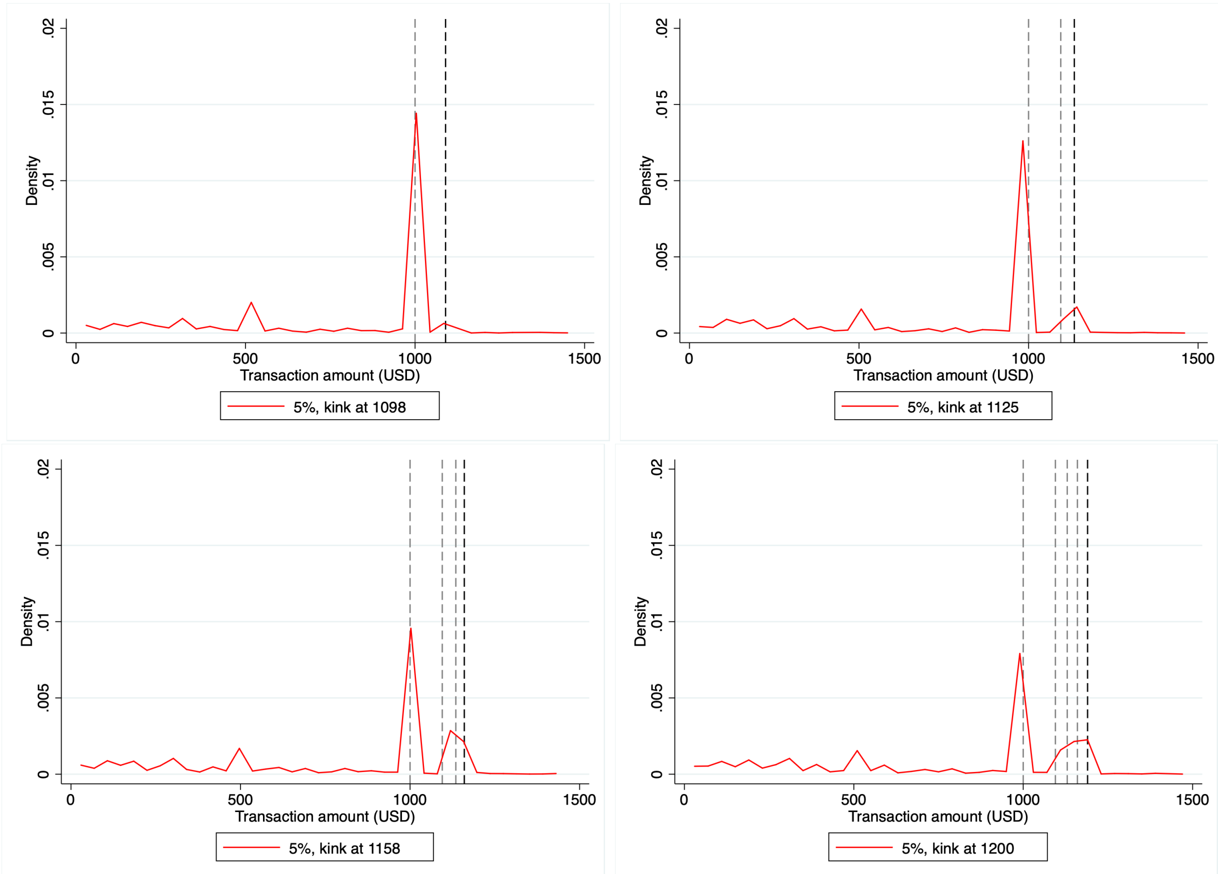
This exercise is characterized by several limitations. First, the counterfactual distributions prior to December 2009, while absent of a kink, are not true counterfactual distributions for the purpose of the bunching exercise insofar that, with a non-zero tax globally in the pre-reform period, there are individuals that move to bunch at the kink that were previously located below the threshold. For this reason, the distortions are less important for the .5% counterfactual distribution, so that my preferred methodology uses the bank account deposit distribution under this regime (as opposed to under the $\tau = 1\%$ regime. Thus, Table A.5.1 displays preferred estimates the net-of-tax-price elasticity of demand for offshore banking services corresponding to between 0.8 and 1.1.

Additionally, given the low kink level, one may also voice concerns over the external validity of the bunching estimates in inferring the tax-price response of elusive behavior through bank account deposits in offshore tax havens. I.e. the bunching activity around the kink if of a fundamentally different nature in purpose than multinational tax strategy.

A.5.2 Descriptive characteristics of bunching individuals

Beyond using bunching behavior estimating elasticities, I brielfy investigate heterogeneity pertaining to income demographic and tax haven usage based on bunching behavior. In particular, do individuals that engage in bunching earn disproportionately more or demonstrate greater propensity to use tax havens?

Figure A.5.5: Distribution of tax haven bank account deposits, moving kink, $\tau = 5\%$



This figure displays the bunching at ISD kink thresholds for manual personal income tax filer bank account deposits in one of the 55 Tørsløv, Wier, and Zucman (2022) tax haven countries. Each panel displays the empirical distribution of tax haven bank account deposits under a certain kink regime, progressing chronologically. Dashed gray vertical lines display the previous kink locations, and the dashed black line displays the relevant kink threshold for each respective outflows regime.

I isolate individuals making bank account deposits in tax havens between December 2009 and April 2016 (the period featuring the outflows tax kink at nominal USD 1000) and assign to each individual their modal bank deposit amount in all foreign bank accounts regardless of tax haven status of domicile. Figure A.5.6 demonstrates little evidence of outsized tax characteristics among individuals located near the USD 1000 kink point in their modal foreign bank account deposit amount. In particular, individuals located near the kink point neither are disproportionately likely to have made a bank account deposit in a tax haven nor exhibit disproportionately greater income than other individuals that make bank account deposits abroad.

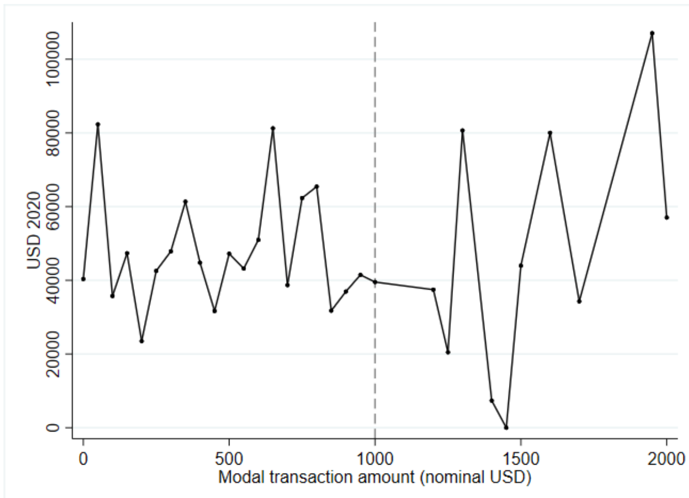
Table A.5.1: Implied net-of-tax-price elasticities, bank account deposits in tax havens

