Can Wealth Taxation Work in Developing Countries? Quasi-Experimental Evidence from Colombia*

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Abstract

We study individual responses to wealth taxation and enforcement using Colombian tax microdata linked with the leaked Panama Papers. We exploit reforms modifying wealth tax rates and enforcement. Individuals lower their reported wealth in response to wealth taxes, with an estimated (short-term) elasticity of 2. In addition, individuals avoid taxes by hiding assets offshore in neighboring tax havens. Yet noncompliance also responds to enforcement. A disclosure scheme encouraged evaders—including 40% of the wealthiest 0.01%—to reveal hidden wealth worth 1.7% of GDP. Furthermore, increased detection probability triggered by Panama Papers leak raised disclosures by 830%, improving wealth tax collection and progressivity.

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1 Introduction

Progressive wealth taxation has received renewed interest as a tool to raise revenue and curb inequality.[1] Following Piketty's (2014) call for a global wealth tax and, more recently, Senator Warren's proposal to tax wealth in the United States, much of the discussion has focused on whether wealth taxes are enforceable if taxpayers (legally) avoid or (illegally) evade them. For instance, taxpayers might hide assets in tax havens or underreport their wealth, jeopardizing the feasibility of taxing wealth in practice. Indeed, tax sheltering by wealthy individuals raises the resource cost of levying taxes, offsets wealth tax progressivity and hinders its redistributive appeal—concerns that are exacerbated in developing countries with high inequality and low tax compliance. While governments may have tools to control enforcement, we know little about the effectiveness of these tools in practice.

A nascent empirical literature estimating behavioral responses to wealth taxes takes enforcement as given and largely ignores key sheltering mechanisms used by wealthy taxpayers, such as offshoring to tax havens.[2] Indeed, it is inherently challenging to reliably measure and identify offshore sheltering responses to taxation (inter alia, secrecy is precisely what makes offshore shell corporations attractive). Further, how individuals respond to taxes depends not only on the tax incentives but, critically, also on the enforcement environment (Slemrod, 2017). Yet there is surprisingly scant evidence on how wealthy individuals respond to stronger enforcement, partly because sources of exogenous variation on wealth tax enforcement have so far been elusive.

This paper breaks new grounds on these issues providing quasi-experimental evidence on behavioral responses to personal wealth taxes and wealth tax enforcement in Colombia. We use extensive tax microdata on wealth covering all income and wealth tax filers between 1993 and 2016, while leveraging Colombia's numerous tax and enforcement policy reforms. First, we estimate how elastic reported wealth is with respect to wealth taxation and the drivers of this elasticity, i.e., real versus reporting responses. We then delve into studying offshoring to Colombia's most relevant tax havens by linking our tax returns to the Panama Papers leak and tracking the clients of Mossack Fonseca, one of the world's five largest wholesalers of offshore secrecy. Lastly, we evaluate how offshore evasion responds to improvements in enforcement, exploiting exogenous shocks to detection probabilities and the punishment for cheating. This piece of evidence is critical to evaluate the feasibility of wealth taxes in a globalized world, given the fear that wealth taxation triggers capital flight to tax havens and the recent global crackdown on offshore tax evasion through voluntary disclosure schemes and mandatory information reporting requirements (e.g., the US Foreign Account Tax Compliance Act—FATCA). In conjunction, these analyses provide the necessary ingredients to assess whether wealth taxes can work, even when the stakes are particularly high.

In the first part of the paper, we exploit variation from discontinuities in Colombia's wealth

[1] Wealth taxes are levied on the stock of (financial and non-financial) assets, net of liabilities.

[2] See Brulhart, Gruber, Krapf and Schmidheiny (2017); Durán-Cabé, Esteller-Moré and Mas-Montserrat (2017); Jakobsen, Jakobsen, Kleven and Zucman (2018); Seim (2017); Zoutman (2015).

tax schedule and reforms modifying who pays the wealth tax and what share of wealth is taxed. The Colombian wealth tax schedule features discrete jumps in tax liability at given thresholds of reported wealth, i.e., tax *notches*. For instance, in 2010, an income taxpayer reporting just below 1 billion pesos (USD 520,830) owed no wealth tax, while a taxpayer reporting an additional peso owed 1 percent of all taxable net wealth, i.e., a tax bill of 10 million pesos (USD 5,208.3). Multiple tax reforms modified both the location of the bracket cutoffs and the wealth tax rate, which ranged from 0 to 6 percent; a very large policy experiment relative to previous studies.[3] Critically, we observe wealth holdings before and after reforms for individuals above and below the cutoffs because taxpayers annually report end-of-year *wealth* (e.g., taxable and non-taxable bank deposits, equities, business assets, real estate, vehicles, debt) in their *income* tax statements regardless of whether they owe wealth taxes.

Leveraging the variation in wealth tax rates across brackets and time, we apply the bunching techniques to estimate the elasticity of substitution between truthfully reporting individual wealth holdings to the tax authority. If individuals do not respond to taxation, reported wealth will be distributed smoothly around the notch points. If, instead, individuals avoid the jumps in wealth tax liability by reporting below the notch points, they will bunch just below them—the quantity of bunching suggesting the responsiveness to the tax policy (see Chetty, Friedman, Olsen and Pistaferri, 2011; Kleven and Waseem, 2013; Saez, 2010). Reassuringly, we can use the observed pre-reform distribution as our counterfactual density, alleviating concerns about implicit functional form or preference assumptions (Blomquist and Newey, 2017). We find large and immediate bunching in response to the wealth tax. In our main analysis, the marginal buncher reports 21 percent lower wealth because of the tax notch. A one percent increase in (one minus) the wealth tax rate raises reported wealth by 2 percent, slashing up to a fifth of the wealth tax revenue. Despite these behavioral responses, in the short run, Colombia remains below its revenue-maximizing wealth tax rate (in the long run, individuals might also potentially adjust their real behavior, like dissaving or making bequests).

To decompose our estimated behavioral response, we use a two-stage least squares approach that characterizes changes in taxpayer reporting behavior induced by wealth taxation. We compare the type of wealth individuals report before and after tax notches are introduced, characterizing taxpayers who bunch in response to the notches. This is akin to an analysis of the compliers characteristics (see Abadie, 2002; Diamond and Persson, 2016). Bunchers avoid the wealth tax by (artificially) inflating liabilities and underreporting business assets not subject to third-party reporting. Consistent with reporting responses driving the bunching elasticity, bunchers exploit the differential coverage of third-party reporting to underreport the type of wealth less likely to be detected by the tax authority.

In the second part of the paper, we focus on offshoring assets to tax havens as a key tool used

[3] Assuming the return to wealth is 6.6 percent, a wealth tax rate of 6 percent implies a 90.9 percent tax on the return to wealth. In contrast, the top wealth tax rate ranged between 1 and 2.5 percent in Europe.

by the wealthiest taxpayers to avoid and evade taxes. We exploit data from the Panama Papers, which lists the names of shareholders of entities incorporated by Mossack Fonseca in Panama and over 20 other jurisdictions between 1977 and 2016.[4] Thanks to the publication of the data by investigative reporters and cooperation with the Colombian tax authority, we match the data to our tax returns using personal names. Leveraging the date individuals incorporated these offshore entities, we examine the interaction between wealth taxation and the dynamics of offshore entity incorporation and tax sheltering at the top. The reintroduction of the wealth tax was followed by a tenfold increase in Colombian entities incorporated in tax havens. These offshore entities were predominantly used by very wealthy individuals: even if underreporting, the wealthiest 0.01 percent is 24 times as likely to appear named in the Panama Papers than the wealthiest 5 percent. Offshore entities were used at least in part to hide assets and minimize the tax burden: although Colombia's residence-based tax system requires reporting all foreign assets, an event study analysis shows the reported value of assets drops 10.9 percent as soon as they incorporate their entity offshore.

In the third part of the paper, we examine how wealthy individuals responds to improvements in enforcement. To crack down on offshore evasion and recover tax on hidden wealth, Colombia implemented a voluntary disclosure program similar to those recently implemented in the United States and Europe (OECD, 2010, 2015). Generous tax incentives were awarded to disclosures of unreported assets and/or nonexistent liabilities in 2015, 2016, or 2017, while evaders who did not come forward faced strict penalties if caught cheating. Wealth worth 1.73 percent of GDP was disclosed under the scheme. Admission of noncompliance rises sharply with wealth: the wealthiest 0.01 percent was 55 times more likely to disclose under the scheme than the wealthiest 5 percent. In all, two-fifths of taxpayers in the wealthiest 0.01 percent disclosed some hidden wealth.[5] At least a third of evaders' wealth had been hidden abroad, concomitant with the pervasiveness of offshore tax evasion at the top.[6] Critically, awarding tax incentives for disclosures had persistent effects on wealth and income tax compliance. A difference-in-differences analysis shows disclosers reported 49.2 percent more wealth as well as more capital income relative to nondisclosers three years after their first disclosure. As a result, disclosers also paid 39 percent more income taxes, further raising revenue collected from the wealthiest tax filers and enhancing the progressivity of the tax system as a whole.

With compliance responding not only to the tax incentives, we test how wealthy taxpayers react to exogenous increases in the perceived risk of detection and the punishment for cheating. Halfway through the disclosure program, the Panama Papers news story broke. The Colombian

[4]Geographic proximity and political stability contributed in making Panama the most popular destination for foreign assets owned by Colombians, after the US. Even before the leak, Colombians were almost 15 times as likely to report owning foreign assets in Panama than in the Virgin Islands or Switzerland.

[5]Top 0.01 percent individuals are almost three times as likely to disclose under these schemes in Colombia than in Norway and Sweden (Alstadsater, Johannesen and Zucman, forthcoming).

[6]Accounting for hidden offshore wealth increases measured wealth inequality. A conservative correction shows that the top 1 percent share of total wealth rises from 40.6 to 43.2 percent. Because offshore wealth is extremely concentrated at the top, the rise is more pronounced for the wealthiest 0.1 percent.

tax authority reacted by scrutinizing Mossack Fonseca and its clients, contacting taxpayers named in the leak and requesting documentation of their offshore activities and transactions. Three weeks after the leak, the governments of Colombia and Panama announced a tax information exchange agreement between the two countries—a move the tax haven had resisted for years. Exploiting the exogenous timing of the leak, we compare outcomes between wealth tax filers named (treated) and not named (control) in the leak before and after it occurred. The difference-in-differences coefficient shows that the Panama Papers and subsequent events induced a 27 percentage point increase in the likelihood of disclosing, i.e., a ninefold increase relative to the pre-event control mean. Disclosures of foreign assets in particular increased more than fifteenfold. Consequently, taxes paid by these individuals more than doubled after the leak.

Six months later, Colombia criminalized tax evasion for the first time. If convicted, tax evaders could face up to nine years in prison. Critically, we find that most disclosers admitted to noncompliance immediately after the criminalization of tax evasion and before the disclosure window expired, arguably at least in part due to the harsher sanction for noncompliance.

We contribute to three main literatures. First, there is the aforementioned empirical literature on wealth taxes in Europe (Brulhart et al., 2017; Durán-Cabé et al., 2017; Jakobsen et al., 2018; Seim, 2017; Zoutman, 2015). Compared to previous studies, we address offshore tax evasion and examine how enforcement policy improves tax compliance among wealthy taxpayers. Further, we examine responses from multiple wealth tax changes, some of which are much larger than in the existing literature. Finally, our estimated elasticities—the first in a developing country context—can be interpreted as an upper bound on responses occurring in settings with a more sophisticated enforcement technology.

Second, a burgeoning literature focuses on globalization and offshore tax evasion (Alstadsater et al., forthcoming; Zucman, 2015) and the effectiveness of the global wave of crackdowns on tax havens through enhanced cross-country tax information exchange agreements (Johannesen, Langetieg, Reck, Risch and Slemrod, 2018), reporting requirements (Johannesen and Larsen, 2016; Johannesen and Zucman, 2014), and the amnesties and voluntary disclosure programs that have accompanied these enforcement initiatives (Alstadsater, Johannesen and Zucman, 2018a; Bayer, Oberhofer and Winner, 2015; Langenmayr, 2017). We are the first to shed light on the interactions between wealth taxation, offshoring, and stronger enforcement. Moreover, we show how the events triggered by Panama Papers leak improved tax compliance among very wealthy individuals. To our knowledge, this is the first direct evidence of whistleblowing contributing to tax compliance.

Lastly, we contribute to the growing literature on tax design and compliance in developing countries. While most of this literature focuses on firm behavior (Bachas and Soto, 2018; Brockmeyer and Hernandez, 2016; Naritomi, 2016; Pomeranz, 2015), we examine the behavior of high net worth individuals, an understudied population that is critical for the design and evaluation of redistributive fiscal policy. It is precisely in these settings, where few individuals at the top end up holding the vast majority of wealth (Alvaredo, Chancel, Piketty, Saez and Zucman, 2018), that

progressive wealth taxation is argued to potentially be a powerful redistributive tool.

The remainder of this paper is organized as follows. Section 2 describes the institutional context and our data. Section 3 presents bunching responses to personal wealth taxes. Section 4 exhibits offshore sheltering using evidence from the Panama Papers. Section 5 studies responses to wealth tax enforcement. Section 6 discusses the implications of wealth concealed offshore for the study of inequality. Finally, Section 7 concludes.

2 Background and Data

2.1 Institutional Context

Colombia is an upper middle income country, with GDP per capita of 14,154 US dollars at purchasing power parity in 2016 (World Bank International Comparison Program database). Total tax revenues represent 19.8 percent of GDP, while recurrent taxes on personal net wealth have constituted 0 to 0.27 percent of GDP between 2002 and 2017 (Figure A.1).[7] In addition to annual taxes on net worth, Colombia levies other taxes on capital (e.g., property tax, inheritance tax) and capital income (e.g., rental income, realized capital gains).

Direct taxes on income and wealth are collected by the central government tax authority, *Dirección de Impuestos y Aduanas Nacionales* (DIAN, for its Spanish acronym). Income and wealth taxes in Colombia are individually based and have never allowed joint filing for married couples. The tax authority records *wealth* information in *income* tax statements every year, regardless of whether income taxpayers are subject to the wealth tax. This is done to calculate the minimum income tax base or "presumptive income," which is based on net worth.[8] Income taxpayers are required to annually self-report end-of-year financial assets (e.g., cash, bank deposits, stocks, bonds, unlisted securities, financial assets held abroad), non-financial assets (e.g., real estate, land, large durables, non-corporate business assets, non-financial assets held abroad), and debt (e.g., mortgages, inter-personal debts).[9] Self-reporting assets is crucial because it provides taxpayers with sheltering opportunities. Income tax filers reporting (taxable and nontaxable) net worth above a cutoff are eligible for the wealth tax and file a separate tax statement.[10] This exemption threshold has been very high and excludes more than 99 percent of adults from the wealth tax. For instance, in 2017, only 0.2 percent of adults paid the wealth tax—a smaller fraction than other wealth-taxing

[7] The equivalent 2016 shares in Spain, Norway, and Switzerland were 0.18, 0.43, and 1.0 percent, respectively (OECD, 2018).

[8] There is a legal presumption that a taxpayer's taxable income is no less than a fixed share of her net worth reported the previous year, minus two allowances (e.g., 6 percent in 1999–2006, and 3 percent in 2007–2016).

[9] A pervasive informal sector, outdated cadastral values, and high filing thresholds imply that only a fraction of tax units (adults aged 20 and above) file income tax returns in Colombia (Alvaredo and Londoño-Vélez, 2014). For instance, in FY 2016, all but 6.6 percent of tax units were excluded from filing income taxes.

[10] Because wealth tax eligibility and rates are determined by taxable *and* non-taxable net worth in our setting, shifting from taxable to non-taxable assets will be a second-order strategy for Colombian taxpayers.

countries (OECD, 2018).

Colombia has a long tradition of taxing net wealth of individuals and firms, as detailed in Appendix B. Recurrent wealth taxes were first introduced in 1935 and kept in place until 1992. A decade after its abolition, President Uribe Vélez reintroduced wealth taxation in 2002 to finance *Seguridad Democrática*—the administration's security effort against drug trafficking, guerrilla, and paramilitary groups—earmarking its revenues for defense and security expenditures. The wealth tax was levied on taxable net worth, that is, net worth minus two allowances: the value of principal residence (up to a limit) and the net equity value of shares in domestic companies (this avoid double wealth taxation of firms and individuals).

The wealth tax was designed as a piecewise linear schedule, with each bracket associated with a fixed *average* tax rate. For instance, in 2010, individuals reporting net worth below 1 billion pesos (2010 USD 520,830) were exempt from the wealth tax, whereas those reporting an additional peso paid 1 percent of all their taxable wealth, i.e., a tax bill of USD 5,208. This wealth tax rate increases to 1.4 percent at 2 billion pesos in reported wealth, 3 percent at 3 billion pesos, and 6 percent at 5 billion pesos. The notched wealth tax schedule thus produces discontinuous jumps in tax liability at bracket cutoffs, as depicted in Figure 1, Panel (a). A series of reforms in the last two decades modified both the wealth tax rates and the bracket cutoffs, as illustrated by Figure 1, Panel (b).

While income is largely covered by third-party reporting in Colombia, there is only partial third-party reporting of wealth. Most financial wealth is subject to third-party reporting: end-of-year savings and checking account balances, loans, bonds, deposits, listed equities, voluntary pension contributions, and mortgage debt are reported by financial institutions. In contrast, non-financial assets such as real estate and vehicles are subject to less third-party reporting; while taxpayers should report the same values as in the property and vehicle taxes, this information is not systematically cross-verified by the tax authority. Finally, several wealth components have virtually no third-party reporting, such as cash, large durables, unlisted equities, non-corporate business assets (e.g., inventories), inter-personal debts, and—until recent developments in tax information exchange agreements with other countries—assets held abroad.

Despite technological improvements in third-party reporting since 2006 (reviewed in Appendix B), enforcement capacity is still limited. The few staff handling third-party reports and the tax technology available are not enough to systematic cross-check items reported in the wealth tax return using available third-party reported information. Unlike some OECD countries, there is no dedicated unit for managing the tax affairs of high net worth taxpayers (OECD, 2017). Moreover, taxpayers reporting total assets in aggregate form in a single box in the income tax return makes it more difficult to detect the sources of year-to-year changes. The tax authority carries out randomized audits and requests documentation for all reductions in wealth holdings that are not evidently compatible with changes in other positions of the tax return. However, we are not aware of the exact number of wealth tax audits performed nor the number of verification or audit activity

for high net worth taxpayers, as the tax authority discloses relatively limited information regarding its verification and audit actions.[11] This offers scope for tax evasion through underreporting or altogether failing to report assets, or fabricating liabilities.[12] To our knowledge, no rigorous estimates of the extent of wealth tax evasion exist for Colombia.[13]

2.2 Data

Our data come from four main sources. Our first dataset is individual-level administrative tax microdata covering the universe of income tax filers between FY 1993 and FY 2016. These comprise 20.5 million observations (taxpayer-years) in a longitudinal panel of taxpayers. Our records contain information on the majority of items recorded in individual income tax declarations, and include total assets and debt owned by December 31 every year. Before 2004, assets are decomposed into six broad categories.[14] The income tax return was modified in 2004 and, since then, this level of wealth disaggregation is only required for taxpayers keeping records.[15] This subset of taxpayers are business owners involved in retail and other commercial ventures, and represent 10–15 percent of income taxpayers every year.

The second dataset is composed of individual-level wealth tax returns for all filers in wealth tax years from 2002 to 2017. Individuals with reported net worth above a cutoff in the income tax statement are required to submit a wealth tax return. For these individuals, and a handful of voluntary filers, this dataset includes the decomposition of taxable and non-taxable net wealth, and wealth tax liability. Between 2015 and 2017, Colombia offered tax benefits to tax evaders voluntarily disclosing hidden assets and inexistent liabilities. Information on these disclosures is also available in our data.

The third dataset is the individual-level information return on foreign assets. Since 2015, all income taxpayers owning any foreign asset must file a separate information tax reform. Tax filers report the type of asset held abroad, the location of the asset, and the value of the foreign asset (the level of disaggregation of this information depends on the value of assets owned). These records have also been made available to us.

[11] This opacity may be optimal from a policy perspective if taxpayers overestimate audit probabilities (Bérgolo, Ceni, Cruces, Giaccobasso and Perez-Truglia, 2018). Overall, the number of completed audits per 100 active taxpayers is extremely low in Colombia compared to OECD countries: 0.38 for the personal income tax, 1.68 for the corporate income tax, and 0.54 for the value-added tax (OECD, 2017).

[12] One way of fabricating a liability is to report a debt contract with a friend or relative such that the debt is held by someone whose wealth placed them above the threshold while the asset was held by someone located below.

[13] The incentives for individuals to own wealth through an entity rather than directly strengthened in recent years because the wealth tax for firms was progressively phased out starting 2015, to be completely eliminated by 2018 (Law 1739/2014). However, this will affect individuals mostly after 2018, i.e., after our period of study.

[14] This decomposition is as follows: (i) cash, deposits in savings or checkings bank accounts, certificates of deposit, and other investments (e.g., bonds, life insurance, voluntary retirement fund); (ii) accounts receivable; (iii) stocks and contributions; (iv) inventories; (v) fixed assets (e.g., real estate, land ownership, vehicles, boats); and (vi) other assets (e.g., jewelery, art, industrial and intellectual property rights).

[15] Figure A.2 plots the decomposition of wealth by asset type for FY 2016.

The last dataset comes from three massive leaks published by the International Consortium of Investigative Journalists (henceforth ICIJ). The largest one comes from Panamanian law firm Mossack Fonseca (i.e., the "Panama Papers"). Around one-third of the offshore entities were incorporated through Portcullis TrustNet (now Portcullis) and Commonwealth Trust Limited (i.e., the "Offshore Leaks"). The remainder come from a trouve of data from the official corporate registry of the Bahamas (i.e., the "Bahamas Leak"). These microdata cover nearly 40 years—from 1977 through to early 2016—and link to individuals and companies in more than 200 countries and territories. The information includes, inter alia, the names of the real owners of offshore entities, the entity contact postal address, the entity incorporation and inactivation dates.

Regrettably, the ICIJ dataset has a number of limitations. First, it is restricted to offshore entities created by only the handful of laws firms and offshore service providers mentioned above. Second, not every officer of a company that appears in the three leaks shows up in the public database. This is either because information about ownership cannot easily be extracted in a systematic manner, or because the law firm or offshore service provider failed to collect the necessary information about the real owners of companies.[16] Third, information on the amount of wealth stored in the offshore entity or taxes evaded is not included. There are legitimate reasons to create a company in an offshore jurisdiction, and many law-abiding individuals declare them to their tax authorities when it is required. For instance, during the more violent 1990s and early 2000s, wealthy Colombians may have preferred safekeeping their wealth abroad. The investigations conducted by the authorities are still ongoing.

Despite these limitations, the Panama Papers provide valuable information (and arguably a lower bound) on the extent to which Colombian citizens—law-abiding or otherwise—use offshore entities. We merge these data with administrative income and wealth tax records using individual names. The Panama Papers included information from 1,752 shareholders of offshore entities with a personal or entity contact address in Colombia, and we are able to match 1,208 individuals to their tax records using personal names, i.e., a match rate of 70 percent. This is partly thanks to the naming custom involving two surnames—a paternal surname, followed by a maternal surname—often practiced in Colombia. The pool of unmatched individuals represents cases where the full name does not uniquely identify an individual in the tax records, or where the individual—whether required to or otherwise—did not file an income tax record in Colombia between 1993 and 2015.

3 Bunching Responses to Wealth Taxes

In this section, we leverage quasi-experimental variation in wealth taxes introduced by the notched tax schedule and the tax reforms described in Section 2 to estimate the elasticity of net wealth

[16] Indeed, anonimity and the strategic veil of secrecy is precisely what makes offshore corporations so attractive to some. For this reason, a sizeable amount of offshore entities are assigned to the Bahamas, the British Virgin Islands, etc. (Alstadsater et al., forthcoming).

with respect to the net-of-wealth tax rate. To fix ideas, consider the 2010 wealth tax reform, which lowered the exemption threshold from 3 to 1 billion pesos (2010 USD 1,562,490 to 520,830) and introduced two notches. Taxpayers previously exempt from the wealth tax suddenly faced average wealth tax rates of 1 percent if reporting 1 to 2 billion pesos or 1.4 percent if reporting 2 to 3 billion pesos. Figure 2 plots the density of tax filers by bins of reported wealth in 2009 (before the reform) and 2010 (after the reform). The distribution of taxpayers is smooth in the absence of wealth taxes (gray curve). In contrast, the introduction of the two tax notches is followed by the immediate emergence of excess and missing masses just below and above the notch points (blue curve). This bunching identifies a direct behavioral response to wealth taxes.

A priori, unlike earnings responses to income taxes, which potentially conflate real and sheltering responses, immediate bunching in the distribution of wealth—a stock—predominantly reflects reporting. It is difficult for individuals to immediately bunch below the notch points using real responses (e.g., investment) because wealth partly depends on asset prices, which are highly uncertain and fluctuate throughout the year (Jakobsen et al., 2018). This motivates our model of wealth underreporting, which we describe below.

3.1 The Elasticity of Reported Wealth: Theory and Evidence

Building on Kleven and Waseem (2013) and Almunia and Lopez-Rodriguez (2018), we propose a stylized model to examine the problem of utility-maximizing individuals that can underreport their wealth to shelter their fortune from taxation and incur a resource cost. We use this framework to estimate how individuals respond to a discontinuous increase in wealth tax liability—a tax notch—at an arbitrary reported wealth threshold.

3.1.1 Conceptual Framework

Consider an economy with a continuum of individuals of measure one. Individuals have (latent) true wealth W, while the government levies a proportional tax τ on the wealth individuals report W_r. The wealth tax liability implies a proportional (average and marginal) tax rate on reported wealth, such that $T(W_r) = \tau W_r$. Since the tax authority does not perfectly observe true wealth, individuals may attempt to misreport it to reduce their tax burden, such that $0 \leq W_r \leq W$. Misreporting wealth implies a (direct and indirect) resource cost, which is captured by the convex cost function $C(1 - W_r/W) \cdot W$. This function captures the intuition that, first, the cost of misreporting is rising in the share of unreported wealth $1 - W_r/W$ (e.g., it is more costly to underreport all of your wealth than just half of it). Second, holding this fraction constant, the misreporting cost is rising in true wealth W (e.g., it is more costly to misreport 10 percent of wealth for an individual owning 5 billion dollars than for an individual owning 500,000 dollars).

A positive wealth tax rate $\tau > 0$ depresses W_r below W, with the strength of the effect determined by elasticity e, the parameter of interest. Intuitively, if $e \to 0$, then individuals report

their true wealth ($W_r \to W$), while if $e \to \infty$, individuals report no wealth at all ($W_r \to 0$). We initially assume elasticity e and resource cost function $C(\cdot)$ are the same for all individuals, but relax this assumption later. Under this homogeneity assumption, all the variation in W_r is due to differences in W. There is a smooth distribution of W in the population captured by a distribution function $F(W)$ and a density function $f(W)$. We denote $H_0(W_r)$ and $h_0(W_r)$ the distribution and density functions for reported wealth associated with the baseline linear tax system. Given a smooth tax system (i.e., no notches and no kinks), the smooth wealth distribution converts into a smooth reported wealth distribution.

Suppose that a proportional tax notch is introduced at reported wealth cutoff W_r^* so that $T(W_r) = \tau W_r + \Delta\tau \cdot W_r \cdot \mathbb{1}(W_r > W_r^*)$ where $\Delta\tau$ is the proportional tax notch and $\mathbb{1}(\cdot)$ is an indicator for being above the cutoff. Figure A.3, Panel (a), illustrates the implications of a proportional tax notch in a budget set diagram with two individuals, L and H, who have "low" and "high" wealth, respectively. Individual L chooses reported wealth W_r^* under both tax regimes, while individual H is the marginal buncher: she chooses reported wealth $W_r^* + \Delta W_r^*$ before the tax change and is exactly indifferent between reducing her reported wealth to bunch at W_r^* (which reduces the expected tax burden but implies a resource cost), or remaining at the interior point W_r^I and facing higher taxes. As a result, L (H) has the lowest (highest) pre-notch reported wealth among those who locate at the notch point. Every individual between L and H locates at the notch point: all individuals who had reported wealth in the interval $(W_r^*, W_r^* + \Delta W_r^*]$ before the introduction of the notch will bunch. There is a hole in the post-notch density distribution as no individual is willing to locate between W_r^* and W_r^I, as depicted in Figure A.3, Panel (b).[17]

Since there is a direct mapping between the true wealth distribution $f(W)$ and the pre-notch reported wealth distribution $h_0(W_r)$, we can define the number of bunching individuals at the notch point as

$$B = \int_{W_r^*}^{W_r^* + \Delta W_r^*} h_0(W_r) dW_r \approx h_0(W_r^*) dW_r^* \tag{1}$$

where the approximation assumes that the counterfactual density $h_0(W_r)$ is roughly constant on the bunching segment $(W_r^*, W_r^* + \Delta W_r^*)$. The number of bunching individuals depends positively on the increase in taxes at the notch and negatively on the resource cost of sheltering wealth from taxation.

We now relax the homogeneity assumptions and allow both the reported wealth elasticity and the cost of sheltering wealth to vary across individuals.[18] Individuals may face different resource cost functions $C(\cdot)$ through various channels. For instance, assets owned by individuals may be more or less covered by third-party reporting and therefore more or less manipulable. They might

[17] To simplify the exposition, Figures 3 and A.3 assume that the notch is associated with a small change in the *marginal* wealth tax rate above the cutoff, so that intensive responses by those who stay above the notch can be ignored. This implies that pre- and post-notch densities coincide above $W_r^* + \Delta W_r^*$.

[18] Appendix B.1 considers another extension of the baseline model, namely, heterogeneity in elasticities but not in the resource cost of sheltering wealth from taxation.

also depend on individuals' access to the offshore wealth management industry, preferences (e.g., risk aversion, honesty), misperception, adjustment costs, or inattention. As a result, individuals with the same underlying wealth W will face different incentives to bunch. If an individual has a prohibitively high resource cost, she might not react to the tax notch because the (perceived or real) costs of misreporting are higher than the expected tax savings of bunching.

We leverage the strong incentives created by tax notches to quantify the response that would be observed if individuals overcame these prohibitively high costs. Unlike kinks, notches can create a region of strictly dominated choice $(W_r^*, W_r^* + \Delta W_r^D]$ in which it is possible to increase individual utility by moving to notch point W_r^*, making these choices dominated under any parametric form for individual preferences.[19] Therefore, the presence of any individual located in the dominated range is directly attributable to the presence of high optimization frictions (Kleven and Waseem, 2013). Frictions also imply some individuals that respond do not bunch *exactly* at the notch point, thus creating a diffuse excess mass rather than a point mass at W_r^*, as illustrated in Figure 3, Panel (a). For instance, because wealth is a stock and not a flow, it is arguably more costly to respond to the notch and more difficult to locate precisely below the notch (inter alia, asset prices are not controlled by the taxpayer).[20]

Denote $a(W_r, e)$ the share of individuals at reported wealth level W_r and elasticity e with sufficiently high resource costs that they are unresponsive to the notch. We then have excess bunching

$$B = \int_e \int_{W_r^*}^{W_r^* + \Delta W_{r,e}^*} (1 - a(W_r, e))\, \tilde{h}_0(W_r, e) dW_r de \approx h_0(W_r^*)\,(1 - a^*)\, E\left[\Delta W_{r,e}^*\right] \tag{2}$$

where the approximation assumes a locally constant counterfactual density and, in addition, a locally constant share of individuals with "large" resource costs, $a(W_r, e) = a^*$ for $W_r \in (W_r^*, W_r^* + \Delta W_{r,e}^*)$ and all e. Then, $E\left[\Delta W_{r,e}^*\right]$ is the average "structural" response not affected by frictions while $(1 - a^*)\, E\left[\Delta W_{r,e}^*\right]$ is the average observed response attenuated by resource costs.

We estimate the share of individuals with prohibitively large resource costs a^* from the strictly dominated range $(W_r^*, W_r^D]$: $a^* \equiv \int_{W_r^*}^{W_r^D} h(W_r) dW_r / \int_{W_r^*}^{W_r^D} h_0(W_r) dW_r$. The reported wealth response that would materialize if individuals overcame resource costs is then proportional to $B/(1 - a^*)$. This means that the larger the number of bunching individuals B and the smaller the hole in the dominated region (i.e., the higher the share of non-bunchers a^*), the larger the response to tax notches. Further, note that because the utility gain of bunching at the notch point, for a

[19] The width of the dominated range ΔW_r^D is defined such that reported wealth level $W_r^* + \Delta W_r^D$ ensures the same level of net-of-tax wealth $W - T(W_r)$ as the notch point W_r^*, that is, $(1 - \tau - \Delta\tau)(W_r^* + \Delta W_r^D) = (1 - \tau) W_r^*$. Therefore $\Delta W_r^D = \Delta\tau \cdot W_r^* / (1 - \tau - \Delta\tau)$. Appendix B.2 shows that even individuals with $e = 0$ should be bunching in the dominated range. Therefore, any remaining mass in that segment must be the result of prohibitively high resource costs.

[20] An alternative interpretation is that taxpayers explicitly avoid bunching *exactly* at the notch if they believe doing so increases the likelihood of auditing. Under this interpretation, bunching farther away from the notch is reflective of risk aversion or an explicit strategy to pass undetected.

given elasticity e, is monotonically *decreasing* in $W_r > W_r^*$ and converges to zero at $W_r^* + \Delta W_{r,e}^*$, while a^* is monotonically *increasing* on bunching segment $(W_r^*, W_r^* + \Delta W_{r,e}^*)$. This implies that estimating a^* from the dominated range *understates* average resource costs, *overstates* the share of bunchers 1-a^*, and therefore provides a *lower bound* of the response ΔW_r^* that would materialize in the absence of resource costs. This is what Kleven and Waseem (2013) denote the "bunching-hole method."

If, instead, none of the missing mass can be explained by low elasticities (i.e., elasticities are homogeneous at $e = \bar{e}$) and it is all driven by frictions, then the "structural" response ΔW_r^* corresponds to the reporting response of the marginal buncher H. This ΔW_r^* can be determined as the point of convergence between observed and counterfactual distributions: $W_r^* + \Delta W_r^*$ is estimated as the point where excess mass is exactly equal to missing mass, as we describe below. This represents an *upper bound* on the average "structural" response ΔW_r^*.

3.1.2 Identification

We can uncover the elasticity e given knowledge of the notch parameters, τ and $\Delta\tau$, and the reporting response ΔW_r^*. This elasticity can be non-parametrically identified without relying on a specific utility functional form, or it can be identified assuming some additional parametric structure. We present the former approach below, and develop the structural approach in Appendix B.2. Specifically, we apply the reduced-form approach described in Kleven and Waseem (2013) and Kleven's online technical note to relate the wealth reporting response ΔW_r^* to the change in the *implicit* marginal tax rate between W_r^* and $W_r^* + \Delta W_r^*$ created by the notch.[21] Treating ΔW_r^* as if generated by a hypothetical kink $1 - t^*$ between W_r^* and the tangency point of individual H's indifference curve $I(W_r)$ assuming $W_r^I \approx W_r^* + \Delta W_r^*$ (i.e., the interior incentives are small), it can be shown that

$$e_R \equiv \frac{\Delta W_r^*}{W_r^*} \cdot \frac{1 - t^*}{\Delta t^*} \approx \left(\frac{\Delta W_r^*}{W_r^*}\right)^2 \cdot \left(\frac{1-\tau}{\Delta\tau}\right) \cdot \frac{1}{2} \tag{3}$$

3.1.3 Estimation

Figure 3, Panel (b) illustrates the bunching estimation to obtain the reporting response ΔW_r^* and corresponding elasticity. We follow previous bunching studies and slice the data into bins of reported net worth and count the number of taxpayers located in each bin to generate an empirical density $h(W_r)$. The counterfactual distribution $h_0(W_r)$ is obtained from a regression of the following form

$$c^j = \sum_{i=0}^{p} \beta_i \cdot (W_r^j)^i + \sum_{i=W_r^l}^{W_r^u} \gamma_i \cdot 1[W_r^j = i] + \eta^j \tag{4}$$

[21] See derivations in Kleven's online technical note here.

where c^j is the number of individual taxpayers in bin j, W_r^j is the reported net worth level in bin j, and p is the order of the polynomial. The excluded range $[W_r^l, W_r^u]$ corresponds to the area that is affected by the notch point either because of excess or missing mass. The counterfactual distribution is estimated as the predicted values from specification (4) omitting the contribution of the dummies in the excluded range, that is, $c^j = \sum_{i=0}^{p} \hat{\beta}_i \cdot (W_r^j)^i$. Excess bunching and missing mass are estimated as the difference between the observed and counterfactual bin counts in the relevant reported net worth ranges, $\hat{B} = \sum_{j \in [W_r^l, W_r^*)} (c^j - \hat{c}^j)$ and $\hat{M} = \sum_{j \in [W_r^*, W_r^u]} (\hat{c}^j - c^j)$.

The lower limit W_r^l is determined both visually and exploiting pre-reform data. The upper limit $W_r^u = W_r^* + \Delta W_r^*$ is estimated by imposing the restriction that the excess bunching equals the missing mass, $\hat{B} = \hat{M}$. This is equivalent to assuming that all responses to the tax notch are on the intensive margin. Starting from a low initial value of the upper bound $W_r^u \approx W_r^*$ and an initial estimate of the counterfactual $\hat{c}^{j0}$, the upper bound is increased in small increments and the counterfactual reestimated every time until $\hat{M}^k = \hat{B}^k$.[22] The estimated upper bound W_r^u is the counterfactual reported wealth of the marginal taxpayer that responds to the tax change. Total excess bunching $\hat{b}$ is then $\hat{B}$ relative to the counterfactual.[23]

Finally, as in other bunching papers, extensive responses and multiple notches are two main concerns we would potentially have to deal with.[24] Extensive responses could occur if taxpayers reduced their reported wealth below the income tax filing requirement. However, the filing cutoff is significantly below the wealth tax notches and also depends not only wealth but also on income and card expenditures. Therefore, extensive margin responses would occur only if individuals jointly reduced income, wealth, and card expenditures below the filing cutoffs. This is very unlikely in the short term.[25] Lastly, the presence of multiple notches may be an issue if bunchers jump more than one notch at a time, as $\hat{B}$ and $\hat{M}$ would no longer match. Reassuringly, the panel structure of our data allows us to test how big of a concern this is. We find that only a handful of bunchers jump more than one notch at a time.

[22] In the empirical application there is a finite number of bins, so we impose the condition that the absolute difference between $\hat{B}$ and $\hat{M}$ be "close" to zero, i.e. $|\hat{B} - \hat{M}| < 0.03$.

[23] Standard errors are calculated by a bootstrap of the entire estimation procedure. We draw 1,000 random samples with replacement, and define the standard error of the estimated excess bunching $\hat{b}$, share $\hat{a}^*$, reported wealth response $\Delta\hat{W}_r^*$ (lower and upper bounds), reduced-form elasticity estimate $\hat{e_R}$, and structural elasticity estimate $\hat{e_S}$ (developed in Appendix B.2) as the standard deviation in the distribution of estimates of each variable.

[24] Note that an additional practical problem that is common in the bunching literature is the higher frequency in the reporting of "round numbers." However, as Figures 4 and 7 demonstrate, our data does not display "round-number" problems often present in other applications.

[25] We test for extensive margin responses to tax notches by checking whether the probability of disappearing from our sample the year of the tax reform is smooth around the tax notch using bins of pre-reform net worth (bin size is current 10 million pesos). Specifically, we use rdrobust command from Cattaneo, Calonico and Titiunik (2014) and confirm that the probability of dropping from the sample the year the tax reform is introduced is smooth around notches for all years (not reported).

3.1.4 Evidence from the 2010 Wealth Tax Reform

We first leverage the variation from the 2010 tax reform to estimate how individual reported wealth responds to wealth taxation. This reform introduced a one-time wealth tax levied on taxpayers reporting to own 1 billion pesos (2010 USD 520,830) or more in (taxable and non-taxable) wealth by December 31, 2010. This exemption threshold was significantly lower than previous years', thus adding more taxpayers into the wealth tax base. Individuals who paid no wealth tax in 2009 now faced two wealth tax notches (see Figure 1).

For our wealth bunching estimation, Panels (a) and (b) in Figure 4 plot the distribution of individuals around the first and second notches, respectively. The red vertical line marks the notch point in each panel. The gray line is the counterfactual distribution, estimated as a fifth-order polynomial, as specified in (4). The estimated parameters are displayed separately. The following patterns emerge from these panels. First, the notches are associated with large and sharp bunching just below the cutoff and missing mass above the cutoff. For the first notch, the excess mass $\hat{b}$ is 4.9 times the counterfactual, meaning there is 5.9 times the expected density in the absence of the notch. The estimated standard error of $\hat{b}$ is 0.17 with an implied t-statistic of 28.82, so the null hypothesis of no bunching at the notch is strongly rejected by the data.[26] For the second notch, $\hat{b}$ is 4.3 (the standard error is 0.37). Second, behavioral responses are significantly attenuated by large optimization frictions: 43 percent and 57 percent of individuals in dominated regions do not bunch in response to the first and second notch, respectively. This implies that the degree of bunching absent these frictions $B/(1-a^*)$ is 1.75 and 2.33 times larger than observed bunching, respectively.

We now turn to the estimation of reported wealth responses ΔW_r^*, combining the nonparametric evidence with the conceptual framework from Section 3.1.1. We bound these responses and elasticities as previously detailed: a lower bound is obtained from the bunching-hole method based on $B/(1-a^*)$, while an upper bound is obtained from the response of the marginal buncher (i.e., the point of convergence between counterfactual and observed distributions). Table 1 presents the estimated parameters. For each reform year, the table shows the notch point (column 2), whether this notch is also the wealth tax exemption threshold (column 3), the average tax rate jump (column 4), the size of the dominated range (column 5), the share of taxpayers in dominated ranges that are unresponsive to the tax notch (column 6), the lower and upper bounds on the reporting responses (columns 7 and 8, respectively), and the bounds on the elasticities based on the reduced-form formula (3) (columns 9 and 10).

Table 1 shows that, if individuals in the dominated region overcame optimization frictions, the reported wealth response would be 11 percent higher than the first notch point (=110/1,000

[26] Figure A.4 shows heterogeneity in bunching across samples with different opportunities to shelter wealth from taxation (capital rentiers, wage-earners, and all other taxpayers). The figure shows that bunching is most pronounced among capital rentiers and least pronounced among wage-earners, who might have less sheltering opportunities than other taxpayers (Jakobsen et al., 2018).

million pesos) and 5.5 percent higher than the second notch point (=110/2,000 million pesos). The marginal buncher responding to the first notch would have reported 20 percent more wealth under a smooth tax system (=200/1,000 million pesos), reducing wealth tax tax revenue by 2010 USD 20.6 million or 3.5 percent of the total personal wealth tax revenues collected that year. For the second notch, the marginal buncher would have reported 9 percent more wealth (=180/2,000 million pesos), reducing wealth tax revenue by 2010 USD 2 million or 0.3 percent of personal wealth tax revenues collected that year. These reported wealth responses are all highly statistically significant. The difference between the marginal buncher's responses to the first and second notch is not significant.

The implied elasticities of reported net worth with respect to the net-of-tax rate can be obtained by applying the reduced-form approximation, equation (3). These elasticities are 0.6 using the bunching-hole method and 2.0 using the convergence method, and both are statistically significantly different from zero at the 1 percent level. This latter elasticity implies that, for the marginal buncher, a 1 percent increase in the net-of-tax rate raises reported wealth by 2 percent. In contrast, because $\Delta\tau$ is smaller at the second notch, the estimated elasticities are smaller (between 0.37 and 1.0), but only precisely estimated using the bunching-hole method.