	K = 1,000, τ = 2%	K = 1,000	K = 1,098	K = 1,125	K = 1,158	K = 1,200
Classical	6.757***	2.779***	0.022***	0.065***	0.087***	0.099***
	(0.096)	(0.033)	(0.002)	(0.004)	(0.004)	(0.004)
Round number	0.405***	0.148***	0.024***	0.099***	0.133***	0.080***
	(0.001)	(0.000)	(0.002)	(0.006)	(0.007)	(0.004)
Emp. distr. (τ = 0.5%)	1.121***	0.467***	0.172**	0.262***	0.581**	0.503**
	(0.140)	(0.058)	(0.080)	(0.071)	(0.274)	(0.229)
Emp. distr. (τ = 1%)	0.775***	0.323***	0.091***	0.372***	0.537***	0.250***
	(0.038)	(0.016)	(0.015)	(0.075)	(0.095)	(0.035)

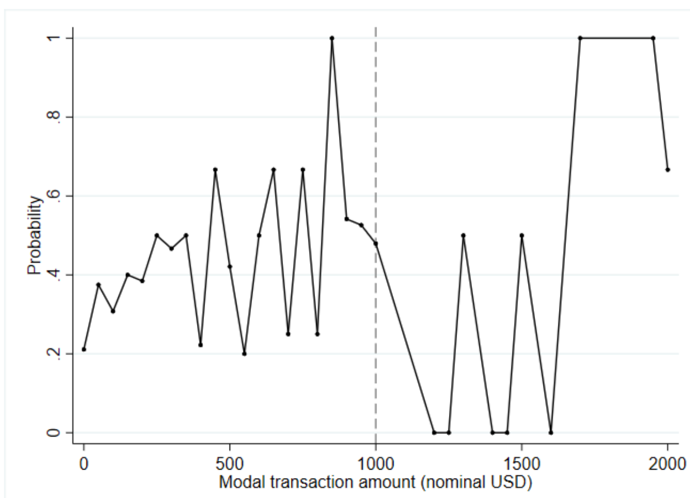
This table calculates cost elasticities of bank account deposits abroad based on bunching at ISD kink thresholds for manual personal income tax filer bank account deposits in one of the 55 Tørsløv, Wier, and Zucman (2022) tax haven countries. Each column represents the elasticity for a specific reform period (kink location K and ISD rate). Only the first column estimates elasticities using the a kink under the $1 - \tau_{ISD} = 0.98$ regime; columns 2-5 all use the $1 - \tau_{ISD} = 0.95$ regime but with varying kink locations. Each row represents a different methodological specification. The classical bunching estimator is specified as in Saez (2010) and Chetty et al. (2011). The second row accounts for round number bias using a dummy for round-number bins as in Kleven (2016). Rows three and four use the empirical distributions of tax haven bank deposits under their respective regimes as impure counterfactuals. Standard errors are estimated via bootstrap at the transaction level 100 times.

Figure A.5.6: Bunching heterogeneity

(a) Taxable income (USD 2020)



(b) Probability making bank deposit in tax havens



These figures illustrate the heterogeneity of tax payers based on their modal foreign bank account deposit amount between 2009 and 2016. Panel (a) plots average taxable income as the dependent variable. Panel (b) plots the probability an individual of has made a bank account deposit in a tax haven conditional on modal transaction amount as the dependent variable. The dashed gray vertical line displays the location of the exemption kink in the outflows tax schedule

Appendix B

Estate tax avoidance and private benefit through charitable giving

B.1 Additional figures and tables

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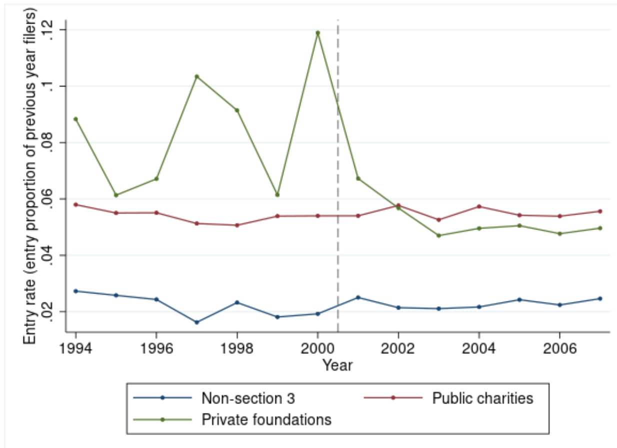
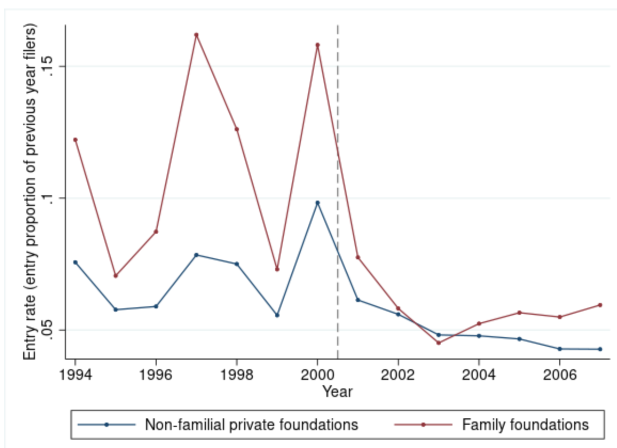
Figure B.1.1: Aggregate entry rates by nonprofit vehicle type

(a) Public charities, private foundations, and 501(c)-non(3)’s



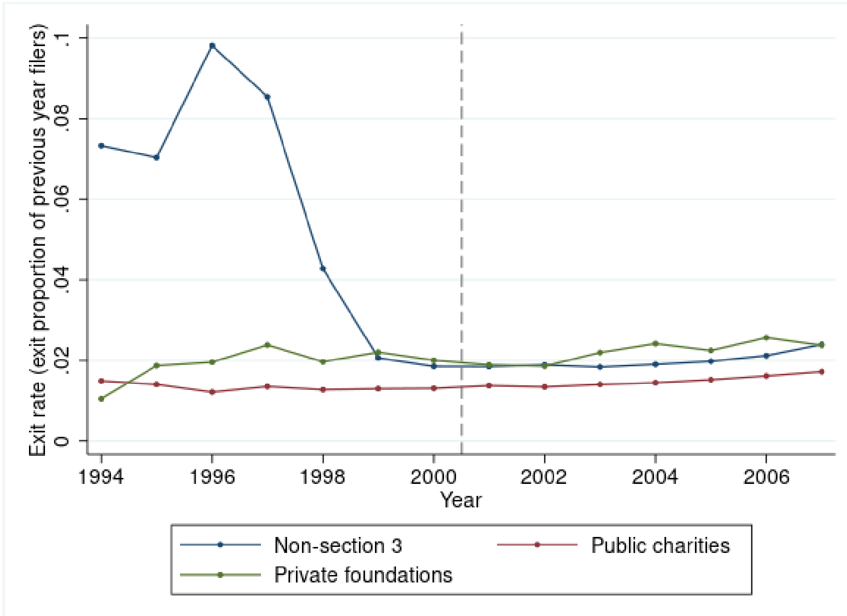
(b) Familial v. non-familial private foundations