An advantage of our setting is that we observe wealth before and after tax policy changes for those affected and not affected by them. This enables us to test key assumptions for the bunching procedure to identify behavioral responses. Panels (c) and (d) in Figure 4 compare the counterfactual densities from cross-sectional data and equation (4) (black line) with the counterfactual density using pre-reform data from 2009 when there are no notches or kinks (gray line). The figures confirm that, first, the distribution of reported net worth is smooth in the absence of wealth tax notches. Second, our estimated parameters are robust to using this counterfactual distribution of reported net worth. For the first notch, estimates using the 2009 distribution as counterfactual density are somewhat larger (e.g., $\hat{W}_r^u$ is 1250 versus 1200), although these differences are mostly not statistically significant. Specifically, upper-bound ΔW_r and corresponding elasticities are not statistically different, while lower-bound ΔW_r and corresponding elasticities are different at the 5 percent level. For the second notch, none of the differences are statistically significant.

Interestingly, taxpayers remain bunched below the exemption cutoff several years after the 2010 reform, even though wealth would not be taxed again until 2014. Figure 5 plots the distribution of reported wealth in years 2009 through 2012. The figure shows that wealth taxation triggers bunching that persists over time and remains salient even in years when wealth is no longer taxed (2011 and 2012). Further, taxpayers remain piled up below the 1,000 million peso cutoff in *current* prices. This implies reporting less wealth in *real* terms.

Lastly, we compare responses over time leveraging the panel microdata. Figure 6 compares taxpayer density across reported wealth bins under a smooth tax schedule in Panel (a) versus a notched tax schedule in Panel (b). Darker bins represent higher relative taxpayer density. Two key insights emerge from the figure. First, in the absence of wealth notches, taxpayers report

owning similar amounts of wealth from year to year, although there is year-to-year variation that is not necessarily related to changes in the wealth tax schedule. In contrast, the introduction of wealth taxation reduces year-to-year variation, making the 45 degree line significantly more salient. Second, the emergence of two horizontal darker areas just below the 1,000 million and 2,000 million notch points in 2010 showcases the "bunchers," that is, taxpayers with wealth above the bracket cutoffs before the reform who report just below them immediately after. We will use this variation to characterize the changes in wealth reporting induced by wealth taxation in Section 3.2.

3.1.5 Evidence from Wealth Tax Reforms in 2003, 2006, 2010, and 2014

We now exploit variation introduced by tax reforms in 2003, 2006, 2010, and 2014 to compare bunching responses and elasticities across wealth levels, notch sizes, and notch saliency. The results, displayed in Table 1 and Figure 7, can be summarized as follows. First, between 35 percent and 74 percent of individuals in the dominated range do not respond to the wealth tax notch. If they overcame their high optimization frictions, excess bunching would be 1.54 to 3.85 times larger. Second, reported wealth responses ΔW_r are large at all notches, almost always precisely estimated, and often not statistically significantly different from each other. The largest responses, in *percentage* terms, come from the bottom notches, that is, the less wealthy taxpayers. These responses are triggered by relatively small tax notches (e.g., 0.05 percent in 2014), which mechanically translates into large elasticities for this group of individuals. This implies that elasticities are generally decreasing in reported wealth. For example, in 2010, the upper-bound reduced-form elasticity estimated from the first notch is statistically significantly different from the equivalent elasticities estimated from the third and fourth notches.

Decreasing bunching elasticities contrast with the conventional wisdom that wealthy taxpayers, who have access to more aggresive avoidance opportunities, are very responsive to taxation. There are several ways to rationalize this result.[27] First, taxpayers may be more elastic to more salient notches; the first notch is the exemption cutoff and arguably the most salient notch. Second, bunching estimates local elasticities driven by the sample of compliers around the tax notch. As the next section shows, individuals in the top brackets have a larger share of their wealth in the form of listed equities and portfolio securities covered by third-party reporting, which are harder to underreport.[28] Third, bunching captures an immediate response to wealth taxation in our context. However, some sophisticated tax sheltering schemes, such as setting up an offshore shell company, have larger fixed costs and thus may not instantaneously respond to wealth tax notches. Further away from the notch at the top, the infra-marginal taxpayers always have incentives to create offshore accounts.

[27] Decreasing bunching elasticities have also been documented in other settings studying earnings (Kleven and Waseem, 2013; Saez, 2010) and firm revenue (Bachas and Soto, 2018) responses to tax kinks and notches.

[28] Table A.2 confirms that taxpayers around the last notch have twice the share of assets in stocks than taxpayers in the first notch. Moreover, taxpayers who respond to the last notch by bunching below the cutoff have a different wealth composition than those remaining above it; specifically, they have a smaller share in stocks.

In Appendix D, we complement the bunching analysis by examining responses over a longer time horizon, leveraging the panel microdata as well as variation introduced by the four wealth tax reforms. We compare outcomes across time between taxpayers reporting above or below the bracket cutoffs in a difference-in-differences design. We find that most of the overall effect on reported wealth is concentrated in the year of the reform, consistent with a one-time avoidance adjustment driving the main reduced-form effects. Interestingly, the gap between the treated and control groups—which conflates mechanical and behavioral responses—persists several years after a reform *even when wealth is no longer taxed*. For instance, a one-off wealth tax in 2010 generates a persistent gap the following years. This is partly due, as discussed above, to the persistence of bunching triggered by wealth taxation.

3.2 Misreporting Wealth Subject to Less Third-Party Reporting

Intuitively, while earnings responses to income taxes potentially conflate real and sheltering responses, bunching in the distribution of reported wealth—a stock—predominantly reflects sheltering. It is difficult for individuals to immediately bunch below notch points using real responses (e.g., changes in investment) because wealth partly depends on asset prices, which are uncertain and fluctuate throughout the year. In this section, we exploit our panel microdata as well as a reform raising in the incentives to bunch to identify the type of wealth taxpayers manipulate to place themselves exactly below the notch point.

Ex ante, it is unclear which type of wealth (e.g., financial, non-financial) should be more responsive to taxation. Financial assets are presumably more liquid and easier to adjust to tax changes; however, they are also generally subject to more third-party reporting and thus harder to misreport. In contrast, non-financial assets such inventories and real estate have values that are harder to "mark to market" for tax authorities (Brulhart et al., 2017). In Colombia, inventories in particular are subject to no third-party reporting, which implies taxpayers may be more likely to manipulate them (Chetty, Friedman and Saez, 2013; Chetty et al., 2011). In all, the question of what type of wealth individuals use to avoid wealth taxation is an empirical one.

We identify and characterize taxpayers who bunch in response to the introduction of wealth tax notches leveraging the panel structure of our data. In our setting, these bunchers denote the subpopulation of individuals who respond to wealth taxes by bunching below the cutoffs, i.e., the compliers in a potential outcomes framework. Always-takers represent individuals who locate below the notch even in the absence of wealth tax notches, while never-takers represent individuals who do not bunch in spite of wealth tax notches. Tax filer i is located in the bunching region B_{it} if she reports wealth between W_r^l and the tax notch W_r^* in year t. Because being located in the bunching region can occur in the absence of wealth taxes, individuals with $B_{it} = 1$ are a mix of compliers and always-takers, as illustrated in Figure A.5. Tax filers located above W_r^* are the never-takers. We pool individuals filing income tax returns before and after the wealth tax reform

(2008 through 2010) and exploit the variation over time in the likelihood of being located in the bunching region due to the introduction of wealth taxation in 2010. We characterize bunchers using the following IV specification:

$$Y_{it} = \alpha_1 + \gamma_1 t + \beta_1 B_{it} + \epsilon_{it} \tag{5}$$

where Y_{it} is the amount of debt or asset type (e.g., bank deposits, real estate, inventories) expressed as a share of total assets reported that year, t is a time trend that accounts for changes in wealth composition, B_{it} is an indicator for being located in the bunching region, and ϵ_{it} is the error term. Because the incentives to bunch are exogenously shocked by the wealth tax reform, B_{it} is instrumented with a post reform dummy $Z_{it} = \mathbb{1}(t = 2010)$. Standard errors are clustered at the taxpayer level to account for serial correlation.

A limitation of our setting is that, while debt is reported by all taxpayers, the decomposition of asset types is available only for the subsample of taxpayers keeping records, as explained in Section 2.2. These taxpayers, who represent 17.5 percent of our estimation sample, report six categories of assets: fixed assets (e.g., real estate, land), stocks and contributions, inventories, bank deposits, accounts receivable, and other assets.[29]

Table 2 presents the results separately by each wealth category, focusing on taxfilers around the first notch. Column (1) plots the average outcome of bunchers in the absence of wealth taxes. Most of bunchers' assets are made up of real estate, land, and vehicles (52.7 percent). The rest is composed of, in decreasing order, stocks and contributions (17 percent), inventories (10.9 percent), bank deposits (8.6 percent), accounts receivable (6.6 percent), and other assets (3.8 percent). Liabilities are worth 9.4 percent of total assets. Compared to these bunchers, Columns (3) and (4) suggest always-takers and never-takers are similar in their observed wealth composition.

Column (2) plots the 2SLS coefficient β_1 from specification (5) representing the percentage point change in wealth composition induced by wealth taxation. First, bunchers do not seem to reduce their bank deposits—the most liquid type of assets–in response to tax notches. They also do not reduce their fixed assets if, for instance, they were to sell or give away their car or residence to avoid the wealth tax. Instead, bunchers do reduce their reported inventories by 22 percent ($= -0.024/0.109$). Because inventories are not subject to third-party reporting, misreporting them is likely to pass undetected by the tax authority. Further, bunchers inflate their liabilities by 35 percent ($= 0.033/0.094$) in response to the introduction of the tax notch. Intuitively, if the debt finances assets (e.g., mortgage to obtain more housing), an increase in debt would be offset by a similar increase in the value of assets, leaving net worth unchanged. If,

[29] Figure A.6 plots the density of record-keeping taxpayers by reported wealth in 2010. Although these taxpayers arguably face stronger resource costs of sheltering due to the adjustment costs imposed by record keeping, the estimated parameters are not significantly different from other taxpayers. However, the excess mass is visibly less diffuse for these individuals, i.e., the bunching segment $[W_r^l, W_r^*)$ is smaller. This suggests that, conditional on bunching, business owners keeping records might be better able to target the cutoff than taxpayers not keeping records, possibly because they have somewhat more control over their reported wealth.

instead, the debt does not finance assets, taking on more debt reduces wealth. Such would be the case if, for instance, bunchers provided untruthful accounts of nonexistent liabilities. While our data does not allow decomposing debt to test this mechanism, anecdotal evidence suggests taxpayers fabricated interpersonal debt, that is, debt owed to friends or family members rather than financial institutions. In fact, this wealth tax evasion mechanism well-known to the tax authority partly motivated the voluntary disclosure program analyzed in Section 5. These pieces of evidence suggest bunchers avoid wealth taxation by manipulating the reported values of assets and liabilities subject to less third-party reporting to artificially place themselves just below the exemption cutoff. Specifically, when enforcement capacity is weak, wealth reported to the tax authority instantly falls upon taxation—even if tax rates are relatively small.

3.3 Interpreting Wealth Elasticities and Short-Term Revenue Loss

To put our estimated elasticities into perspective, we first compare them to those of previous studies. As an illustration, our bunching estimation using the 2010 eligibility cutoff shows the elasticity of reported wealth with respect to the net-of-tax rate is 2. This estimate is an order of magnitude larger than estimates exploiting kinks in the wealth tax schedule (Jakobsen et al., 2018; Seim, 2017), which is consistent with tax notches being more salient than kinks. In fact, the estimates from studies exploiting kinks are similar to those we derive for wealthier taxpayers. In contrast, our elasticity of 2 is closer to that found using a difference-in-differences approach in Catalonia (Durán-Cabé et al., 2017).[30] Lastly, our elasticities are an order of magnitude smaller than the elasticity of 34.7 estimated using cross-canton comparisons in Switzerland by Brulhart et al. (2017).[31]

Importantly, a positive tax on wealth affects the return to wealth. For instance, a 1 percent tax on wealth corresponds to a 20 percent tax on capital income, assuming a rate of return on wealth of 5 percent. Wealth taxes can therefore be interpreted as isomorphic to taxes on capital income. In particular, the elasticity of wealth is equivalent to the elasticity of capital income multiplied by a factor of $(1-\tau_W)/r(1-\tau_K)$:

$$\epsilon_K = \epsilon_W \cdot \frac{r(1-\tau_K)}{1-\tau_W} \tag{6}$$

where ϵ_K is the elasticity of capital income, ϵ_W the elasticity of wealth, r the rate of return on wealth, τ_K the capital income tax rate, and τ_W the wealth tax rate (see derivation in Appendix C). In our example, $\tau_W = 0.01, r = 0.05, \tau_K = 0.2$, and $\epsilon_W = 2$ from our main analysis imply

[30] Elasticities estimated using difference-in-differences designs are often an order of magnitude larger than bunching estimates, as discussed in Aronsson, Jenderny and Lanot (2017); He, Peng and Wang (2018); Kleven and Schultz (2014).

[31] Brulhart et al. (2017) report a semi-elasticity of taxable wealth with respect to the wealth tax rate of 34.5. With the average wealth tax rate being 0.476 percent, this implies an elasticity of taxable wealth with respect to the net-of-tax rate of of 34.7 ($= 34.5/(1-0.00476)$).

$\epsilon_K = 0.08$. Thus, our relatively large elasticities with respect to $1 - \tau_W$ translate into fairly small conventional elasticities with respect to $1 - \tau_K$.[32]

In addition, our estimated wealth elasticities enable us to recover the revenue loss due to short-term behavioral responses to wealth taxes, as well as the short-run revenue-maximizing wealth tax rate. We apply the framework laid out in Saez, Slemrod and Giertz (2012) to our tax notches in order to evaluate the efficiency cost of a wealth tax reform. Starting from an *average* tax rate τ for taxpayers with reported wealth above W_r^*, increasing the top tax rate by $\Delta\tau$ mechanically raises revenue by $dM = NW_r\Delta\tau$ where N is the number of taxpayers in that bracket and W_r the average wealth in that bracket.

Taxpayers react to wealth tax notches by bunching below the cutoffs. These behavioral responses reduce reported wealth by $\Delta W_r = W_r \cdot \sqrt{2 \cdot e \cdot \frac{\Delta\tau}{(1-\tau)}}$, where e is the elasticity of reported wealth with respect to the net-of-tax rate. Using equation (3) for ΔW_r, taxpayers' behavioral responses reduce tax revenue by $dB = -N\Delta\tau\Delta W_r = -N\Delta\tau W_r\sqrt{2 \cdot e \cdot \frac{\Delta\tau}{(1-\tau)}}$. Hence, the total effect on tax revenue is

$$\begin{aligned} dT &= dM + dB \\ &= N\Delta\tau W_r - N\Delta\tau W_r\sqrt{2 \cdot e \cdot \frac{\Delta\tau}{(1-\tau)}} \\ &= NW_r\Delta\tau\left(1 - \sqrt{2 \cdot e \cdot \frac{\Delta\tau}{(1-\tau)}}\right) \end{aligned}$$

For instance, in FY 2010, $\tau = 0, \Delta\tau = 0.01$, and the upper bound of e is 2, as described above. This means that, based on our elasticity estimate, at most 20 percent of the projected tax revenue increase is lost through behavioral responses. Further, we estimate that the largest loss of tax revenues due to behavioral responses occurred in FY 2014 (21 percent, using the highest elasticity estimated from the first notch). We thus conclude that at most one-fifth of the projected tax revenue increase is lost due to short-term responses to wealth taxation.

Finally, what do our results imply for the revenue-maximizing (marginal) wealth tax rate? Again using our highest elasticity estimate from Table 1, the highest revenue-maximizing marginal wealth tax rate is $1/(1 + a \cdot e) = 1/(1 + 1.676 \times 4.41) = 11.9$ percent, where we have estimated $a = \frac{E[W_r|W_r>W_r^*]}{E[W_r|W_r>W_r^*]-W_r^*} = 1.676$ among individuals with reported wealth above notch point W_r^* of 1,000 million pesos in FY 2014.[33] This suggests Colombia is below its short-run revenue-maximizing wealth tax rate. Note, however, that this revenue-maximizing wealth tax rate regards short-run responses only. In the short run, past savings decisions are fixed and estimated behavioral responses capture mostly sheltering responses to wealth taxes. However, in the long run, individuals overcome

[32] Brulhart et al. (2017) provide a verbal description linking wealth elasticities and capital income elasticities.

[33] Note that this formula applies a tax system with marginal tax rates. If the government were to keep its notched tax schedule, the formula would need to be adjusted because the bunching response from notches has a first-order, strictly negative effect on tax revenue (Lockwood, 2018).

frictions and adjust their saving, investment, migration, and bequest decisions. As a result, real responses may generate larger distortions in the long run. With the observed elasticity increasing in time, the long-run revenue-maximizing wealth tax rate is likely well below 11.9 percent.

4 Offshoring Assets to Tax Havens: Evidence from the Panama Papers

Previous evidence in the literature suggests wealthy individuals often have access to sophisticated tax sheltering strategies and often hide assets offshore in tax havens. In this section, we focus on this particular tax sheltering mechanism. We identify taxpayers having incorporated offshore entities using data from the Panama Papers, and track their reported wealth across time.

We exploit the leaked Panama Papers microdata, which includes information the ultimate beneficial owners of offshore entities incorporated with the help of Mossack Fonseca. While these entities were incorporated in more than twenty different jurisdictions, Panama represents a particularly desirable destination for wealthy Colombians to hold assets offshore, offering geographic proximity, the convenience of Spanish as the official language, and political stability. Unsurprisingly, Panama constitutes Colombians' most preferred destination for holding reported foreign assets, after the United States (see Figure A.7). Panama is also Colombia's most relevant tax haven. Even before the leak, Colombians were almost fifteen times as likely to report owning assets in Panama than in the Virgin Islands or Switzerland. Thus, the information offered by the Panama Papers is particularly relevant to study offshoring by Colombians.[34]

4.0.1 The Dynamics of Offshore Entity Incorporation and Wealth Taxation

Figure 8, Panel (a), plots the evolution of the top wealth tax rate in Colombia between 1995 and 2015 (dashed blue line) and the number of offshore entities incorporated by Colombians through Mossack Fonseca each year (solid black line). Offshore entity incorporation rose tenfold between the reintroduction of wealth taxes in 2002 and 2015. Further, the two series closely trail each other: more offshore entities are incorporated when the top statutory wealth tax rate increases. This rise is particularly salient in 2010, when the top wealth tax rate skyrocketed to 6 percent, and in 2014, following the reintroduction of progressive wealth taxes that year.[35] The flow of new incorporations remained particularly high since 2010, reaching a peak of 270 new incorporations in 2015 and a cumulative total of 1,784 entities since 1973.

[34] Trusts are less prevalently used in Latin America than in Anglo-Saxon countries. For those reluctant to loose control over their assets (for instance, due to mistrust in others or in the rule of law), foundations represent an attractive alternative. Catering to the Latin American elite, Panama has made the foundation form one of its specialties within the offshore industry (Harrington, 2016).

[35] An alternative (but not necessarily mutually exclusive) explanation for the more frequent incorporation of offshore entities by Colombians through Mossack Fonseca could be supply-driven if, for instance, Mossack Fonseca decided to more aggressively lure its Colombians clients into creating offshore entities in recent years.

Panel (b) compares the flow of offshore entities incorporated by Americans, Brazilians, Venezuelans, and Mexicans. As far as we can observe in the Panama Papers and the Offshore Leaks, Colombians incorporate more offshore entities every year, even relative to more populous countries like Brazil, Mexico, or the United States.[36] Figure A.8 extends this comparison with more countries and confirms that Colombia's stark increase in the relative flow of offshore entities cannot not replicated elsewhere.[37]

4.0.2 Who Are The Shareholders Of Offshore Entities Created By Mossack Fonseca?

To identify the shareholders of offshore entities created by Mossack Fonseca, we merge the microdata from the Panama Papers to our individual income tax returns using personal names, as detailed in Section 2.2. Table 3 presents descriptive statistics separately for individuals filing at any moment between 1993 and 2016 (Column 1) who do *not* appear named in the Panama Papers leak, and those that do appear named in the leak (Column 2). We observe more than 3.3 million taxpayers, that is, around 9.54 percent of the total number of tax units.[38] On average, individuals not appearing in the Panama Papers filed income taxes in Colombia for only 6.2 years during our period of study, relative to 15.8 years for the 1,208 taxpayers identified in the Panama Papers. Tax filers in the Panama Papers are more likely to be male and born before 1985 (these differences are statistically significant). They are also twice as likely to be "capital rentiers," meaning most of their income comes from owning capital. Tax filers in the Panama Papers are also more likely to be wage-earners, and less likely to report another activity codes (e.g., business-owners).

The most striking differences between taxpayers named and not named in the Panama Papers leak are in their average wealth and capital gains. Even if underreporting to the tax authority, individuals named in the leak are more than seven times as wealthy as others. More than two-thirds of them are among the wealthiest 1 percent of adults in Colombia, and over one-fourth are among the top 0.1 percent. To further illustrate this point, Figure 9, Panel (a), plots the likelihood of appearing named in the Panama Papers by the average wealth reported to the tax authority across all filing years. Appearing in the Panama Papers rises steeply with wealth. This probability is 0.02 percent for P95–P99 individuals with average reported net worth between 0.14 and 0.41 billion pesos (USD 47,261–136,869), 0.1 percent for the next wealthiest group, and 1.7 percent for individuals in the top 0.01 percent of net worth (these differences are statistically significant). That is, one in sixty individuals in the wealthiest 0.01 percent are identified in the Panama Papers, and this likelihood is 24 times higher than for the top 5 percent as a whole. Therefore, Colombians named in the Panama Papers are among the wealthiest individuals in the country.

[36] Given Colombians may use other asset management firms not included in these leaks or located in other offshore financial centers, Figure 8 represents a lower bound on total offshoring.

[37] The only other Latin American country with a similarly large flow of offshore entity incorporation is Uruguay, included in the European Union's 2017 "Grey List" due to concerning tax practices.

[38] As noted in Section 2, only a fraction of tax units are required to file income taxes in Colombia due to high exemption thresholds, outdated cadasters, and a pervasive informal sector.

4.0.3 Individuals Hid Assets in These Offshore Entities

Admittedly, many of the activities carried out through offshore entities are perfectly legal, and there are security-related and other legitimate reasons for a Colombian to store wealth offshore. Indeed, Colombia allows owning foreign assets, but requires taxpayers report them to the tax authority (i.e., a residence-based tax system). To test whether individuals change their reporting behavior once they create an offshore entity, we leverage information on the date of entity incorporation and the full time series of assets reported by individuals to the tax authority.

Specifically, we use an event study design that compares reported assets across individuals before and after incorporating an offshore entity. Let W_{it} be the value of assets reported to the Colombian tax authority by taxpayer i in FY t, and define the year in which individual i incorporated an offshore entity through Mossack Fonseca as e_i. Define $D_{it}^k = \mathbb{1}(t = e_i + k)$ as an indicator variable that equals 1 if event e_i took place k years ago and 0 otherwise.[39] In our main specification, $k \in [-5, 1]$, to avoid dropping the significant number of offshore entities incorporated in the later years of our sample, as depicted in Figure 8.[40] The event study specification then takes the following form:

$$W_{it} = \alpha_i + \gamma_t + \sum_{k=-5}^{1} \beta_k D_{it}^k + u_{it} \tag{7}$$

where α_i and γ_t are individual and year fixed effects, respectively, and u_{it} is the error term. We cluster standard errors at the individual level because individual-specific errors are likely to be serially correlated. Any decrease in reported assets after entity incorporation ($\beta_0, \beta_1 < 0$) is consistent with these entities being used to hide assets from the tax authority.

Figure 10, Panel (a), plots the β_k in equation (7) over time and provides estimates of the mean assets in "event time" after having taken out individual- and year-specific effects. We scale the estimates with respect to mean reported wealth in 2001, the year preceding the introduction of the wealth tax in Colombia. The figure shows there are no pre-event trends: reported assets are not affected by offshore entity incorporation before it actually occurs, which lends some support against the strict exogeneity assumption of the timing of the event.[41] Moreover, the figure suggests that the value of total assets reported to the tax authority drops by 10.9 percent the year the taxpayer incorporates an offshore entity (the t-statistic is -2.38).[42] A joint F test on post-event years 0 and 1 strongly rejects the null hypothesis that the coefficients are equal to zero ($p = 0.0088$).

To explore heterogeneity, Panel (b) splits the sample by above- and below-median assets

[39] The handful of tax filers incorporating offshore entities before 2000 are given an entity incorporation date of 2000 to preserve their anonimity.

[40] As a robustness check, Figure A.9 plots β_k coefficients for different event time windows.

[41] A joint F test on pre-event years -5 to -2 cannot reject the null hypothesis that the coefficients are equal to zero ($p = 0.8389$.)

[42] We test whether opening an offshore is associated with a drop in either reported income or income taxes owed by substituting W_{it} for these variables in specification (7). Large standard errors do not allow us to reject the null hypothesis of no statistically significant differences across event time in either case (not reported).

reported in event time $k = -5$. The figure shows that the immediate drop depicted in Panel (a) is driven by the wealthiest 50 percent of individuals in the Panama Papers. For these individuals, reported assets fall by 13.7 percent the year of offshore entity incorporation (the t-statistic is -2.02).[43] In contrast, for the bottom 50 percent, reported assets are *increasing* leading up to the event, with the trend breaking upon entity incorporation and the event having no statistically significant impact on reported assets.[44]

5 How Responsive is Tax Evasion to Better Enforcement?

In this section, we examine how better enforcement helps recover tax on hidden offshore wealth. Announced in December 2014, Colombia's voluntary wealth disclosure program allowed tax evaders to come clean with the tax authority.[45] Tax filers could voluntarily disclose any hidden wealth (e.g., underreported or unreported foreign or domestic assets) and/or inexistent debt in the wealth tax return filed in 2015, 2016, or 2017.[46] Unlike voluntary disclosure programs put in place across OECD countries, Colombia allowed disclosers to waive unpaid income and wealth taxes from past years. Disclosers paid a one-time explicit penalty of 10, 11.5 or 13 percent of the value of the disclosed assets and liabilities if disclosed in 2015, 2016, or 2017, respectively.[47] Disclosers also paid wealth taxes upon disclosure, and could face higher presumptive income taxes the following year. If caught misreporting after 2018, individuals would face monetary penalties worth 200 percent of owed taxes.[48]

5.1 How Tax Evasion Varies With Wealth

The program encouraged 11,927 individuals to disclose 15.76 trillion pesos (USD 5.28 billion) in hidden assets and inexistent liabilities between 2015 and 2017. This is equivalent to 1.73 percent of GDP being disclosed under the scheme. Specifically, 11,050 individuals disclosed assets worth

[43] A joint F test on post-event years 0 and 1 for above-median taxpayers strongly rejects the null hypothesis that the coefficients are equal to zero ($p = 0.0327$).

[44] A joint F test on pre-event years 2 through 5 cannot reject the null hypothesis that the coefficients are jointly equal to zero ($p = 0.3852$), and neither can a joint F test on post-event years 0 and 1 ($p = 0.2542$).

[45] The 2015–2017 wealth disclosure program represents Colombia's first comprehensive effort to encourage evaders to regulare their tax affairs by disclosing hidden assets and fake debts (Article 35, Law 1739/2014). In 2003, taxpayers voluntarily disclosing hidden assets and/or fake debt were subject to harsher tax treatment (Article 6, Law 863/2003, ruled constitutional by *Sentencia C-910/04*). Subsequent attempts to encourage such disclosures in 2012 and 2013 were blocked by the Constitutional Court, arguing evaders were being given overly generous tax benefits (Article 163, Law 1607/2012, ruled unconstitutional by *Sentencia C-833/13*). Because disclosers were charged a penalty, the 2015–2017 voluntary disclosure program was ruled constitutional on August 26, 2015 (*Sentencia C-551/15*).

[46] Disclosers reported their hidden assets and inexistent liabilities in separate boxes in the wealth tax return (form 440, see Figure F.4), which we use to identify program participants.

[47] See Figure A.10 for a timeline of the events taking place around the voluntary disclosure program.

[48] The government's communication strategy explicitly did not encourage repatriation of capital invested abroad, by expressly stating that the aim of the program was *not* to have disclosers repatriate their offshore assets but rather to have them declare such assets to the tax authority for income and wealth tax purposes.

14.76 trillion pesos (USD 4.95 billion), 87 percent of which had been located abroad (1.4 percent of GDP). Liabilities worth 999.86 billion pesos (USD 335.08 million) were declared inexistent by 1,380 individuals; 97.6 percent of which was (mis-)reported to be in Colombia. The government collected 1.93 trillion pesos (USD 647.23 million) in penalty revenues, equivalent to 0.21 percent of GDP.

Table 4 presents descriptive statistics for disclosers and non-disclosers who filed an income tax return before the scheme (FY 2013) and filed a wealth tax return in either 2015, 2016, or 2017.[49] This subsample includes 55,098 individuals who did not disclose under the scheme (Column 1), and 11,210 who did (Column 2). Columns (3)–(5) presents the summary statistics separately for disclosers by year of first disclosure. Despite facing higher penalties, most disclosers revealed their wealth in 2017, i.e., immediately before the disclosure window expired. Otherwise, the table suggests that while disclosers and non-disclosers are similar in demographic characteristics, disclosers are almost 20 percent more likely to self-report their economic activity code as either capital rentiers or wage-earners than any other category. Crucially, disclosers are eight times more likely to appear in the Panama Papers than non-disclosers. Indeed, 37.5 percent (453 of 1,208) of taxpayers identified in the Panama Papers admitted past noncompliance and participated in the voluntary disclosure program, a point we return to in Section 5.3.[50]

Further, Table 4 suggests that, even before disclosing hidden wealth, disclosers are wealthier than non-disclosers: the latter have on average 2.84 billion pesos (2017 USD 950,909) in assets, while the former have 3.29 billion (2017 USD 1,102,095) in assets, i.e., 16 percent more wealth. The same is true for net worth. To further illustrate this point, Panel (b) in Figure 9 plots scheme partipation by net worth (FY 2013 net worth including disclosures). The probability of disclosing hidden wealth under the scheme rises with wealth: individuals in the top 0.01 percent are 55 times more likely to disclose under the scheme than the top 5 percent. In all, two-fifths of individuals in the wealthiest 0.01 percent admitted noncompliance and disclosed under the same (gray dashed line).[51] Once again, individuals identified in the Panama Papers are significantly more likely to disclose wealth under the scheme across all wealth levels, with 71.4 percent of those in the wealthiest group disclosing under the scheme (black solid line).

The magnitudes of these disclosures are also rising in wealth, as depicted in Figure 11. Panel

[49] 93.6 percent of program participants filed personal income taxes immediately before the scheme (i.e., FY 2013).

[50] Not all taxpayers identified in the Panama Papers participated in the voluntary disclosure program. First, being a client of Mossack Fonseca does not imply tax evasion. In Colombia and most other countries, it is legal to own offshore accounts, as long as they are duly declared on tax returns. Thus, tax-compliant client may have already been reporting their offshore entity to the Colombian tax authority. Second, the Panama Papers included Colombians having incorporated their offshore entity as far back as 1973; thus, some taxpayers could have deactivated their offshore entity by the time the disclosure scheme was introduced (and allegedly no longer hold assets offshore). Finally, risk-loving taxpayers may have chosen not to participate in the disclosure scheme and continue evading.

[51] Figure A.11 plots scheme partipation by pre- and post-disclosure net worth (that is, net worth in FY 2013 excluding and including disclosures). Ranking taxpayers by pre-disclosure wealth, only 0.05 percent of adults in P95–P99 disclosed under the scheme, while 10.3 percent of P99.9–P99.95 did so—and this difference is statistically significant. Disclosure probability continues to rise by wealth group, with one in four of the wealthiest 0.01 percent admitting prior noncompliance and disclosing under the scheme.

(a) shows that disclosures represent 0.01 percent of wealth for individuals in P95–P99 and 15.3 percent of wealth for the top 0.01 percent. In other words, 15.3 percent of wealth of the top 0.01 percent had been concealed from the tax authority, with foreign assets representing the lion's share of concealed wealth. Panel (b) reproduces this estimate for disclosers only and shows that, on average, disclosures represent around 30 percent of wealth for all but the top group, for whom disclosures amount to 37.5 percent of wealth. For this group, foreign assets represent 85 percent of disclosures and 31.9 percent of their wealth, reflecting the pervasiveness of offshore tax evasion at the very top of the distribution. These figures thus confirm that hiding wealth offshore had been a key mechanism to evade taxes among the Colombian elite.[52]

5.2 Improvements in Wealth and Income Tax Compliance

We have shown that taxpayers participating in the scheme disclosed foreign and domestic assets. Of direct tax policy interest is the effect these disclosures had on income reported and subjected to tax. We study wealth and capital income reporting behavior by linking the disclosure information with individuals' income tax returns, and comparing outcomes between disclosers and non-disclosers across time. To maximize the number of post-disclosure years for which we can observe reporting behavior, we focus on individuals who first disclosed in 2015.[53] Specifically, we compare outcomes using a balanced sample of 44,958 taxpayers (1,777 of whom first disclosed in 2015 and 43,181 of whom never disclosed) using the following difference-in-differences regression specification:

$$\log(y_{it}) = \alpha_i + \gamma_t + \sum_{k=-4}^{3} \beta_k \cdot D_{it}^k + \nu_{it} \tag{8}$$

where $\log(y_{it})$ is a log-approximation (the inverse hyperbolic sine transformation) of outcome y reported by individual i in year t, α_i is an individual fixed effect, γ_t is a year fixed effect, D_{it}^k is an interaction term between year t and the discloser dummy, and ν_{it} is the error term.[54] We

[52] Table A.3 compares the location and type of assets reported by wealth tax filers who reported foreign assets in 2017. The table shows wealth tax filers who disclosed under the scheme in 2015–2017 are 63.6 percent more likely to report owning foreign assets in tax havens (e.g., Barbados, Bermuda, Cayman Islands, Monaco, Panama, Switzerland, the Virgin Islands) than those who did not disclose under the scheme. Disclosers are significantly more likely to report owning foreign financial assets than non-disclosers, with this difference being particularly large for portfolio securities and trusts. In contrast, disclosers are significantly less likely to report owning foreign non-financial assets (real estate and vehicles).

[53] Note that, compared to individuals who first disclosed in 2016 or 2017, our main estimation compares individuals who disclosed hidden wealth to the tax authority in the absence of (1) the Panama Papers leak, and (2) harsher punishment for evaders. That is, it is a selected sample of tax evaders responding to the tax benefits awarded by the disclosure scheme. Table A.5 and Figure A.12 present results equivalent to Table 5 and Figure 12 but for taxpayers first disclosing hidden wealth in 2016.

[54] To accommodate zeros in the dependent variable, we follow Johannesen et al. (2018) and use the inverse hyperbolic sine transformation, which is preferred when using administrative data and focusing on high-income groups. For positive ranges of y_{it}, the β_k coefficients in specification (8) can be interpreted exactly as if we were using a log specification, i.e., as the difference between reported log wealth reported at time t and reported log wealth had disclosure not occurred. As a robustness exercise, Table A.4 presents results using different functional form specifications.

cluster standard errors at the individual level because individual-specific errors are likely to be positively serially correlated. The β_k coefficients are our main parameters of interest and identify the percentage change in reported outcomes of disclosers relative to non-disclosers and the year immediately before the disclosure scheme. For instance, we expect β_k to be positive and statistically significant if foreign and domestic assets that generate taxable income and had not previously been reported are now being reported for tax purposes.

Figure 12, Panel (a), plots the event study coefficients and associated 95 percent confidence intervals from specification (8) using reported gross wealth (total assets) and net wealth (total assets minus debt) as the outcome variable. In both series, the difference between disclosers and non-disclosers is close to zero and not statistically significant before disclosure, thus validating the parallel trend assumption of our difference-in-differences specification. Moreover, in both series, the outcome jumps sharply in 2015 for disclosers relative to non-disclosers. The larger rise for net worth is consistent with disclosures of fake liabilities under the scheme. Importantly, there is no sign that either outcome decreases after the initial surge, and both remain significantly higher three years after policy rollout. Table 5 presents estimates of the difference in outcomes between disclosers and non-disclosers before and after policy rollout, i.e., the difference-in-differences coefficient, collapsing the event time in specification (8) to a simple post reform dummy. Columns (1) and (2) present the estimates for gross and net wealth, respectively. Disclosers report around 33.38 percent ($= 100 \times (e^{0.288} - 1)$) more assets and 49.2 percent ($= 100 \times (e^{0.4} - 1)$) more wealth relative to non-disclosers after the scheme is introduced.

As discussed above, if individuals are disclosing hidden assets, they should also be reporting the capital income (e.g., domestic interest income, capital gains) received by asset ownership. This, coupled with presumptive income taxes on net wealth, imply tax compliant disclosers should also pay more income taxes. Importantly, 2015 disclosers were required to truthfully report their income in the tax—not calendar—year of their disclosure. We thus expect wealth disclosures in 2015 to affect reported capital income starting 2016. Panels (b) through (d) from Figure 12 plot the event study coefficients for regular and irregular income categories. Panel (b) plots interest income, total gross income, taxable income, and income taxes owed. Panel (c) plots dividends and foreign income, which are reported as separate income categories starting in 2014. Panel (d) plots irregular income, a category that combines long-term realized capital gains, inheritances, and *inter vivos* gifts. Again, the figures suggest there is no difference in the trend of income categories prior to disclosure, followed by a large increase in reported capital income starting 2016.[55]

Table 5 presents the associated difference-in-differences coefficients and associated standard errors in Columns (3)–(12). The table shows that disclosers report 174.6 percent ($= 100 \times (e^{1.01} - 1)$) more foreign income and 51.6 percent ($= 100 \times (e^{0.416} - 1)$) more interest income than non-disclosers

[55] There is no impact on dividend income, presumably because dividends—which are subject to third-party reporting—should have already been fully reported.

once the disclosure scheme is introduced.[56] In all, the total amount of income reported increases by 14.1 percent ($= 100 \times (e^{0.132} - 1)$), raising taxable income by the same amount. This translates into 39 percent ($= 100 \times (e^{0.329} - 1)$) more regular income taxes owed. Reported irregular income net of costs also increases by 38 percent ($= 100 \times (e^{0.322} - 1)$), such that disclosers are paying more irregular income taxes than non-disclosers after policy rollout.[57]

Our results therefore indicate that wealth disclosures were associated with large increases in capital income reporting and income taxes owed. Prior to the disclosure scheme, noncompliant taxpayers underreported capital income by not reporting returns to foreign assets. Upon disclosure, disclosers report all (or at least more of) their true capital income and also pay more income taxes. Our results thus rule out substitution towards legal income tax avoidance; on the contrary, wealth disclosers are disclosing more capital income and paying more taxes on that income relative to non-disclosers once the disclosure scheme is introduced.

As a result of the higher taxes paid by disclosers, the overall progressivity of the tax system improved. Figure 13 plots the effective tax rate (total income and wealth taxes as a share of net wealth) by wealth group. First, despite having a progressive income tax schedule, the progressivity of the tax system is low in the absence of wealth taxes (see Alvaredo and Londoño-Vélez, 2014). The effective tax rate hovers just over 1 percent regardless of wealth: on average, the top 0.01 percent paid the same share in taxes as the top 1 percent of the distribution. Second, the reintroduction of progressive wealth taxes raised the effective tax rate for the wealthiest 0.05 percent of individuals, i.e., those above the exemption threshold. Wealth taxes can therefore complement progressive personal income taxes in reinforcing tax progressivity at the top. Third, the penalties associated with program participation that year further raised the effective tax rate from 1.4 percent to 2.6 percent for the wealthiest 0.01 percent. The disclosure scheme thus appears to have been an effective way to reduce evasion and generate more revenue from the wealthiest tax filers.

5.3 Tax Evasion Responds to Other Shocks in Enforcement

Tax evasion is likely to not only depend on the tax incentives, studied in the previous section, but also critically, on the information and enforcement environment. In this section, we analyze how shocks in the perceived detection probability and the punishment for noncompliance affected tax compliance at the top of the distribution.

[56] Interest income should be expected to increase if disclosers repatriate their offshore assets upon disclosure.

[57] These spillover results are robust across different functional form specifications, as shown in Table A.4. With the inverse hyperbolic sine function, however, some of the aforementioned effect may be due to changes in reporting from zero to positive amount. Because this extensive margin of capital income reporting is of interest, Table A.4 substitutes the outcome for a binary variable indicating whether the taxpayer reported any positive value of the dependent variable. We find a 4.4 percentage point increase in the probability of reporting any positive foreign income, a 1.8 percentage point increase in reporting any positive interest income, and a 1.2 percentage point increase in owing any income tax (see Figure A.13). We also detect some extensive margin impacts on reported irregular income.

On April 3, 2016—that is, one month before the second deadline to disclose under the scheme—the Panama Papers news story broke and the names of Mossack Fonseca's clients were thrust into the public spotlight.[58] The Colombian tax authority reacted by scrutinizing Mossack Fonseca and its clients, contacting taxpayers named in the leak and requesting documentation of their offshore activities and transactions.[59] Taxpayers named in the Panama Papers were allowed, and in fact encouraged, to participate in the disclosure program. Three weeks after the leak, the governments of Colombia and Panama announced a tax information exchange agreement between the two countries, a move that the tax haven had resisted for years.[60] The agreement involved on-demand and automatic exchanges of information starting June 2017 and 2018, respectively. These events arguably raised the perceived threat of detection.

Exploiting the exogenous timing of the Panama Papers, we identify the causal effect of the leak and subsequent events on tax compliance among very wealthy individuals. We use a difference-in-differences approach that compares outcomes between wealth tax filers named (treated) and not named (control) in the leak before and after it occurred. To fix ideas, Figure 14 plots the probability of first disclosing under the scheme by wealth group before (2015) and after (2016) the leak for taxpayers named and not named in the leak. While the likelihood of disclosing under the scheme was similar prior to the leak, the leak substantially raised disclosures for taxpayers named in the Panama Papers. Interestingly, however, the leak does not appear to have raised disclosures among taxpayers unnamed in the leak. Hence, we do not find empirical support to the claim that the leak itself deters evasion among wealthy individuals.

Equation (9) presents the OLS specification used to estimate the causal effects of the Panama Papers leak on tax compliance:

$$y_{it} = \alpha + \gamma \mathbb{1}(\text{In Panama Papers})_i + \lambda \mathbb{1}(\text{After Leak})_t + \beta \cdot \mathbb{1}(\text{DID})_{it} + \mu_{it} \tag{9}$$

where y_{it} is the outcome of interest, β the parameter of interest, and μ the error term. Because the leak was unanticipated by both taxpayers and the Colombian tax authority, we can interpret β as identifying the causal response to the Panama Papers leak and subsequent events.

The results from specification (9) are presented in Table 6. Column (1) shows the Panama Papers leak raised willingness to disclose hidden wealth by 27.4 percentage points. On a base of 3.3

[58] Colombians mentioned in the Panama Papers scandal involved businessmen, politicians, members of congress, lawyers, and journalists. The leak drew media coverage and public interest in the matter. As an illustration, Figure A.14 plots the number of times individuals in Colombia searched for the term "Panama Papers" on Google.

[59] The first formal charges of illicit enrichment, fraud, money laundering, among others, would not be filed by Colombia's district attorney's office against individuals related to the Panama Papers until October 4, 2017. Later that month, a number of individuals would be sent to house arrest. See Figure A.10 for a timeline of events taking place between 2014 and 2017.