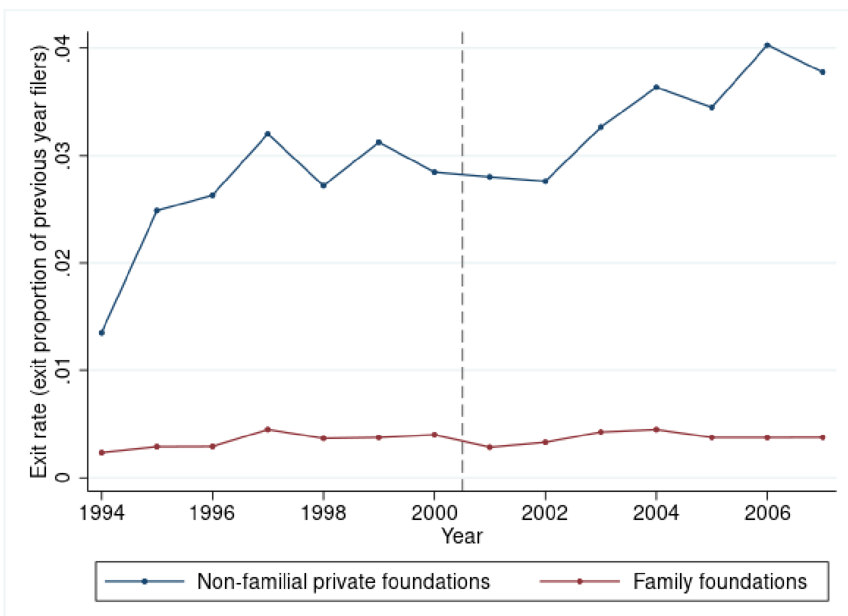
These figures plot annual values of nonprofit entry rate by nonprofit vehicle type between 1994 and 2007. Entry rate in year t is defined as the number of nonprofits filing a 990 or 990-PF declaration for the first time in year t divided by the number of nonprofits operating in year $t-1$. Panel (a) plots the evolution in entry rate for private foundations, public charities, and nonprofit entities organized outside of subsection 501(c)(3). Panel (b) disaggregates entry rates between non-familial private foundations and familial private foundations.

Figure B.1.2: Aggregate exit rates by nonprofit vehicle type

(a) Public charities, private foundations, and 501(c)-non(3)'s

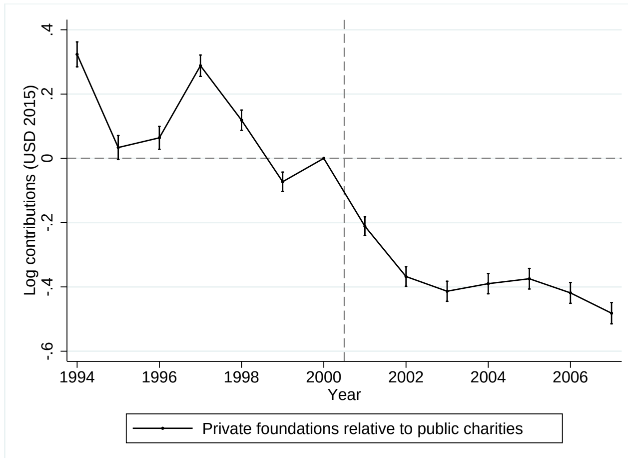


(b) Familial v. non-familial private foundations



These figures plot annual values of nonprofit exit rate by nonprofit vehicle type between 1994 and 2007. Exit rate in year t is defined as the number of nonprofits filing a 990 or 990-PF declaration for the last time in year t divided by the number of nonprofits operating in year $t-1$. Panel (a) plots the evolution in exit rate for private foundations, public charities, and nonprofit entities organized outside of subsection 501(c)(3). Panel (b) disaggregates exit rates between non-familial private foundations and familial private foundations.

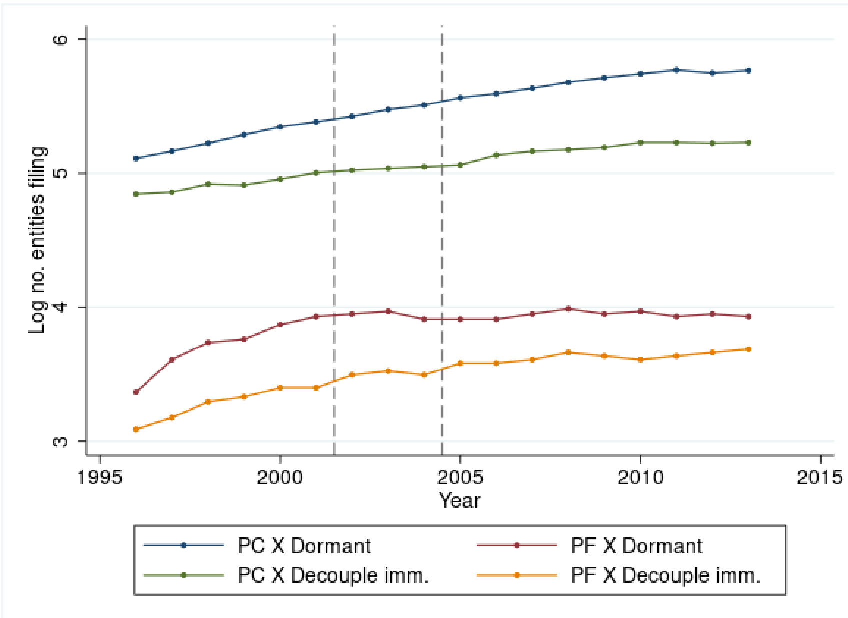
Figure B.1.3: Federal reform: Log contributions
Private foundations and public charities relative to non-section-3 organizations



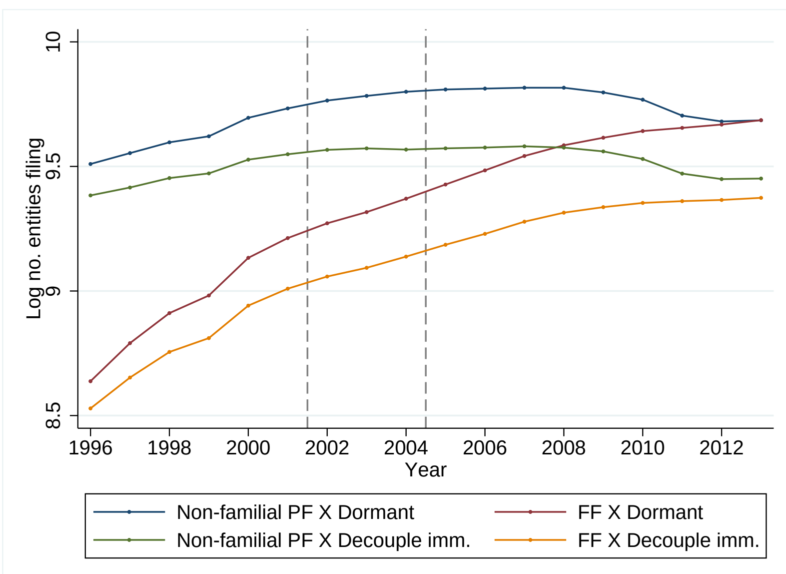
This figure plots the annual difference-in-differences coefficients for the two-way fixed effect specification: $y_{i,t} = \alpha_i + \sum_{k=1994}^{2007} 1\{Year_t = k\} + \sum_{l \in \{c,n,p\}} \sum_{k=1994}^{2007} \beta_{lk}\{\theta_i = l\}1\{Year_t = k\} + \varepsilon_{it}$. Public charities and the year 2000 serve as the baseline for estimation. The 95% confidence bands use standard errors clustered on the EIN-level.

Figure B.1.4: Log aggregate reported contributions by nonprofit vehicle type

(a) Public charities and private foundations



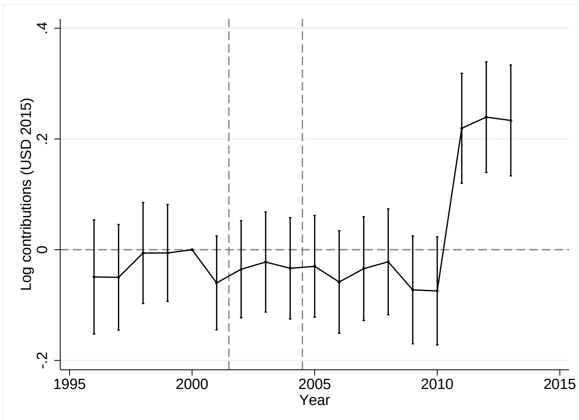
(b) Familial v. non-familial private foundations



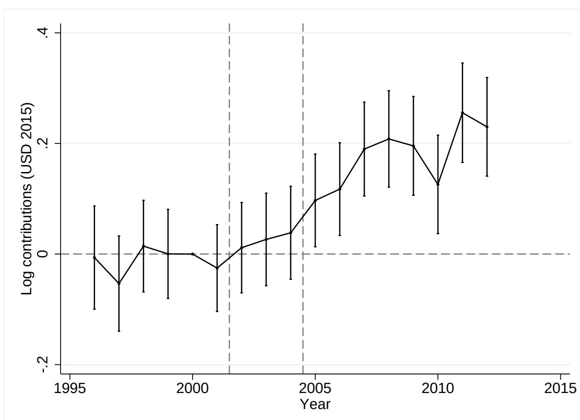
These figures plot annual values of the log number of operating nonprofit entities by nonprofit vehicle type between 1996 and 2013. Panel (a) disaggregates total annual contributions between private foundations and public charities. Panel (b) disaggregates total annual contributions between non-familial private foundations and familial private foundations.

Figure B.1.5: Triple differences in state × vehicle type: log contributions, no fixed effects

(a) Private foundations v. public charities, no controls



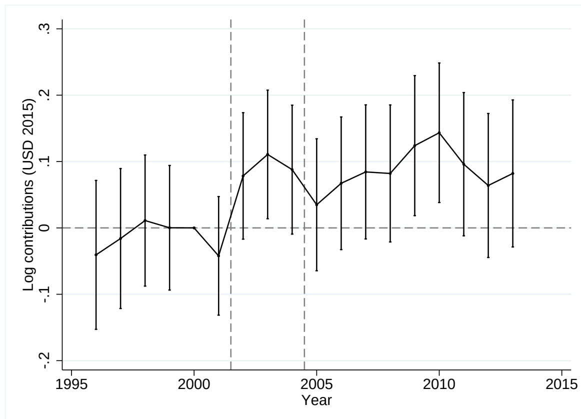
(b) Private foundations v. public charities, controlling for size and state-year taxes



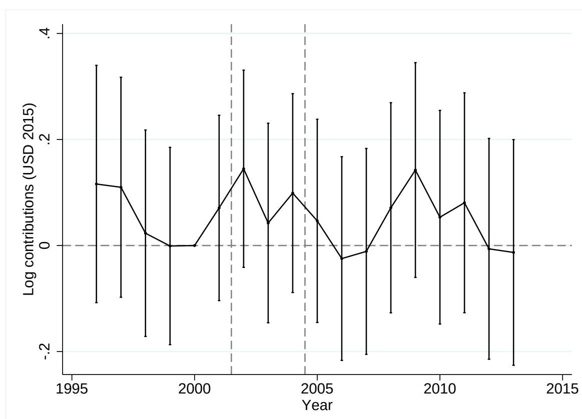
These figures plot annual values of the triple difference coefficients for log aggregate reported contributions comparing private foundations against public charities by state estate tax treatment status, using the year 2000 as a baseline. Panel (a) excludes all controls. Panel (b) controls for nonprofit size measured in assets as well as state-year level income, unemployment, and corporate income tax rates. The years between the dashed gray lines indicate the phase-out period of the federal-state estate tax credit. Error bars represent 95% confidence intervals with standard errors clustered on the EIN-level.

Figure B.1.6: Triple differences in state × vehicle type (later repealers as treated): log cont.

(a) Public charities and private foundations



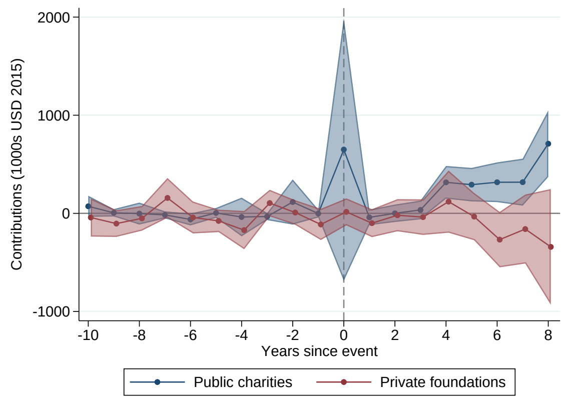
(b) Familial v. non-familial private foundations



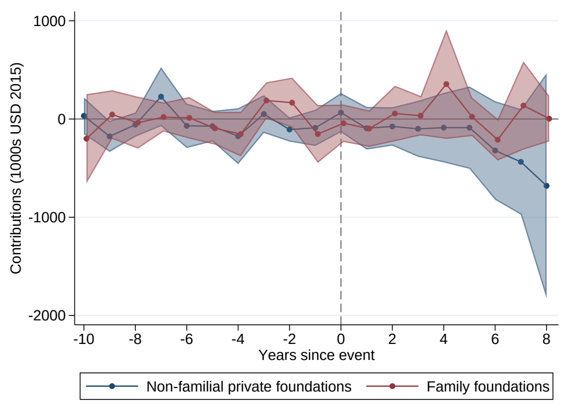
These figures plot annual values of the triple difference coefficients for log aggregate reported contributions comparing between vehicle type and state estate tax treatment status, using the year 2000 as a baseline. This specification uses states initially decoupling from the federal-state estate tax credit but later repealing as "treated", and uses dormant states as the control group. The specifications includes two-way fixed effects on the EIN-year-level. Panel (a) compares private foundations with public charities. Panel (b) isolates private foundations and compares familial foundations against non-familial foundations. The years between the dashed gray lines indicate the phase-out period of the federal-state estate tax credit. Error bars represent 95% confidence intervals with standard errors clustered on the EIN-level.