[60] This announcement came after lengthy negotiations dating from 2014. On October 7, 2014, the deadline for Panama to sign an information exchange treaty with Colombia expired, leading Colombia to declare Panama a tax haven (Decree 1966/2014). Financial transactions with Panama would thus be taxed at withholding at 33 percent in lieu of 10 percent. A diplomatic crisis between the two countries ensued, leading Colombia to remove Panama from its list of tax havens on October 21, 2014 (Decree 2095/2014).

percent for wealth tax filers not appearing in the Panama Papers before the leak, this translates into a more than 830 percent increase in wealth disclosures induced by the Panama Papers. Consistent with a drop in offshore tax evasion in particular, Column (2) shows that disclosures of foreign assets increased more than fifteenfold (= .296/.0192). As a result, Column (3) shows wealth taxes increased by 29.8 percent ($= 100 \times (e^{0.261} - 1)$). Finally, including disclosure penalties raises taxes owed to 134 percent ($= 100 \times (e^{0.85} - 1)$), as shown in Column (4).

Six months after the Panama Papers leak, in December 2016, Colombia criminalized tax evasion for the first time. If convicted, tax evaders could face sentences of up to nine years in prison.[61] Most disclosers admitted to noncompliance after tax evasion was criminalized in 2017 (see Figure A.15), arguably at least in part due to the harsher sanction for noncompliance. However, larger disclosures in 2017 also coincides with the expiration of the disclosure window. Unfortunately, if taxpayers disclose this year for other reasons, such as procrastination, we cannot attribute the rise in disclosures solely to the harsher punishment of tax evasion.

6 Implications for the Study of Wealth Inequality

We end with a brief discussion of our findings for the study of wealth inequality. We combine tax records and household survey data to analyze how measured wealth inequality is affected by accounting for unreported offshore wealth.

In Colombia, measuring top wealth shares, such as the fraction of total wealth held by the top 1 percent, faces challenges due to severe data limitations. Unlike in many developed countries, there is no aggregate wealth measure to construct the total amount of wealth in Colombia (i.e., the denominator). We cannot compute aggregate wealth as the total wealth reported in tax records because, as discussed, less than 6 percent of tax units file taxes. This implies that we must refer to household survey data to capture wealth for non-filers, which is a second-best alternative and has limitations of its own (see Saez and Zucman, 2016). Further, even in spite of the improvements in enforcement, offshore wealth may remain underreported in tax records for the purposes of reducing the tax burden. To the extent that wealthier individuals are disproportionately likely to hold foreign assets, our measures of top wealth shares will underestimate inequality if we do not account for unobserved offshore wealth. Appendix E describes in detail these issues and how we deal with each of them. We argue that our measures will likely be biased downward, meaning that, in addition to interpreting our estimates as a first, albeit imperfect attempt at measuring wealth inequality in Colombia, they should also be considered potentially conservative.

We estimate that the top 1 percent today has 40.6 percent of total wealth in Colombia (Figure 15, Panel (a)). Given the richest 1 percent has roughly 20 percent of total income (Alvaredo and

[61] Evaders caught underreporting their assets or overreporting their liabilities over 7,250 monthly minimum wages (2017 5.66 billion pesos or USD 1.9 million) could face between 48 and 108 months in prison, and pay a penalty worth 20 percent of the value of the hidden or misreported assets or liabilities (Article 338 of Law 1819/2016).

Londoño-Vélez, 2014), wealth in Colombia is twice as unequally distributed as income. In fact, this baseline estimate places Colombia as one of the most unequal countries for which similar wealth inequality measures exist, second only to the United States, from whom the top 1 percent owns 41.8 percent of total wealth.[62] Interestingly, the similarity between Colombia and the US in terms of income inequality is reproduced again in terms of wealth inequality.

Further up the wealth hierarchy, we find that the top 0.1 percent has 15.85 percent of total wealth (Figure 15, Panel (b)). This is less than the equivalent American share of 22 percent (Saez and Zucman, 2016). Even further up, the top 0.01 has 6.01 percent of total wealth in Colombia, which is in fact roughly half of the United States' equivalent share of 11.2 percent. Therefore, while the two countries share similar top 1 percent shares, wealth is less concentrated at the extreme top of the distribution in Colombia than in the United States.[63]

As we have discussed, foreign assets may continue to be underreported in tax records in spite of the recent enforcement initiatives. Indeed, while the 2015–2017 voluntary disclosure program incentivized some taxpayers to disclose (at least part of) their assets hidden in tax havens, it is likely that other individuals continue choosing to hide their fortunes from the tax authority. We would therefore like to put bounds on the total amount of offshore wealth that could potentially remain hidden abroad, and analyze its implications for the measurement of wealth inequality.

We begin from the macro estimate for total offshore wealth by Colombians from Alstadsater, Johannesen and Zucman (2018b). Using fiduciary deposits data from the Central Bank of Switzerland in 2003–2004 as well as cross-border bank deposits data from offshore financial centers in 2007, Alstadsater et al. (2018b) estimate that total offshore wealth by Colombians is 9.0 percent of GDP. This places Colombia just below the world average of 9.8 percent of GDP kept offshore. Adding up total offshore wealth reported by individuals in the tax return for foreign assets amounts (tax form #160), offshore assets represented 2.8 percent of GDP in FY 2017. That is, less than one-third of the baseline measure of offshore wealth is reported to the tax authorities.[64] This means that 6.2 percent of GDP remains concealed offshore.

Who owns this unreported offshore wealth? Our estimates, using data from the Panama Papers, the 2015–2017 voluntary disclosure scheme, and foreign asset information returns, all show that offshore wealth is extremely concentrated at the top. Specifically, the disclosure scheme shows that 99 percent of disclosed offshore wealth is owned by the wealthiest 1 percent, with the wealthiest 0.01 percent owning 58 percent of disclosed offshore wealth (see Figure E.2). We

[62] Applying the capitalization method to income tax microdata, Saez and Zucman (2016) estimate that the top 1 percent had 41.8 percent of total wealth in 2012. Using household survey data, the wealthiest 1 percent of households are estimated to own 42.5 percent of total wealth (Balestra and Tonkin, 2018). Further, comparing our estimates with measures of household wealth inequality from the OECD Wealth Distribution Database, Colombia appears to be twice as unequally distributed as France, Luxembourg, and Norway.

[63] Furthermore, we estimate that the wealth-to-income ratio $\beta = W/Y$ is 213 percent in Colombia. This is half the equivalent estimate for the United States, where household β is 430 percent (Saez and Zucman, 2016), but similar to Mexico, where β is 237 percent. In fact, Colombia's wealth-to-income ratio today is similar to that in Germany, Canada, and Italy in the 1970s.

[64] Half of this amount (1.4 percent of GDP) was disclosed thanks to the voluntary disclosure scheme.

assume that the distribution of *unreported* offshore wealth is similar to the distribution of offshore wealth disclosures made during the 2015–2017 disclosure program by each net wealth group, and recompute top wealth shares accordingly.

Note, however, that the estimate from Alstadsater et al. (2018b) is based mostly on data from 2007, that is, a period preceding hefty wealth taxation in Colombia. As Figure 8 illustrated, some individuals may have responded to the high wealth tax rates by obscuring their wealth offshore. This implies that basing our estimate from Alstadsater et al. (2018b) represents a lower bound on unreported offshore wealth. To construct an upper bound, we assume that the increase in unreported offshore wealth is one-half the rise in the stock of offshore entities created by Mossack Fonseca between 2007 and 2015. This inflates our measure of unreported offshore wealth to 15 percent of GDP, placing offshore wealth owned by Colombians—both reported and unreported, expressed as share of GDP—above the equivalent shares owned by Americans, Frenchmen, and Germans.

Figure 15 shows that conservatively accounting for unreported offshore wealth increases our estimates for top 1 percent share by three percentage points, from 40.64 to 43.17 percent.[65] The upper bound raises this share to 46.4 percent, as reported in the last bar of Panel (a). The resulting increase in measured top 0.1 percent shares is even more dramatic, from 15.85 percent to 19.06–23.17 percent, as reported in Panel (b). Therefore, accounting for unreported offshore wealth places Colombia's top share estimates closer to those of the United States at the very top.

7 Conclusion

Progressive wealth taxation has received renewed interest as a tool to raise revenue and address wealth inequality. However, the feasibility of levying this tax depends on how wealthy individuals respond to it, an empirical question few papers have examined due to the major challenges regarding measurement and identification. While a handful of researchers have recently estimated behavioral responses to wealth taxes in Europe, it is unclear what policy implications, if any, their findings have for developing countries, where enforcement capacity is severely limited and few individuals own a very large fraction of total wealth. Further, offshoring assets to tax havens represents might potentially be a significant threat to wealth taxation at the very top of the distribution, yet there is no evidence on the extent to which offshore evasion responds to wealth taxation and enforcement. Thus, understanding how wealthy individuals response to wealth taxes and wealth tax enforcement is key to assessing whether wealth taxes can work in these settings.

We contribute to this discussion by providing quasi-experimental evidence of behavioral responses to wealth taxes and enforcement policy in a developing country. We exploit extensive

[65] Intuitively, given that the wealth-to-income ratio $\beta = W/Y$ for Colombia is 213 percent, and that unreported wealth is 6.2 percent of GDP and is owned solely by the top 1 percent, then the top 1 percent share of total wealth corrected for hidden wealth is almost 3 percentage points higher.

administrative tax microdata on the assets and debts of wealthy individuals linked with microdata from the Panama Papers leak to shed light on offshore sheltering. We find clear evidence that individuals respond to both wealth taxes as well as better enforcement. In spite of significant sheltering responses to wealth taxation, we find that enforcement policy can enhance tax compliance among wealthy individuals and thus improve wealth tax collection.

Our results point to the critical importance of investing in tax enforcement capacity. First, requiring taxpayers report their assets separately to the tax authority facilitates enforcement. Second, enforcement capacity may also be improved thanks to a wider coverage of third-party reporting, if coupled with systematic cross-validation of reported information and increased scrutiny of high net worth taxpayers. Third, improving compliance at the very top requires cracking down on offshore tax evasion. Policies promoting financial transparency and foreign asset reporting, as well as voluntary disclosure schemes, may aid the tax authority in collecting new information about offshore assets and income and generate more revenue from wealthy taxpayers. Yet, for such programs to be effective in improving compliance in the shorter and longer term, stricter enforcement needs tough noncompliance sanctions and a credible threat of detection, for example, by exploiting an automatic exchange of tax information and whistleblower data. Further, getting tax havens to cooperate and provide information about foreign owned financial assets in their jurisdictions is key—hence the paramount importance of understanding the effectiveness of recent initiatives like the United States's FATCA. Through stronger enforcement, wealth taxes can complement progressive income taxes to reinforce progressivity at the top.

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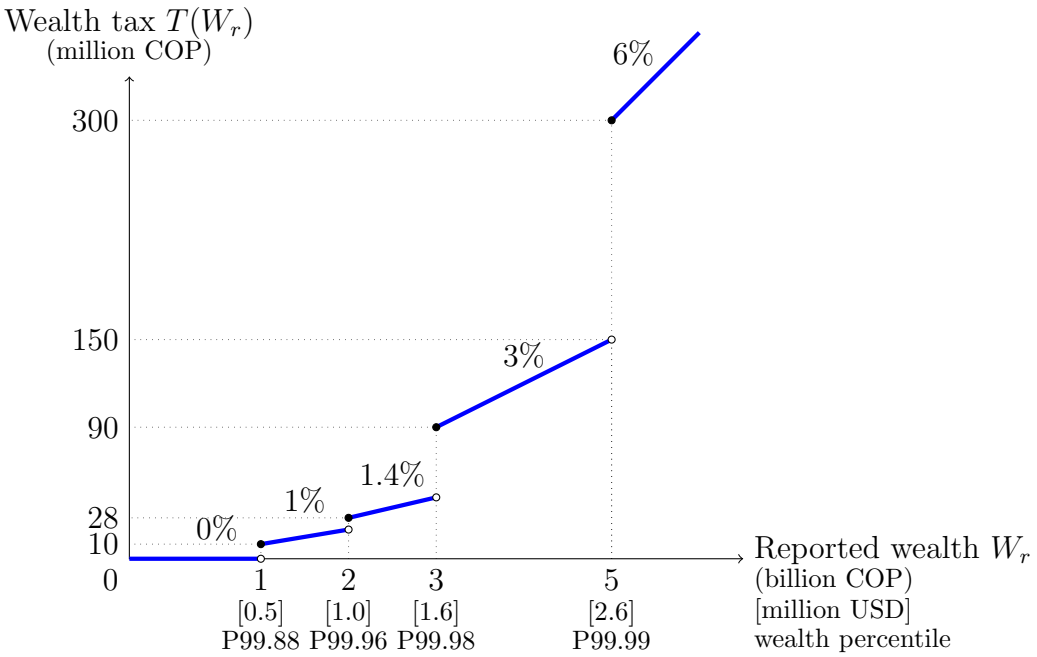
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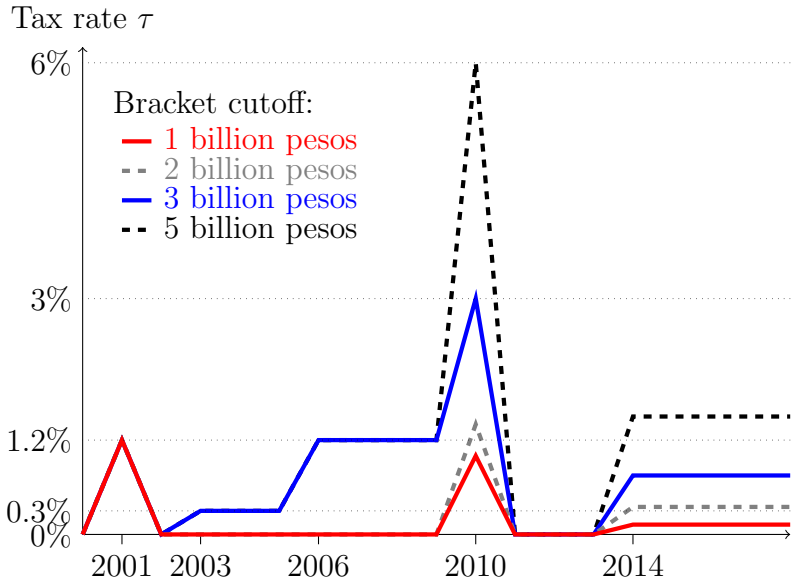
Figures and Tables

Figure 1: The Personal Wealth Tax Schedule in Colombia

(a) Wealth Tax Liability as a Function of Reported Net Wealth (FY 2010)

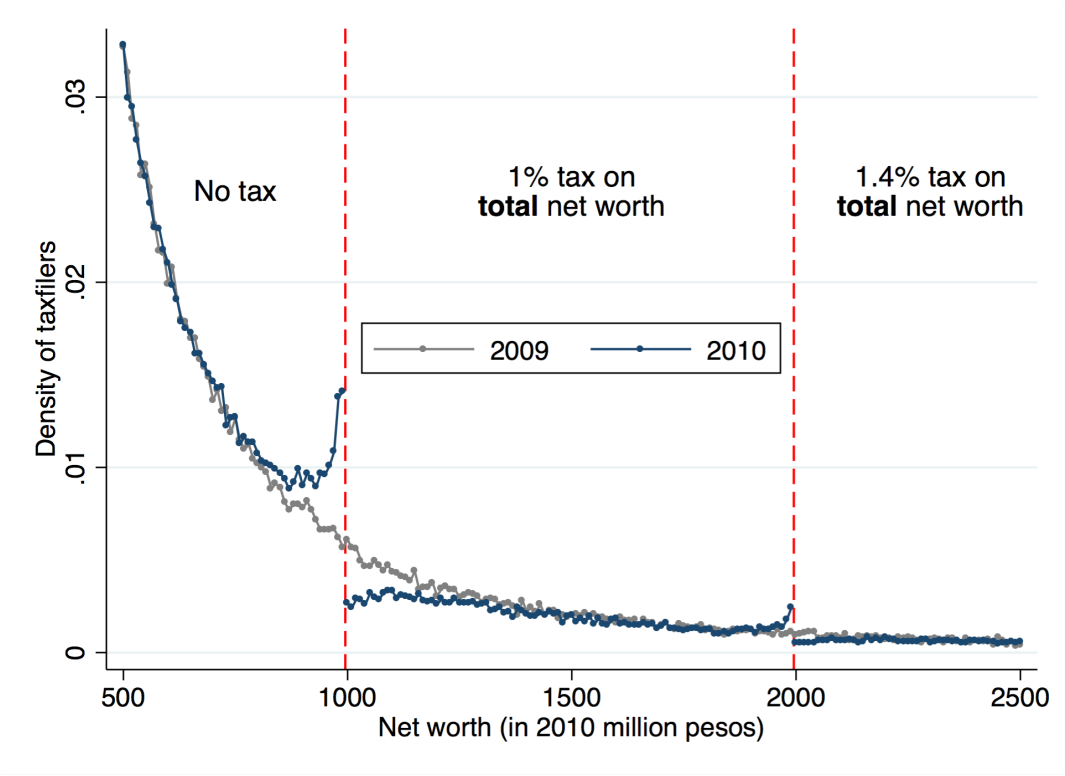


(b) Evolution of Statutory Annual Wealth Tax Rates by Bracket Cutoff



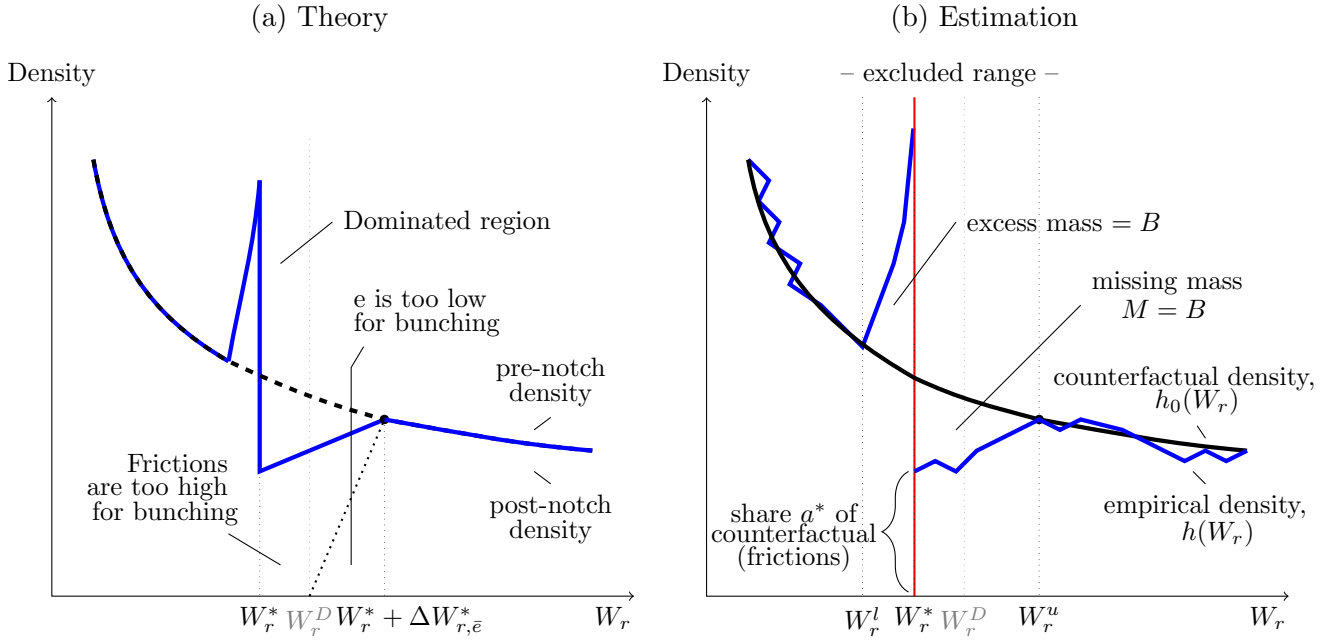
Notes: These figures depict the personal wealth tax schedule for Colombia. Panel (a) plots wealth tax liability by reported wealth W_r in FY 2010. Each bracket of W_r is associated with a fixed average tax rate on taxable net wealth. As a result, wealth tax liability $T(W_r)$ jumps discretely at the notch points. That year, the wealth tax brackets affected the top 0.12%, top 0.04%, top 0.02%, and top 0.01%, respectively. Panel (b) plots the statutory wealth tax rate FY 2000–2018. Wealth tax eligibility is determined using (taxable and non-taxable) net worth in all years but 2001, when it is determined using gross wealth. For 2007–2009, eligibility is established in 2006. In 2015–2018, eligibility is established in 2014. Tax brackets are expressed in current values for all years except 2004 and 2005 (2003 pesos). The tax schedule refers to average tax rates for all brackets in FY 2001–2010. In FY 2014–2018, only the first bracket is an average tax rate; the rest are marginal rates. *Source:* Table A.1

Figure 2: Distribution of Reported Net Worth in 2009 (Before Reform) and 2010 (After Reform)



Notes: This figure overlays the distribution of tax filers by reported wealth before and after a wealth tax reform. The reform introduced the wealth tax for all taxpayers reporting 1 billion pesos (USD 520,830) or more in wealth. Two notches were introduced at 1 and 2 billion pesos (red vertical lines), generating jumps in the wealth tax liability at these thresholds. While the distribution of tax filers is smooth in the absence of these tax notches (2009), there is an immediate emergence of excess and missing masses just below and above them, respectively (2010). This observed bunching of taxpayers below the notch points is a direct behavioral response to wealth taxation. Bin width is 2010 10,000,000 pesos (2010 USD 5,208.30 in 12/31/2010). *Source:* Authors' calculations using administrative data from DIAN.

Figure 3: Bunching Theory and Estimation: Density Distribution of Reported Wealth

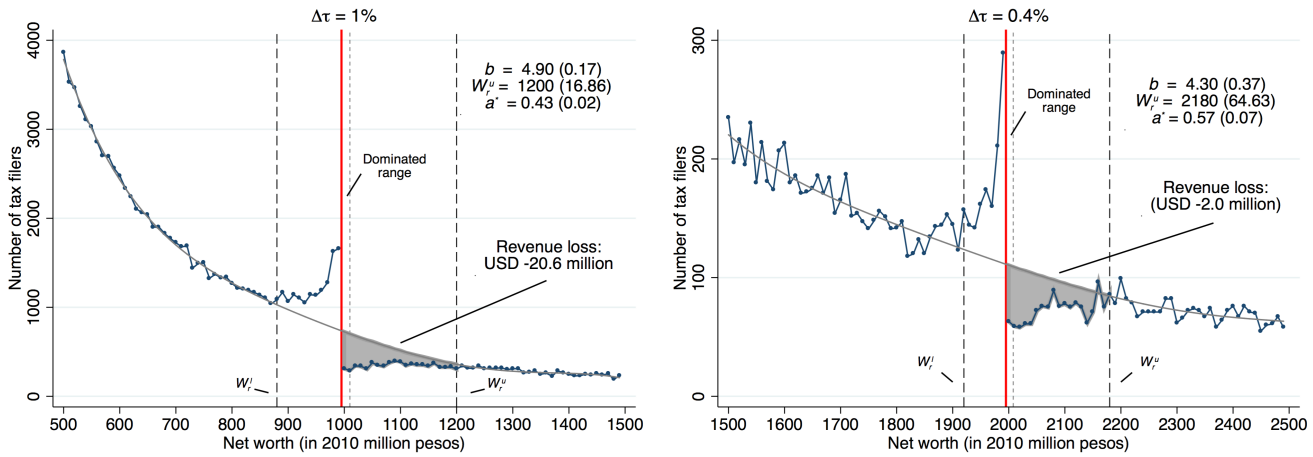


Notes: These figures illustrate the bunching approach to a proportional tax notch ($\Delta\tau > 0$) that discontinuously raises tax liability for those reporting wealth above W_r^*. For simplification, this notch is associated with a small change, such that intensive responses by those who stay above the notch can be ignored. Panel (a) depicts the theoretical effect of this notch on the density distribution of reported net wealth in the presence of heterogeneous elasticities and optimization frictions. Before the notch, the distribution of reported wealth is smoothly decreasing around the cutoff (dashed black line). A group of individuals responds to the notch by underreporting wealth below W_r^*. The notch thus generates excess mass at W_r^* and corresponding missing mass between the interval $(W_r^*, W_r^* + \Delta W_r^*]$ (solid blue line). Some individuals in the range $(W_r^*, W_r^D]$ cannot bunch below the notch point due to high optimization frictions (to compare this result with the baseline case of no frictions and homogeneous elasticities, see Figure A.3). Panel (b) illustrates the bunching estimation. The blue line represents the (hypothetical) empirical density of taxpayers. The black solid line represents the counterfactual density, which is estimated by either fitting a flexible polynomial to the empirical density and excluding observations in a range $[W_r^l, W_r^u]$, or by using observed pre-reform density. We denote W_r^u as the net worth of the marginal buncher, obtained with the point of convergence method such that the excess mass (B) below W_r^* and the missing mass (M) above W_r^* are equal ($B = M$). A lower bound on the estimated elasticity is obtained by scaling excess mass B by $1 - a^*$, where a^* is the share of individuals in the range of the dominated region $(W_r^*, W_r^D]$ who are unresponsive to the notch.

Figure 4: Wealth Bunching Estimation at First Two Notches in 2010, and Robustness using Pre-Reform Counterfactual

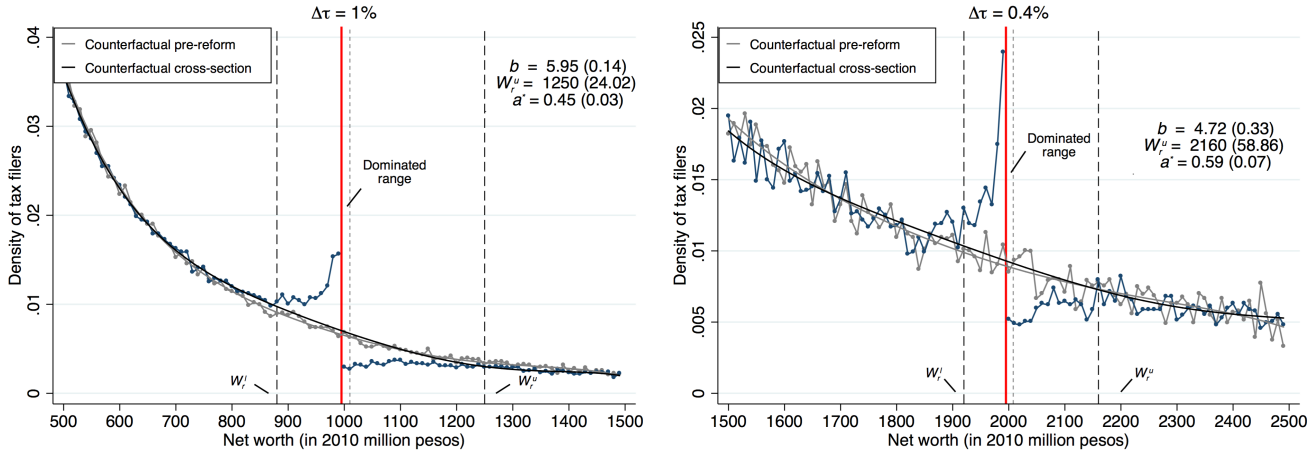
(a) First Notch

(b) Second Notch



(c) Robustness: First Notch

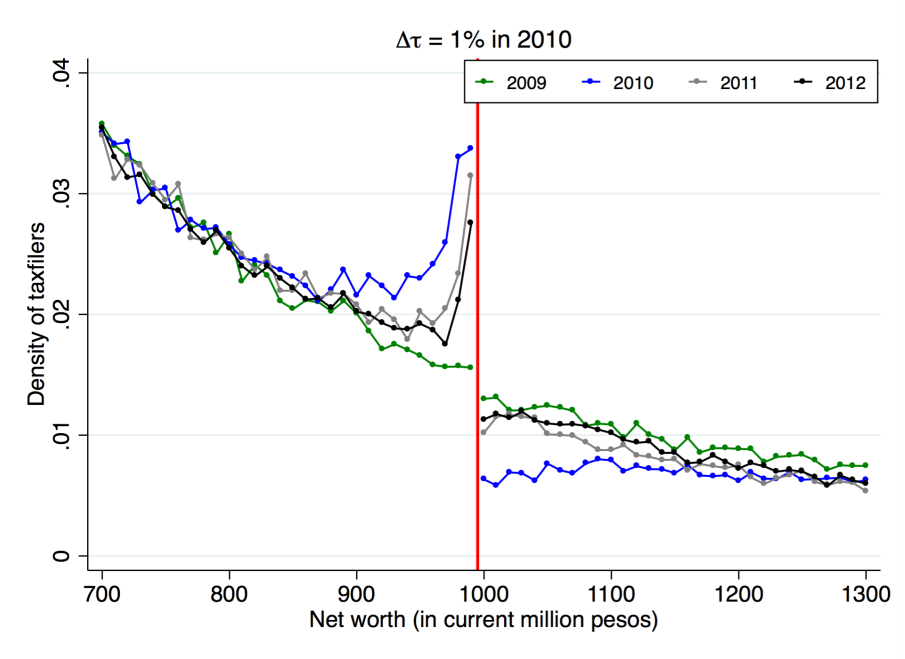
(d) Robustness: Second Notch



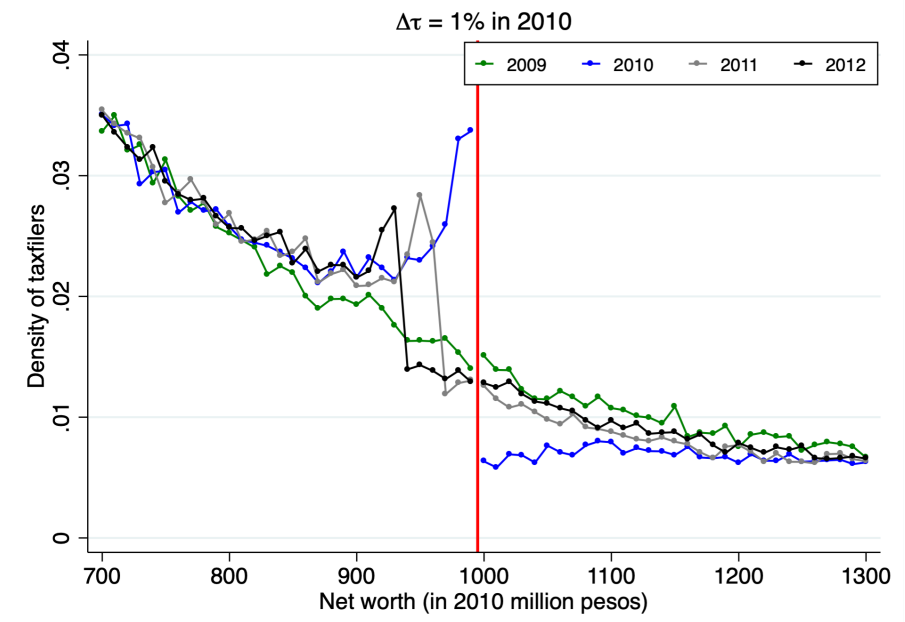
Notes: These figures display taxpayer density by 2010 net worth around the first notch in Panels (a) and (c), and the second notch in Panels (b) and (d). The counterfactual densities are obtained from the regression of a polynomial of degree 5 on all data points outside the $[W_r^l, W_r^u]$ interval in Panels (a) and (b), and using pre-reform data (in gray) in Panels (c) and (d). b is the excess mass as a share of the counterfactual and W_r^u is the net worth of the marginal buncher, obtained with the point of convergence method. The lower bound W_r^l is determined visually. The upper bound W_r^u is estimated from an iterative process: starting from $W_r^u = W_r^*$, we obtain the counterfactual and estimate the excess mass (B) below the threshold and missing mass (M) above the threshold. For low W_r^u, the excess mass is larger than the missing mass ($B >> M$). We iteratively increase W_r^u until the two masses are equal ($B = M$). a^* represents the share of individuals in the dominated range that do not bunch due to optimization frictions. The standard errors in parentheses are estimated from 1,000 bootstrap samples with replacement. Revenue losses are obtained by multiplying $\tau \times W_r$ by the shaded area between the counterfactual and observed densities. Bin width is 10,000,000 pesos (2010 USD 5,208.30 in 12/31/2010). The estimated parameters are summarized in Table 1. *Source:* Authors' calculations using administrative tax microdata from DIAN.

Figure 5: Bunching Persists Even When Wealth is Not Taxed

(a) Bunching in Current Pesos



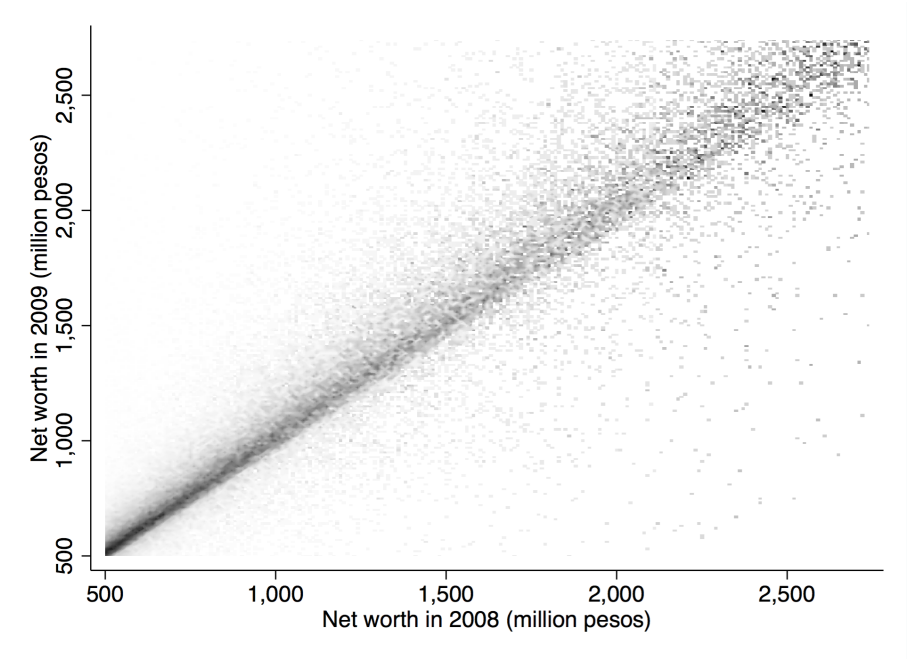
(b) Bunching in Constant Pesos



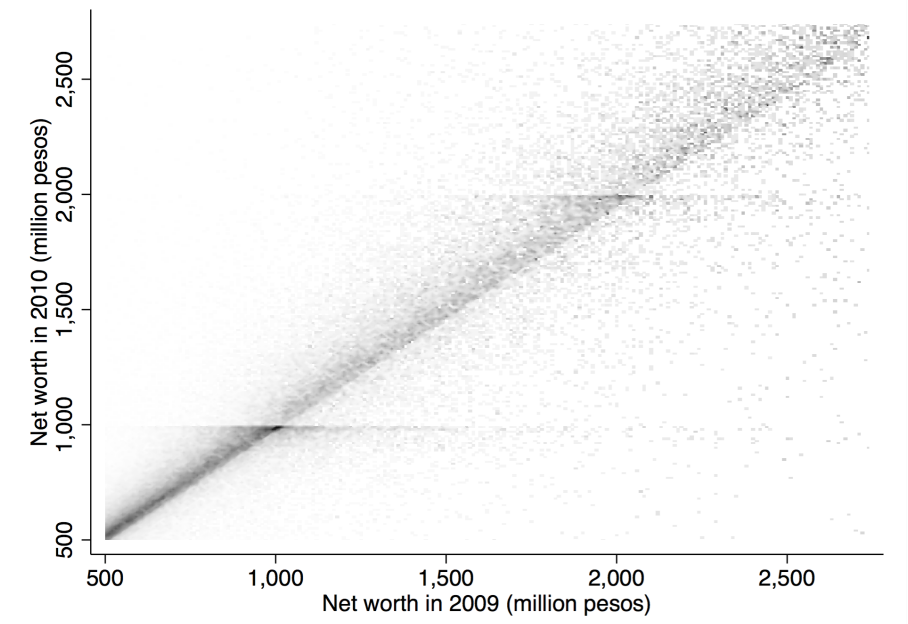
Notes: This figure shows the distribution of reported wealth before and after a reform that taxed wealth owned in 2010 for those reporting at least 1 billion pesos (USD 520,830) that year. Tax filer density by bins of 10,000,000 pesos is plotted in 2009 (no wealth tax for these taxpayers), 2010 (a 1 percent wealth tax), 2011 (no wealth tax), and 2012 (no wealth tax). Pesos are expressed in *current* terms in Panel (a) and in *constant* 2010 terms in Panel (b). Panel (a) shows the immediate emergence of excess mass below the exemption cutoff in 2010. Critically, bunching persists two years after wealth was taxed, even though there was no wealth tax those years. Panel (b) shows that, because taxpayers bunch below the cutoff in *current* pesos, they report less wealth in *real* terms. *Source:* Authors' calculations using administrative tax microdata from DIAN.

Figure 6: Tax Filer Density Before and After a Wealth Tax Reform

(a) Tax Filers in 2008 and 2009 (Not Subject to the Wealth Tax)



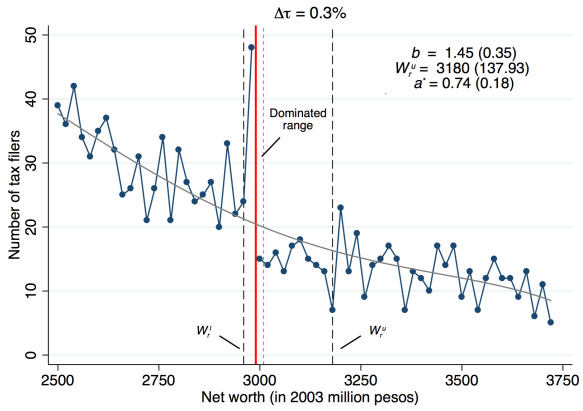
(b) Tax Filers in 2009 and 2010 (Subject to the Wealth Tax)



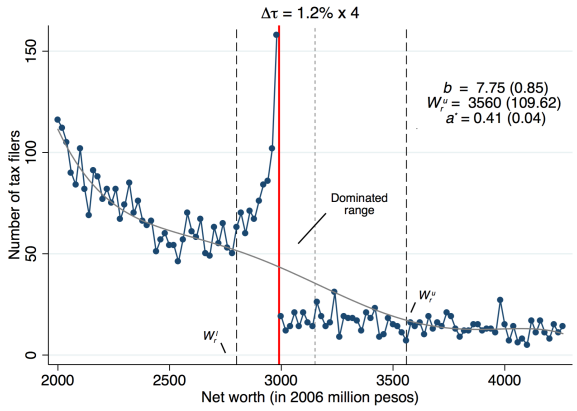
Note: These figures present density heatmaps for taxpayers reporting 500 million to 3,000 million pesos in bins of 2010 10 million × 10 million pesos (USD 5,208.30 in 12/31/2010) in 2008, 2009, and 2010. Bins are re-weighted by the total number of taxpayers in the column, so that darker bins represent higher relative taxpayer density. Panel (a) is restricted to individuals who filed in 2008 and 2009 (no notches or kinks). Taxpayers report similar values of wealth from year to year in the absence of wealth tax notches. The presence of diffuse mass in lieu of a precise 45 degree line suggests wealth rises and falls year-to-year, and that such variations are not necessarily related to changes in the wealth tax schedule. Panel (b) is restricted to individuals in 2009 and 2010 (a notched schedule was introduced in 2010). Taxpayers report more similar values of wealth relative to the previous year, rendering the 45 degree line more salient. Taxpayers also respond by bunching just below the two notches to avoid owing more wealth tax. *Source:* Authors' calculations using administrative data from DIAN.

Figure 7: Wealth Bunching Estimation Across Time and Notches: 2003, 2006, 2010, and 2014

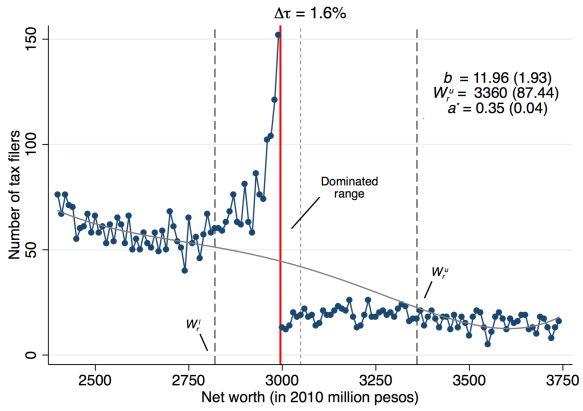
(a) 2003, First (and Only) Notch



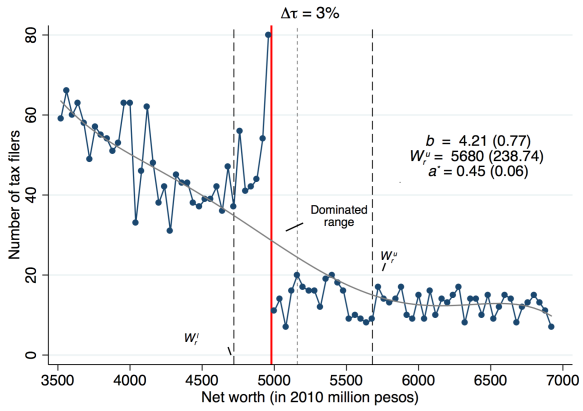
(b) 2006, First (and Only) Notch



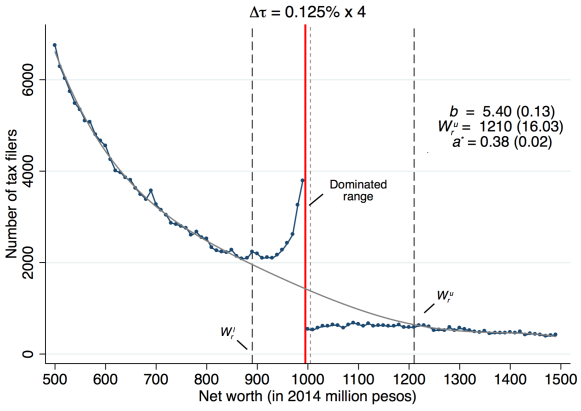
(c) 2010, Third Notch



(d) 2010, Fourth Notch



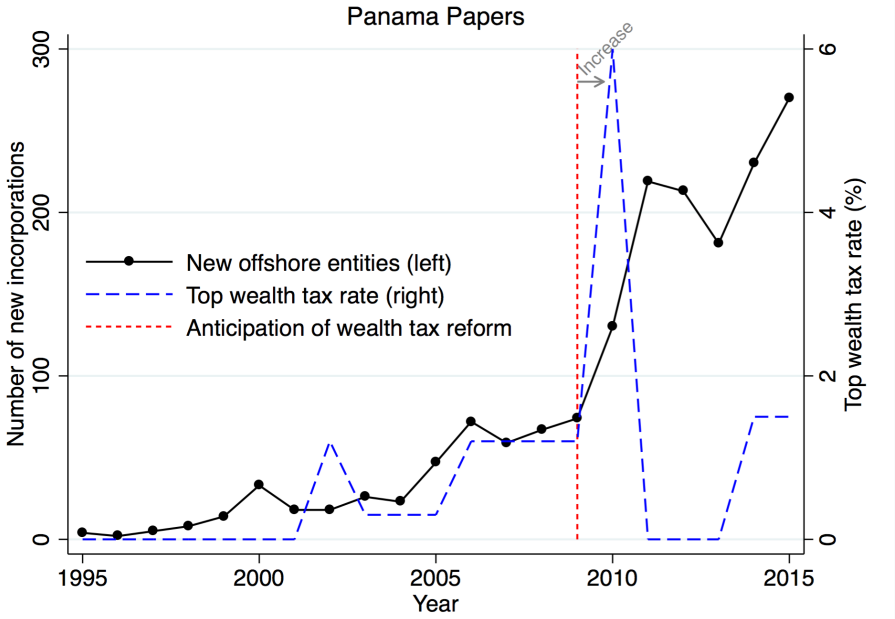
(e) 2014, First Notch



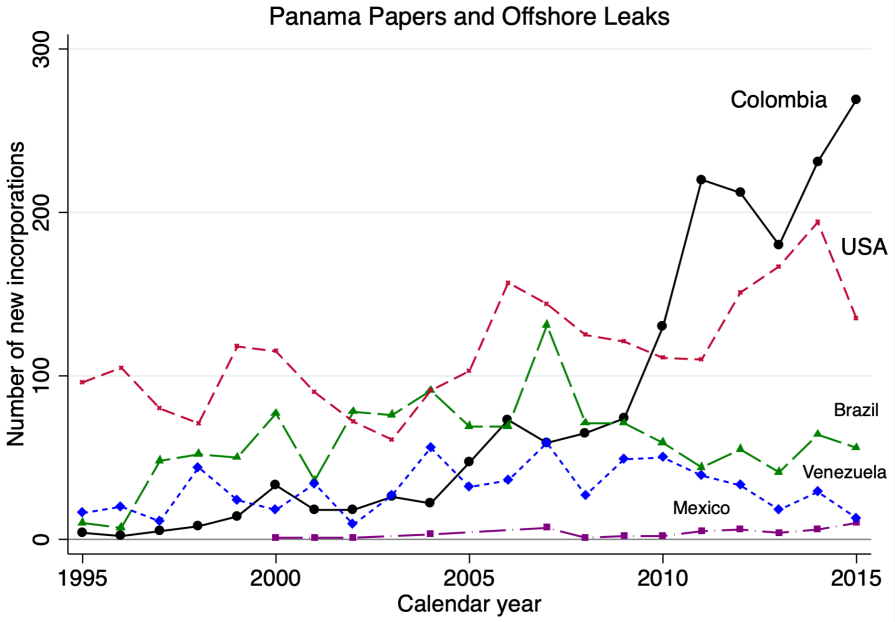
Notes: These figures display taxpayer density by net worth in 2003, 2006, 2010, and 2014, and fit the counterfactual distribution. b is the excess mass as a share of the counterfactual and W_r^u the net worth of the marginal buncher, obtained with the point of convergence method which requires the excess and missing masses around the threshold be equal. a^* is the share of individuals in the dominated range that do not bunch. The tax notch $\Delta\tau$ is $1.2\% \times 4$ in 2006 because individuals reporting wealth of 3 billion or more that year were subject to the wealth tax until 2009 (inclusive). The tax notch is $0.125\% \times 4$ in 2014 for similar reasons. Standard errors in parentheses are estimated from 1,000 bootstrap samples with replacement. Bin width is 20 million pesos in Panels (a) and (b), 10 million pesos in Panels (c) and (e), and 40 million pesos in Panel (d). The estimated parameters are summarized in Table 1. *Source:* Authors' calculations using administrative tax microdata from DIAN.