Figure B.1.7: Event study estimates with two-way fixed effects
Repeal events

(a) Private foundations v. public charities



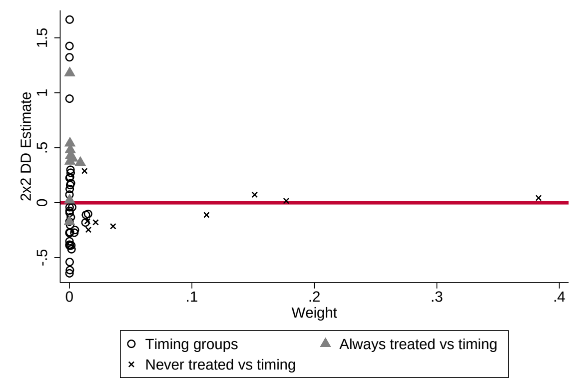
(b) Family foundations v. non-familial private foundations



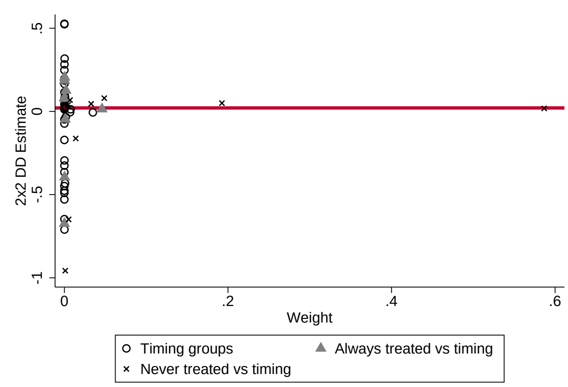
These figures estimate the two-way fixed effect event study $y_{it} = \alpha_i + \sum_{k=2002}^{2015} \delta_k 1\{Year_t = k\} + \sum_{j=t_0}^{t'} \beta_j 1\{EventTime_{s(i),t} = j\} + \varepsilon_{it}$ around de facto state estate tax repeal events. The event study coefficients $\{\beta_j\}$ are estimated using the procedure from Callaway and Sant'Anna 2020 to account for heterogeneous and dynamic treatment effects. Panel (a) studies the responses of public charities and private foundations domiciled in states repealing their state estate taxes. Panel (b) focuses on family foundations and non-familial private foundations. For each panel, the two series of coefficients are computed on samples excluding nonprofits domiciled in "always-treated" states (i.e. the states never having a separate estate tax and during the sample period) and stratified by charitable giving vehicle type on nonprofits between 2002 and 2015.

Figure B.1.8: Goodman-Bacon decomposition
Event study estimates with two-way fixed effects (repeal events)

(a) Private foundations



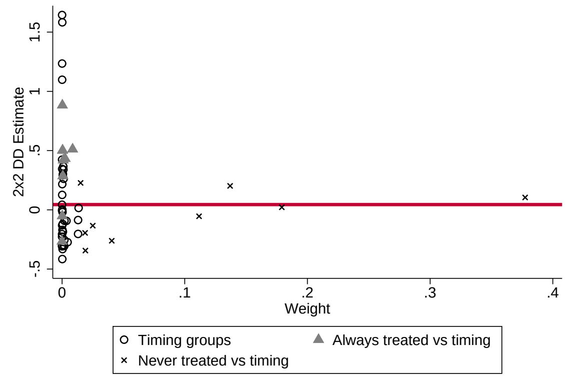
(b) Public charities



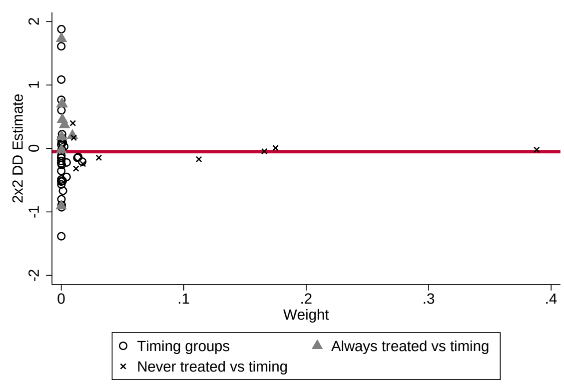
These figures plot the Bacon Decomposition (see Goodman-Bacon 2020) for the two-way fixed effect event studies for the staggered repeal of state-level estate taxes. The decomposition corresponds with the reduced form: $y_{it} = \alpha_i + \sum_{k=2002}^{2015} \delta_k 1\{Year_t = k\} + \sum_{j=-8}^{8} \beta_j 1\{EventTime_{s(i),t} = j\} + \varepsilon_{it}$, estimated on the sample of nonprofits remaining in a single state between 2002 and 2015 and excludes nonprofits domiciled in states never imposing an estate tax in this time period (always-treated units). Panel (a) estimates this specification on the subsample of private foundations. Panel (b) estimates this specification on the subsample of public charities.

Figure B.1.9: Goodman-Bacon decomposition
Event study estimates with two-way fixed effects (repeal events)

(a) Family foundations



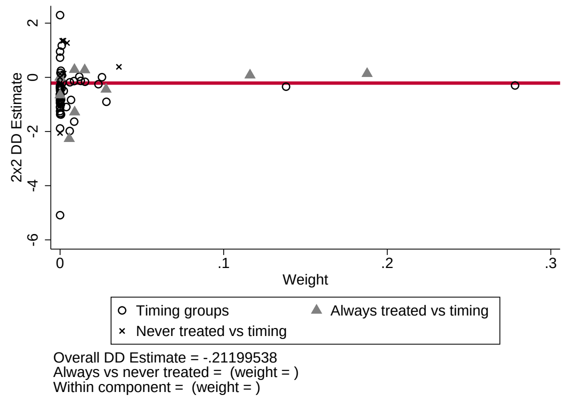
(b) Non-familial private foundations



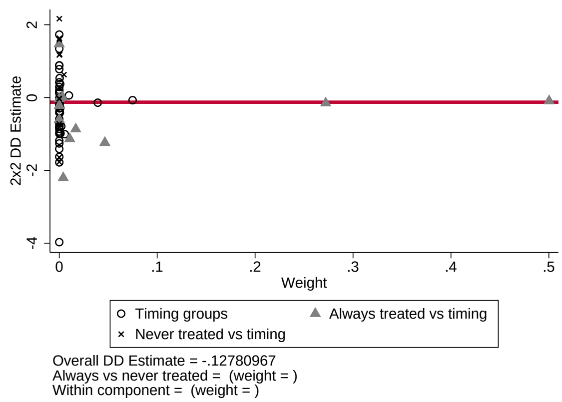
These figures plot the Bacon Decomposition (see Goodman-Bacon 2020) for the two-way fixed effect event studies for the staggered repeal of state-level estate taxes. The decomposition corresponds with the reduced form: $y_{it} = \alpha_i + \sum_{k=2002}^{2015} \delta_k 1\{Year_t = k\} + \sum_{j=-8}^{8} \beta_j 1\{EventTime_{s(i),t} = j\} + \varepsilon_{it}$, estimated on the sample of nonprofits remaining in a single state between 2002 and 2015 and excludes nonprofits domiciled in states never imposing an estate tax in this time period (always-treated units). Panel (a) estimates this specification on the subsample of family foundations. Panel (b) estimates this specification on the subsample of non-familial private foundations.