Figure 8: The Use of Offshore Entities

(a) Colombia



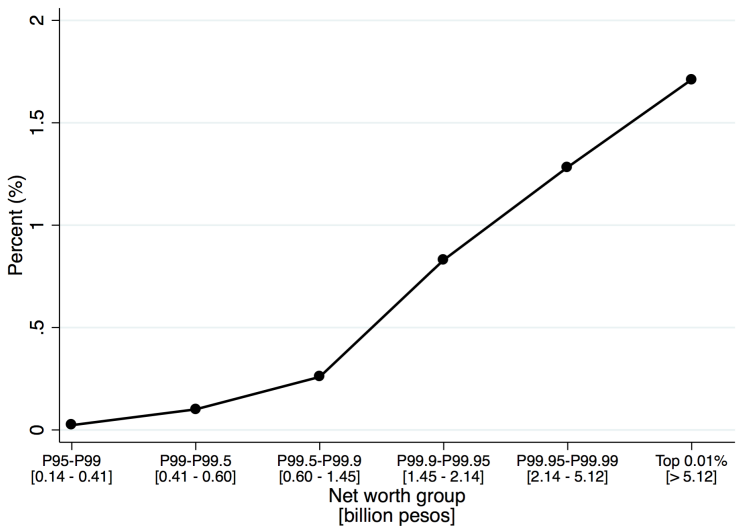
(b) Colombia versus Selected Countries



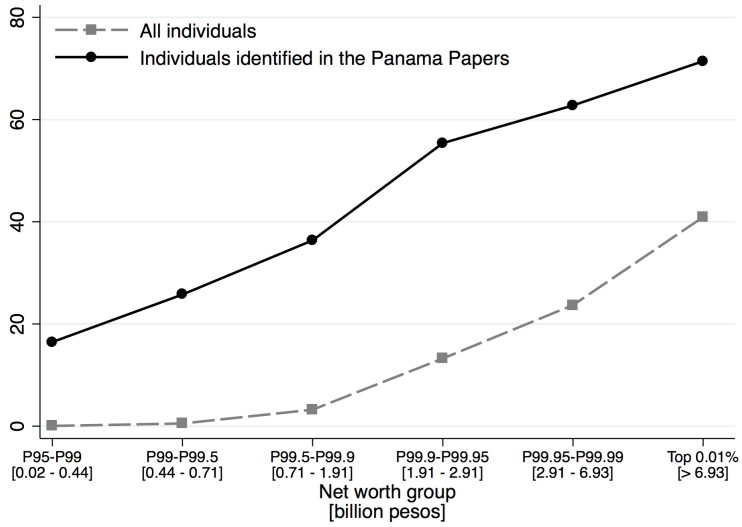
Note: These figures, based on the Panama Papers microdata, compare the flow of offshore entities created by individuals from Colombia and other countries through Panamanian law firm Mossack Fonseca. Panel (a) plots the number of new Colombian offshore entities that are incorporated every year (black solid line) and the top statutory annual wealth tax rate (blue dashed line). The figure suggests wealth tax changes are associated with a more frequent incorporation of offshore entities. Panel (b) compares Colombia's offshore entity incorporation flow with that of several other countries (the red vertical line marks the reintroduction of net wealth taxes in Colombia). The figure suggests Colombians stand out in their use of offshore entities, even relative to larger and wealthier countries. Both panels include active and inactive offshore entities. *Source:* ICIJ. Accessed June 12, 2017.

Figure 9: Panama Papers and Disclosures of Hidden Wealth Under Voluntary Disclosure Scheme, by Wealth Group

(a) Probability of Appearing Named in the Panama Papers



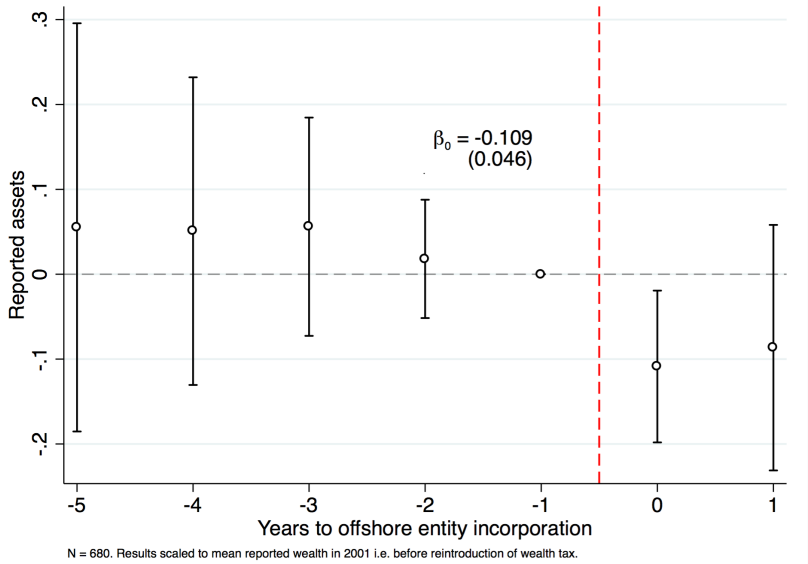
(b) Probability of Disclosing Hidden Wealth Under Scheme



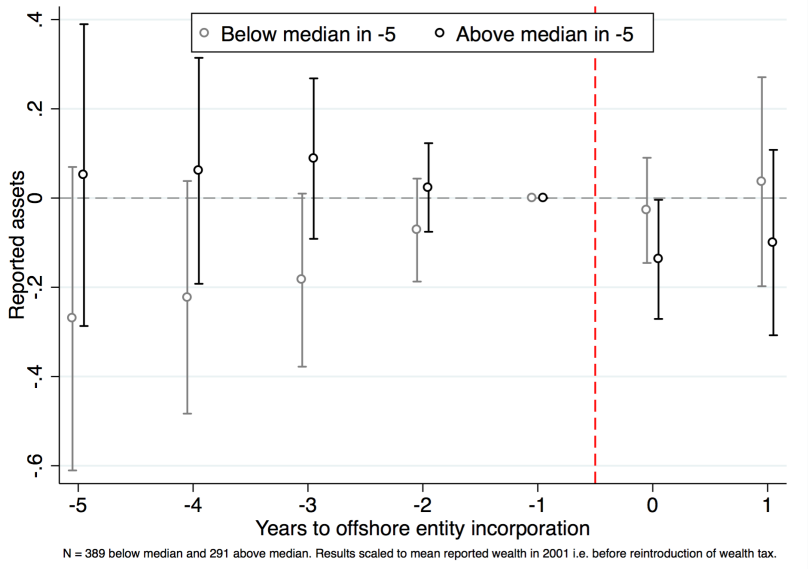
Notes: Panel (a) plots the fraction of tax units in Colombia identified in the Panama Papers by bins of net worth. Individuals are ranked by their average net worth reported for any year in which they have filed an income tax return. The sample includes 1,208 shareholders of offshore entities created by Mossack Fonseca who could be exactly matched to their individual income tax return filed at any point between 1993 and 2015. The figure shows that the likelihood of appearing in the Panama Papers is increasing in reported wealth (the differences across wealth groups are always statistically significant). One in sixty individuals in the wealthiest 0.01 percent (1.7 percent) are identified in the Panama Papers. Panel (b) plots the probability of participating in voluntary disclosure program by wealth bins for all tax filers (gray dash line), and tax filers identified in the Panama Papers (solid black line). Individuals are ranked by FY 2013 net worth plus any disclosures made under the scheme. The figure shows that two-fifths percent of individuals in the wealthiest 0.01 percent disclosed hidden wealth under the scheme. This share is 71 percent for individuals identified in the leak. The sample in Panel (b) is restricted to 1,633,383 individuals filing the income tax return in FY 2013, and includes 11,210 disclosers and 1,085 individuals in the Panama Papers (of which 434 disclosed hidden wealth). The exchange rate for 1 billion pesos is USD 335,130 in 12/31/2017. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

Figure 10: The Effect of Opening an Offshore Entity on Assets Reported to the Tax Authority

(a) All Tax Filers



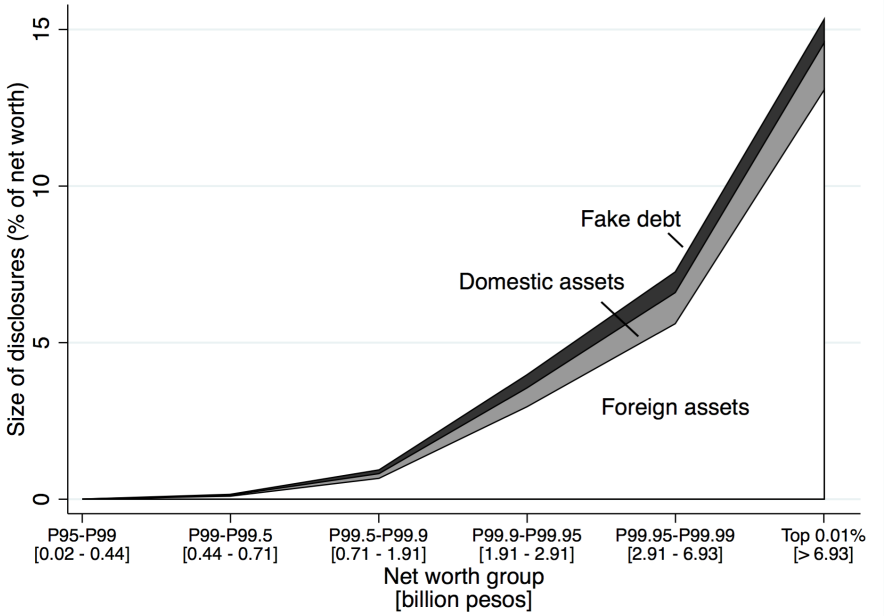
(b) Heterogeneity: Above- vs Below-Median Reported Assets in Event Time -5



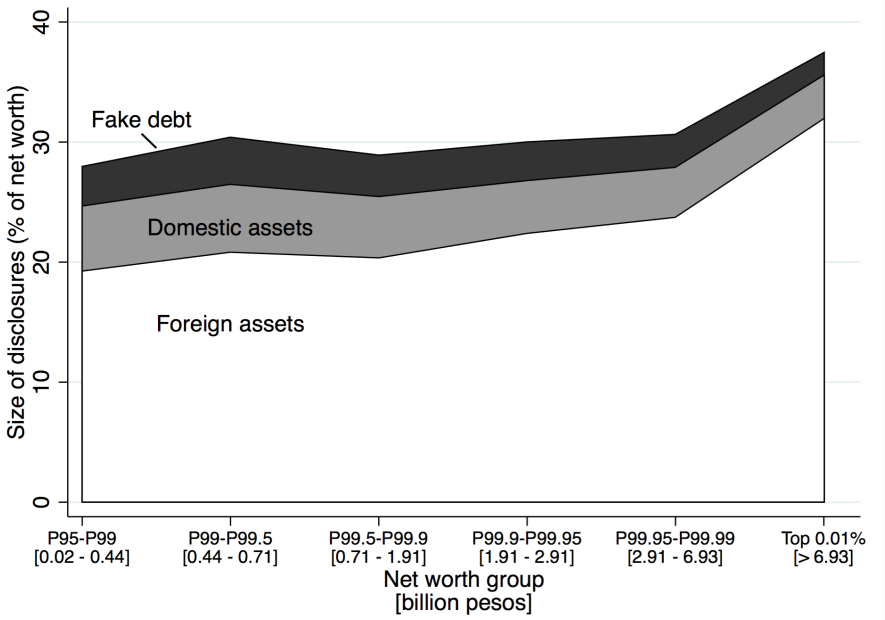
Notes: These figures compare total assets reported to the Colombian tax authority before and after incorporating an offshore entity in Panama and other tax havens through Mossack Fonseca. Panel (a) presents the β_k coefficients from event study specification (7). The outcome variable is total reported assets scaled with respect to mean reported wealth in 2001 (i.e., the year preceding the reintroduction of wealth taxation in Colombia). An "event" is defined as the year an individual incorporates an offshore entity for taxpayers with only one offshore entity. The sample is balanced in event time and excludes taxpayers not appearing in the Panama Papers. The figure suggests reported assets drop by 10.9 percent the year a taxpayer incorporates an offshore entity through Mossack Fonseca. This drop is consistent with wealth obfuscation for the purpose of reducing the tax burden. Panel (b) presents results separately for individuals with above- and below-median reported assets in event time -5. The figure suggests that the result is driven by the wealthiest individuals: for this group, reported assets significantly drop by 13.7 percent the year of offshore entity incorporation. As a robustness check, Figure A.9 plots β_k coefficients for different event time windows. *Sources:* Authors' calculations using administrative tax microdata from DIAN and ICIJ.

Figure 11: Size of Disclosed Hidden Wealth in 2015–2017 Relative to Post-Disclosure Net Worth, by Post-Disclosure Top Wealth Group

(a) All



(b) Disclosers Only



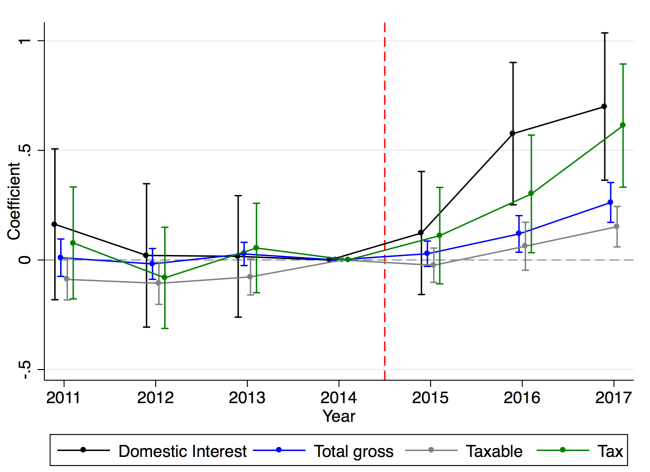
Notes: These figures show the magnitude of hidden foreign and domestic assets and fake liabilities disclosed during the 2015–2017 voluntary disclosure program. The sample is restricted to 1,633,383 individuals filing income taxes in FY 2013 (they may or not file a wealth tax return in 2015–2017), of which 11,210 participated in the disclosure program ("disclosers"). Tax filers are ranked by pre-program (FY 2013) net worth *plus* disclosures. Panel (a) shows the size of disclosed hidden assets and fake liabilities between 2015–2017 as a share of FY 2013 net worth *plus* disclosures. The figure suggests 15.3 percent of wealth had been hidden for among the top 0.01 percent. Panel (b) plots these shares for disclosers only. The figure suggests that hidden wealth represented 37.5 percent of disclosers' wealth for those in the top 0.01 percent. The exchange rate for 1 billion pesos is USD 335,130 in 12/31/2017. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

Figure 12: The Impact of a Voluntary Disclosure Program on Reported Wealth and Income

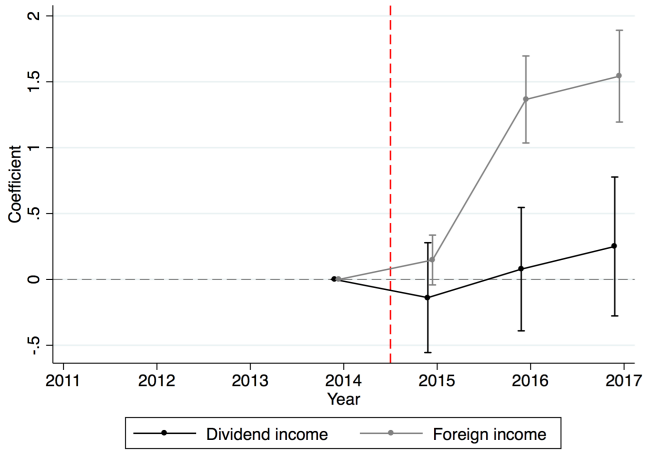
(a) Wealth: Gross and Net



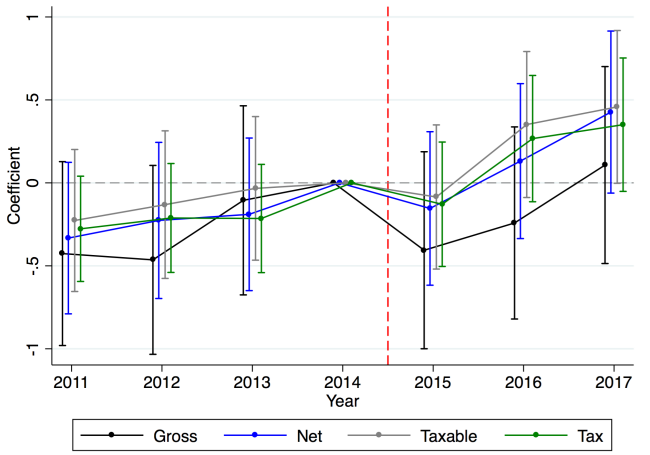
(b) Regular Income: Interest, Total Gross, Taxable, and Tax



(c) Regular Income: Dividend and Foreign



(d) Irregular Income (Includes Long-Rerm Realized Capital Gains): Gross, Net, Taxable, and Tax



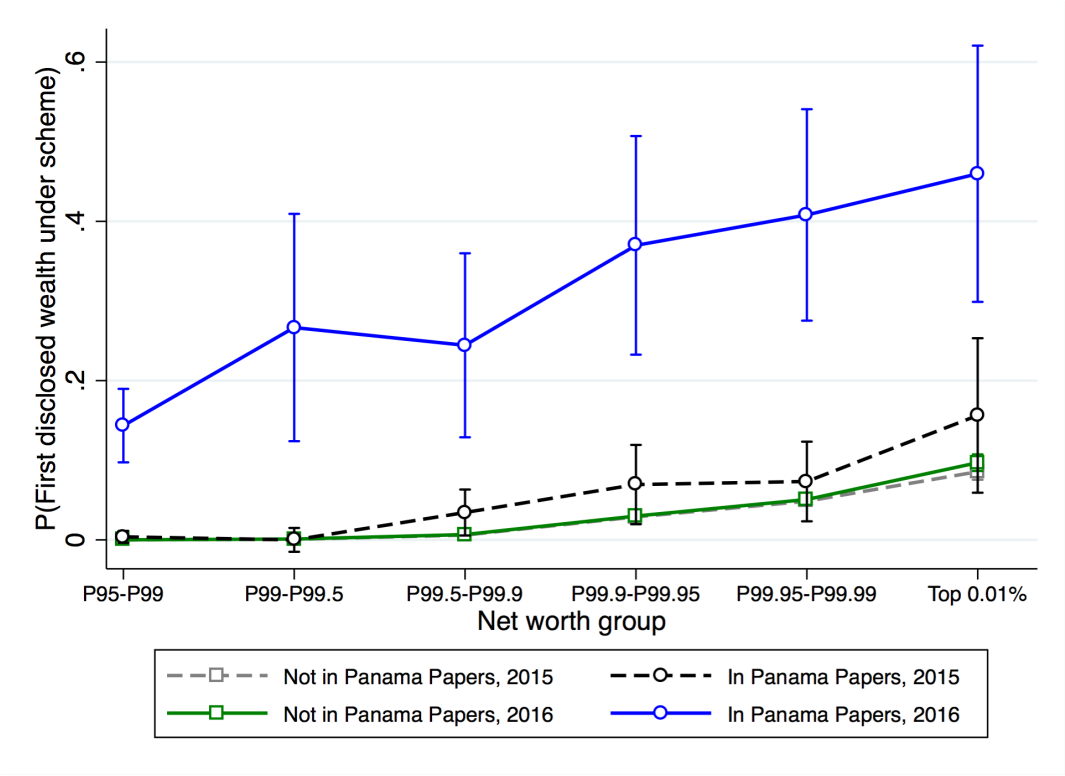
Notes: These figures present the effect of the voluntary wealth disclosure scheme on tax compliance. The outcome variable is reported wealth in Panel (a) and reported income categories in Panels (b)–(d). The figures compare outcomes between 1,777 individuals that voluntarily disclosed hidden wealth in 2015 and 43,181 that never disclosed under the scheme between 2015 and 2017. The outcome, an inverse hyperbolic sine transformation of a given income category, is regressed on individual fixed effects and a voluntary discloser dummy interacted with year fixed effects (2014 is the omitted category). Standard errors are clustered at the taxpayer level. The lines plot the coefficients on the interaction terms and 95 percent confidence intervals. The red vertical line marks the period individuals disclosed hidden wealth. The figure shows that the scheme raised wealth reported to the tax authority three years after initial disclosure, as well as reported capital income (interest income, foreign income, realized capital gains) derived from asset ownership. As a result, income tax liability increased. The sample is a balanced panel of 44,958 individuals that both filed income taxes annually between 2011 and 2017, and filed the wealth tax in 2015, 2016, or 2017. Tax filers that first disclosed assets and liabilities *after* 2015 (i.e., in 2016 or 2017) are excluded from the estimation sample. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

Figure 13: Rise in the Effective Tax Rate for Wealthiest Tax Filers



Notes: This figure illustrates how wealth taxation and a voluntary disclosure scheme raised tax progressivity at the top of the wealth distribution. The figure plots average taxes paid on income and wealth in 2014 and 2017, expressed as a share of net wealth for subgroups of individuals in the wealthiest 1 percent of the distribution. Individuals are ranked by their net wealth reported before the voluntary disclosure scheme (FY 2013) including any disclosures made under the scheme. The gray curve plots income taxes in calendar year 2014 (FY 2013), before the wealth tax was reintroduced. The black curve plots income *and* wealth taxes in 2017 (FY 2016), while the dashed blue curve adds the penalties associated with the disclosure program that year. The figure shows that wealth taxation increases taxes paid by the wealthiest individuals, and that the voluntary disclosure scheme more than doubled the average effective tax rate for the wealthiest group of individuals. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

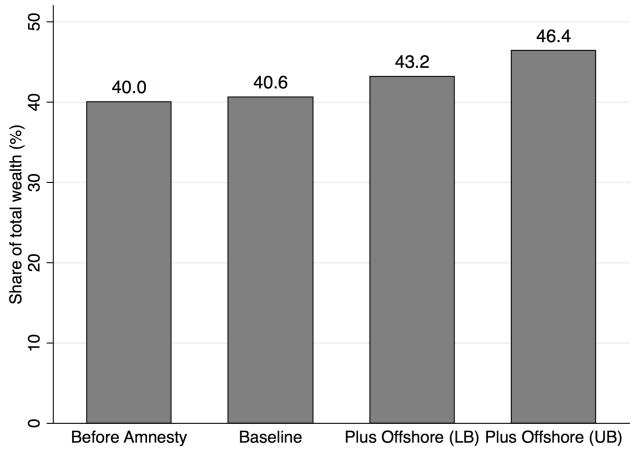
Figure 14: The Panama Papers Leak Raised Disclosures of Hidden Wealth



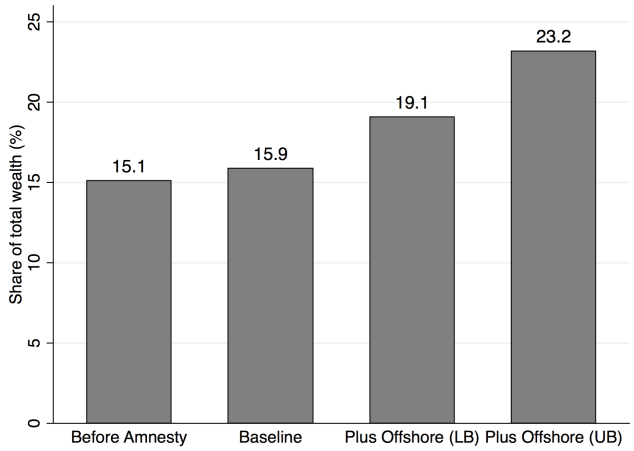
Notes: This figure illustrates the impact of the Panama Papers leak on tax compliance. The figure plots the probability of first disclosing hidden assets and/or fake liabilities in 2015 (before the leak) and 2016 (after the leak) for taxpayers in the Panama Papers (round marker) and taxpayers not in the Panama Papers (square marker) by wealth group. The vertical lines represent the 95 percent confidence intervals. The figure suggests that the Panama Papers leak in 2016 raised evaders' willingness to disclose hidden wealth for those named in the leak. The sample is an unbalanced panel of 2,421,936 individuals that either filed the income tax in 2014–2016 or filed a wealth tax return 2015–2017, and includes 11,927 disclosers and 1,167 individuals in the Panama Papers (of which 453 ever disclosed assets). Wealth groups are generated every year including disclosures. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

Figure 15: Wealth Inequality in Colombia Including Hidden Offshore Wealth

(a) Top 1 Percent



(b) Top 0.1 Percent



Notes: These figures presents estimates of top wealth shares in Colombia for 2017. In the baseline estimates, the top 1 percent owns 40.64 percent of total wealth in Panel (a), and the top 0.1 percent owns 15.85 percent of total wealth in Panel (b). The figures compare wealth inequality excluding offshore assets disclosed during the amnesty (first bar). In addition, the figures present estimates for top shares corrected by including unreported offshore wealth. Using data from Alstadsater et al. (2018b) and the Panama Papers leak, the lower bound assumes unreported offshore wealth today represents 6.2 percent of GDP, while the upper bound assumes it represents 15 percent. *Sources:* Table A.6.

Table 1: Summary of Notches, Responses, and Elasticities

Year of Reform (1)	Notch Point (mill. pesos) (2)	Exemption Cutoff (3)	ATR Jump $\Delta\tau$ (%) (4)	Dominated Range ΔW_r^D (mill. pesos) (5)	Frictions a^* using ΔW_r^D (6)	Response ΔW_r^* (mill. pesos)		Reduced-Form Elasticity e_R	
						Bunching-Hole Method (7)	Convergence Method (8)	Bunching-Hole Method (9)	Convergence Method (10)
2003	3,000	✓	0.3	9	0.74	120	180	0.27	0.60
					(0.18)	(80.09)	(137.93)	(0.62)	(1.76)
2006	3,000	✓	1.2×4	151	0.41	340	560	0.13	0.36
					(0.04)	(52.04)	(109.62)	(0.04)	(0.16)
2010	1,000	✓	1.0	10	0.43	110	200	0.60	2.00
					(0.02)	(7.91)	(16.86)	(0.09)	(0.35)
2010	2,000		0.4	8	0.57	110	180	0.37	1.00
					(0.07)	(24.10)	(64.63)	(0.19)	(0.99)
2010	3,000		1.6	49	0.35	220	360	0.17	0.44
					(0.04)	(40.82)	(87.44)	(0.09)	(0.20)
2010	5,000		3.0	160	0.45	360	680	0.08	0.30
					(0.06)	(105.16)	(238.74)	(0.06)	(0.23)
2014	1,000	✓	0.0125×4	5	0.38	110	210	1.21	4.41
					(0.02)	(6.31)	(16.03)	(0.15)	(0.71)

Notes: This table presents elasticity estimates at different wealth levels exploiting four wealth tax reforms taking place in 2003, 2006, 2010, and 2014. Column (1) presents the year of the wealth tax reform. Column (2) indicates the bracket cutoff, expressed in current million pesos. Column (3) indicates whether this cutoff also marks the eligibility threshold, below which taxpayers are exempt from the wealth tax. Column (4) presents the size of the wealth tax notch. Column (5) presents the dominated range in current million pesos, defined as $\Delta\tau \cdot W_r^*/(1-\tau-\Delta\tau)$. Column (6) presents the estimate of frictions (the fraction of individuals in dominated ranges who are unresponsive). Columns (7)–(8) present the reporting responses in current million pesos using bunching-hole and convergence methods, respectively. Columns (9)–(12) present elasticities based on the reduced-form formula (3) in columns (9)–(10). Table B.1 includes the elasticities based on a parametric equation for a comparison. *Source:* Authors' calculations using administrative tax microdata from DIAN.

Table 2: Compliers (i.e., bunchers) analysis for the first notch in 2010

	$E[Y(0)\|\text{Compliers}]$ (1)	$E[Y(1)-Y(0)\|\text{Compliers}]$ (2)	$E[Y\|\text{Always-takers}]$ (3)	$E[Y\|\text{Never-takers}]$ (4)
Fixed assets (real estate, land, vehicle)	0.527	-0.002	0.63	0.541
	(0.027)	(0.023)	(0.042)	(0.01)
Stocks and shares	0.17	0.015	0.091	0.161
	(0.02)	(0.019)	(0.027)	(0.007)
Inventories	0.109	-0.024	0.109	0.107
	(0.016)	(0.012)	(0.024)	(0.006)
Bank deposits, bonds, other investments	0.086	0.008	0.08	0.094
	(0.016)	(0.017)	(0.022)	(0.005)
Accounts receivable	0.066	0.025	0.074	0.08
	(0.016)	(0.013)	(0.02)	(0.005)
Other assets	0.038	-0.021	0.019	0.018
	(0.011)	(0.012)	(0.016)	(0.002)
Debt	0.094	0.033	0.079	0.121
	(0.005)	(0.004)	(0.009)	(0.002)

Notes: This table presents the results of a compliers analysis using the set-up illustrated by Figure A.5. In this setting, a complier refers to a taxpayer bunching below the exemption cutoff in response to the wealth tax. The sample is a balanced panel of 8,016 income tax filers reporting net wealth between W_r^l and W_r^u in 2008, 2009, and 2010. The endogenous variable is $B_{it} = 1$ if the individual has net wealth (in 2010 pesos) between W_r^l and W^*, i.e., the bunching region. Complier means in Column (1) are calculated as the coefficient on $1 - B_{it}$ in a 2SLS regression of $1 - B_{it}$ multiplied by Y_i and using 2010 as the instrument (Z_{it}). Column (2) presents the 2SLS coefficient β_1 from specification (5). Always-taker and never-taker means are calculated in analogous 2SLS regressions of $B_{it}(1 - Z_{it})Y_{it}$ on $B_{it}(1 - Z_{it})$ and $(1 - B_{it})Z_{it}Y_{it}$ on $(1 - B_{it})Z_{it}$, respectively, again using 2010 as Z_{it}. The first stage coefficient is 0.313 (t-stat 35.3) for debt, and 0.275 (t-stat 13.13) for all others, as only business owners keeping records report asset types separately. Standard errors are clustered at the taxpayer level. The table suggests bunchers inflate their debt and underreport inventories, which are not covered by third-party reports, to artificially place themselves below the wealth tax exemption cutoff. *Source:* Authors' calculations using administrative tax microdata from DIAN.

Table 3: Who Are the Shareholders of Offshore Entities Incorporated by Mossack Fonseca?

	Not in Panama Papers (1)	In Panama Papers (2)
Number of individuals	3,300,718	1,208
Number of years filed tax return	6.21	15.83
	[5.87]	[6.91]
Demographics		
Male (percent)	56.2	63.4
Born after 1985 (percent)	7.2	5.1
Rentier (percent)	13.21	27.40
Wage-earner (percent)	37.16	59.69
Other (percent)	49.63	12.91
Income and wealth (2017 millions)		
Gross wealth	263.11	1,880.42
	[1,034.38]	[3,511.60]
Net worth	209.72	1,533.36
	[878.76]	[3,245.76]
Irregular capital income	8.11	65.04
	[140.32]	[178.49]
P99 (percent)	9.54	68.96
P99.9 (percent)	0.95	28.75
P99.99 (percent)	0.09	4.47

Notes: This table presents descriptive statistics (means and standard deviations in brackets) for the 3.3 million income tax filers we observe between tax years 1993 and 2016 (Column 1) and for tax filers that appear named in the Panama Papers (Column 2). Rentier, Wage-earner and Other refer to economic activity codes, as self-reported by taxpayers to the tax authority. Rentier also includes individuals without an economic activity as well as dependents. Income and wealth values (in 2017 million pesos) and top percentile groups use individual net worth means across tax years. The exchange rate for 1 million pesos is USD 335.13 in 12/31/2017. *Sources:* Authors' calculations using administrative tax microdata from DIAN and ICIJ.

Table 4: Who Disclosed Hidden Assets or Inexistent Liabilities?

	Non-disclosers	Disclosers	Disclosers by year of disclosure		
			2015	2016	2017
	(1)	(2)	(3)	(4)	(5)
Number of individuals	55,098	11,210	2,179	2,708	6,323
Number of years filed tax return	19.69	19.19	19.08	19.38	19.15
	[5.00]	[5.62]	[5.58]	[5.55]	[5.67]
Demographics					
Male (percent)	60.58	57.76	61.03	56.99	56.95
Born after 1985 (percent)	0.0	0.0	0.0	0.0	0.0
Rentier (percent)	29.54	34.55	33.59	35.23	34.59
Wage-earner (percent)	24.29	28.72	24.55	31.09	29.13
Other (percent)	46.17	36.74	41.85	33.68	36.28
In the Panama Papers (percent)	0.43	3.87	1.88	10.60	1.68
Buncher (percent)	18.27	13.26	13.68	12.15	13.59
Pre-Disclosure Wealth					
Gross wealth	2,837.43	3,288.56	4,445.34	2,976.44	3,023.58
	[7,638.74]	[20,666.54]	[37,727.68]	[5,092.94]	[15,975.48]
Net worth	2,367.62	2,719.82	3,538.67	2,487.30	2,537.22
	[5,557.32]	[18,570.51]	[36,321.41]	[4,295.27]	[12,196.98]
Irregular capital income	98.29	95.20	110.60	72.94	99.42
	[678.19]	[740.71]	[526.18]	[311.14]	[914.13]
P99 (percent)	100.0	100.0	100.0	100.0	100.0
P99.9 (percent)	46.08	39.71	43.05	42.87	37.21
P99.99 (percent)	4.04	6.75	7.85	7.24	6.17

Notes: This table presents descriptive statistics (means and standard deviations in brackets) for 66,308 income tax filers in FY 2013 (i.e., immediately before the disclosure program) that filed a wealth tax declaration in either 2015, 2016, or 2017. Column 1 provides summary statistics for those that did not disclose hidden wealth or inexistent liabilities in 2015, 2016, nor 2017, while Column 2 provides summary statistics for those that ever disclosed between 2015 and 2017. Columns 3–5 provide summary statistics separately by year of first disclosure. Rentier, Wage-earner and Other refer to economic activity codes, as self-reported by taxpayers to the tax authority. Rentier also includes individuals without an economic activity as well as dependents. An individual is coded as a buncher if she is located within the bunching region $[W_r^l, W_r^*)$ in FY 2003, 2006 or 2010, as defined in Section 3.1. Wealth values (expressed in 2017 million pesos) and top percentile groups (using net worth) are based on values reported in the income tax statement in FY 2013 (calendar year 2014), i.e., immediately before the disclosure program. The exchange rate for 1 million pesos is USD 335.13 in 12/31/2017. *Sources:* Authors' calculations using administrative tax microdata from DIAN and ICIJ.

Table 5: The Impact of a Voluntary Disclosure Program on Wealth and Income Reported to the Tax Authority

	Wealth		Income						Capital gains and other irregular income			
	Gross	Net	Foreign	Dividend	Interest	Total gross	Taxable	Tax	Gross	Net	Taxable	Tax
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DID	0.288***	0.400***	1.010***	0.061	0.416***	0.132***	0.132***	0.329***	0.069	0.322**	0.339***	0.339***
	(0.015)	(0.030)	(0.105)	(0.170)	(0.117)	(0.030)	(0.034)	(0.090)	(0.157)	(0.130)	(0.125)	(0.100)
N	314,706	314,706	138,004	138,004	314,706	314,706	314,706	314,706	314,706	314,706	314,706	314,706
R^2	0.66	0.572	0.614	0.753	0.629	0.686	0.547	0.641	0.264	0.246	0.246	0.242

Notes: This table presents the effects of the 2015 voluntary disclosure program on income and wealth reported to the Colombian tax authority. The dependent variables in columns (1) and (2) are taken from the wealth tax form 440, while those in columns (3)–(12) are taken from the individual income tax forms 110 and 210. Outcomes are expressed in log-approximation form using the inverse hyperbolic sine function. The table compares outcomes between 1,777 taxpayers that voluntarily disclosed hidden assets and inexistent liabilities in 2015 and 43,181 that did not disclose between 2015 and 2017. Each outcome is regressed on individual fixed effects, year fixed effects, and an interaction of the voluntary discloser dummy and post-reform years (2014 is the omitted category): $\log(y_{it}) = \alpha_i + \gamma_t + \beta \cdot \mathbb{1}(\text{Post} \times \text{Discloser}) + \nu_{it}$. The standard errors in parentheses are clustered at the taxpayer level. The sample is a balanced panel of 44,958 individuals that both filed income taxes annually between 2011 and 2017, and filed the wealth tax in 2015. Tax filers that first disclosed assets and liabilities strictly after 2015 (i.e., in 2016 or 2017) are excluded from the estimation sample. The number of observations with foreign income and dividend income is smaller than the rest because taxpayers report these two varibles as separate variables starting 2014. Wealth tax liability is not reported as an outcome because there is no wealth tax during most of the pre-program period. $*p < 0.1, **p < 0.05, ***p < 0.01$. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

Table 6: The Effect of the Panama Papers Leak on Wealth Disclosures and Taxes Owed

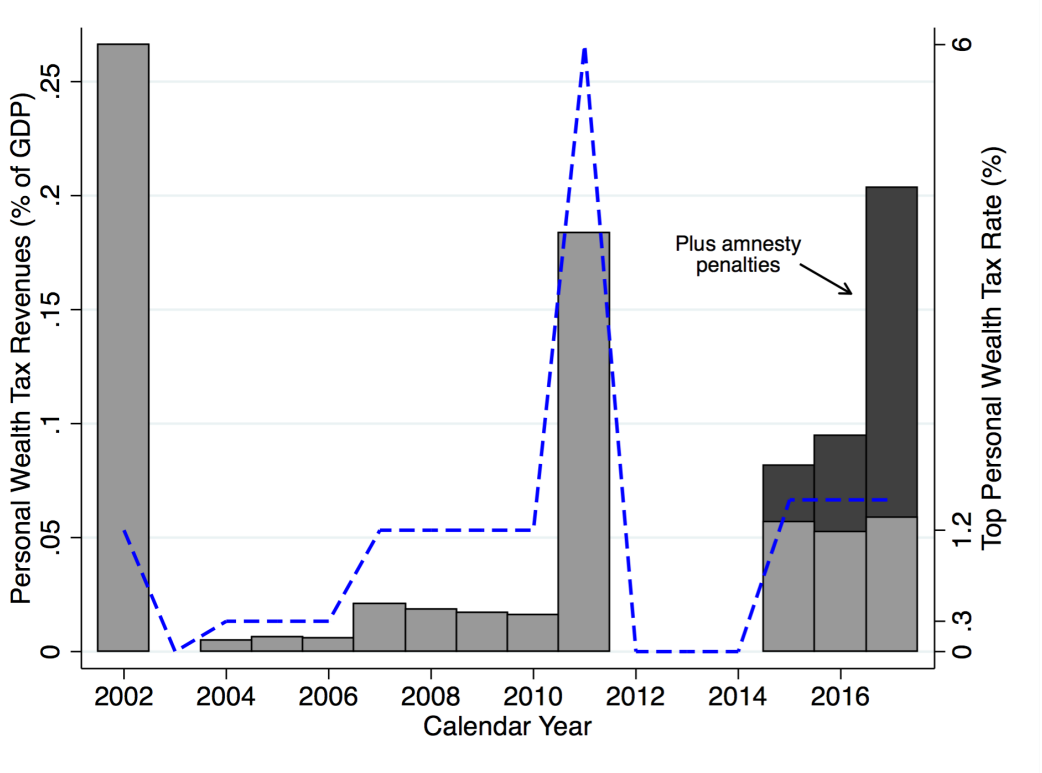
	Dependent variable			
	𝟙(Disclosed any)	𝟙(Disclosed foreign asset)	log(Wealth tax)	log(Wealth tax plus penalties)
	(1)	(2)	(3)	(4)
β	0.274***	0.296***	0.261***	0.850***
	(0.027)	(0.025)	(0.043)	(0.088)
Control Mean	0.0328	0.0192	15.221	15.315
N	118,966	118,966	118,966	118,966
R^2	0.015	0.023	0.001	0.004

Notes: This table presents the effect of the Panama Papers leak on willingness to disclose hidden wealth and tax liability. Column (1) presents the likelihood of disclosing any hidden asset or fake liability for the first time. Column (2) plots the likelihood of disclosing foreign assets in particular. Columns (3) and (4) display wealth tax liability, including or excluding penalties associated with disclosing hidden wealth. These outcomes are expressed in log-approximation form using the inverse hyperbolic sine function. The table compares outcomes using a balanced panel of 59,483 individuals that filed the wealth tax return in 2015 (before the Panama Papers leak) and 2016 (after the Panama Papers leak), 504 of which appear in the Panama Papers and 58,979 of which do not. The difference-in-differences coefficient represents β from specification (9). The standard errors in parentheses are clustered at the individual level. Column (1) results suggest that taxpayers in the Panama Papers are 27.4 percentage points more likely to first disclose hidden assets and/or fake liabilities after the Panama Papers leak relative to taxpayers that do not appear in the Panama Papers before the leak. On a basis of 0.0328, this implies a more than ninefold increase in the likelihood of disclosing hidden wealth. $*p < 0.1, **p < 0.05, ***p < 0.01$. *Sources:* Authors' calculations using administrative tax microdata from DIAN and ICIJ.

Appendices

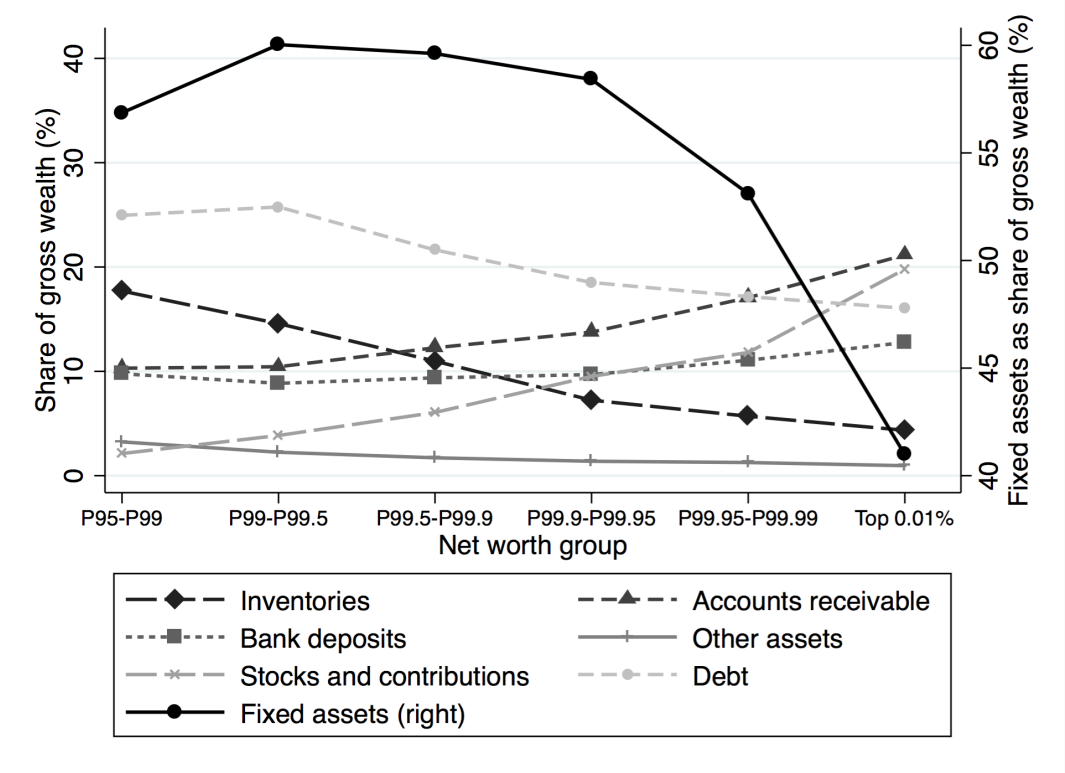
A Online Figures and Tables

Figure A.1: Personal Wealth Tax and Voluntary Disclosure Program Revenues



Notes: This figure plots personal wealth tax revenue (gray bars) plus disclosure penalty revenue (black bars) relative to GDP, and the statutory top personal wealth tax rate (dashed blue line) between calendar years 2002 and 2017. The figure shows that tax revenues on recurrent personal wealth taxes represented between 0 and 0.27% of GDP in Colombia during this period. As a comparison, in 2016 the equivalent share was 0.18% in Spain, 0.22% in France, 0.43% in Norway, and 1.0% in Switzerland (OECD, 2018). Total penalty revenues collected between 2015 and 2017 represent 0.21% of GDP. Wealth tax revenues do not systematically increase in 2016 and 2017 for non-disclosers because (i) eligibility for FY 2015–2018 is determined by net wealth held January 1, 2015 only, and (ii) rules regarding year-to-year changes in tax base. For instance, if net worth is 1,000 million in FY 2015 and 2,000 million in FY 2016 (i.e., an increase), FY 2016 wealth tax base is 1,000 million $\times(1+0.25i)$ where i is 2015 inflation rate. If net worth is 2,000 million in FY 2015 and 1,000 million in FY 2016 (i.e., a decrease), FY 2016 wealth tax base is 2,000 million $\times(1-0.25i)$. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

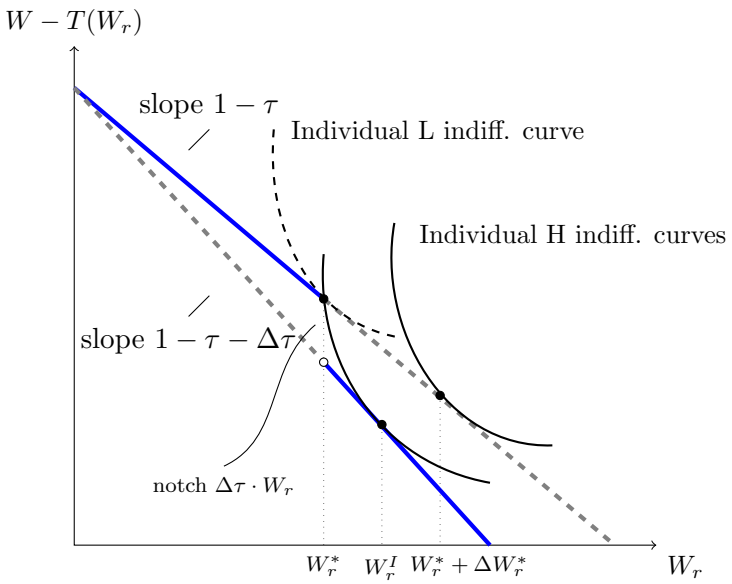
Figure A.2: Wealth Decomposition by Top Wealth Groups, Business Owners Keeping Records



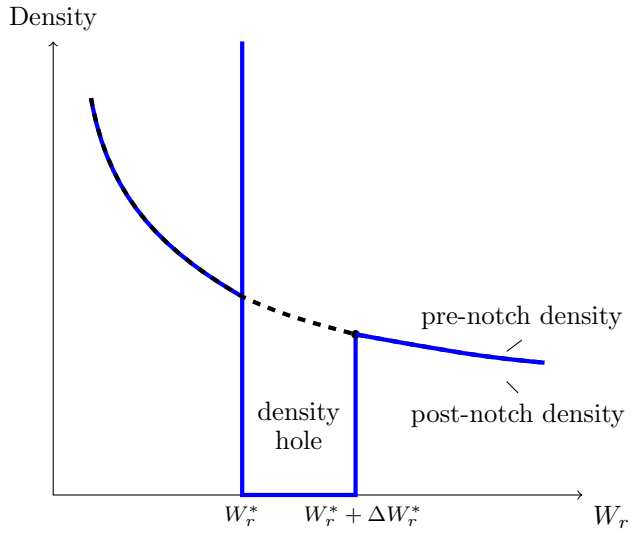
Notes: This figure plots mean wealth items as a share of gross wealth by top percentile groups. The figure suggests fixed assets (e.g., real estate, land) represent 56.9 percent of total wealth for individuals in P95–P99, but only 41.0 percent for the top 0.01 percent. In contrast, stocks and contributions, and accounts receivable are increasing in wealth, representing around 40 percent of wealth among the wealthiest 0.01 percent. Top wealth groups are generated ranking all income tax filers in 2016 by their reported net worth. The shares of wealth items are computing using the sample of business owners required to keep records and filing income tax form 110, because wealth decomposition is only available for these taxpayers.

Figure A.3: Behavioral Responses to a Tax Notch

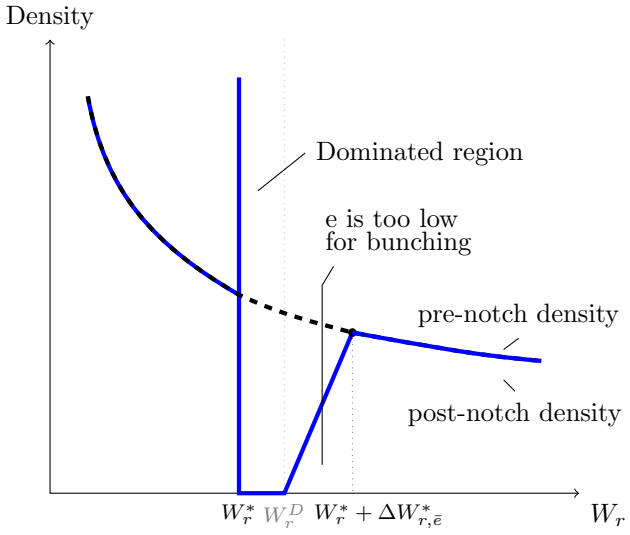
(a) Budget Sets



(b) Density Distributions in the Baseline Model (Homogeneous Elasticities and No Frictions)

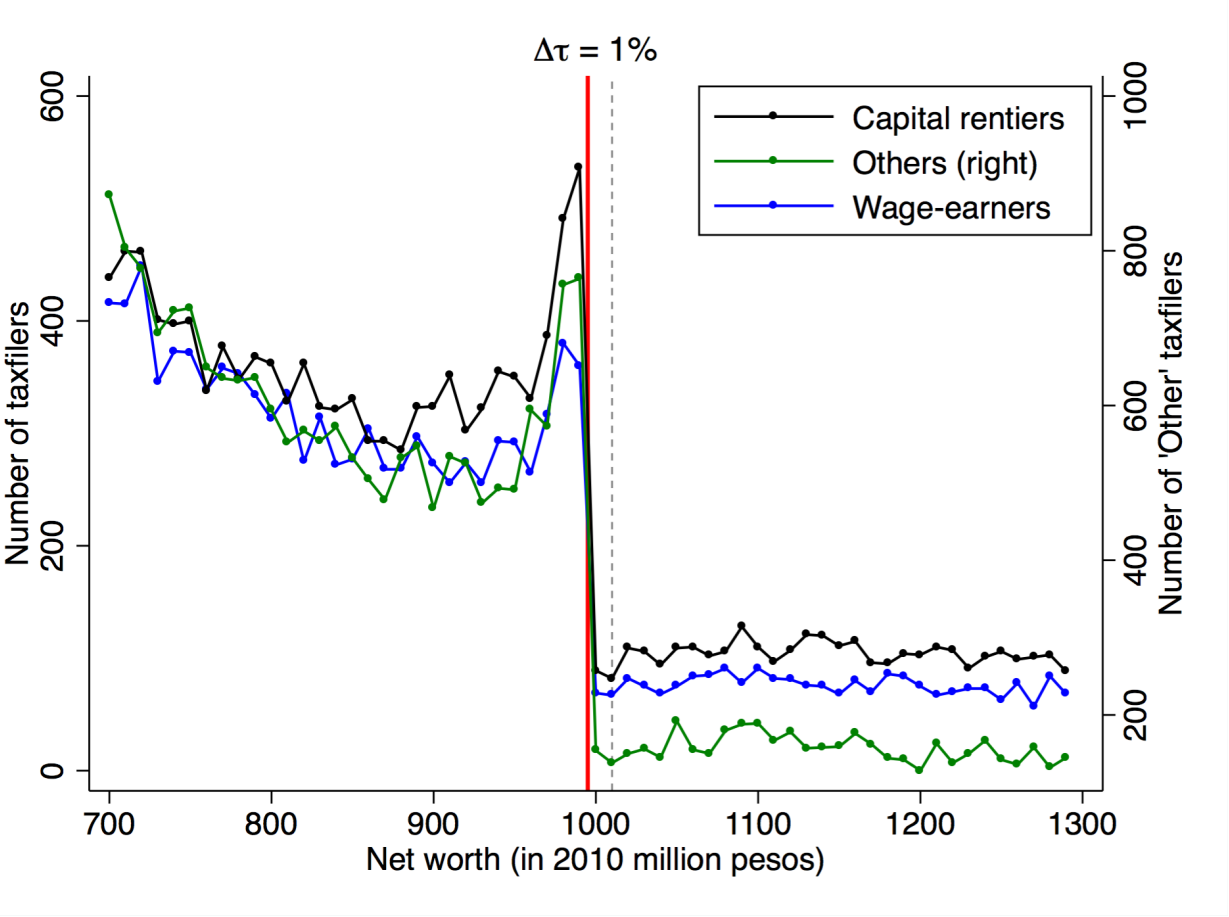


(c) Heterogeneity in Elasticities



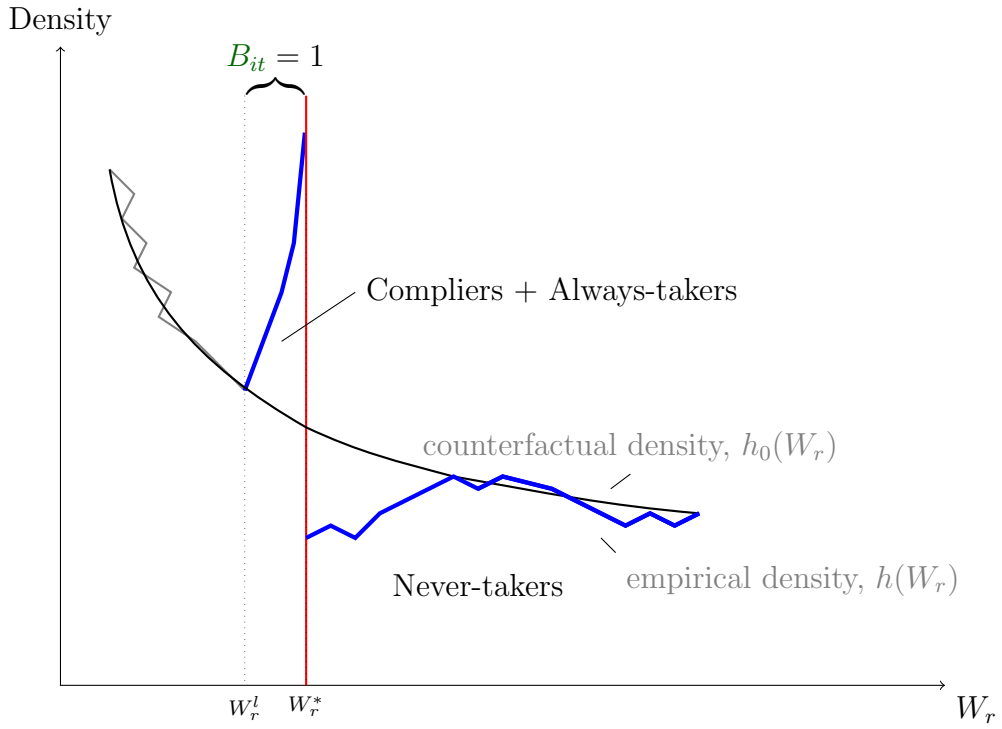
Notes: These figures illustrate the implications of a proportional tax notch ($\Delta\tau > 0$) in a budget diagram in Panel (a), and a density distribution diagram in Panels (b) and (c). For simplification, we assume the notch is associated with a small change in the marginal tax rate above the cutoff, so that we can ignore intensive responses by those who stay above the notch. Panel (a) shows the budget constraint of two individuals, L and H, assuming $W_r \leq W$. L has the lowest pre-notch reported wealth W_r (lowest true wealth W) among those who locate at the point; she chooses W_r^* both before and after the tax change. Individual H has the highest pre-notch reported wealth (highest true wealth) among those who locate at the notch point; she chooses reported wealth $W_r^* + \Delta W_r^*$ before the tax change and is exactly indifferent between the notch point W_r^* and the interior point W_r^I after the tax change. Panel (b) shows the corresponding distribution of net worth in the presence of such tax schedule in the baseline model, under homogeneous elasticities and no optimization frictions. There is bunching at the notch point by all individuals between L and H, i.e., who have reported wealth in an interval $(W_r^*, W_r^* + \Delta W_r^*]$. Panel (c) extends the baseline model to allow for heterogeneity in elasticities. Individual density is empty in the strictly dominated range $(W_r^*, W_r^D]$ and then increases gradually until it converges with the pre-notch density at $W_r^* + \Delta W_{r,\bar{e}}^*$. Tax filers with reported wealth in the range $(W_r^D, W_r^* + \Delta W_{r,\bar{e}}^*]$ do not bunch because their elasticity is too low. Figure 3 extends Panel (c) to incorporate optimization frictions.

Figure A.4: Wealth Bunching in 2010 by Economic Activity



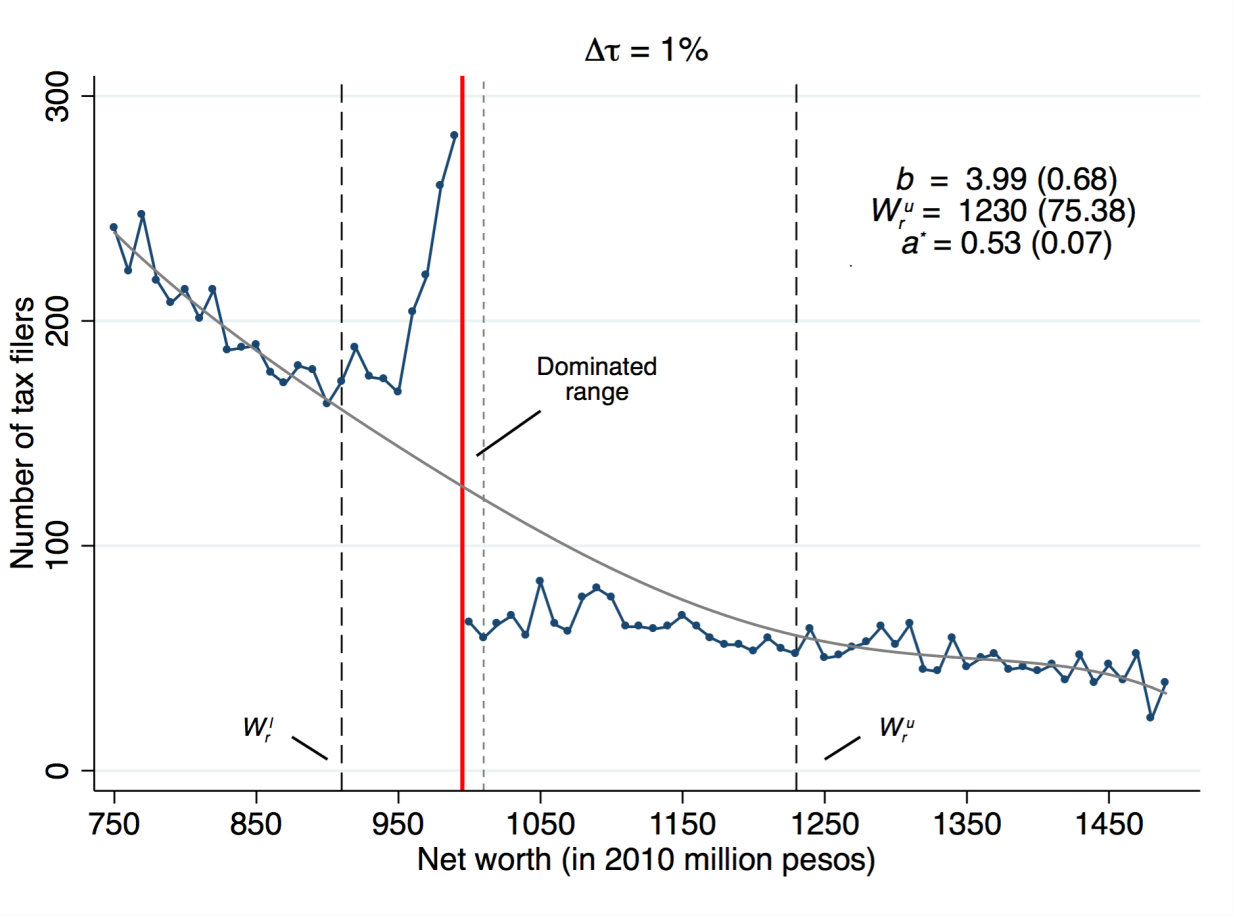
Notes: This figure shows heterogeneity in bunching among various samples of taxpayers that have different opportunities to shelter wealth from taxation. The three samples are built based on individuals' self-reported economic activity code: capital rentiers (in black), wage-earners (in blue), and others (the remainder, in green). The figure shows capital rentiers display more bunching behavior than other taxfilers, while wage-earners display the least bunching. Bin width is 2010 10,000,000 pesos (2010 USD 5,208.30 in 12/31/2010). *Source:* Authors' calculations using administrative tax microdata from DIAN.

Figure A.5: Compliers (i.e., bunchers) analysis



Notes: This figure illustrates the analysis of compliers characteristics in the context of bunching in response to discontinuities in a tax schedule. The blue line represents the (hypothetical) empirical density of taxpayers by reported wealth W_r. The black solid line represents the counterfactual density. $B_{it} = 1$ if individual i is located in bunching range $[W_r^l, W_r^*)$ in year t. Tax filers located in this range will be a mix of compliers (i.e., those who react to tax notches by bunching below the cutoff) and always-takers (i.e., those who would be located in that range even in the absence of tax notches). Tax filers located above W_r^* are never-takers (i.e., those who will not or cannot bunch in response to the tax notch). A 2SLS-IV specification is as follows: $Y_{it} = \alpha_1 + \gamma_1 t + \beta_1 B_{it} + \epsilon_{it}$, where t is a time trend and B_{it} is instrumented with the post-reform dummy $Z_{it} = \mathbb{1}(t = 2010)$. The results of this analysis are presented in Table 2 for individuals around 2010's wealth tax eligibility cutoff.

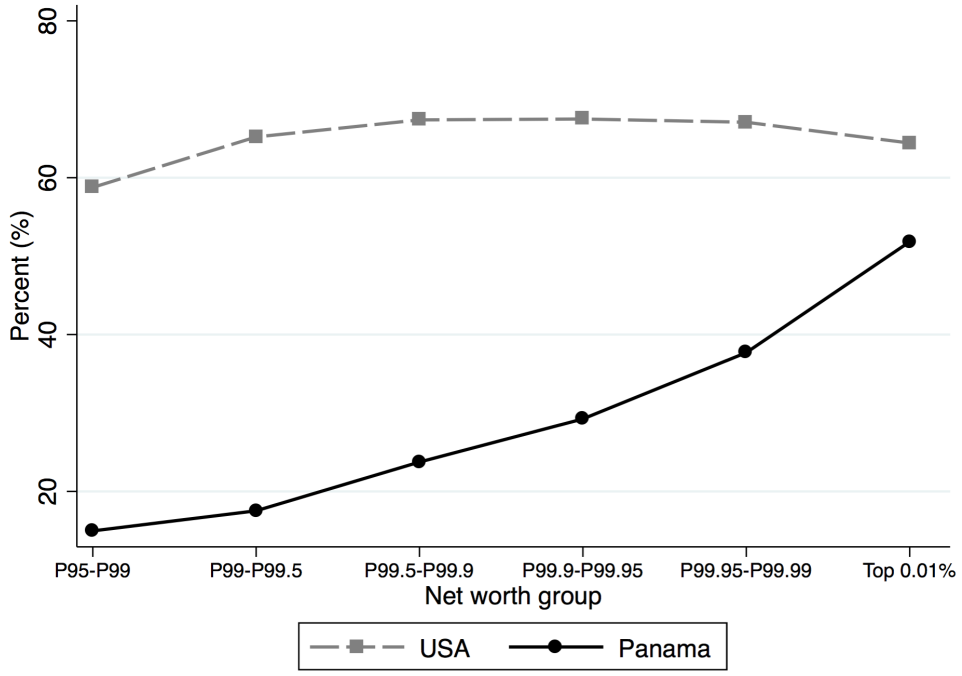
Figure A.6: Bunching Among Business Owners Required to Keep Records



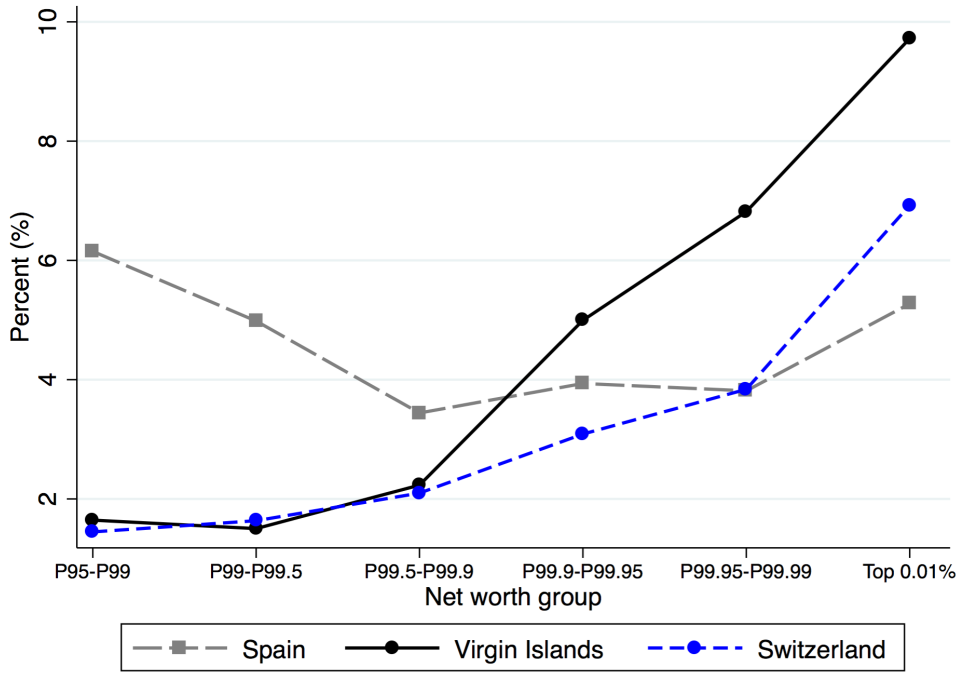
Notes: This figure displays the density of taxpayers required to keep records by their net worth in 2010, and fits the counterfactual distribution. b is the excess mass as a share of the counterfactual and W_r^u the net worth of the marginal buncher, obtained with the point of convergence method. The counterfactual is obtained from the regression of a polynomial of degree 5 on all data points outside the $[W_r^l, W_r^u]$ interval. The lower bound W_r^l is determined visually. The upper bound W_r^u is estimated from an iterative process: starting from $W_r^u = W_r^*$, we obtain the counterfactual and estimate the excess mass (B) below the threshold and missing mass (M) above the threshold. For low W_r^u, the excess mass is larger than the missing mass ($B >> M$). We iteratively increase W_r^u until the two masses are equal ($B = M$). a^* represents the share of individuals in the dominated range that do not bunch due to adjustment costs. Bootstrapped standard errors in parentheses are estimated from 1,000 bootstrap samples with replacement. Bin width is 10,000,000 pesos (2010 USD 5,208.30 in 12/31/2010). *Source:* Authors' calculations using administrative tax microdata from DIAN.

Figure A.7: Location of Foreign Assets according to Reports of Foreign Assets in 2017

(a) Two Most Popular Destinations

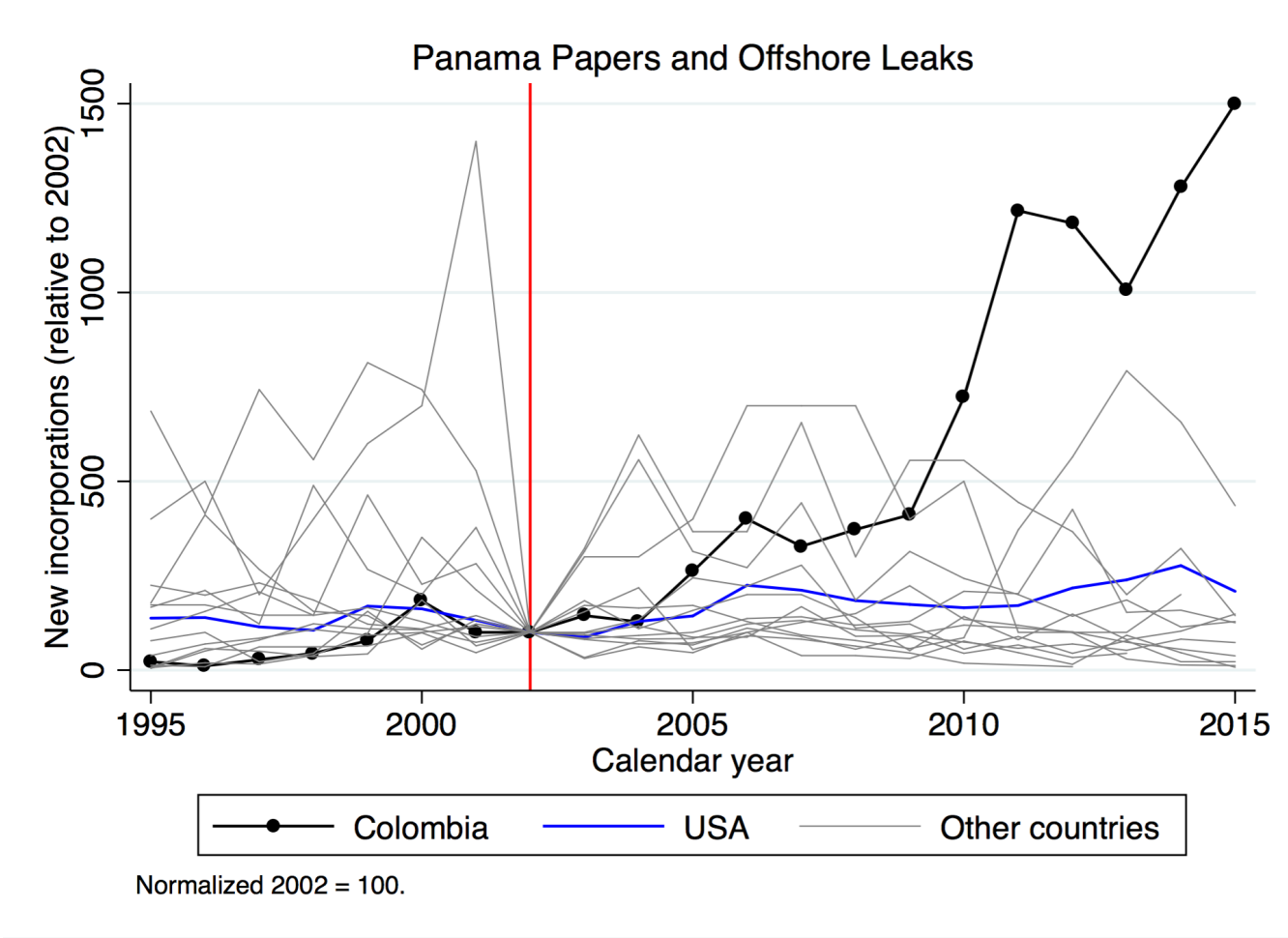


(b) Next Three Most Popular Destinations



Notes: These figures show the likelihood of reporting a foreign asset located in a given location for taxpayers filing a foreign asset return (form #160) in FY 2017. The sample is restricted to 2,076,685 individuals filing either the FY 2016 income tax return or FY 2017 a wealth tax return. This sample includes 29,183 taxpayers reporting foreign assets. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

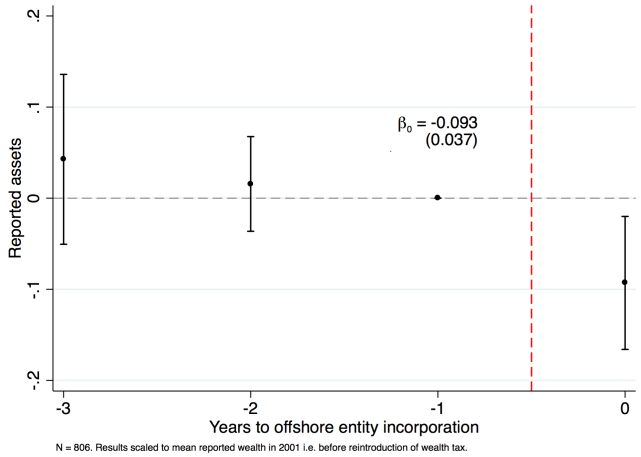
Figure A.8: The Use of Offshore Entities: Colombia versus Other Countries



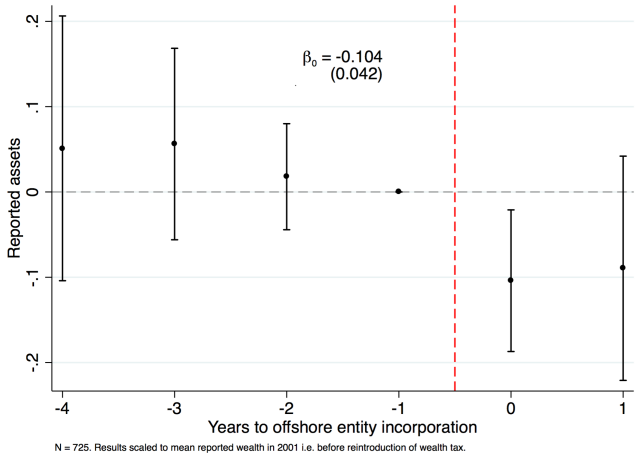
Note: This figure compares the dynamics of offshore entity incorporation between Colombia, the United States, and thirteen other countries. To facilitate the comparison, the number of offshore entities is expressed relative to 2002 (the year annual wealth taxation begins in Colombia). The comparison is restricted to countries that have not themselves been considered tax havens (e.g., Panama, British Virgin Islands, United Arab Emirates) and have at least 100 active or inactive offshore entities by December 31, 2002. The countries in gray are Brazil, Canada, Costa Rica, France, Germany, Greece, Ireland, Israel, Russia, Spain, United Kingdom, Uruguay, and Venezuela. Both active and inactive offshore entities are included. The high number of new offshore corporations in 2001 corresponds to Germany. *Source:* ICIJ. Accessed June 12, 2017.

Figure A.9: Robustness Check: The Effect of Opening an Offshore Entity on Assets Reported to the Tax Authority Using Different Event Time Windows

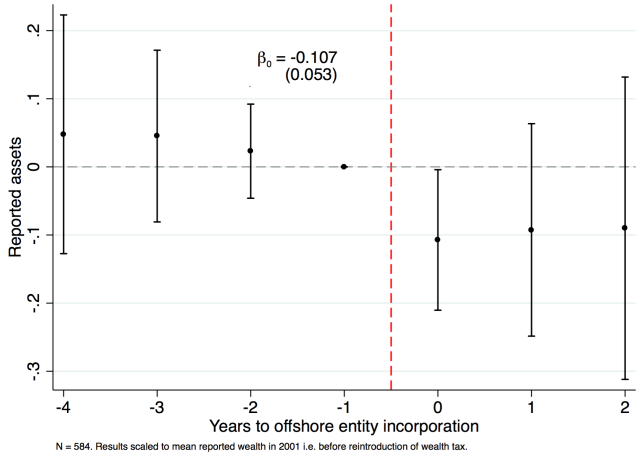
(a) Balanced in $k \in [-3, 0]$



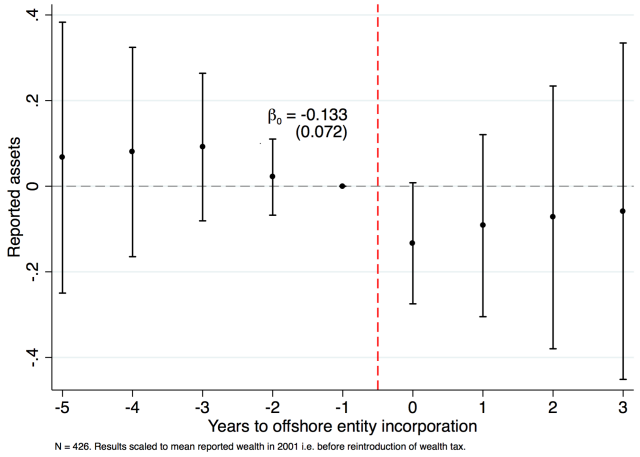
(b) Balanced in $k \in [-4, 1]$



(c) Balanced in $k \in [-4, 2]$

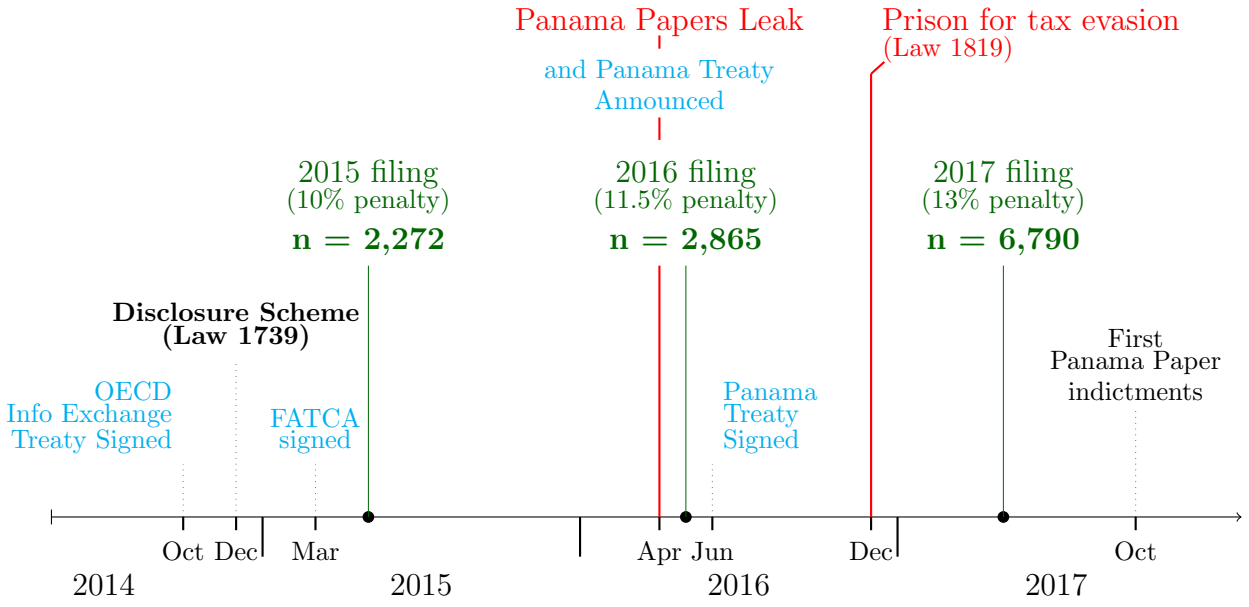


(d) Balanced in $k \in [-5, 3]$



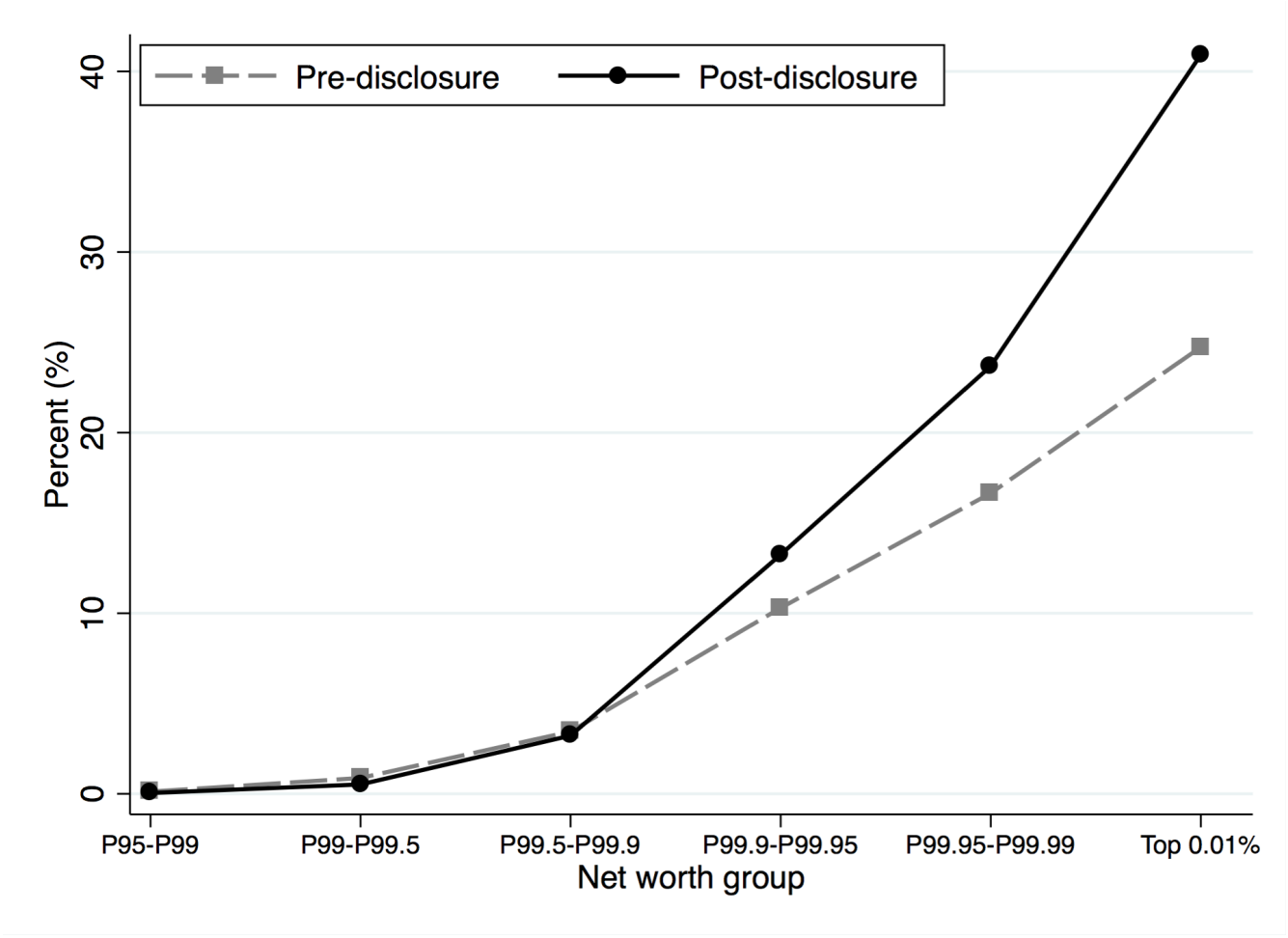
Notes: These figures present robustness checks on the β_k coefficients from event study specification (7), varying the event time window across balanced samples of taxpayers in the Panama Papers. The outcome variable is total assets reported to the Colombian tax authority, scaled to the mean wealth in 2001 (i.e., the year before annual taxation of net wealth is re-introduced in Colombia). An event is defined as the year a taxpayer incorporates an offshore entity through Mossack Fonseca, for taxpayers with only one offshore entity. *Sources:* Authors' calculations using administrative tax microdata from DIAN and ICIJ.

Figure A.10: Timeline of Events



Notes: This figure plots a timeline of events taking place around Colombia's voluntary disclosure scheme between 2014 and 2018. n (in green) represents the number of individuals first disclosing hidden wealth under the scheme.