Figure B.1.10: Goodman-Bacon decomposition
Event study estimates with two-way fixed effects (installation events)

(a) Private foundations



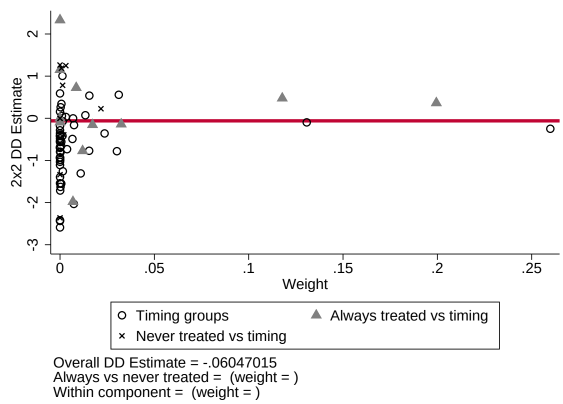
(b) Public charities



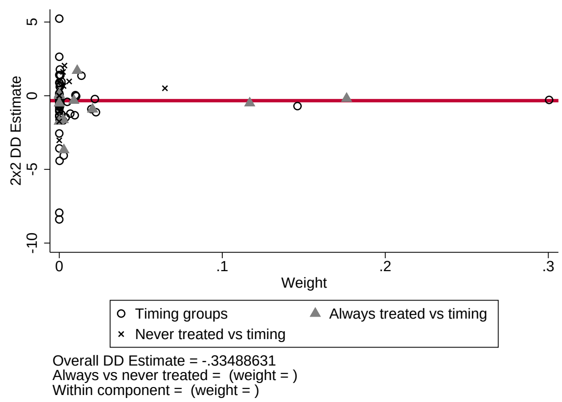
These figures plot the Bacon Decomposition (see Goodman-Bacon 2020) for the two-way fixed effect event studies for the staggered installation of state-level estate taxes. The decomposition corresponds with the reduced form: $y_{it} = \alpha_i + \sum_{k=2002}^{2015} \delta_k 1\{Year_t = k\} + \sum_{j=-8}^{8} \beta_j 1\{EventTime_{s(i),t} = j\} + \varepsilon_{it}$, estimated on the sample of nonprofits remaining in a single state between 2002 and 2015 and excludes nonprofits domiciled in states never imposing an estate tax in this time period (always-treated units). Panel (a) estimates this specification on the subsample of private foundations. Panel (b) estimates this specification on the subsample of public charities.

Figure B.1.11: Goodman-Bacon decomposition
Event study estimates with two-way fixed effects (installation events)

(a) Family foundations



(b) Non-familial private foundations



These figures plot the Bacon Decomposition (see Goodman-Bacon 2020) for the two-way fixed effect event studies for the staggered installation of state-level estate taxes. The decomposition corresponds with the reduced form: $y_{it} = \alpha_i + \sum_{k=2002}^{2015} \delta_k 1\{Year_t = k\} + \sum_{j=-8}^{8} \beta_j 1\{EventTime_{s(i),t} = j\} + \varepsilon_{it}$, estimated on the sample of nonprofits remaining in a single state between 2002 and 2015 and excludes nonprofits domiciled in states never imposing an estate tax in this time period (always-treated units). Panel (a) estimates this specification on the subsample of family foundations. Panel (b) estimates this specification on the subsample of non-familial private foundations.

Table B.1.1: Panel (a): Revenue summary statistics by organization type

	Non-section 3		Public charities	
	Mean	Median	Mean	Median
Revenue total	3.000e+06	130000	5.200e+06	170000
	(6.1e+07)	[5.9e+06]	(9.8e+07)	[1.0e+07]
Contributions / revenue	0.130	0	0.500	0.500
	(0.28)	[0.94]	(0.40)	[1.00]
Revenue / expense	10.07	1.030	9.810	1.030
	(4157.94)	[1.19]	(1317.62)	[2.18]
Contributions > 0	0.310	0	0.840	1
	(0.46)	[1.00]	(0.36)	[1.00]
Investment revenue	110000	720.6	140000	169.9
	(4.1e+06)	[1.5e+05]	(1.1e+07)	[1.6e+05]
Gross receipts	4.800e+06	170000	7.300e+06	230000
	(3.0e+08)	[7.0e+06]	(2.3e+08)	[1.3e+07]
Dividend revenue	32658	7006	30619	0
	(1.4e+05)	[1.2e+05]	(4.2e+05)	[46198.00]
Interest revenue	2031	0	6091	24
	(24315.09)	[4560.00]	(1.7e+05)	[13488.00]
Net income	160000	2069	260000	3371
	(3.9e+07)	[4.4e+05]	(2.0e+07)	[6.3e+05]
Inventory profit	38062	0	23242	0
	(9.7e+05)	[63276.89]	(1.0e+06)	[12221.77]
Disqualified amounts	8.560	0	48368	0
	(2182)	[0]	(1.3e+06)	[0]

This table displays mean and median values of select revenue summary stats for non-section (3) nonprofit organizations and public charities computed using a panel of annual financial declarations (as reported in IRS form 990) for between 1989 and 2015. Disqualified amounts corresponds with contributions from individuals legally designated as "disqualified members" due to proximity to organization leadership. Disqualified amounts are only reported starting 2011. Standard deviations are reported in parentheses; hard brackets indicate the difference between the 95th and 5th percentiles. Dollar values are expressed in terms of real USD 2015.

Table B.1.1: Panel (b): Revenue summary statistics by organization type

	Non-familial private foundations		Family foundations	
	Mean	Median	Mean	Median
Revenue total	1000000	36000	1.300e+06	77946
	(1.6e+07)	[2.0e+06]	(3.1e+07)	[3.1e+06]
Contributions / revenue	0.290	0	0.340	0
	(0.41)	[1.00]	(0.42)	[1.00]
Revenue / expense	70.79	1	98.55	1.030
	(10147.61)	[8.34]	(9283.43)	[14.05]
Contributions > 0	0.390	0	0.490	0
	(0.49)	[1.00]	(0.50)	[1.00]
Investment revenue	520000	9582	630000	23802
	(1.2e+07)	[8.6e+05]	(2.0e+07)	[1.4e+06]
Gross receipts	4.300e+06	130000	3.100e+06	240000
	(1.2e+08)	[2.2e+06]	(8.4e+06)	[2.2e+07]
Dividend revenue	120000	3247	130000	8104
	(2.2e+06)	[2.7e+05]	(2.4e+06)	[3.7e+05]
Interest revenue	16526	31	33984	41
	(3.2e+05)	[33362.00]	(3.5e+06)	[50713.00]
Net income	290000	0	450000	1.100
	(1.1e+07)	[9.6e+05]	(1.6e+07)	[1.9e+06]
Inventory profit	2170	0	244	0
	(1.9e+05)	[0.00]	(28713.72)	[0.00]
Disqualified amounts			520000	0
			(1.4e+06)	[3.9e+06]

This table displays mean and median values of select revenue summary stats for non-familial private foundations and family foundations computed using a panel of annual financial declarations (as reported in IRS form 990-PF) for between 1989 and 2015. Disqualified amounts corresponds with contributions from individuals legally designated as “disqualified members” due to proximity to organization leadership. Disqualified amounts are only reported starting 2011. Standard deviations are reported in parentheses; hard brackets indicate the difference between the 95th and 5th percentiles. Dollar values are expressed in terms of real USD 2015.

Table B.1.2: Panel (a): Expense summary statistics by organization type

	Non-section 3		Public charities	
	Mean	Median	Mean	Median
Expenses total	1.400e+06	100000	4.800e+06	150000
	(3.4e+07)	[2.6e+06]	(9.2e+07)	[9.6e+06]
Disqualified comp.	5600	0	22864	0
	(2.0e+05)	[0.00]	(1.0e+06)	[0.00]
Contributions paid	78784	4584	160000	2176
	(9.2e+05)	[2.1e+05]	(1.9e+06)	[3.8e+05]
Administrative expense	6258	1184	15815	0
	(28585.31)	[25030.00]	(2.9e+05)	[18199.00]
Admin. expense share	0.250	0.170	0.100	0
	(0.27)	[0.87]	(0.25)	[0.82]
Exp. / assets	3110	0.930	1372	0.980
	(1.2e+06)	[10.01]	(4.0e+05)	[15.10]
Rev. / exp.	2.600	1.030	9.840	1.030
	(285.99)	[1.09]	(1314.60)	[2.18]
Contributions received / paid	70.6	0.55	39.59	0.270
	(1052)	[72.75]	(680.51)	[40.43]
Contributions / expense	0.68	0.78	0.560	0.780
	(0.38)	[1.00]	(0.43)	[1.00]

This table displays mean and median values of select expense summary stats for non-section (3) nonprofit organizations and public charities computed using a panel of annual financial declarations (as reported in IRS form 990) for between 1989 and 2015. Standard deviations are reported in parentheses; hard brackets indicate the difference between the 95th and 5th percentiles. Dollar values are expressed in terms of real USD 2015.

Table B.1.2: Panel (b): Expense summary statistics by organization type

	Non-familial private foundations		Family foundations	
	Mean	Median	Mean	Median
Expenses total	680000	36924	730000	65000
	(1.0e+07)	[1.4e+06]	(2.5e+07)	[1.7e+06]
Disqualified comp.	14524	0	8850	0
	(1.9e+05)	[57342.82]	(1.7e+05)	[31323.83]
Contributions paid	490000	19421	580000	51147
	(8.0e+06)	[9.8e+05]	(2.0e+07)	[1.4e+06]
Administrative expense	110000	1741	70581	2658
	(2.4e+06)	[2.1e+05]	(2.2e+06)	[1.6e+05]
Admin. expense share	0.220	0.100	0.150	0.0700
	(0.29)	[0.91]	(0.22)	[0.75]
Expense / assets	16610	0.0800	505.6	0.0800
	(2.8e+06)	[9.39]	(38062.98)	[3.21]
Revenue / expense	70.79	1	98.55	1.030
	(10147.61)	[8.34]	(9283.43)	[14.05]
Contributions received / paid	269.8	0.620	216.4	0.780
	(28561.65)	[50.00]	(21430.52)	[57.22]
Contributions / expense	0.660	0.810	0.800	0.890
	(0.35)	[1.00]	(0.27)	[1.00]

This table displays mean and median values of select summary stats for non-familial private foundations and family foundations computed using a panel of annual financial declarations (as reported in IRS form 990-PF) for between 1989 and 2015. Standard deviations are reported in parentheses; hard brackets indicate the difference between the 95th and 5th percentiles. Dollar values are expressed in terms of real USD 2015.

Table B.1.3: Panel (a): Metadata by organization type

w

	Non-section 3		Public charities	
	Mean	Median	Mean	Median
Age	17.88	11	6.700	2
	(19.11)	[54.00]	(11.70)	[32.00]
Reporting age (max 31)	12.64	8	9.970	8
	(11.23)	[30.00]	(8.60)	[29.00]
Reporting prop.	0.870	0.970	0.910	0.950
	(0.20)	[0.60]	(0.14)	[0.38]
Distinct EINs	3.3e+05		6.0e+05	

This table displays mean and median values of select metadata for non-section 3 nonprofit organizations and public charities computed using a panel of annual financial declarations (as reported in IRS form 990) for between 1989 and 2015. Age corresponds with the maximum difference between most recent reporting year and founding year achieved by each EIN (with summary statistics computed from a separate cross-sectional dataset). Reporting age corresponds with the maximum within-panel age achieved by each EIN computed as the difference between the latest and earliest reporting years. Reporting proportion refers to the fraction of years out of an entity's within-panel age in which it filed a 990 or 990-PF declaration. Standard deviations are reported in parentheses; hard brackets indicate the difference between the 95th and 5th percentiles. Dollar values are expressed in terms of real USD 2015.

Table B.1.3: Panel (b): Metadata by organization type

	Non-familial private foundations		Family foundations	
	Mean	Median	Mean	Median
Age	3.050	2	2.620	1
	(3.84)	[8.00]	(5.14)	[8.00]
Reporting age (max 31)	12.55	11	17.87	18
	(9.59)	[30.00]	(8.10)	[26.00]
Reporting prop.	0.870	0.910	0.840	0.850
	(0.15)	[0.50]	(0.13)	[0.43]
Distinct EINs	93976		46512	

This table displays mean and median values of select summary stats for non-familial private foundations and family foundations computed using a panel of annual financial declarations (as reported in IRS form 990-PF) for between 1989 and 2015. Age corresponds with the maximum difference between most recent reporting year and founding year achieved by each EIN (with summary statistics computed from a separate cross-sectional dataset). Reporting age corresponds with the maximum within-panel age achieved by each EIN computed as the difference between the latest and earliest reporting years. Reporting proportion refers to the fraction of years out of an entity's within-panel age in which it filed a 990 or 990-PF declaration. Standard deviations are reported in parentheses; hard brackets indicate the difference between the 95th and 5th percentiles. Dollar values are expressed in terms of real USD 2015.