Figure A.11: Probability of Participating in the 2015–17 Voluntary Disclosure Scheme, by Pre- and Post-Disclosure Wealth Group



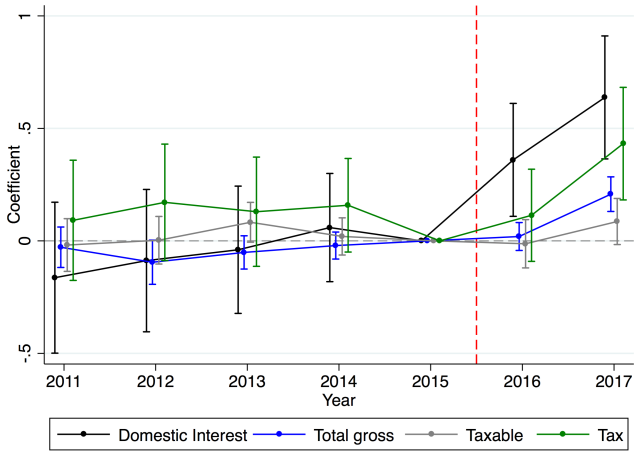
Notes: This figure plots the fraction of tax units in Colombia that participate in the 2015–17 voluntary disclosure program by bins of reported net worth. The figure ranks individuals by pre- and post-disclosure net worth, and shows that participation in the program is increasing in both measures of wealth. Ranking by pre-disclosure wealth, 24.7 percent of individuals in the wealthiest 0.01 percent disclosed hidden wealth (dashed gray line). Ranking by wealth including disclosures, 40.9 percent of individuals in the wealthiest 0.01 percent disclosed (solid black line). The sample is restricted to 1,633,383 individuals filing the income tax return in FY 2013 (they may or not file a wealth tax return in 2015–2017), and includes 11,210 disclosers and 1,085 individuals in the Panama Papers (of which 434 disclosed wealth). *Sources:* Authors' calculations using administrative tax microdata from DIAN.

Figure A.12: The Impact of a Voluntary Disclosure Program on Reported Wealth and Income: 2016 Disclosers

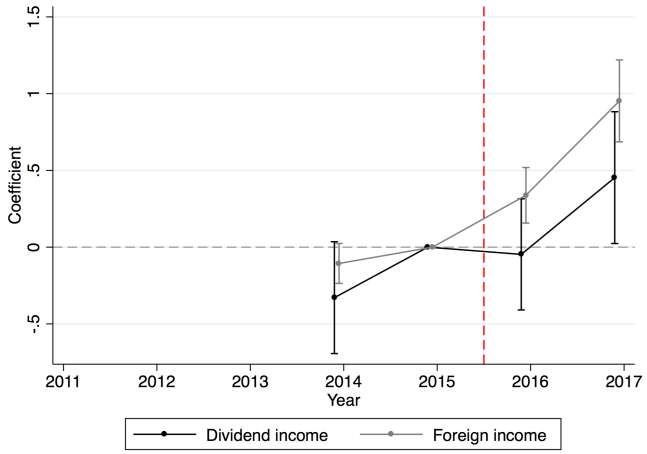
(a) Wealth: Gross and Net



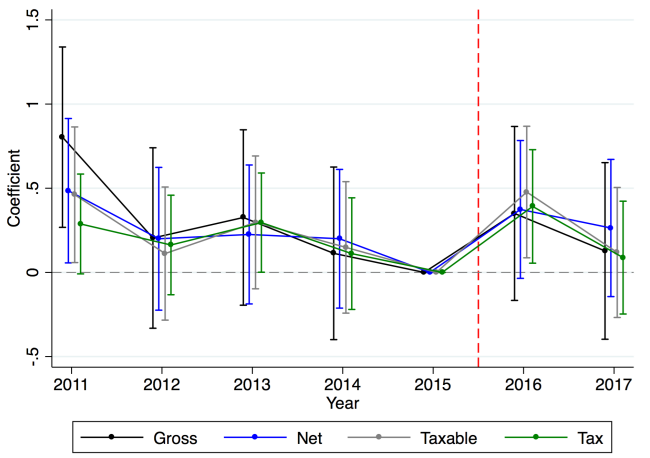
(b) Regular Income: Interest, Total Gross, Taxable, and Tax



(c) Regular Income: Dividend and Foreign



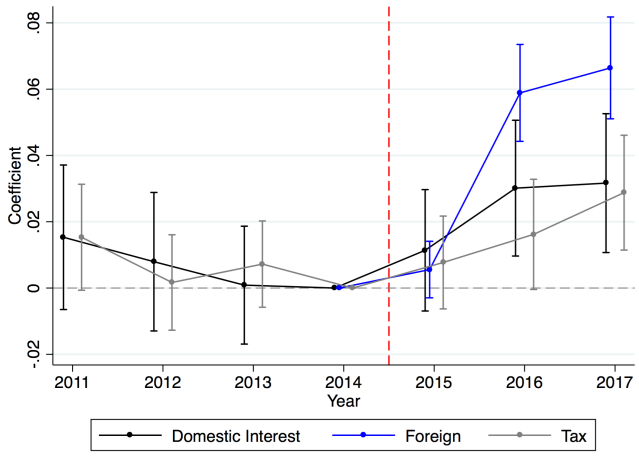
(d) Irregular Income (Includes Long-Rerm Realized Capital Gains): Gross, Net, Taxable, and Tax



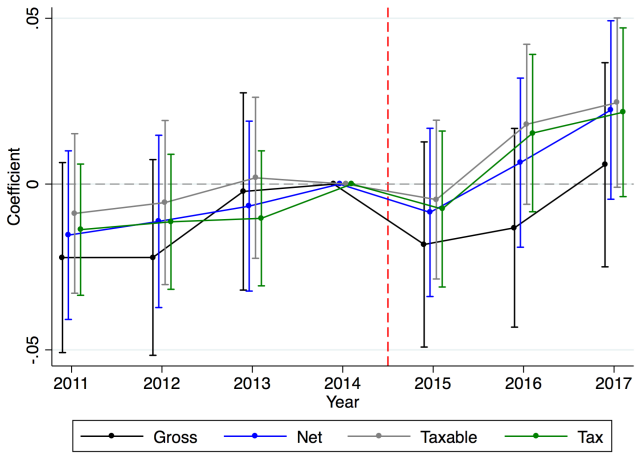
Notes: These figures compare outcomes between 2,074 taxpayers that first disclosed hidden assets or inexistent liabilities in 2016 and 43,181 that never disclosed between 2015 and 2017. The inverse hyperbolic sine transformation of a given outcome is regressed on individual fixed effects and a voluntary discloser dummy interacted with year fixed effects (2015 is the omitted category). The standard errors are clustered at the taxpayer level. The figures plot the coefficients on the interaction terms and 95 percent confidence intervals. The red vertical line marks the period taxpayers first disclosed their hidden assets and fake debts. The sample is a balanced panel of 45,255 individuals that both filed income taxes annually between 2011 and 2017, and filed the wealth tax in 2015, 2016, or 2017. Tax filers that first disclosed assets and liabilities in either 2015 or 2017 are excluded from the estimation sample. The corresponding difference-in-differences coefficients are presented in Table A.5. *Sources: Sources:* Authors' calculations using administrative tax microdata from DIAN.

Figure A.13: The Impact of a Voluntary Disclosure Program on the Probability of Reporting Strictly Positive Values of Capital Income

(a) Regular Income: Interest, Foreign, and Tax

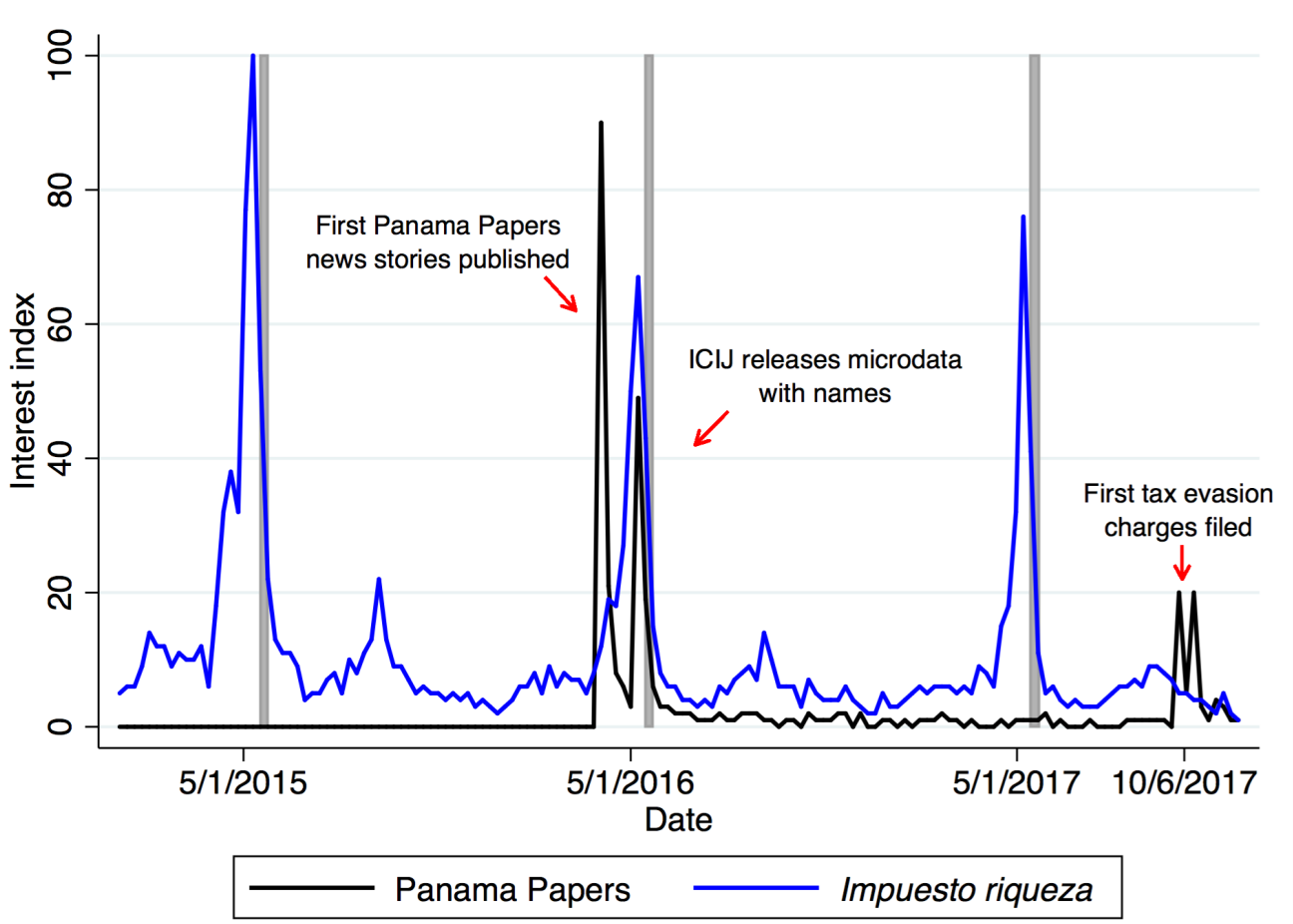


(b) Irregular Income (Includes Long-Rerm Realized Capital Gains): Gross, Net, Taxable, and Tax



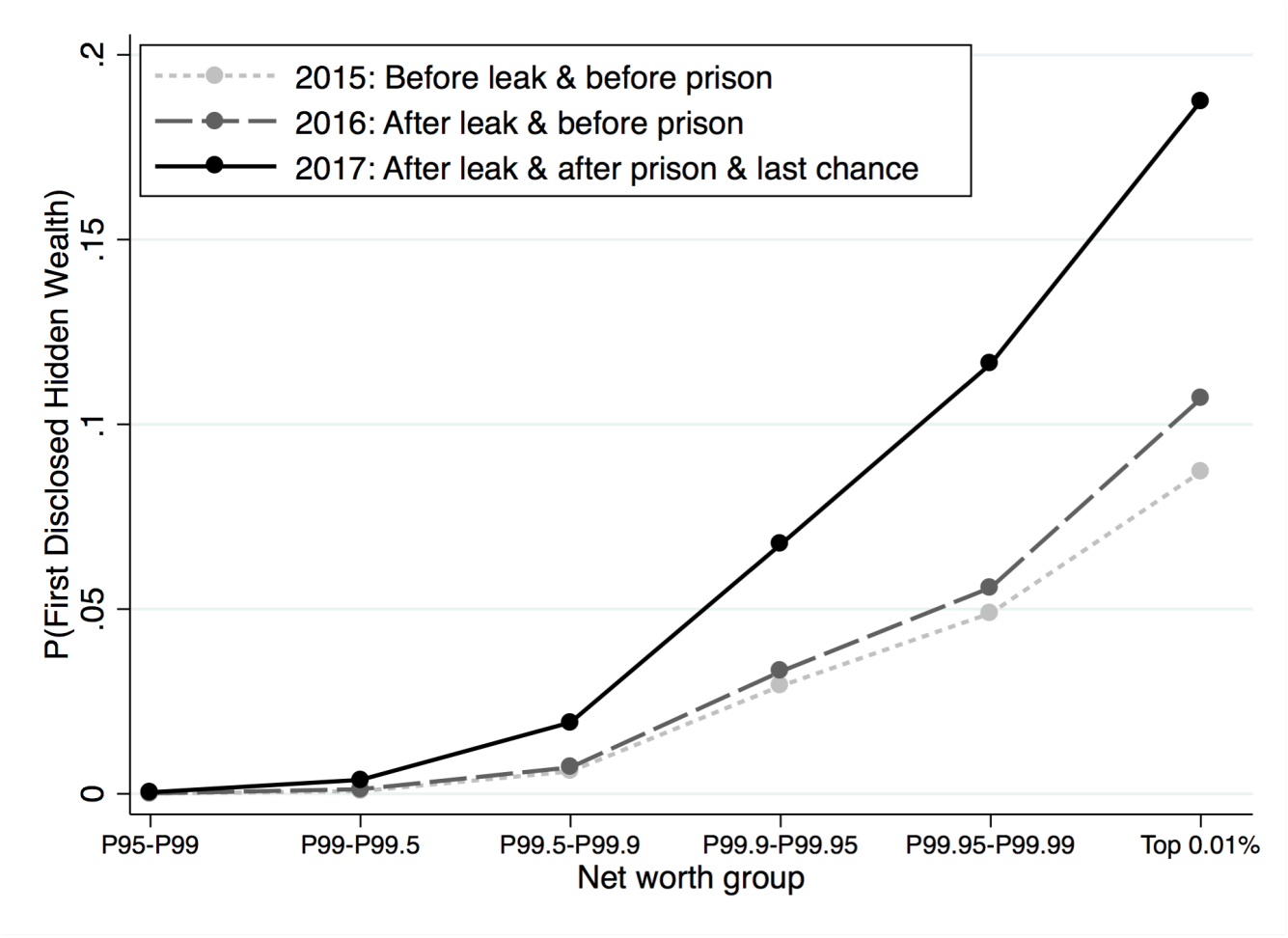
Notes: These figures present the effect of the 2015 voluntary disclosure program on the probability of reporting positive values of selected regular income categories in Panel (a) and irregular income categories in Panel (b). The figures compare outcomes between 1,777 taxpayers that voluntarily disclosed hidden assets and inexistent liabilities in 2015 and 43,181 that never disclose their assets and liabilities between 2015 and 2017. The outcome, which is a dummy for reporting strictly positive values, is regressed on individual fixed effects and a voluntary discloser dummy interacted with year fixed effects (2014 is the omitted category). The standard errors are clustered at the taxpayer level. The figures plot the coefficients on the interaction terms and 95 percent confidence intervals. The red vertical line marks the period taxpayers disclosed their hidden assets and fake debts. The sample is a balanced panel of 44,958 individuals that both filed income taxes annually between 2011 and 2017, and filed the wealth tax in 2015, 2016, or 2017. Tax filers that first disclosed hidden assets or fake liabilities *after* 2015 (i.e., in 2016 or 2017) are excluded from the estimation sample. The corresponding difference-in-differences coefficients are presented in Table A.4, Panel B. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

Figure A.14: Comparison on Google Trends of Search Terms "Panama Papers" and "Impuesto Riqueza" (Wealth Tax) in Colombia



Notes: This figure plots the relative search interest in Colombia of the terms "Panama Papers" in black and "Impuesto riqueza" (wealth tax, in Spanish) in blue. The number in the y-axis represents search interest relative to the highest point on the chart for Colombia during the plotted period of time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular, while a score of 0 means the term was less than 1 percent as popular as the peak. The gray bars represent the annual wealth tax filing season. The first Panama Papers news stories were published April 3, 2016. On May 9, 2016, the ICIJ released the database revealing the names and contact addresses of thousands of shareholders of offshore entities. The *fiscalía*—the Colombian equivalent of the district attorney's office—filed the first charges related to the Panama Papers on October 4, 2017. Nineteen individuals were charged for illicit enrichment, fraud, and money laundering, among others. *Source:* Google Trends, accessed November 30, 2017. Click here.

Figure A.15: Probability of Participating in the Voluntary Disclosure Program, by Post-Disclosure Wealth and Year of First Disclosure



Notes: This figure plots the fraction of tax units in Colombia that file taxes and participate in the voluntary disclosure program, by bins of net worth (including disclosures) and the year in which they first disclosed hidden wealth. The figure shows that (1) disclosing hidden wealth is increasing in net worth; and (2) the wealthiest taxpayers disclosed in 2017. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

Table A.1: Wealth Tax Reforms

	Tax year																	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Reform		D1838		L863			L1111			L1730	L1430				L1739			
Assessment year																		
Eligibility		2001		2003	2004	2005	2006	2006	2006	2006	2010				2014	2014	2014	2014
Rate		2001		2003	2004	2005	2006	2006	2006	2006	2010				2014	2015	2016	2017
Wealth tax schedule																		
Eligibility cutoff (bill. pesos)		0.1695		3	3.183	3.344	3	3*	3*	3*	1				1	1*	1*	1*
Rates (%)		1.2		0.3	0.3	0.3	1.2	1.2	1.2	1.2	1/1.4/3/6				0.125/0.35/0.75/1.5	0.125/0.35/0.75/1.5	0.125/0.35/0.75/1.5	0.125/0.35/0.75/1.5
Cutoff (bill. pesos)		0.1695		3	3.183	3.344	3	3*	3*	3*	1/2/3/5				1/2/3/5	1/2/3/5*	1/2/3/5*	1/2/3/5*
Notch or kink		N		N	N	N	N	N	N	N	N/N/N/N				N/K/K/K	N/K/K/K	N/K/K/K	N/K/K/K

Notes: * subject to eligibility, as defined by another tax year. Wealth tax eligibility is determined using (taxable and non-taxable) net worth in all years but 2001, when it is determined using gross wealth. For 2007–2009, eligibility is established in 2006. For 2010, the tax is paid in eight periods between 2011 and 2014. In 2015–2017, eligibility is established in 2014. Values are expressed in current billion pesos. The tax schedule refers to average tax rates in years 2001–2010, and marginal tax rates in years 2014 and 2015.

Table A.2: Compliers (i.e., bunchers) analysis for the fourth notch in 2010

	$E[Y(0)\|\text{Compliers}]$ (1)	$E[Y(1)-Y(0)\|\text{Compliers}]$ (2)	$E[Y\|\text{Always-takers}]$ (3)	$E[Y\|\text{Never-takers}]$ (4)
Debt	0.112	0.061	0.1	0.096
	(0.047)	(0.039)	(0.012)	(0.015)
Inventories	-0.004	-0.043	0.078	0.043
	(0.033)	(0.049)	(0.021)	(0.015)
Bank deposits	0.133	-0.039	0.13	0.068
	(0.073)	(0.076)	(0.032)	(0.019)
Stock	0.01	-0.088	0.266	0.271
	(0.135)	(0.092)	(0.042)	(0.048)
Fixed assets	0.404	0.092	0.364	0.351
	(0.16)	(0.118)	(0.05)	(0.052)
Accounts receivable	0.458	0.085	0.158	0.261
	(0.161)	(0.117)	(0.041)	(0.049)
Other assets	-0.001	-0.008	0.004	0.005
	(0.013)	(0.015)	(0.002)	(0.005)

Notes: This table presents the results of a compliers analysis using the set-up illustrated by Figure A.5. In this setting, a complier refers to a taxpayer bunching below the exemption cutoff in response to the wealth tax. The sample is a balanced panel of 241 income tax filers reporting net wealth between $W_r^l = 4.5$ billion and $W_r^u = 5.8$ billion in 2008, 2009, and 2010. The endogenous variable is $B_{it} = 1$ if the individual has net wealth (in 2010 pesos) between W_r^l and W^*, i.e., the bunching region. Complier means in Column (1) are calculated as the coefficient on $1 - B_{it}$ in a 2SLS regression of $1 - B_{it}$ multiplied by Y_i and using 2010 as the instrument (Z_{it}). Always-taker and never-taker means are calculated in analogous 2SLS regressions of $B_{it}(1-Z_{it})Y_{it}$ on $B_{it}(1-Z_{it})$ and $(1-B_{it})Z_{it}Y_{it}$ on $(1-B_{it})Z_{it}$, respectively, again using 2010 as Z_{it}. The first stage coefficient is 0.139 (t-stat 3.88) for debt, and 0.19 (t-stat 2.06) for all others, as only business owners keeping records report asset types separately. Standard errors are clustered at the taxpayer level. *Source:* Authors' calculations using administrative tax microdata from DIAN.

Table A.3: Location and Type of Foreign Assets Reported in 2017: Amnesty Disclosers vs Non-disclosers

	Dependent variable					
	Tax Haven	Type of Asset				
		Bank Deposits	Portfolio Securities	Trusts	Real Estate	Cars
	(1)	(2)	(3)	(4)	(5)	(6)
Discloser	0.205***	0.031***	0.171***	0.028***	-0.081***	-0.018***
	(0.008)	(0.008)	(0.008)	(0.003)	(0.006)	(0.002)
Constant	0.323***	0.376***	0.401***	0.015***	0.187***	0.024***
	(0.005)	(0.006)	(0.006)	(0.001)	(0.005)	(0.002)
N	14,387	14,387	14,387	14,387	14,387	14,387
R^2	0.043	0.002	0.029	0.007	0.013	0.006

Notes: This table compares the location and type of foreign assets held by disclosers and non-disclosers for taxpayers reporting to own any foreign asset in 2017 (information tax return #160). Each column represents a separate regression with a different dependent variable obtained from the foreign asset information return. The dependent variable in Column (1) is an indicator for declaring a foreign asset located in a tax haven (Barbados, Bermuda, Cayman Islands, Curacao, Monaco, Panama, Switzerland, Uruguay, or the Virgin Islands). The outcomes in Columns (2)–(6) are indicator variables for reporting each type of foreign asset. This information is available only for taxpayers with foreign assets above approximately USD 40,000. Portfolio securities refer to portfolios of equities, bonds, and mutual fund shares owned by taxpayers on foreign accounts. The dependent variable is regressed on a dummy for having disclosed a foreign asset during the 2015–17 wealth disclosure program. Robust standard errors in parentheses. The sample is restricted to individuals having (1) filed a wealth tax return in either 2015, 2016, or 2017, and (2) filed a foreign asset information return in 2017. $*p < 0.1, **p < 0.05, ***p < 0.01$. *Source:* Authors' calculations using administrative tax microdata from DIAN.

Table A.4: Robustness Checks: The Effect of a Voluntary Wealth Disclosure Program on Reported Income and Wealth

	Wealth		Income						Capital gains and other irregular income			
	Gross	Net	Foreign	Dividend	Interest	Total gross	Taxable	Tax	Gross	Net	Taxable	Tax
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Panel A. ArcSinh: no winsorizing											
DID	0.288***	0.400***	1.010***	0.061	0.416***	0.132***	0.132***	0.329***	0.069	0.322**	0.339***	0.339***
	(0.015)	(0.030)	(0.105)	(0.170)	(0.117)	(0.030)	(0.034)	(0.090)	(0.157)	(0.130)	(0.125)	(0.100)
C Mean	22.018	21.823	0.324	7.622	11.297	20.089	18.741	15.205	4.252	2.695	2.421	1.031
N	314,706	314,706	138,004	138,004	314,706	314,706	314,706	314,706	314,706	314,706	314,706	314,706
R^2	0.66	0.572	0.614	0.753	0.629	0.686	0.547	0.641	0.264	0.246	0.246	0.242
	Panel B. Dummy for strictly positive values											
DID	0	0.001	0.044***	-0.002	0.018***	0.001	0.001	0.012**	0.003	0.015**	0.016**	0.019***
	(0.000)	(0.001)	(0.005)	(0.008)	(0.007)	(0.001)	(0.002)	(0.005)	(0.008)	(0.007)	(0.007)	(0.006)
C Mean	1.000	0.999	0.0138	0.346	0.721	0.996	0.992	0.906	0.222	0.153	0.139	0.066
N	314,706	314,706	179,832	179,832	314,706	314,706	314,706	314,706	314,706	314,706	314,706	314,706
R^2	0.176	0.256	0.604	0.764	0.567	0.507	0.403	0.558	0.263	0.245	0.241	0.24
	Panel C. Levels (in million pesos)											
DID	2021.490***	1586.210***	8.298***	80.673***	5.844*	-60.53	24.642**	7.748**	-28.171*	0.986	2.324	-0.299
	(681.692)	(180.578)	(1.500)	(28.006)	(3.116)	(193.269)	(11.324)	(3.733)	(15.463)	(7.054)	(6.613)	(1.263)
C Mean	2489.714	2038.660	5.409	72.012	20.842	890.369	123.418	26.409	72.462	18.938	11.385	1.466
N	314,706	314,706	138,004	138,004	314,706	314,706	314,706	314,706	314,706	314,706	314,706	314,706
R^2	0.791	0.815	0.506	0.609	0.248	0.685	0.709	0.706	0.148	0.164	0.163	0.161
	Panel D. Levels: winsorizing at top 0.1% each year (in million pesos)											
DID	1326.350***	1413.511***	7.808***	42.251***	7.858***	43.151	15.431***	4.707***	0.777	8.043**	8.040**	0.727**
	(81.334)	(75.080)	(1.282)	(11.549)	(1.595)	(45.563)	(3.602)	(1.175)	(8.052)	(3.839)	(3.218)	(0.329)
C Mean	2432.978	1993.944	4.485	64.967	19.037	831.345	121.943	25.921	65.399	15.088	8.525	0.900
N	314,706	314,706	138,004	138,004	314,706	314,706	314,706	314,706	314,706	314,706	314,706	314,706
R^2	0.874	0.863	0.586	0.648	0.581	0.843	0.741	0.738	0.21	0.187	0.185	0.189
	Panel E. Levels: winsorizing at top 1% each year (in million pesos)											
DID	1116.518***	1176.559***	2.131***	21.910***	5.226***	41.387*	15.269***	4.642***	3.397	4.886***	4.592***	0.449***
	(54.471)	(49.964)	(0.235)	(5.390)	(0.940)	(22.634)	(2.613)	(0.843)	(4.675)	(1.468)	(1.101)	(0.109)
C Mean	2347.821	1925.880	0.543	53.249	16.750	732.548	116.873	24.245	53.210	8.978	5.599	0.438
N	314,706	314,706	138,004	138,004	314,706	314,706	314,706	314,706	314,706	314,706	314,706	314,706
R^2	0.874	0.866	0.592	0.667	0.63	0.845	0.772	0.768	0.217	0.202	0.202	0.208

Notes: This table presents the effects of the 2015 voluntary disclosure program on eleven outcomes reported to the Colombian tax authority in the income and wealth tax forms. The table compares outcomes between 1,777 taxpayers that voluntarily disclosed hidden assets and inexistent liabilities in 2015 and 43,181 that never disclose their assets and liabilities between 2015 and 2017. Each outcome is regressed on individual fixed effects, year fixed effects, and an interaction of the voluntary discloser dummy and post-reform years (2014 is the omitted category): $\log(y_{it}) = \alpha_i + \gamma_t + \beta \cdot \mathbb{1}(\text{Post} \times \text{Discloser}) + \nu_{it}$. The standard errors in parentheses are clustered at the taxpayer level. The sample is a balanced panel of 44,958 individuals that both filed income taxes annually between 2011 and 2017, and filed the wealth tax in 2015, 2016, or 2017. Tax filers that first disclosed assets and liabilities strictly *after* 2015 (i.e., in 2016 or 2017) are excluded from the estimation sample. The number of observations with foreign income is smaller than the rest because taxpayers report foreign income as a separate variable starting 2014. The outcome variables are in log-approximation form in Panel A (inverse hyperbolic sine function), a dummy for strictly positive values in Panel B, and in levels in Panels C–E. Panels D and E winsorize the outcome variables by replacing all values above the 99.9th and 99th percentile of the outcome variable by the 99.9th and 99th percentile value, respectively. "C Mean" represents the mean of the outcome variable for the control group across all pre-event years. $*p < 0.1, **p < 0.05, ***p < 0.01$. *Source:* Authors' calculations using administrative tax microdata from DIAN.

Table A.5: The Impact of a Voluntary Disclosure Program on Reported Wealth and Income: 2016 Disclosers

	Wealth		Income						Capital gains and other irregular income			
	Gross	Net	Foreign	Dividend	Interest	Total gross	Taxable	Tax	Gross	Net	Taxable	Tax
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DID	0.307***	0.343***	0.697***	0.366**	0.545***	0.153***	0.019	0.163*	-0.051	0.097	0.094	0.068
	(0.014)	(0.023)	(0.079)	(0.142)	(0.102)	(0.029)	(0.040)	(0.086)	(0.148)	(0.121)	(0.115)	(0.096)
N	316,785	316,785	139,725	139,725	316,785	316,785	316,785	316,785	316,785	316,785	316,785	316,785
R^2	0.66	0.576	0.605	0.754	0.628	0.685	0.551	0.643	0.264	0.245	0.241	0.24

Notes: This table presents the effects of the voluntary disclosure program on the logarithm of income and wealth reported to the Colombian tax authority. The dependent variables in columns (1) and (2) are taken from the wealth tax form 440, while those in columns (3)–(12) are taken from the individual income tax forms 110 and 210. Outcomes are expressed in log-approximation form using the inverse hyperbolic sine function. The table compares outcomes between 2,074 taxpayers that first disclosed hidden assets and inexistent liabilities in 2016 and 43,181 that did not disclose between 2015 and 2017. Each outcome is regressed on individual fixed effects, year fixed effects, and an interaction of the voluntary discloser dummy and post-disclosure years: $\log(y_{it}) = \alpha_i + \gamma_t + \beta \cdot \mathbb{1}(\text{Post} \times \text{Discloser}) + \nu_{it}$. The standard errors in parentheses are clustered at the taxpayer level. The sample is a balanced panel of 45,255 individuals that both filed income taxes annually between 2011 and 2017, and filed the wealth tax in 2015, 2016, or 2017. Tax filers that first disclosed assets and liabilities in 2015 or 2017 are excluded from the estimation sample. The number of observations with foreign income and dividend income is smaller than the rest because taxpayers report these two varibles as separate variables starting 2014. Wealth tax liability is not reported as an outcome because there is no wealth tax during most of the pre-program period. $*p < 0.1, **p < 0.05, ***p < 0.01$. *Sources:* Authors' calculations using administrative tax microdata from DIAN.

Table A.6: Top Wealth Shares in Colombia Using Tax and Survey Data, Including and Excluding Hidden Offshore Wealth

	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.05%	Top 0.01%	Top 5% to 1%	Top 1% to 0.5%	Top 0.5% to 0.1%	Top 0.1% to 0.05%	Top 0.05% to 0.01%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Survey Data	55.46	25.78	18.11	7.63	5.1	1.52	29.68	7.67	10.48	2.53	3.58
Before Amnesty	68.07	40.04	30.05	15.09	11.1	5.56	28.02	9.99	14.96	3.99	5.54
Baseline	68.39	40.64	30.75	15.85	11.81	6.01	27.74	9.9	14.89	4.05	5.79
Plus Offshore (LB)	69.74	43.17	33.66	19.06	14.8	8.23	26.57	9.51	14.6	4.26	6.57
Plus Offshore (UB)	71.47	46.4	37.39	23.17	18.64	11.08	25.06	9.01	14.22	4.53	7.57
Offshore 37.25%	75.07	53.14	45.17	31.73	26.64	17	21.92	7.98	13.43	5.09	9.64

Notes: This table presents top wealth shares in Colombia in 2017. The first row presents estimates using survey data only, while the rest combine tax and survey data. The second row presents estimates before disclosures of offshore hidden wealth during the 2015–2017 voluntary disclosure program. The third row is the baseline, without correcting for unreported hidden wealth. The last rows account for unreported offshore wealth, and make different assumptions about the size of hidden offshore wealth. Using data from Alstadsater et al. (2018b) and the Panama Papers leak, the lower bound assumes unreported offshore wealth today represents 6.2 percent of GDP, while the upper bound assumes it represents 15 percent. The last row augments unreported wealth by the observed increased in the stock of entities ever incorporated through Mossack Fonseca between 2007 and 2015. See Section E for a descriptions of how these estimates were constructed. *Sources:* Authors' calculations using administrative tax microdata from DIAN and IEFIC from DANE.

B A Brief Recount of Wealth Taxation in Colombia

Colombia began taxing the wealth of its wealthiest citizens in 1935 using a progressive schedule (Law 78/1935). After a series of reforms affecting its marginal tax rates and tax bases over the next five decades (Law 45/1942, Law 135/1944, Law 81/1960, Law 9/1983), the wealth tax was abolished in 1992, only to be re-established a decade later.

Colombia is unique in the extent to which it adopted multiple wealth tax reforms over the last two decades that have significantly changed both tax rates and base. Uribe was inaugurated president of Colombia on August 7, 2002 amid a precarious security situation and dismal economic conditions. Four days after inauguration, Uribe declared a state of emergency, enabling him to take extraordinary legislative measures to boost revenue to finance heightened military spending against illegal armed groups, including FARC (Decree 1837/2002).[66] Decrees 1838, 1885, and 1949 of August 2002 introduced a wealth tax dubbed "special tax for Democratic Security," in reference to Uribe's security policy.[67][68] Its rate was established at a flat rate of 1.2 percent of *all* net worth for individuals and firms whose *gross* wealth is at or above $169.5 million pesos by August 31, 2002.[69] In other words, the *average* tax rate jumps for individuals with *gross* wealth at or above $169.5 million pesos. This reform affected 48.05% of individual income tax filers: around 158,430 individual filers and 151,101 corporations were subject to this tax.[70] However, individual taxpayers contributed less than one-quarter of this tax revenue, with the bulk being paid for by corporations.

The following year, Uribe extended the "special" tax on wealth to continue funding the exigencies of war against illegal armed groups. Individuals with net worth of $3 billion (thousand million) Colombian pesos or more (base year 2004) by January 1, 2004, January 1, 2005, and January 1, 2006 would be subject to this tax (Law 863/2003).[71] For these individuals, the tax was levied at a flat rate of 0.3 percent on *all* taxable wealth (i.e., net worth minus two allowances) for FY 2003-05 using tax form 420.[72][73] This reform thus generates a notch around 3 billion pesos, the threshold at which the average rate jumps from 0 to 0.3 percent. This reform annually affected only 1,420 individual taxpayers and some 4,850 firms, with the overwhelming majority (97%) of the tax burden falling on corporations.

After Uribe's re-election, the wealth tax was extended for tax years 2007-10 (Law 1111/2006), and its *average* rate was raised to 1.2 percent for net worth of $3 billion (thousand million) pesos or more by January 1, 2007. To be clear, this is *not* a marginal tax rate of 1.2 percent; rather, the 1.2 percent is levied on *all* net worth after substracting two allowances, thus generating a notch around the 3 billion

[66] "*The adoption of temporary yet effective extraordinary measures is non-postponable to give Colombians their individual and collective security and to respond to the unprecedented challenge posed by criminal groups... every individual must make a significant tax effort to enable the State to ensure public security in vast parts of its territory*" (Decree 1837/2002, our translation).

[67] Importantly, this decree was announced a couple of months *after* the deadline to submit income tax returns for FY 2001.

[68] It should be noted that the exigencies of the war against drug cartels and illegal armed groups had previously led to the creation of forced investment bonds, in 1996 and 1998. Tax filers with net worth above 150 million pesos in 1996 were required to invest 0.5 percent of taxable net worth in "Bonds for Security" (Law 345/1996), while taxpayers with net worth above 210 million pesos in 1998 were required to invest 0.6 percent of taxable net worth in "Solidarity Bonds for Peace" in 1999 and 2000 (Law 487/1998).

[69] Deductions are (i) net wealth value of assets in national businesses, and (ii) mandatory contributions to pension funds.

[70] Flores-Macías (2014) studies the factors behind the adoption of the "Democratic Security" tax by Uribe in 2002.

[71] Note that net worth possessed Jan 1, year t refers to the amount declared in the income tax in FY $t-1$, updated to valuations in year t.

[72] Allowances are (i) net wealth value of assets in national businesses, and (ii) the first 200 million pesos of the principal residence (increased to 212,200,000 pesos for FY 2005 and 222,959,000 for FY 2006).

[73] Importantly, the reform was announced and adopted several months *before* the deadline to submit returns for FY 2003.

pesos threshold.[74] Importantly, even though the tax was levied on net worth held in tax years 2006, 2007, 2008, and 2009, only taxpayers with net worth of at least 3 billion pesos in 2007 were levied. That is, an individual reporting 2,999,999,999 pesos in FY 2006 and 3 billion pesos or more in 2007, 2008, or 2009 will *not* be subject to the wealth tax. This reform annually affected only some 1,800 individual filers and 5,690 corporations, with 97% of the tax burden falling on firms.

In 2009, Uribe introduced a one-off wealth tax with a increasing average rates of 2.4 percent for taxable wealth held by January 1, 2011 between $3–5 billion pesos, and 4.8 percent for taxable wealth of $5 billion pesos or more for 2011 (Law 1370/2009).[75] However, in December the following year, and allegedly to cover expenses to palliate the disastrous effects of the 2010 extreme weather conditions, newly-elected Santos reduced the filing thresholds to $1 billion pesos, and introduced two additional rates: 1 percent for taxable wealth between $1–2 billion pesos and 1.4 percent for wealth between $2–3 billion pesos. In addition, Santos imposed a surcharge of 25 percent on taxpayers covered in Law 1370/2009. This set the previous rates to 3 percent for taxable wealth between $3–5 billion pesos and 6 percent for wealth of $5 billion pesos or more to be made in up to eight equal payments between 2011 and 2014 (Law 1430/2010). Note that, once again, these are *not* marginal tax rates but *average* tax rates on *all* taxable net worth. This affected 31,690 individual filers and 21,512 firms, with 94% of the tax revenue being collected from corporations.

On September 10, 2014, the Minister of Finance announced a bill to establish a permanent and progressive wealth tax for individuals with net worth of at least 1 billion pesos. The bill proposed the following tax schedule: an average rate of 0.4 percent for net worth $1–3 billion, a marginal rate of 1.1 percent for net worth $3–5$ billion, 2 percent for net worth $5–8 billion, and 2.25 percent for net worth of $8 billion and above. Importantly, this announcement was made *before* individual taxpayers' deadline to submit their income tax return for FY 2013; in fact, some taxpayers could file their return up to 22 October, 2014 (Decree 2972/2013). Insofar as some taxpayers may have submitted their 2013 tax return expecting wealth taxation, we may see reporting responses starting FY 2013.

The law creating a permanent wealth tax was adopted in December 2014, albeit with a different tax schedule and significantly lower marginal rates that the initial proposed bill (Law 1739/2014). Individuals and corporations with net worth of 1 billion pesos and above on January 1, 2015 would be required to file a wealth tax return. A tax would be levied on net worth held on January 1, 2015, 2016, 2017 and 2018 for individuals using form 440. Importantly, even though the tax was levied on net worth held in tax years 2014–2017, only taxpayers with net worth of 1 billion pesos or more in FY 2014 were levied. That is, an individual reporting 999,999,999 pesos in FY 2014 and 1 billion pesos or more in 2015, 2016, or 2017 will *not* be subject to the wealth tax. For individuals, the tax rate is an *average* rate of 0.125 percent for taxable wealth below 2 billion, and a *marginal* rate of 0.35 percent for taxable wealth between 2 and 3 billion, 0.75 percent for taxable wealth between 3 and 5 billion, and 1.5 percent for taxable wealth of 5 billion and above.[76][77] The reform thus generates a notch around 1 billion pesos in net worth and kinks at 2, 3, and 5 billion pesos in taxable net worth. This reform affected 4.19 percent of filers, with again

[74] These allowances are (i) net wealth value of assets in national businesses, and (ii) the first 220 million pesos of the principal residence.

[75] Allowances are (i) net wealth value of assets in national businesses, and (ii) the first 319,215,000 pesos of the principal residence, and some other items.

[76] If the wealth tax base in either year t 2016, 2017 or 2018 is bigger (smaller) than that in 2015, the resulting tax base will be the minimum between 2015 tax base plus (minus) 25 percent of the inflation rate in year $t-1$ and the tax base in year t.

[77] For corporations, the wealth tax is phased out between 2015 and 2017 according to the following schedule: in 2015, the tax rates are an average rate of 0.2 percent (0.15 percent in 2016, and 0.05 percent in 2017) for taxable wealth below 2 billion pesos, and a marginal rate of 0.35 percent (0.25 percent in 2016, and 0.10 percent in 2017) for taxable wealth between 2 and 3 billion, 0.75 percent (0.5 percent in 2016, and 0.2 percent in 2017) for taxable wealth between 3 and 5 billion, and 1.15 percent (1 percent in 2016, and 0.4 percent in 2017) for taxable wealth of 5 billion and above.

the bulk of the burden falling on corporations.[78][79]

Improvements in Third-Party Reporting: The number of third-party reporting institutions, as well as the coverage of reported items, has been subject to significant changes over the past years. In 2006, Colombia established the list of public and private institutions required to provide third-party reports, and allowed uploading these reports through its newly-created online web portal, *sistema Muisca*. In 2012, the tax authority sought to further improve tax technology (e.g., Resolutions 111–118 from October 31 2012, Law 1607/2012), expanding the coverage of third-party reports and requiring this information be submitted online. Since then, taxpayers have been granted online access to all their third-party reported information. Note, however, that there is no return pre-filling and that taxpayers are not currently required to neither file nor pay their taxes electronically (OECD, 2017).

The Issue of Valuation: Regarding the issue of valuation, the value of some assets reported in tax records is often below its corresponding market values, defined as the price at which an asset would be traded in a competitive market. For instance, real estate is reported at cadastral values. In Colombia, as in many developing countries, cadastres are typically outdated; updating cadastres requires massive fieldwork and labor-intensive operations, as Colombia—unlike OECD countries—does not use values from transactions to estimate property values.[80] As a result, cadastral values today represent between 60 and 70 percent of market values.[81] Moreover, unlisted equities are recorded at the price at which they are bought rather than their market price. For other illiquid assets that are infrequently traded and therefore hard-to-value, including artwork and high-value jewellery, insured values could be used instead of market values; in practice, underreporting is rampant.

B.1 Bunching Theory: Extensions

Heterogeneity in Elasticities But Not in Cost Function. If there is heterogeneity in elasticities e, the tax notch creates different incentives to bunch for individuals with the same latent wealth W. Behavioral responses can be characterized as in the baseline model detailed above at each elasticity level: the bunching segment at elasticity e is given by $(W_r^*, W_r^* + \Delta W_{r,e}^*)$, where $\Delta W_{r,e}^*$ is increasing in e and equals ΔW_r^D for $e = 0$.[82] If $e > 0$, the bunching interval will be larger than the region of strictly dominated choice ($\Delta W_r^* > \Delta W_r^D$). The dominated range therefore represents a lower bound on the wealth reporting response to tax notches under any compensated elasticity in this frictionless model.

The post-notch density is empty in the strictly dominated range, as depicted in Figure A.3, Panel (c). It then increases gradually—the elasticity being too low for some individuals to bunch—until converging with the pre-notch density at $W_r^* + \Delta W_{r,\bar{e}}^*$. With heterogeneity, the bunching method estimates the *average* response in the population $E\left[\Delta W_{r,e}^*\right]$. Excess bunching at the notch is then

$$B = \int_e \int_{W_r^*}^{W_r^* + \Delta W_{r,e}^*} \tilde{h}_0(W_r, e) dW_r de \approx h_0(W_r^*) E\left[\Delta W_{r,e}^*\right] \tag{10}$$

where $\tilde{h}_0(W_r, e)$ represents the joint reported wealth-elasticity distribution in the baseline without a notch, and $h_0(W_r) \equiv \int_e \tilde{h}_0(W_r, e) de$ represents the unconditional reported wealth distribution in the

[78] Allowances are (i) net wealth value of assets in national businesses, and (ii) the first 12,200 UVT of the principal residence, and some other items.