B.2 Mathematical proofs

B.2.1 Proof of comparative statics results with non-additively separable bequest motive

I apply the implicit function theorem to the interior optimum defined implicitly by the mapping

$$f(x^*, \lambda, \beta, \tau, w) = \begin{bmatrix} \beta v_b - \frac{\lambda}{1-\tau} \\ u_c' - \lambda \\ u_n' - \frac{\lambda}{1-\tau} \\ \beta v_{g_p} + u_p' - \lambda \\ w - \frac{b}{1-\tau} - g_c - \frac{g_n}{1-\tau} - g_p \end{bmatrix} = \vec{0} \in \mathbb{R}^5 \tag{B.1}$$

so as to express partial derivatives of $x^* = (b^*, g_c^*, g_n^*, g_p^*, \lambda)$ with respect to τ.

$$\begin{bmatrix} \frac{\partial b^*}{\partial \tau} \\ \frac{\partial g_c^*}{\partial \tau} \\ \frac{\partial g_n^*}{\partial \tau} \\ \frac{\partial g_p^*}{\partial \tau} \\ \frac{\partial \lambda}{\partial \tau} \end{bmatrix} = -1 \cdot \begin{bmatrix} \beta v_{bb} & 0 & 0 & \beta v_{bg_p} & \frac{-1}{1-\tau} \\ 0 & u_c'' & 0 & 0 & -1 \\ 0 & 0 & u_n'' & 0 & \frac{-1}{1-\tau} \\ \beta v_{g_p b} & 0 & 0 & \beta v_{g_p g_p} + u_p'' & -1 \\ \frac{-1}{1-\tau} & -1 & \frac{-1}{1-\tau} & -1 & 0 \end{bmatrix}^{-1} \cdot \begin{bmatrix} -\lambda(1-\tau)^{-2} \\ 0 \\ -\lambda(1-\tau)^{-2} \\ 0 \\ -(b+g_n)(1-\tau)^{-2} \end{bmatrix}$$

We can express the implicitly defined partial derivatives at an interior optimum as:

$$\begin{bmatrix} \frac{\partial b^*}{\partial \tau} \\ \frac{\partial g_c^*}{\partial \tau} \\ \frac{\partial g_n^*}{\partial \tau} \\ \frac{\partial g_p^*}{\partial \tau} \\ \frac{\partial \lambda}{\partial \tau} \end{bmatrix} = \frac{1}{\Lambda(1-\tau)^2} \begin{bmatrix} \lambda(\beta \frac{v_{bg_p} u_c''}{1-\tau} + u_c'' u_n'' + u_n'' U_{g_p g_p}) + (b+g_n) u_c'' u_n'' (\beta v_{bg_p} - \frac{U_{g_p g_p}}{1-\tau}) \\ \lambda(\frac{\beta^2 v_{bg_p}^2 - \beta v_{bb} U_{g_p g_p} - u_n'' U_{g_p g_p}}{1-\tau} + \beta v_{bg_p} u_n'') + (b+g_n) u_n'' (\beta^2 v_{bg_p}^2 - \beta v_{bb} U_{g_p g_p}) \\ \lambda(\beta v_{bb}(u_c'' + U_{g_p g_p}) - \beta^2 v_{bg_p}^2 - \beta v_{bg_p} \frac{u_c''}{1-\tau}) + (b+g_n) \frac{u_c''}{1-\tau} (\beta^2 v_{bg_p}^2 - \beta v_{bb} U_{g_p g_p}) \\ -\lambda(\beta v_{bg_p} u_n'' + \frac{u_c''}{1-\tau}(\beta v_{bb} + u_n'')) + (b+g_n) u_c'' u_n'' (\frac{\beta v_{bg_p}}{1-\tau} - \beta v_{bb}) \\ \lambda u_c'' (\frac{\beta^2 v_{bg_p}^2 - U_{g_p g_p}(\beta v_{bb} + u_n'')}{1-\tau} + \beta v_{bg_p} u_n'') + (b+g_n) u_c'' u_n'' (\beta^2 v_{bg_p}^2 - \beta v_{bb} U_{g_p g_p}) \end{bmatrix}$$

for $U_{g_p g_p} = \beta v_{g_p g_p} + u_p''$ and

$$\Lambda = U_{g_p g_p} \Big(\frac{u_c''}{(1-\tau)^2} (\beta v_{bb} + u_n'') + \beta v_{bb} u_n'' \Big) + \beta u_c'' u_n'' (v_{bb} - 2 \frac{v_{bg_p}}{1-\tau}) - \beta^2 v_{bg_p}^2 (u_n'' + \frac{u_c''}{(1-\tau)^2}).$$

Imposing additive separability between bequests b and private foundation giving g_p trivially establishes a critical value as a local maximum and produces standard substitution effects and normal income effects.

However, allowing for a more general form of v_{bg_p} may introduce non-trivialities that require additional assumptions on the shape of $v(b, g_p)$ and its relationship with the other value functions in order to preserve the critical points of the Lagrangian as a maxima. These restrictions are more apparent expressing Λ as a quadratic function in v_{bg_p} :

$$\Lambda = \underbrace{-\beta^2 \Big(u_n'' + \frac{u_c''}{(1-\tau)^2} \Big)}_{>0} v_{bg_p}^2 \quad - \quad \underbrace{2 \frac{\beta u_c'' u_n''}{1-\tau}}_{>0} v_{bg_p} \quad + \quad \underbrace{\Big(U_{g_p g_p} \Big(\frac{u_c''}{(1-\tau)^2} (\beta v_{bb} + u_n'') + \beta v_{bb} u_n'' \Big) + \beta u_c'' u_n'' v_{bb} \Big)}_{<0}.$$

The coefficients of this quadratic equation imply that a critical value represents a local maximum for v_{bg_p} contained in the connected open interval with bounds

$$\frac{u_c''u_n'' \pm \sqrt{(u_c''u_n'')^2 + (u_n''(1-\tau)^2 + u_c'')\Big(U_{g_pg_p}\Big(\frac{u_c''}{(1-\tau)^2}(\beta v_{bb} + u_n'') + \beta v_{bb}u_n''\Big) + \beta u_c''u_n''v_{bb}\Big)}}{-\beta\frac{u_n''(1-\tau)^2+u_c''}{1-\tau}}$$

at a critical value.

Note that for bequests b and private foundation giving g_p, the linearity of the budget constraint reduces the second partial derivatives of the Lagrangian expression of the constrained optimization problem to the second partial derivatives of the bequesting value function $v(b, g_p)$, so that at a local maximum,

$$\Big(\frac{\partial^2 v}{\partial b \partial g_p}\Big)^2 - \frac{\partial^2 v}{\partial b^2}\frac{\partial^2 v}{\partial g_p^2} = \Big(\frac{\partial^2 \mathcal{L}}{\partial b \partial g_p}\Big)^2 - \frac{\partial^2 \mathcal{L}}{\partial \mathcal{L}^2}\frac{\partial^2 v}{\partial g_p^2} < 0.$$

Regular substitution and normal income effects follow from allowing for $v_{bg_p} \geq 0$ within the above restrictions. However, imposing the requirement that $v_{bg_p} < 0$ introduces additional non-trivialities. Namely, the condition that $\Big(\frac{\partial^2 v}{\partial b \partial g_p}\Big)^2 - \frac{\partial^2 v}{\partial b^2}\frac{\partial^2 v}{\partial g_p^2} < 0$ allows for only one of the following or neither to hold:

$$\frac{v_{g_pg_p}}{1-\tau} > v_{bg_p},$$
$$v_{bb} > \frac{v_{bg_p}}{1-\tau},$$

which implies the net inferiority of bequests or private foundation giving respectively.