[79] Note that, in both cases, the first marginal tax rate applies to *all* taxable wealth below 2 billion, *not* only taxable wealth between 1 and 2 billion.

[80] Property transaction data is limited and, when available (e.g., real estate sales are reported by notaries), it usually suffers from underreporting due to tax avoidance.

[81] By law, cadastral values must represent at least 60 percent of market values (Law 1450/2011). Historically, Bogota has updated cadastral values closer to market values more systematically than other cities in Colombia.

[82] See proof in Appendix B.2.

baseline case.[83]

B.2 Framework for Recovering the Structural Bunching Elasticity

This section presents the conceptual framework used to identify the structural elasticity of reported wealth with respect to the net-of-tax rate. Unlike the reduced-form approach developed in Section 3.1.1, this section builds a parametrized model and assumes a specific utility functional form.

Consider with a utility function of the form

$$u(W, W_r) = W - T(W_r) - W\left[\frac{1}{1+e} - \frac{W_r}{W} + \frac{1}{1+1/e}\left(\frac{W_r}{W}\right)^{1+1/e}\right] \tag{11}$$

where $T(W_r)$ represents wealth tax liability and the convex cost function $C(1 - W_r/W)$ is parametrized by $\frac{1}{1+e} - \frac{W_r}{W} + \frac{1}{1+1/e}\left(\frac{W_r}{W}\right)^{1+1/e}$.[84]

If tax liability implies a proportional (average and marginal) tax rate on reported wealth, $T(W_r) = \tau W_r$, then the individual maximization problem leads to the first order condition

$$\tilde{W}_r = W\,(1-\tau)^e \tag{12}$$

The optimality condition (12) indicates that a positive tax rate depresses $\tilde{W}_r$ below W, with the strength of the effect determined by e, the parameter of interest. If $e \to 0$, then individuals report their true wealth ($\tilde{W}_r = W$), while if $e \to \infty$, individuals report no wealth at all ($\tilde{W}_r = 0$).

The combination of the wealth distribution and the reported wealth function (12) yields a reported wealth distribution associated with the baseline linear tax system. We denote $H_0(W_r)$ and $h_0(W_r)$ the distribution and density functions for reported wealth associated with this baseline. Using the optimality condition (12), we obtain $H_0(W_r) = F\left(\frac{W_r}{(1-\tau)^e}\right)$ and hence $h_0(W_r) = H_0'(W_r) = f\left(\frac{W_r}{(1-\tau)^e}\right)/(1-\tau)^e$. Therefore, given a smooth tax system (i.e., no notches and no kinks), the smooth wealth distribution converts into a smooth reported wealth distribution.

Consider the marginal buncher H located at $W_r^* + \Delta W_r^*$ before the reform, whose wealth is $W^* + \Delta W^*$, and is indifferent between the notch point W_r^* and the best interior point W_r^I after the tax change. At notch point W_r^*, her utility level is given by

$$u^N = W^* + \Delta W^* - \tau W_r^* - (W^* + \Delta W^*) \cdot \left[\frac{1}{1+e} - \frac{W_r^*}{W^* + \Delta W^*} + \frac{1}{1+1/e}\left(\frac{W_r^*}{W^* + \Delta W^*}\right)^{1+\frac{1}{e}}\right] \tag{13}$$

Using the first order condition $W_r^I = (W^* + \Delta W^*)\,(1 - \tau - \Delta\tau)^e$, the utility level obtained at the best interior location can be written as

$$u^I = (W^* + \Delta W^*) \cdot \left[\frac{(1-\tau-\Delta\tau)^{1+e}}{1+e} + \frac{1}{1+1/e}\right] \tag{14}$$

From the condition $u^I = u^N$ and using the relationship $W^* + \Delta W^* = (W_r^* + \Delta W_r^*)/\,(1-\tau)^e$, we can rearrange the terms so as to obtain

$$\frac{1}{1 + \Delta W_r^*/W_r^*} - \frac{1}{1+1/e}\left(\frac{1}{1 + \Delta W_r^*/W_r^*}\right)^{1+1/e} - \frac{1}{1+e}\left(1 - \frac{\Delta\tau}{1-\tau}\right)^{1+e} = 0 \tag{15}$$

[83] The approximation assumes that the counterfactual density is locally constant in reported wealth (but not elasticities).

[84] Note that $C(0) = 0$, i.e., there is no cost of underreporting when taxpayers do not underreport. Moreover, $C(\cdot)$ is convex: if $u = 1 - W_r/W$, $C'(u) = W[1 - (1-u)^{1/e}] \geq 0$ and $C''(u) = W(1-u)^{1/e-1}/e \geq 0$.

This condition characterizes the relationship between the percentage reporting response $\Delta W_r^*/W_r^*$, the percentage change in the average net-of-tax rate created by the notch, $\Delta\tau/(1-\tau)$, and the structural elasticity e.[85] Although it is not possible to obtain an analytical solution for e, this can be solved numerically given an estimate for ΔW_r^* and the observed value of the other arguments.

The disadvantage of this approach is that it relies on a functional form for utility. While the wealth reporting response ΔW_r^* can be non-parametrically identified, the underlying structural elasticity e from equation (15) that could be used for out-of-sample prediction cannot. It is therefore useful to develop a reduced-form approach that does not rely on the specific functional form for individuals' utility, as we do in Section 3.1. As discussed in Kleven and Waseem (2013), under some assumptions equation (3) for this reduced-form elasticity represents an upper bound on the structural elasticity e from equation (15).

Finally, note that, as the compensated elasticity e converges to zero (L-shaped Leontief preferences), equation (15) implies

$$\lim_{e\to 0} \Delta W_r^* = \frac{\Delta\tau \cdot W_r^*}{1-\tau-\Delta\tau} \equiv \Delta W_r^D \tag{16}$$

This means that, as $e \to 0$, the bunching interval ΔW_r^* converges to the strictly dominated range ΔW_r^D. The dominated range therefore represents a lower bound on the wealth reporting response to tax notches under any compensated elasticity in a frictionless model (Kleven and Waseem, 2013).

Table B.1 presents the estimated parameters. For each reform year, the table shows the notch point (column 2), whether this notch also defined eligibility for the wealth tax (column 3), the average tax rate jump (column 4), the size of the dominated range (column 5), the share of taxpayers in dominated ranges that are unresponsive to the tax notch (column 6), the lower and upper bounds on the reporting responses (columns 7 and 8, respectively), and the bounds on the elasticities based on either the parametric equation (15) (columns 9 and 10) or the reduced-form formula (3) (column 11 and 12).

The table shows that the structural elasticities driving the large wealth reporting responses for the first notch in 2010 range between 0.47 to 1.42. The reduced-form elasticities, which represent an upper bound if the uncompensated reported wealth elasticity is not too strongly negative, are between 0.6 and 2.0.[86] These elasticities obtained for the first notch are all statistically significantly different from zero at the 1 percent level. In contrast, elasticities obtained from the second notch are smaller and often less precisely estimated: the structural elasticities between 0.32 to 0.84, and the reduced-form elasticities are between 0.37 and 1.0, but the upper bounds using the convergence method are not statistically significantly different from zero.

[85] See proofs and derivations in Section C.

[86] Reduced-form elasticities are somewhat larger than structural elasticities, as the former provide an approximation (upper bound) of the true structural elasticity. Kleven and Waseem (2013) show that, given the size of the notch $\Delta\tau/(1-\tau)$ and a true functional form for utility, the bias of the reduced-form approach is determined by the percentage reporting response $\Delta W_r^*/W_r^*$.

Table B.1: Summary of Notches, Responses, and Elasticities

Year of Reform (1)	Notch Point (mill. pesos) (2)	Exemption Cutoff (3)	ATR Jump $\Delta\tau$ (%) (4)	Dominated Range ΔW_r^D (mill. pesos) (5)	Frictions a^* using ΔW_r^D (6)	Response ΔW_r^* (mill. pesos)		Structural Elasticity e		Reduced-Form Elasticity e_R	
						Bunching-Hole Method (7)	Convergence Method (8)	Bunching-Hole Method (9)	Convergence Method (10)	Bunching-Hole Method (11)	Convergence Method (12)
2003	3,000	✓	0.3	9	0.74	120	180	0.24	0.53	0.27	0.60
					(0.18)	(80.09)	(137.93)	(0.52)	(1.27)	(0.62)	(1.76)
2006	3,000	✓	1.2 × 4	151	0.41	340	560	0.07	0.21	0.13	0.36
					(0.04)	(52.04)	(109.62)	(0.03)	(0.10)	(0.04)	(0.16)
2010	1,000	✓	1.0	10	0.43	110	200	0.47	1.42	0.60	2.00
					(0.02)	(7.91)	(16.86)	(0.07)	(0.22)	(0.09)	(0.35)
2010	2,000		0.4	8	0.57	110	180	0.32	0.84	0.37	1.00
					(0.07)	(24.10)	(64.63)	(0.14)	(0.73)	(0.19)	(0.99)
2010	3,000		1.6	49	0.35	220	360	0.18	0.33	0.17	0.44
					(0.04)	(40.82)	(87.44)	(0.05)	(0.14)	(0.09)	(0.20)
2010	5,000		3.0	160	0.45	360	680	0.06	0.20	0.08	0.30
					(0.06)	(105.16)	(238.74)	(0.06)	(0.16)	(0.06)	(0.23)
2014	1,000	✓	0.0125 × 4	5	0.38	110	210	0.98	3.17	1.21	4.41
					(0.02)	(6.31)	(16.03)	(0.12)	(0.42)	(0.15)	(0.71)

Notes: This table presents elasticity estimates at different wealth levels exploiting four wealth tax reforms taking place in 2003, 2006, 2010, and 2014. Column (1) presents the year of the wealth tax reform. Column (2) indicates the bracket cutoff, expressed in current million pesos. Column (3) indicates whether this cutoff also marks the eligibility threshold, below which taxpayers are exempt from the wealth tax. Column (4) presents the size of the wealth tax notch. Column (5) presents the dominated range in current million pesos, defined as $\Delta\tau \cdot W_r^*/(1-\tau-\Delta\tau)$. Column (6) presents the estimate of frictions (the fraction of individuals in dominated ranges who are unresponsive). Columns (7)–(8) present the reporting responses in current million pesos using bunching-hole and convergence methods, respectively. Columns (9)–(12) present elasticities based on either the parametric equation (15) in columns (9)–(10) or the reduced-form formula (3) in columns (11)–(12). *Source:* Authors' calculations using administrative tax microdata from DIAN.

C Proofs and Derivations

Structural elasticity formula, equation (15): Recall from Figure A.3, Panel (a), that the marginal buncher H is located at $W_r^* + \Delta W_r^*$ before the reform and has (latent) wealth $W^* + \Delta W^*$. This individual is indifferent between the notch point W_r^* and the best interior point W_r^I after the tax change. Her utility level at notch point W_r^* is given by

$$u^N = W^* + \Delta W^* - \tau W_r^* - (W^* + \Delta W^*) \cdot \left[\frac{1}{1+e} - \frac{W_r^*}{W^* + \Delta W^*} + \frac{1}{1+1/e} \left(\frac{W_r^*}{W^* + \Delta W^*} \right)^{1+\frac{1}{e}} \right]$$

Using the first order condition $W_r^I = (W^* + \Delta W^*)(1 - \tau - \Delta\tau)^e$, the utility level obtained at the best interior location is

$$\begin{aligned}
u^I &= W^* + \Delta W^* - (\tau + \Delta\tau) W_r^I - (W^* + \Delta W^*) \cdot \left[\frac{1}{1+e} - \frac{W_r^I}{W^* + \Delta W^*} + \frac{1}{1+1/e} \left(\frac{W_r^I}{W^* + \Delta W^*} \right)^{1+\frac{1}{e}} \right] \\
&= W^* + \Delta W^* - (W^* + \Delta W^*)(\tau + \Delta\tau)(1 - \tau - \Delta\tau)^e \\
&\quad - (W^* + \Delta W^*) \cdot \left[\frac{1}{1+e} - \frac{W^* + \Delta W^*}{W^* + \Delta W^*} \cdot (1 - \tau - \Delta\tau)^e + \frac{1}{1+1/e} \left(\frac{W^* + \Delta W^*}{W^* + \Delta W^*} \cdot (1 - \tau - \Delta\tau)^e \right)^{1+\frac{1}{e}} \right] \\
&= (W^* + \Delta W^*) \left[1 - (\tau + \Delta\tau)(1 - \tau - \Delta\tau)^e - \frac{1}{1+e} + (1 - \tau - \Delta\tau)^e - \frac{1}{1+1/e} (1 - \tau - \Delta\tau)^{1+e} \right] \\
&= (W^* + \Delta W^*) \left[1 + (1 - \tau - \Delta\tau)^{1+e} - \frac{1}{1+1/e} (1 - \tau - \Delta\tau)^{1+e} - \frac{1}{1+e} \right] \\
&= (W^* + \Delta W^*) \cdot \left[\frac{(1 - \tau - \Delta\tau)^{1+e}}{1+e} + \frac{1}{1+1/e} \right]
\end{aligned}$$

From the condition $u^I = u^N$ and using the relationship $W^* + \Delta W^* = (W_r^* + \Delta W_r^*)/(1-\tau)^e$, we can obtain

$$\begin{aligned}
& W^* + \Delta W^* - \tau W_r^* - (W^* + \Delta W^*) \cdot \left[\frac{1}{1+e} - \frac{W_r^*}{W^* + \Delta W^*} + \frac{1}{1+1/e} \left(\frac{W_r^*}{W^* + \Delta W^*} \right)^{1+\frac{1}{e}} \right] \\
& \qquad - (W^* + \Delta W^*) \cdot \left[\frac{(1 - \tau - \Delta\tau)^{1+e}}{1+e} + \frac{1}{1+1/e} \right] = 0 \\
\Leftrightarrow\ & \frac{W_r^* + \Delta W_r^*}{(1-\tau)^e} - \tau W_r^* - \frac{W_r^* + \Delta W_r^*}{(1-\tau)^e} \cdot \left[\frac{1}{1+e} - \frac{W_r^*(1-\tau)^e}{W_r^* + \Delta W_r^*} + \frac{1}{1+1/e} \left(\frac{W_r^*(1-\tau)^e}{W_r^* + \Delta W_r^*} \right)^{1+\frac{1}{e}} \right] \\
& \qquad - \frac{W_r^* + \Delta W_r^*}{(1-\tau)^e} \cdot \left[\frac{(1 - \tau - \Delta\tau)^{1+e}}{1+e} + \frac{1}{1+1/e} \right] = 0
\end{aligned}$$

Dividing by $\frac{W_r^*+\Delta W_r^*}{(1-\tau)^e}$:

$$1-\frac{\tau W_r^*(1-\tau)^e}{W_r^*+\Delta W_r^*}-\frac{1}{1+e}+\frac{W_r^*(1-\tau)^e}{W_r^*+\Delta W_r^*}-\frac{1}{1+1/e}\left(\frac{W_r^*(1-\tau)^e}{W_r^*+\Delta W_r^*}\right)^{1+\frac{1}{e}}-\frac{(1-\tau-\Delta\tau)^{1+e}}{1+e}-\frac{1}{1+1/e}=0$$

$$\frac{W_r^*(1-\tau)^{1+e}}{W_r^*+\Delta W_r^*}-\frac{1}{1+1/e}\left(\frac{W_r^*(1-\tau)^e}{W_r^*+\Delta W_r^*}\right)^{1+\frac{1}{e}}-\frac{(1-\tau-\Delta\tau)^{1+e}}{1+e}=0$$

$$\frac{(1-\tau)^{1+e}}{1+\Delta W_r^*/W_r^*}-\frac{1}{1+1/e}\left(\frac{(1-\tau)^e}{1+\Delta W_r^*/W_r^*}\right)^{1+\frac{1}{e}}-\frac{(1-\tau-\Delta\tau)^{1+e}}{1+e}=0$$

Dividing by $(1-\tau)^{1+e}$:

$$\frac{1}{1+\Delta W_r^*/W_r^*}-\frac{1}{1+1/e}\left(\frac{1}{1+\Delta W_r^*/W_r^*}\right)^{1+1/e}-\frac{1}{1+e}\left(1-\frac{\Delta\tau}{1-\tau}\right)^{1+e}=0$$

□

Equivalence between wealth and capital income elasticities: Let τ_W be the wealth tax rate and τ_K the equivalent tax rate on capital income so that $\tau_W = r \cdot \tau_K$ where r is the rate of return on wealth. For instance, if τ_W is 1 percent, and r is 5 percent, then τ_K is 20 percent.

$$d(1-\tau_W) = d(1-\tau_K)\cdot r$$

$$\frac{d(1-\tau_W)}{(1-\tau_W)} = \frac{d(1-\tau_K)}{(1-\tau_K)}\cdot r\left(\frac{1-\tau_K}{1-\tau_W}\right)$$

$$\left[\frac{d(1-\tau_W)}{(1-\tau_W)}\cdot\frac{W}{dW}\right]^{-1} = \left[\frac{d(1-\tau_K)}{(1-\tau_K)}\cdot r\left(\frac{1-\tau_K}{1-\tau_W}\right)\cdot\frac{W}{dW}\right]^{-1}$$

$$\epsilon_W = \epsilon_K\cdot\left[\frac{1-\tau_W}{r(1-\tau_K)}\right]$$

In our example, $\frac{1-\tau_W}{r(1-\tau_K)} = 24.75$. Therefore, to translate our estimated elasticities of reported wealth into the equivalent elasticities of capital income, we divide ϵ_W by a factor of 24.75.

D Difference-in-Differences Comparing Taxpayers Close to the Bracket Cutoffs

Section 3 showed that taxpayers respond to wealth taxation by immediately lowering their reported wealth below the notch points. In this section, we complement the bunching analysis by examining responses over a longer time horizon, leveraging the panel microdata and variation from four wealth tax reforms in 2003, 2006, 2010, and 2014.

We run two types of analyses. First, we compare the number of individuals reporting wealth above and below the bracket cutoffs across time. Figure D.1 plots these series separately for each reform and bracket cutoff, normalizing each series to equal 0 in the year before a given wealth tax reform. Three key insights emerge from the figure. First, the two series are on parallel trends in the years leading up to the reform. Second, consistent with the immediate bunching responses documented in Section 3, there is a sudden drop in the relative number of taxpayers reporting wealth just above the cutoff and a corresponding rise in those reporting just below it. Third, this gap persists over time, even when reporting above the cutoff no longer triggers wealth tax liability. For instance, while wealth taxes owed between 2007 and 2009 depend only on wealth reported in 2006, Panel (b) shows that the gap between the two series remains large throughout this period. Similarly, even though wealth is not taxed in 2011–2013, Panel (c) shows that the gap in induced by the 2010 wealth tax persists across time. However, the effect is not growing over time. In fact, it can also revert back, as shown in Panels (d) and (e).

Second, we consider a difference-in-differences approach in which we compare wealth reported by treatment and control groups in a balanced panel of taxpayers. To define the groups that were differentially affected by wealth taxation, we exploit the notched tax schedule whereby wealth tax liability jumps discontinuously at the bracket cutoffs. We assign taxpayers to treatment and control groups based on their reported wealth in the year immediately before a reform. We then compare reported wealth between taxpayers below (control) and above (treated) the cutoffs using the following specification:

$$\log(W_{it}) = \alpha_i + \sum_{j \neq K} \beta_j^C 1(Year)_{j=t} + \sum_{j \neq K} \beta_j^T 1(Year)_{j=t} \times 1(\text{Treated})_i + u_{it} \tag{17}$$

where W_{it} denotes the wealth reported by individual i in year t, α_i is an individual fixed effect, $1(Year)_{j=t}$ equals 1 when the year equals t, $1(\text{Treated})_i$ equals 1 for treated taxpayers, and u_{it} is the error term. We choose K such as to normalize with respect to the year immediately before the reform.

In Figures D.2 through D.6, Panel (a) shows the time series of log reported wealth in the control group (black dots) and treated group (blue triangles) in the years before and after a wealth tax reform, i.e., estimates $\hat{\beta}_t^C$ and $\hat{\beta}_t^C + \hat{\beta}_t^T$. Panel (b) shows the differences between the control and treated groups in year t ($\hat{\beta}_t^T$), i.e., our reduced-form estimate of the effect of the wealth tax reform. Several insights emerge from these figures. First, while the two series evolve in tandem in the years leading up to the reform, they immediately diverge afterwards. Second, most of the overall effect is concentrated in the year of the reform, consistent with a one-time avoidance adjustment driving the results. Third, the gap between the two series—which conflates mechanical and behavioral responses—persists several years after a reform. This is expected if wealth is taxed more than once, as is the case between 2003 and 2005 (Figure D.2) or between 2006 and 2009 (Figure D.3), with the mechanical effect—governed by the large change in the average after-tax return—driving the result. Yet, interestingly, the gap persists *even when wealth is no longer taxed*: a one-off wealth tax in 2010 generates a persistent gap in Figure D.4. This is partly

due to the peristence of bunching documented in Section 3 and Figure 5.[87]

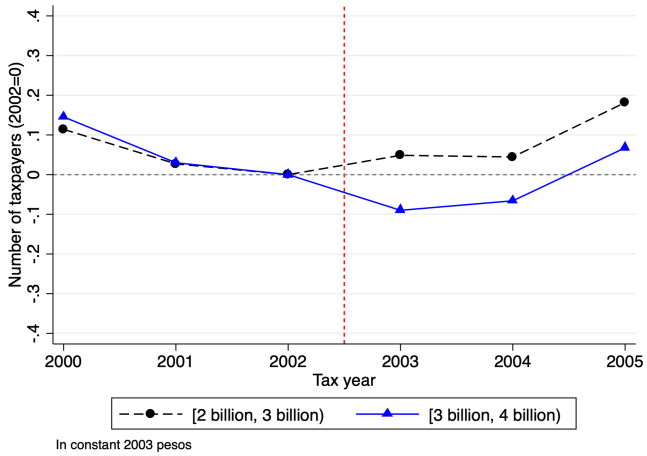
Because the treatment assignment is based on *pre-reform* reported wealth, it may not systematically determine whether a taxpayer actually owed wealth taxes. For instance, some taxpayers reporting above the cutoff in $t-1$ (treated) may immediately bunch below the cutoff in year t to avoid the wealth tax. Indeed, one-fifth of treated taxpayers based on wealth reported in 2009 would belong to the control group based on wealth reported in 2010. This means β is a reduced-form or ITT estimate. Moreover, some taxpayers in the control group who would have reported above the cutoff may remain below it in response to the reform. This implies that control taxpayers also lower their reported wealth in response to wealth taxation, driving β towards zero. Third, as in other studies using difference-in-differences approaches with panel data (Saez et al., 2012), the possibility of mean reversion implies that treated wealth in base year $t-1$ is likely to decrease because some individuals are part of the treated group in $t-1$ due to having large positive transitory wealth shocks.

To examine how sensitive our estimates are to the response of taxpayers around the notch point, Panels (c) and (d) in Figures D.2 through D.6 re-estimate the results excluding taxpayers in the bunching area around the bracket cutoff. Although the results vary somewhat depending on the reform year and notch point, the qualitative findings remain very similar.

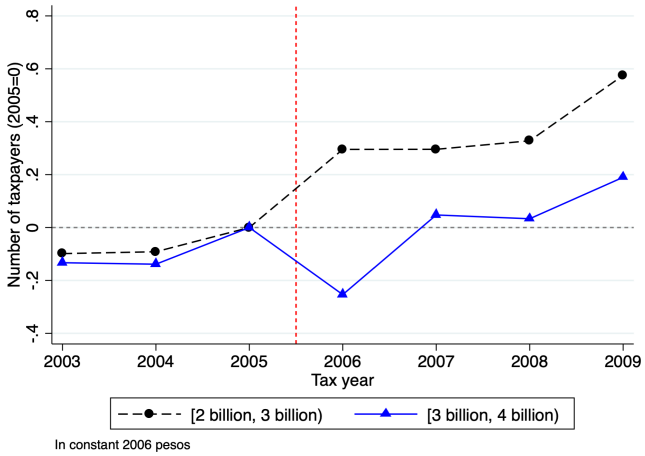
[87] This effect is less precisely identified and estimated for taxpayers further up the distribution (Figures D.5 and D.6), partly because these taxpayers were already subject to wealth taxes prior to the 2010 reform. Further, we do not present results for two comparisons: (a), the impact of the reintroduction of the wealth tax in 2014, because of persistent bunching from the reform in 2010; and (b) the second notch in 2010 at 2 billion pesos, because it is too close to the other two notches at 1 and 3 billion pesos.

Figure D.1: Number of Taxpayers Above and Below Wealth Tax Bracket Cutoffs

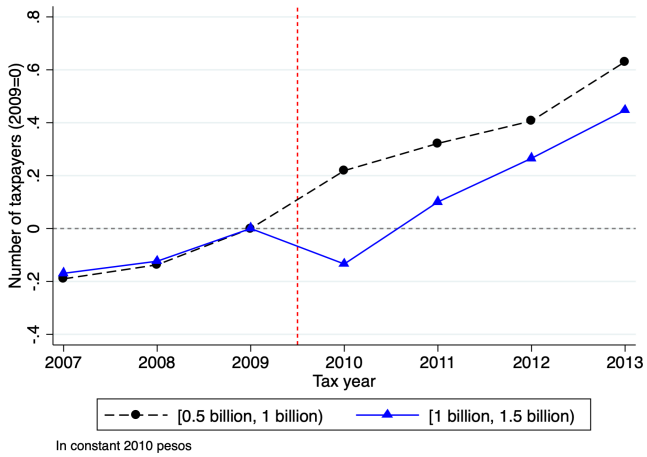
(a) 2003–05: $\Delta\tau = 0.3\%$ and $W_r^* = 3$ Billion



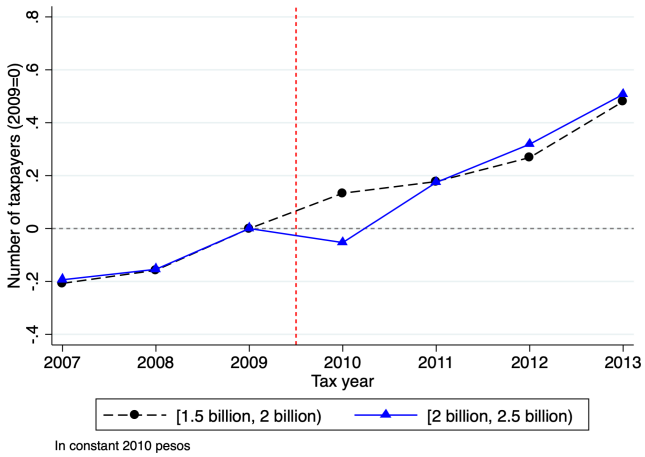
(b) 2006: $\Delta\tau = 1.2\% \times 4$ and $W_r^* = 3$ Billion



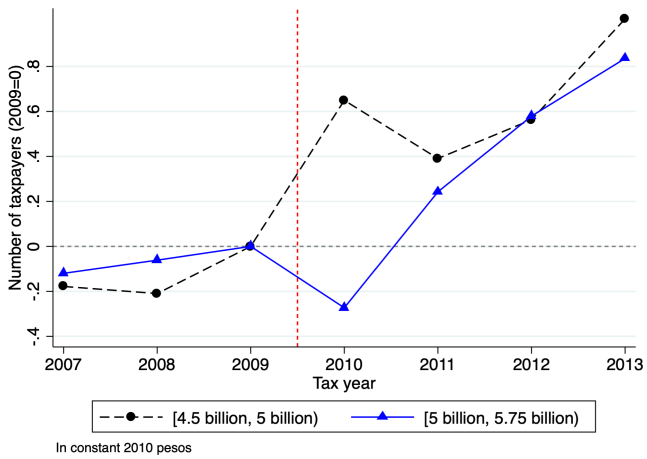
(c) 2010: $\Delta\tau = 1\%$ and $W_r^* = 1$ Billion



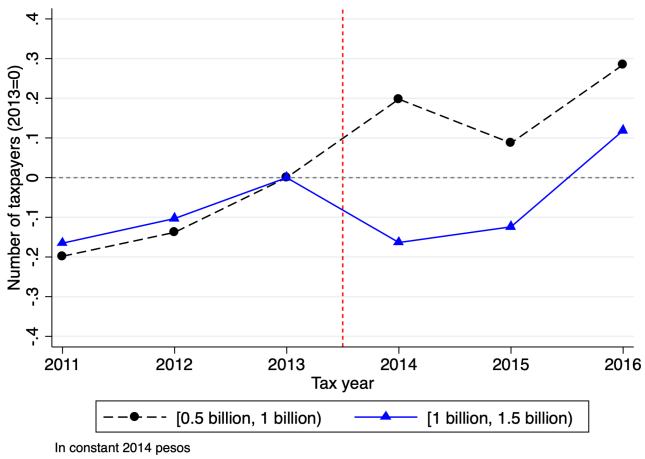
(d) 2010: $\Delta\tau = 0.4\%$ and $W_r^* = 2$ Billion



(e) 2010: $\Delta\tau = 3\%$ and $W_r^* = 5$ Billion



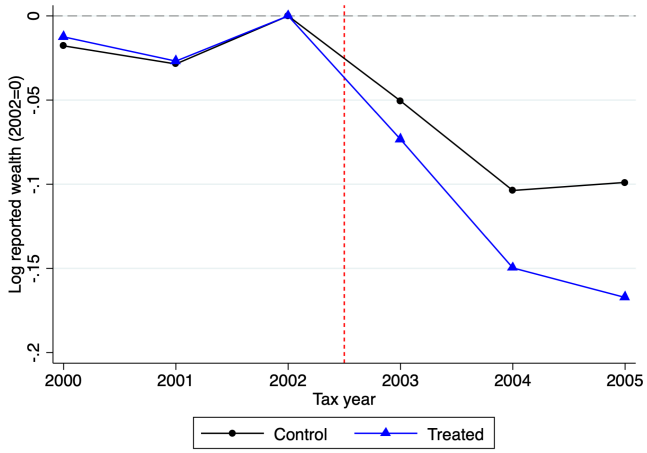
(f) 2014: $\Delta\tau = 0.125\% \times 4$ and $W_r^* = 1$ Billion



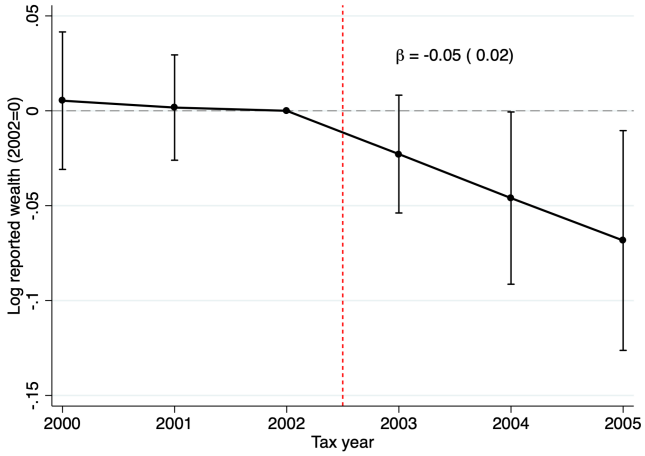
Notes: The figure shows the number of taxpayers reporting wealth in a given range below (control, dashed black line) and above (treated, blue solid line) bracket cutoff W_r^*, normalized to zero in the pre-reform year. We do not plot the series around 2010's third notch of $\Delta\tau = 1.6$ percent at $W_r^* = 3$ billion pesos, as it interferes with the wealth tax put in place between 2006 and 2009 at a similar cutoff.

Figure D.2: 2003–05 First (and Only) Notch with $\Delta\tau = 0.3\%$ and $W_r^* = 3$ Billion (2003 pesos)

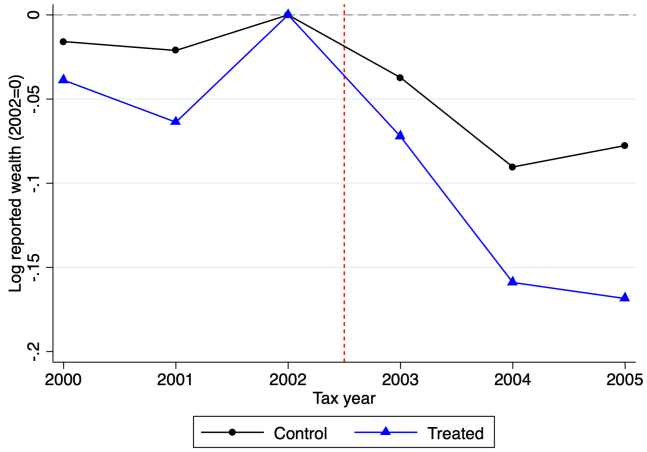
(a) $W_r^{2002} : C = [2, 3)$ vs $T = [3, 4)$



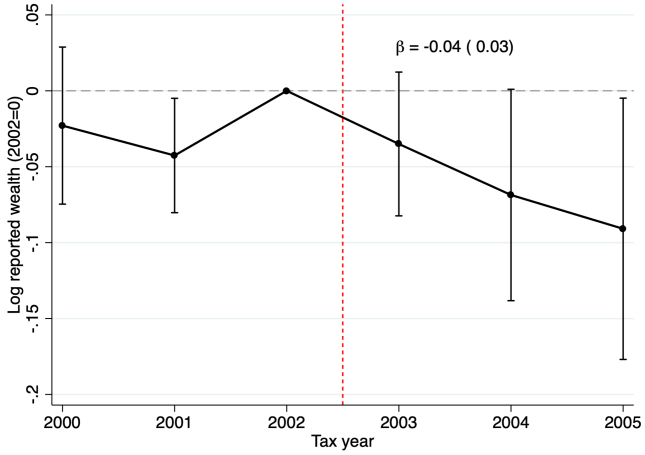
(b) $W_r^{2002} : C = [2, 3)$ vs $T = [3, 4)$



(c) $W_r^{2002} : C = [2, 2.5)$ vs $T = [3.5, 4)$



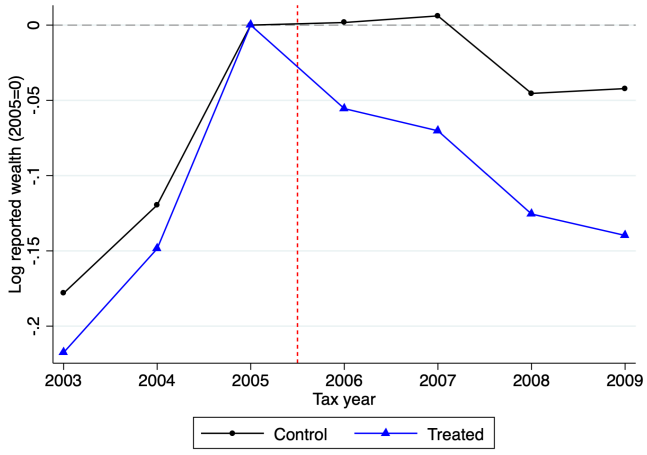
(d) $W_r^{2002} : C = [2, 2.5)$ vs $T = [3.5, 4)$



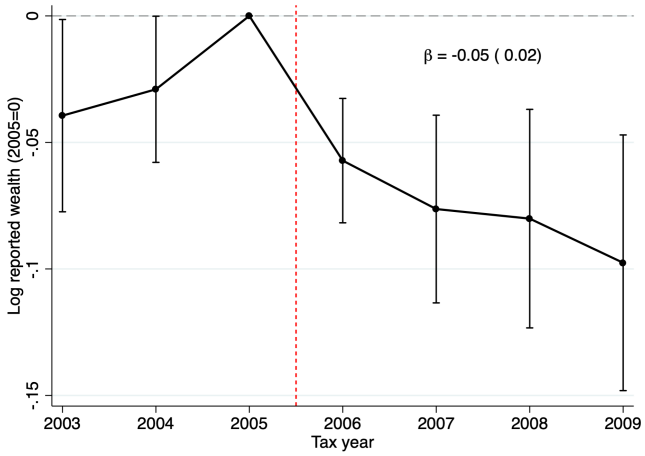
Notes: The figure shows the (intention-to-treat) effects of a wealth tax reform on reported wealth based on a difference-in-differences comparison of taxpayers around the eligibility cutoff. Taxpayers reporting 3 billion pesos (in 2003 pesos) or more in wealth owed 0.3 percent of taxable wealth in 2003, 2004, and 2005. The estimation sample is a balanced panel of taxpayers observed in all years plotted in the figure. Panel (a) shows the evolution of reported wealth for taxpayers reporting wealth between 2003 2 and 3 billion pesos in 2002 (control) and between 2003 3 and 4 billion pesos in 2002 (treated), normalized to zero in 2002 and using specification (17). Panel (b) shows the differences between these two series, i.e., our difference-in-differences estimates. The 95 percent confidence intervals are based on robust standard errors clustered at the individual level. Panels (c) and (d) examine how these estimates vary when excluding taxpayers in the bunching area, that is, comparing taxpayers owning between 2 and 2.5 billion versus 3.5 and 4 billion pesos in 2002.

Figure D.3: 2006 First (and Only) Notch with $\Delta\tau = 1.2\% \times 4$ and $W_r^* = 3$ Billion

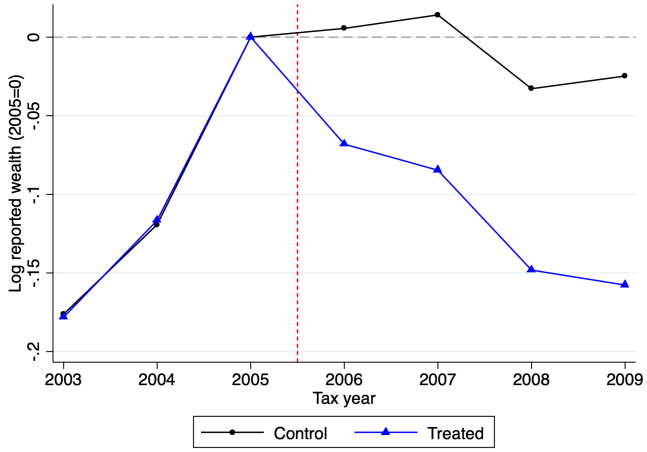
(a) $W_r^{2005} : C = [2, 3)$ vs $T = [3, 4)$



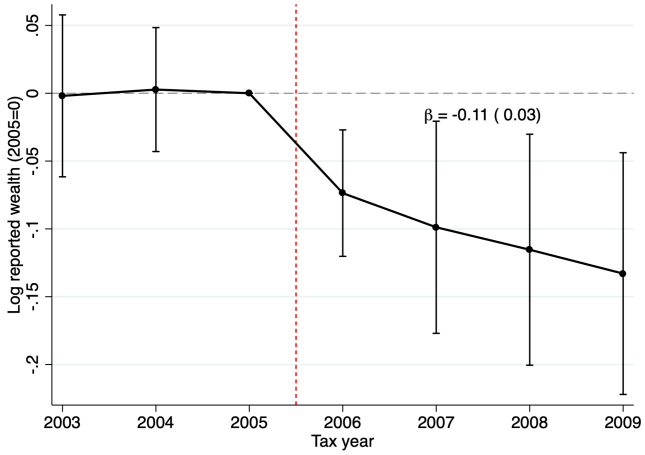
(b) $W_r^{2005} : C = [2, 3)$ vs $T = [3, 4)$



(c) $W_r^{2005} : C = [2, 2.5)$ vs $T = [3.5, 4)$



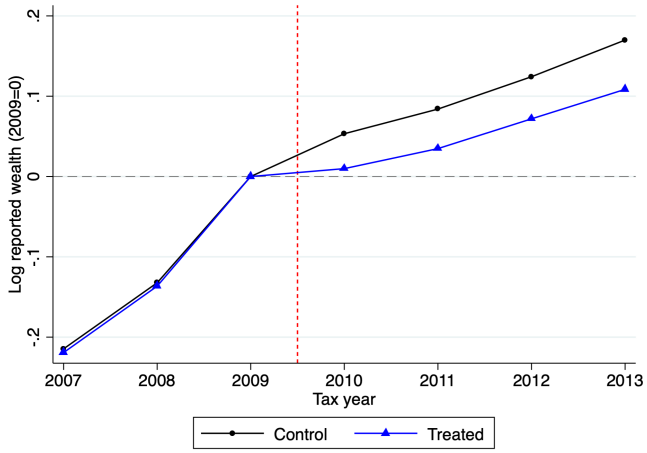
(d) $W_r^{2005} : C = [2, 2.5)$ vs $T = [3.5, 4)$



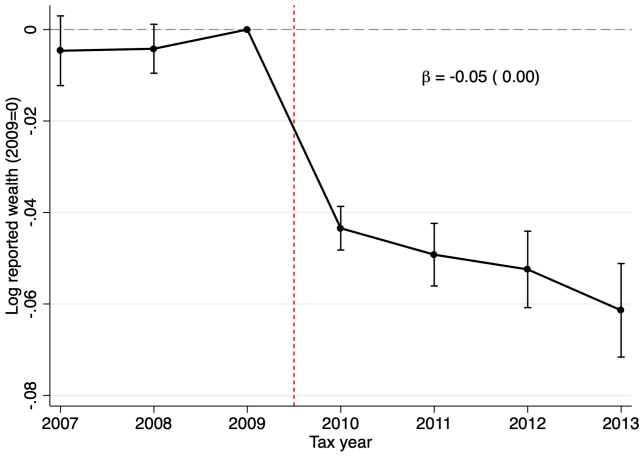
Notes: The figure shows the (intention-to-treat) effects of a wealth tax reform on reported wealth based on a difference-in-differences comparison of taxpayers around the eligibility cutoff. Taxpayers reporting 3 billion pesos or more in wealth in 2006 owed 1.2 percent of taxable wealth in 2006, 2007, 2008, and 2009. The estimation sample is a balanced panel of taxpayers observed in all years plotted in the figure. Panel (a) shows the evolution of reported wealth for taxpayers reporting wealth between 2006 2 and 3 billion pesos in 2005 (control) and between 2006 3 and 4 billion pesos in 2005 (treated), normalized to zero in 2005 and using specification (17). Panel (b) shows the differences between these two series, i.e., our difference-in-differences estimates. The 95 percent confidence intervals are based on robust standard errors clustered at the individual level. Panels (c) and (d) examine how these estimates vary when excluding taxpayers in the bunching area, that is, comparing taxpayers owning between 2 and 2.5 billion versus 3.5 and 4 billion pesos in 2005.

Figure D.4: 2010 First Notch with $\Delta\tau = 1\%$ and $W_r^* = 1$ Billion

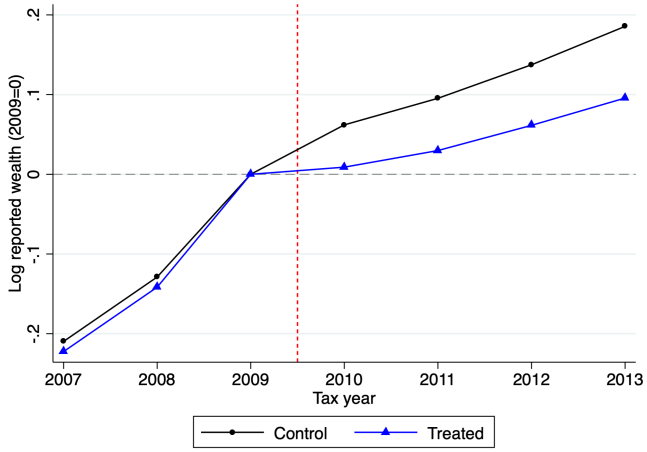
(a) $W_r^{2009} : C = [0.5, 1)$ vs $T = [1, 1.5)$



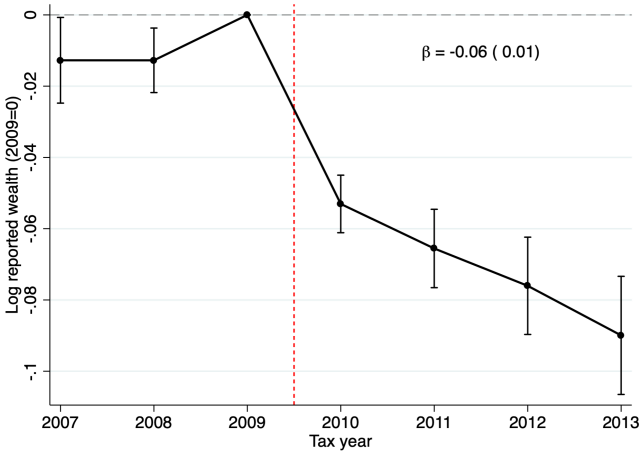
(b) $W_r^{2009} : C = [0.5, 1)$ vs $T = [1, 1.5)$



(c) $W_r^{2009} : C = [0.5, 0.75)$ vs $T = [1.25, 1.5)$



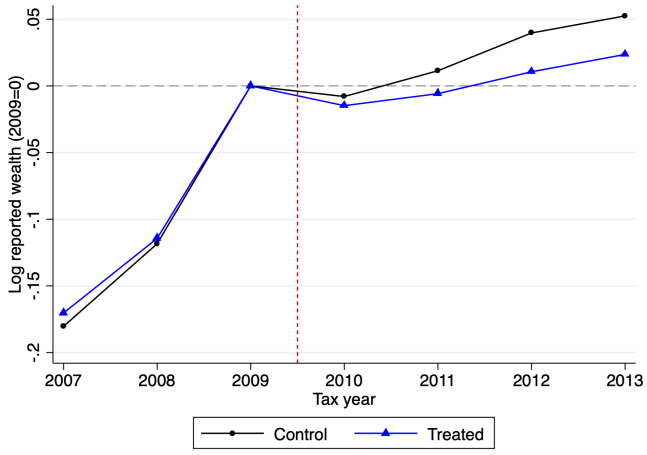
(d) $W_r^{2009} : C = [0.5, 0.75)$ vs $T = [1.25, 1.5)$



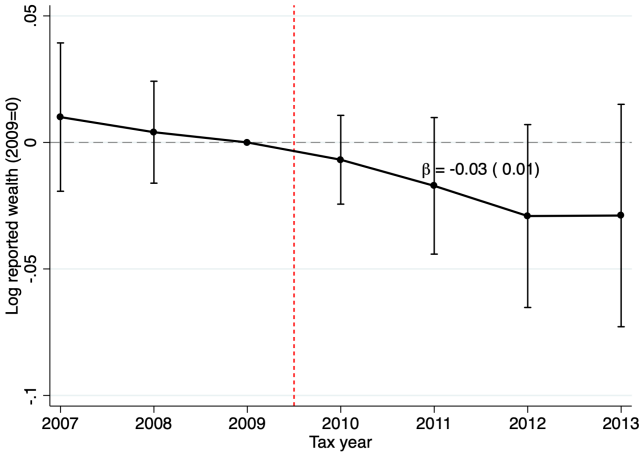
Notes: The figure shows the (intention-to-treat) effects of a wealth tax reform on reported wealth based on a difference-in-differences comparison of taxpayers around the eligibility cutoff. Taxpayers reporting between 1 and 2 billion pesos in 2010 owed 1 percent of taxable wealth that year. The estimation sample is a balanced panel of taxpayers observed in all years plotted in the figure. Panel (a) shows the evolution of reported wealth for taxpayers reporting wealth between 2010 0.5 and 1 billion pesos in 2009 (control) and between 2010 1 and 1.5 billion pesos in 2009 (treated), normalized to zero in 2009 and using specification (17). Panel (b) shows the differences between these two series, i.e., our difference-in-differences estimates. The 95 percent confidence intervals are based on robust standard errors clustered at the individual level. Panels (c) and (d) examine how these estimates vary when excluding taxpayers in the bunching area, that is, comparing taxpayers owning between 0.5 and 0.75 billion versus 1.25 and 1.5 billion pesos in 2009.

Figure D.5: 2010 Third Notch with $\Delta\tau = 1.6\%$ and $W_r^* = 3$ Billion

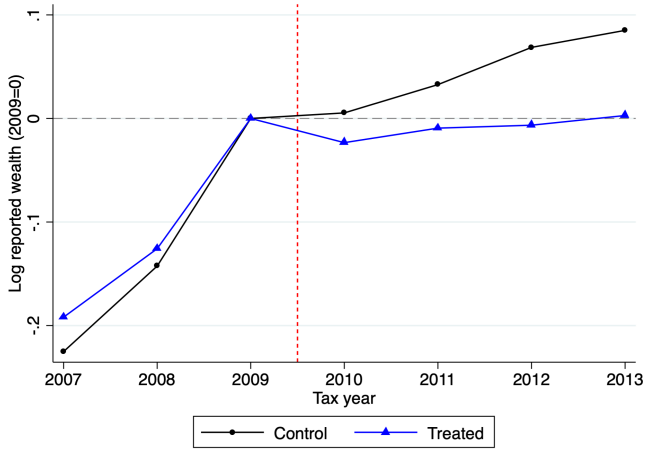
(a) $W_r^{2009} : C = [2.5, 3)$ vs $T = [3, 4)$



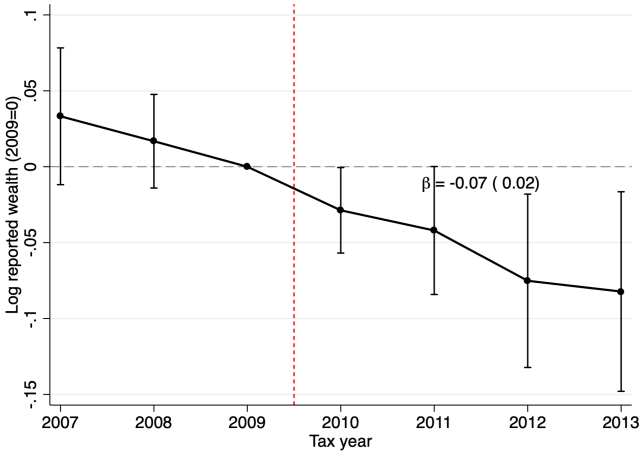
(b) $W_r^{2009} : C = [2.5, 3)$ vs $T = [3, 4)$



(c) $W_r^{2009} : C = [2.25, 2.5)$ vs $T = [3.5, 4)$



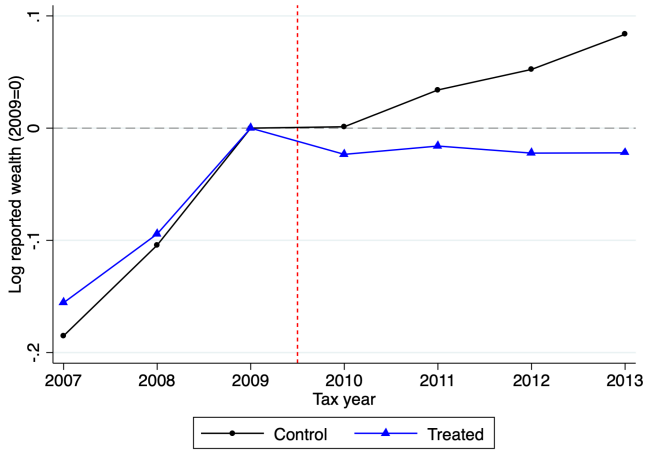
(d) $W_r^{2009} : C = [2.25, 2.5)$ vs $T = [3.5, 4)$



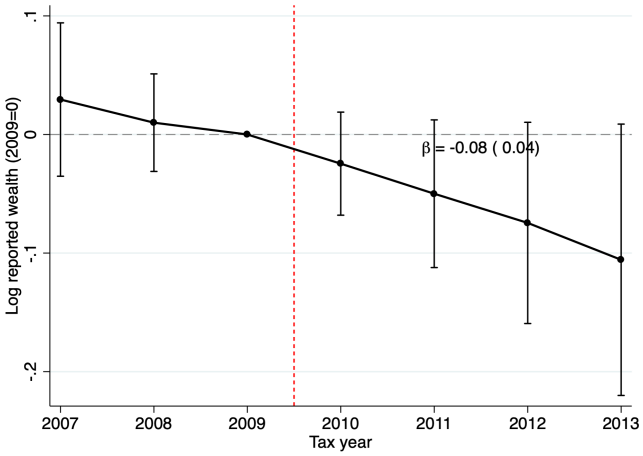
Notes: The figure shows the (intention-to-treat) effects of a wealth tax reform on reported wealth based on a difference-in-differences comparison of taxpayers around the eligibility cutoff. Taxpayers reporting between between 2 and 3 billion pesos in 2010 owed 1.4 percent of taxable wealth that year, whereas those reporting between 3 and 5 billion pesos owed 3 percent. The estimation sample is a balanced panel of taxpayers observed in all years plotted in the figure. Panel (a) shows the evolution of reported wealth for taxpayers reporting wealth between 2010 2.5 and 3 billion pesos in 2009 (control) and between 2010 3 and 4 billion pesos in 2009 (treated), normalized to zero in 2009 and using specification (17). Panel (b) shows the differences between these two series, i.e., our difference-in-differences estimates. The 95 percent confidence intervals are based on robust standard errors clustered at the individual level. Panels (c) and (d) examine how these estimates vary when excluding taxpayers in the bunching area, that is, comparing taxpayers owning between 2.25 and 2.5 billion versus 3.5 and 4 billion pesos in 2009.

Figure D.6: 2010 Fourth Notch with $\Delta\tau = 3\%$ and $W_r^* = 5$ Billion

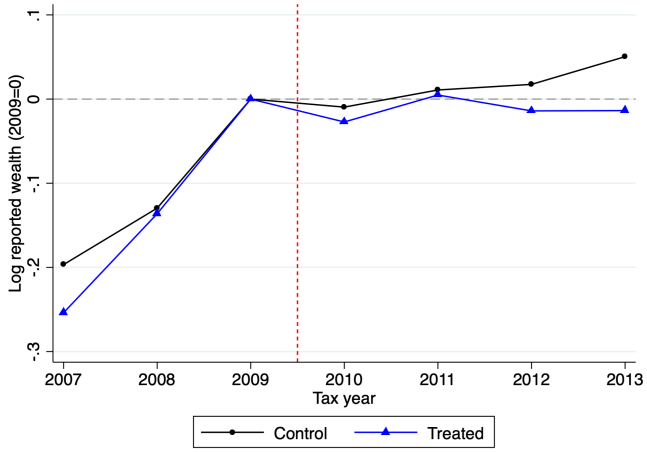
(a) $W_r^{2009} : C = [4.5, 5)$ vs $T = [5, 5.75)$



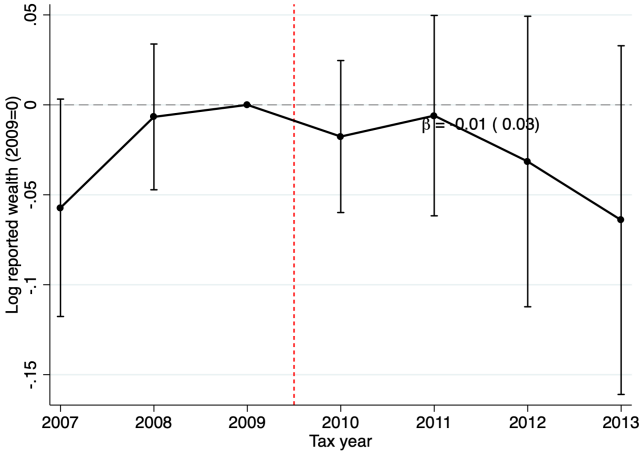
(b) $W_r^{2009} : C = [4.5, 5)$ vs $T = [5, 5.75)$



(c) $W_r^{2009} : C = [4, 4.5)$ vs $T = [6, 8)$



(d) $W_r^{2009} : C = [4, 4.5)$ vs $T = [6, 8)$



Notes: The figure shows the (intention-to-treat) effects of a wealth tax reform on reported wealth based on a difference-in-differences comparison of taxpayers around the eligibility cutoff. Taxpayers reporting between between 3 and 5 billion pesos in 2010 owed 3 percent of taxable wealth that year, whereas those reporting between 5 billion pesos or more owed 6 percent. The estimation sample is a balanced panel of taxpayers observed in all years plotted in the figure. Panel (a) shows the evolution of reported wealth for taxpayers reporting wealth between 2010 4.5 and 5 billion pesos in 2009 (control) and between 2010 5 and 5.75 billion pesos in 2009 (treated), normalized to zero in 2009 and using specification (17). Panel (b) shows the differences between these two series, i.e., our difference-in-differences estimates. The 95 percent confidence intervals are based on robust standard errors clustered at the individual level. Panels (c) and (d) examine how these estimates vary when excluding taxpayers in the bunching area, that is, comparing taxpayers owning between 4 and 4.5 billion versus 6 and 8 billion pesos in 2009.

E Measuring Wealth Inequality in Colombia

Measuring top wealth shares (e.g., the fraction of total wealth held by the top 1 percent) faces challenges due to severe data limitations in Colombia. These data limitations affect both our measure of the amount of wealth held by wealthy individuals (the numerator) and the total amount of wealth held by individuals (the denominator). This section discusses these limitations and describes how we deal with each one of them to estimate top wealth shares in Colombia.

E.1 Total Wealth of Non-Filers

Unlike in many developed countries, there is no aggregate wealth measure to construct the denominator in Colombia. National accounts do not report personal wealth estimates and personal financial wealth, as reported by the Central Bank, appears significantly underestimated. Moreover, we cannot compute total wealth as wealth reported in the tax records because only a fraction of tax units file taxes in Colombia. For instance, in FY 2016, taxpayers with gross wealth below 133,889,000 pesos (USD 46,780) did not have to file income taxes. This excluded the bottom 94% of tax units (adults aged 20+) from filing income taxes, which means we do not observe wealth holdings for most tax units. As a second-best alternative, we refer to survey data to capture wealth for non-filers.

For this purpose, we use *Encuesta de Carga Financiera y Educación Financiera de los Hogares* (IEFIC). IEFIC surveys a representative sample of households with formal financial services from three largest urban areas (Bogota, Medellin, and Cali). In 2017, 28,114 households were surveyed from Colombia's main household survey, *Gran Encuesta Integrada de Hogares* (GEIH). Among these surveyed households, 19,419 households reported to have access to financial services and are thus included in IEFIC. Therefore, our initial survey sample comes from 47,347 individuals aged 18 and above. Before any corrections, monthly individual income ranges from 0 to 100 million pesos (USD 0 to 33,500), and household net wealth ranges from 0 to 10 billion pesos (USD 0 to 3,605,362). 45.13% of households are self-reported home-owners.

Using household survey data from IEFIC to estimate the wealth of non-filers has three main issues. The first issue is that the unit of observation is the tax unit in our study (individuals aged 20 and above) while individuals aged 18 and above are included in the survey. We thus drop survey respondents aged below 20 from the sample. Further, some assets and debts are reported at the family-level by the head of household in the survey (real estate, business assets, vehicles, and livestock; and the outstanding debt of each asset), while others are reported at the individual-level (financial assets, consumption debt). This implies that we must make assumptions about the intra-family distribution of assets and debts reported at the family level in the survey. We proceed as follows:

- For family size $n = 1$, we attribute 100% of assets and debts to head of household ($w_h = 1$)
- For family size $n = 2$ with head of household and spouse/partner, we split assets and debts equally ($w_h = w_s = .5$)
- For family size $n \geq 2$ with head of household but no spouse/partner, we attribute 80% to head of household and the remaining 20% split equally across other members ($w_h = .8, w_{j \neq h} = .2/(n-1)$)
- For family size $n > 2$ with head of household and spouse/partner, we attribute 40% to each spouse/partner and the remaining 20% split equally across other members ($w_h = w_s = .4, w_{j \neq h,s} = .2/(n-2)$)

The second issue is valuation. At face value, wealth items reported in the survey are similar to those in the tax records: primary and secondary housing, business assets, real estate properties (e.g., industrial buildings, land, offices, warehouses, parking lots, hotels and lodgings), livestock, vehicles (e.g., motorcycles, private vehicles, boats, planes), inventories, financial assets (e.g., savings accounts, mutual

investment funds, shares, swaps), shares and contributions, and voluntary pension contributions are all included in the survey. None of these items are top-coded. However, the survey asks respondents to self-assess their wealth at "market" values. The questionnaire reads as follows: "*If you wanted to sell this asset, what would be the minimum price at which you would sell it?*" Survey respondents are encouraged to use bank account statements to answer questions regarding debts. Nevertheless, it is clear that values reported by survey respondents are not systematically the same as values reported in tax records.

The direction of the bias of wealth items in the survey relative to tax records could go in either direction. On the one hand, survey respondents are more likely to self-report their assets at market values, which are larger than cadastral values. Moreover, given incentives for underreporting wealth in tax records, survey respondents are also likely to overstate their wealth in surveys compared to what they would report to the tax authority. On the other hand, wealthy individuals with financial assets poorly covered in the survey questionnaire will underreport their wealth. Because we focus on potential non-filers in the survey to capture wealth at the bottom of the distribution, it is more likely that our estimates of wealth for this population suffers from upward bias, thus artificially deflating top wealth shares.

The third and last issue is the representativeness of the survey. IEFIC is representative of households in Bogota, Medellin, and Cali that have access to financial services. It is therefore *not* representative of all Colombian adults.[88] Because urban household with access to financial services are likely to be wealthier than other households, this again implies that our estimates of wealth for non-filers will likely suffer from upward bias. Given are wealth denominator will be biased upward, our top wealth shares will be biased downwards. We thus interpret our top wealth shares as conservative estimates of wealth inequality in Colombia.

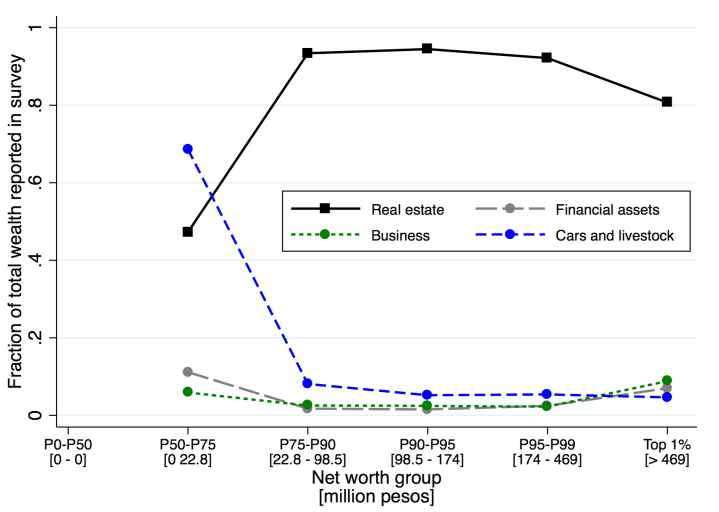
In the survey data, we find that the wealthiest 10 percent of individuals own 71 percent of all wealth reported in the survey. This is very close to the equivalent top share of 75.3 percent in the United States, based on data from the Survey of Consumer Finances from 2013 (Saez and Zucman, 2016). Moreover, the wealthiest 1 percent in Colombia own 25.8 percent of total wealth according to IEFIC survey, which is significantly less than the United States' 35.8 percent estimate for households using the Survey of Consumer Finances. Figure E.1 plots wealth decomposition by net wealth groups. The figure shows that 50 percent of individuals have 0 net wealth. This is not surprising, given recent evidence that one-quarter of households in OECD countries have negative net wealth (Balestra and Tonkin, 2018). Individuals in the third quartile (P50–P75) have less than 22.8 million pesos, that is, less than USD 7,641. For these individuals, most of their wealth comes from vehicle and livestock ownership. For middle and upper-middle class individuals (e.g., P75–P95), real estate represents more than 90 percent of wealth. Finally, for individuals in the top 1 percent, the share of wealth belonging to real estate falls to 80.7 percent while the shares of financial and business assets increase. However, it is clear from Figure E.1 that financial assets are underreported in the survey data, making this less than ideal to study wealth inequality at the top. Because our use of survey data is to focus on wealth at the bottom for non-filers, this issue is less of a concern for our purposes.

We impute average net worth for non-filers using net worth of surveyed units with gross wealth below the filing threshold of 133,889,000 pesos. For this group, average net worth is 12,763,333 pesos (USD 4,277). At baseline, non-filers have one-third of total wealth.

Forbes: According to the 2018 Forbes rich list, the fortune of Colombia's richest man alive, Luis Carlos Sarmiento, was worth US $12.1 billion. Sarmiento ranked 123 on the list of the world's wealthiest individuals, and was followed by the Santo Domingo dynasty (Alejandro and Andrés ranked 449 with US $4.3 billion; Julio Mario III ranked 1103 with US $2.2 billion.), Jaime Gilinski Bacal (ranked 606 with US $3.7 billion), and Carlos Ardila Lulle (ranked 859 with US $2.8 billion).

[88] In fact, the sum of survey weights add up to 6,719,291, i.e., 21 percent of all tax units.

Figure E.1: Wealth Decomposition in Survey Data



Notes: This figure plots wealth decomposition by asset types across wealth groups using household survey data from 2017. Individuals aged 20 and above are included. For assets reported at the family level (real estate, business assets, vehicles, and livestock—and the outstanding debt of each asset), we make the following assumptions about the intra-family distribution. For family size $n = 1$, we attribute 100% of assets and debts to head of household. For family size $n = 2$ with head of household and spouse/partner, we split assets and debts equally. For family size $n \geq 2$ with head of household but no spouse/partner, we attribute 80% to head of household and the remaining 20% split equally across other members. Finally, for family size $n > 2$ with head of household and spouse/partner, we attribute 40% to each spouse/partner and the remaining 20% split equally across other members. Individuals are ranked by their net worth. *Sources:* Authors' calculations using 2017 IEFIC from DANE.

Table E.1: Net wealth groups in survey data

Fractile	Min (million pesos)	Mean (million pesos)	Mean P_0–P_1 (million pesos)	Share of total wealth (%)	Sum of survey weights
(1)	(2)	(3)	(4)	(5)	(6)
P50	0.0	71.39	6.35	100	6,719,291
P75	22.8	136.43	52.00	95.6	6,719,291
P90	98.5	263.10	130.21	73.7	6,719,291
P95	174.0	396.01	264.70	55.5	6,719,291
P99	469.0	923.38	923.38	25.8	6,719,291

Notes: This table plots mean net worth across wealth groups, as well as the minimum wealth needed to belong to each group, using household survey data from Colombia. Individuals aged 20 and above are included. For assets reported at the family level (real estate, business assets, vehicles, and livestock—and the outstanding debt of each asset), we make the following assumptions about the intra-family distribution. For family size $n = 1$, we attribute 100% of assets and debts to head of household. For family size $n = 2$ with head of household and spouse/partner, we split assets and debts equally. For family size $n \geq 2$ with head of household but no spouse/partner, we attribute 80% to head of household and the remaining 20% split equally across other members. Finally, for family size $n > 2$ with head of household and spouse/partner, we attribute 40% to each spouse/partner and the remaining 20% split equally across other members. Individuals are ranked by their net worth. *Sources:* Authors' calculations using 2017 IEFIC from DANE.

E.2 Cadastral-to-Market Values

For most middle-class individuals, real estate represents the largest share of gross assets (Balestra and Tonkin, 2018). Yet in Colombia, real estate is reported in tax records at cadastral (not market) values and, as in other developing countries, cadasters are outdated. This implies that cadastral values represent a fraction of market values today. As a result, our measure of real estate in the tax records must be adjusted to obtain wealth at market values W^*:

$$W^* = [K \cdot (1 - \alpha) + \alpha \cdot K \cdot \delta] - L \tag{18}$$

where K represents gross wealth as reported in tax records, $\alpha \in [0, 1]$ represents real estate as a fraction of K, $\delta \in [0, 1]$ is the cadastral-to-market value conversion factor, and L represents liabilities. Equation (18) thus shows measuring W^* depends critically on accurate measures of α and δ. We discuss how we estimate each parameter next.

Unfortunately, since 2004, wealth is not decomposed by type of assets for most taxpayers, so it is impossible to know what share of assets α should be inflated to reflect market values. To deal with this issue, we obtain α using data from taxpayers required to keep accounting books, which are mostly business owners. In FY 2016, these taxpayers represented 8% of all taxpayers. The tax return used by these taxpayers (income tax form #110) has a "fixed assets" category that includes real estate, land ownership, vehicles, and boats. We assume that the share of fixed assets is similar between individuals required and not required to keep accounting books, and impute estimated shares for all taxpayers. We estimate these shares separately by top wealth groups for FY 2016: $\alpha_{P0-P99} = 0.6, \alpha_{P99-P99.9} = 0.55, \alpha_{P99.9-P99.99} = 0.4$, and $\alpha_{P99.99} = 0.25$.

To inflate cadastral values to reflect market values, we account for the fact that Bogota has done a better job updating its cadasters than other cities in Colombia. We assume cadastral values represent 70 percent of market values in Bogota, and 60 percent in all other cities (hence $\delta = 1/.7 = 1.43$ in Bogota and $\delta = 1/.6 = 1.67$ elsewhere). Unfortunately, there is time and spatial variation in how outdates cadastral values are in Colombia. Legislation has been introduced to force regular updating of cadastres, such that cadastral values be at least 40 (Law 223/1995) or 60 (Law 1450/2011) percent of market values. However, compliance with this norm varies substantially across neighborhoods and time. We ignore these issues and assume δ is the same across individuals within a given city.

E.3 Unreported Offshore Wealth

As discussed in Sections 4 and 5, offshore wealth may be underreported in tax records for the purposes of reducing the tax burden. To the extent that wealthier individuals are disproportionately likely to hold foreign assets, our measures of top wealth shares will underestimate inequality if we do not account for unobserved offshore wealth. Indeed, while the 2015–2017 voluntary disclosure program incentivized some taxpayers to disclose (at least part of) their assets hidden in tax havens, it is likely that other taxpayers choose to continue evading and remain keeping their fortunes concealed from the tax authority. In this section, we place bounds on the total amount of offshore wealth that could potentially remain hidden abroad, and illustrate their implications for estimates of wealth inequality in Colombia.

We begin from the macro estimate for total offshore wealth by Colombians from Alstadsater et al. (2018b). Using fiduciary deposits data from the Central Bank of Switzerland in 2003–2004 as well as cross-border bank deposits data from offshore financial centers in 2007, Alstadsater et al. (2018b) estimate that total offshore wealth by Colombians is 9.0% of GDP. This places Colombia just below the world average of 9.8 percent of GDP kept offshore. How much of this is reported to the tax agency?

In FY 2017, total offshore wealth reported by individuals in tax return #160 for foreign assets amounts to 2.8% of GDP. That is, less than one-third of the baseline measure of offshore wealth is reported to the tax authorities. Half of this amount (1.4% of GDP) was disclosed thanks to the voluntary

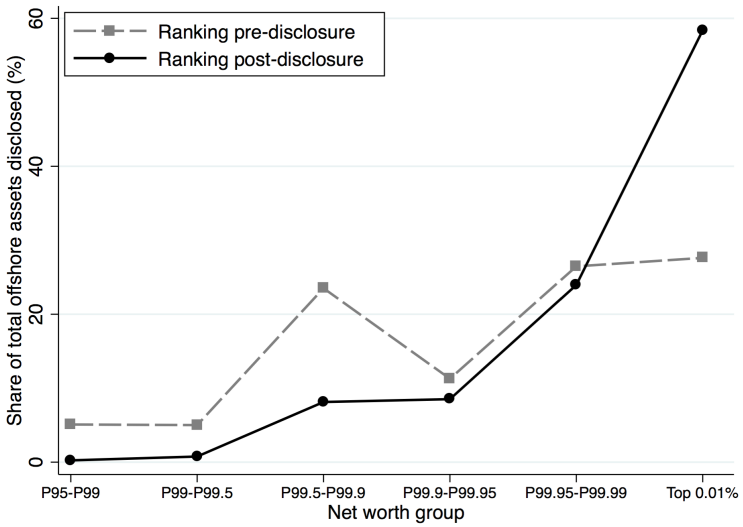
disclosure program.[89] This means 6.2% of GDP remains concealed offshore. Who holds this offshore wealth?

We assume that the distribution of unreported offshore wealth is similar to the distribution of offshore wealth disclosures made during the 2015–2017 voluntary disclosure program by each net wealth group. Figure E.2 shows the total amount of offshore assets disclosed by wealth group, ranking individuals by their pre- and post-disclosure wealth. We use the black solid line as our estimate of unreported wealth for each wealth group: 58% if P99.99; 24% if P99.95–P99.99, 9% if P99.9–P99.95, 8% if P99.5–P99.9, 0.8% if P99–P99.5, 0.2% if P95–P99, and 0% if P0–P95. We then re-rank individuals according to this augmented measure of wealth and re-compute total wealth accordingly.

Note, however, that the estimates from (Alstadsater et al., 2018b) are based mostly from 2007, a year that predates high wealth taxation in Colombia. If individuals respond to higher wealth taxes by obscuring their wealth offshore, as suggested in Section 4, this implies that our baseline measure of unreported offshore wealth today may be underestimated. How much could overall offshore wealth have increased due to higher wealth taxes in Colombia?

We use the Panama Papers microdata to estimate increases in offshore wealth between 2007 and 2015 due to high wealth taxation in Colombia. The cumulative number of entities ever incorporated through Mossack Fonseca was 400 in 2007 and 1778 in 2015. This represents a 345 percent increase. If the increase in the use of offshore structures also reflects rises in assets held offshore, then offshore wealth today could reach 40 percent of GDP ($40\% = (1 + 3.45) \times 9\%$) and 37.25 percent of GDP would be unreported to the tax agency. We use this estimate as an upper bound on the total amount of offshore wealth that is unreported to the tax authority today.

Figure E.2: Distribution of Hidden Offshore Assets in 2015–2017, by Pre/Post-Disclosure Top Wealth Group

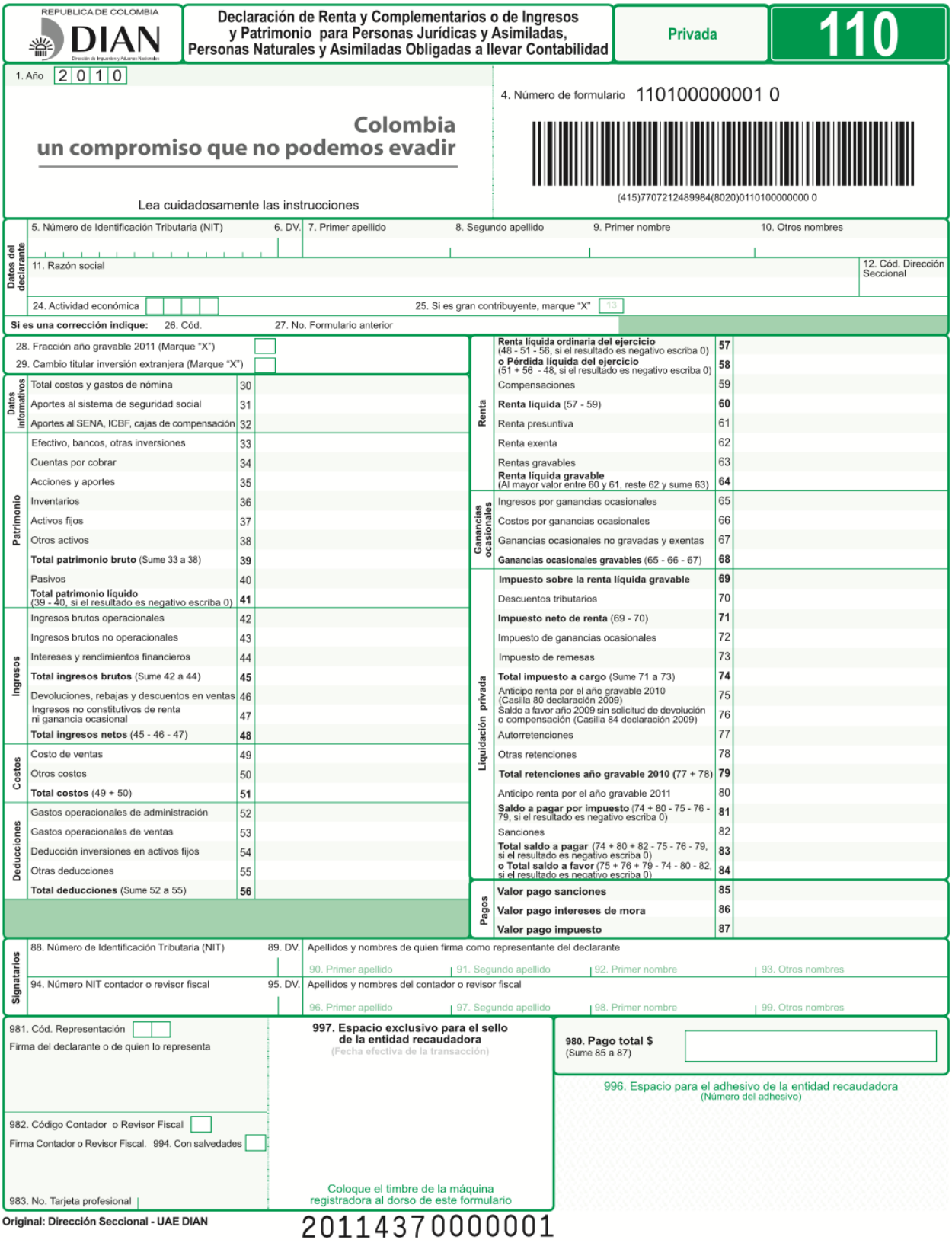


Notes: This figure shows the fraction of total disclosures of hidden offshore assets during the 2015–2017 voluntary disclosure program for each wealth group, ranking by pre- and post-disclosure net worth. The figure shows that the volume of offshore assets disclosed in 2015–2017 is increasing in net worth. Tax filers in the wealthiest 0.01 percent post-disclosure disclosed 58 percent of all disclosures. The sample is restricted to 1,633,383 individuals filing the income tax return in FY 2013 (they may or not file a wealth tax return in 2015–2017). This sample includes 11,210 disclosers and 1,085 taxpayers in the Panama Papers (of which 434 disclosed wealth). *Sources:* Authors' calculations using administrative tax microdata from DIAN.

[89] Total disclosures of hidden foreign and domestic assets and fake liabilities during the 2015–2017 voluntary disclosure program represent 1.73% GDP.

F Income and Wealth Tax Returns in Colombia

Figure F.1: Income Tax Form 110 for Tax Filers Required to Keep Records (2010)



REPUBLICA DE COLOMBIA
DIAN
Dirección de Impuestos y Aduanas Nacionales

Declaración de Renta y Complementarios o de Ingresos y Patrimonio para Personas Jurídicas y Asimiladas, Personas Naturales y Asimiladas Obligadas a llevar Contabilidad

Privada

110

1. Año 2010

4. Número de formulario 110100000001 0

(415)7707212489984(8020)0110100000000 0

Colombia
un compromiso que no podemos evadir

Lea cuidadosamente las instrucciones

Datos del declarante

5. Número de Identificación Tributaria (NIT) | 6. DV. | 7. Primer apellido | 8. Segundo apellido | 9. Primer nombre | 10. Otros nombres

11. Razón social | 12. Cód. Dirección Seccional

24. Actividad económica | 25. Si es gran contribuyente, marque "X" 13

Si es una corrección indique: 26. Cód. | 27. No. Formulario anterior

28. Fracción año gravable 2011 (Marque "X")

29. Cambio titular inversión extranjera (Marque "X")

Datos informativos

Total costos y gastos de nómina	30	
Aportes al sistema de seguridad social	31	
Aportes al SENA, ICBF, cajas de compensación	32	

Patrimonio

Efectivo, bancos, otras inversiones	33	
Cuentas por cobrar	34	
Acciones y aportes	35	
Inventarios	36	
Activos fijos	37	
Otros activos	38	
Total patrimonio bruto (Sume 33 a 38)	39	
Pasivos	40	
Total patrimonio líquido (39 - 40, si el resultado es negativo escriba 0)	41	

Ingresos

Ingresos brutos operacionales	42	
Ingresos brutos no operacionales	43	
Intereses y rendimientos financieros	44	
Total ingresos brutos (Sume 42 a 44)	45	
Devoluciones, rebajas y descuentos en ventas	46	
Ingresos no constitutivos de renta ni ganancia ocasional	47	
Total ingresos netos (45 - 46 - 47)	48	

Costos

Costo de ventas	49	
Otros costos	50	
Total costos (49 + 50)	51	

Deducciones

Gastos operacionales de administración	52	
Gastos operacionales de ventas	53	
Deducción inversiones en activos fijos	54	
Otras deducciones	55	
Total deducciones (Sume 52 a 55)	56	

Renta

Renta líquida ordinaria del ejercicio (48 - 51 - 56, si el resultado es negativo escriba 0)	57	
o Pérdida líquida del ejercicio (51 + 56 - 48, si el resultado es negativo escriba 0)	58	
Compensaciones	59	
Renta líquida (57 - 59)	60	
Renta presuntiva	61	
Renta exenta	62	
Rentas gravables	63	
Renta líquida gravable (Al mayor valor entre 60 y 61, reste 62 y sume 63)	64	

Ganancias ocasionales

Ingresos por ganancias ocasionales	65	
Costos por ganancias ocasionales	66	
Ganancias ocasionales no gravadas y exentas	67	
Ganancias ocasionales gravables (65 - 66 - 67)	68	

Liquidación privada

Impuesto sobre la renta líquida gravable	69	
Descuentos tributarios	70	
Impuesto neto de renta (69 - 70)	71	
Impuesto de ganancias ocasionales	72	
Impuesto de remesas	73	
Total impuesto a cargo (Sume 71 a 73)	74	
Anticipo renta por el año gravable 2010 (Casilla 80 declaración 2009)	75	
Saldo a favor año 2009 sin solicitud de devolución o compensación (Casilla 84 declaración 2009)	76	
Autorretenciones	77	
Otras retenciones	78	
Total retenciones año gravable 2010 (77 + 78)	79	
Anticipo renta por el año gravable 2011	80	
Saldo a pagar por impuesto (74 + 80 - 75 - 76 - 79, si el resultado es negativo escriba 0)	81	
Sanciones	82	
Total saldo a pagar (74 + 80 + 82 - 75 - 76 - 79, si el resultado es negativo escriba 0)	83	
o Total saldo a favor (75 + 76 + 79 - 74 - 80 - 82, si el resultado es negativo escriba 0)	84	

Pagos

Valor pago sanciones	85	
Valor pago intereses de mora	86	
Valor pago impuesto	87	

Signatarios

88. Número de Identificación Tributaria (NIT) | 89. DV. | Apellidos y nombres de quien firma como representante del declarante
90. Primer apellido | 91. Segundo apellido | 92. Primer nombre | 93. Otros nombres

94. Número NIT contador o revisor fiscal | 95. DV. | Apellidos y nombres del contador o revisor fiscal
96. Primer apellido | 97. Segundo apellido | 98. Primer nombre | 99. Otros nombres

981. Cód. Representación

Firma del declarante o de quien lo representa

982. Código Contador o Revisor Fiscal

Firma Contador o Revisor Fiscal. 994. Con salvedades

983. No. Tarjeta profesional

997. Espacio exclusivo para el sello de la entidad recaudadora
(Fecha efectiva de la transacción)

Coloque el timbre de la máquina registradora al dorso de este formulario

980. Pago total $
(Sume 85 a 87)

996. Espacio para el adhesivo de la entidad recaudadora
(Número del adhesivo)

Original: Dirección Seccional - UAE DIAN

20114370000001

Figure F.2: Income Tax Form 210 for Tax Filers Not Required to Keep Records (2010)



REPUBLICA DE COLOMBIA
DIAN
Dirección de Impuestos y Aduanas Nacionales

Declaración de Renta y Complementarios Personas Naturales y Asimiladas No Obligadas a llevar Contabilidad

Privada

210

1. Año 2010

4. Número de formulario 210100000001 0

(415)7707212489984(8020)02101 00000000 0

Colombia
un compromiso que no podemos evadir

Lea cuidadosamente las instrucciones

Datos del declarante

5. Número de Identificación Tributaria (NIT) | 6. DV. | 7. Primer apellido | 8. Segundo apellido | 9. Primer nombre | 10. Otros nombres | 12. Cód. Dirección Seccional

24. Actividad económica

Si es una corrección indique: 25. Cód. | 26. No. Formulario anterior

27. Fracción año gravable 2011 (Marque "X") | 28. Cambio titular inversión extranjera (Marque "X")

Datos informativos	Total costos y gastos de nómina	29	Ganancias ocasionales	Ingresos por ganancias ocasionales	53
	Aportes al sistema de seguridad social	30		Costos por ganancias ocasionales	54
	Aportes al SENA, ICBF, cajas de compensación	31		Ganancias ocasionales no gravadas y exentas	55
Patrimonio	Total patrimonio bruto	32		**Ganancias ocasionales gravables** (53 - 54 - 55)	56
	Deudas	33	Liquidación privada	**Impuesto sobre la renta líquida gravable**	57
	Total patrimonio líquido (32 - 33, si el resultado es negativo escriba 0)	34		Descuentos tributarios	58
Ingresos	Salarios y demás pagos laborales	35		**Impuesto neto de renta** (57 - 58)	59
	Honorarios, comisiones y servicios	36		Impuesto de ganancias ocasionales	60
	Intereses y rendimientos financieros	37		**Total impuesto a cargo** (Sume 59 a 60)	61
	Otros ingresos (Arrendamientos, etc.)	38		Anticipo renta por el año gravable 2010 (Casilla 65 declaración 2009)	62
	Total ingresos recibidos por concepto de renta (Sume 35 a 38)	39		Saldo a favor año 2009 sin solicitud de devolución o compensación (Casilla 69 declaración 2009)	63
	Ingresos no constitutivos de renta	40		Total retenciones año gravable 2010	64
	Total ingresos netos (39 - 40)	41		Anticipo renta por el año gravable 2011	65
Costos y deducciones	Deducción inversión en activos fijos	42		**Saldo a pagar por impuesto** (61 + 65 - 62 - 63 - 64, si el resultado es negativo escriba 0)	66
	Otros costos y deducciones	43		Sanciones	67
	Total costos y deducciones (42 + 43)	44		**Total saldo a pagar** (61 + 65 + 67 - 64 - 63 - 62, si el resultado es negativo escriba 0)	68
Renta	**Renta líquida ordinaria del ejercicio** (41 - 44, si el resultado es negativo escriba 0)	45		**o Total saldo a favor** (62 + 63 + 64 - 61 - 65 - 67, si el resultado es negativo escriba 0)	69
	o Pérdida líquida del ejercicio (44 - 41, si el resultado es negativo escriba 0)	46	Pagos	**Valor pago sanciones**	70
	Compensaciones (Por exceso de renta presuntiva)	47		**Valor pago intereses de mora**	71
	Renta líquida (45 - 47)	48		**Valor pago impuesto**	72
	Renta presuntiva	49			
	Renta exenta	50			
	Rentas gravables	51			
	Renta líquida gravable (Al mayor valor entre 48 y 49, reste 50 y sume 51, si el resultado es negativo escriba 0)	52			

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Signatario

73. Número de Identificación Tributaria (NIT) | 74. D.V. | Apellidos y nombres de quien firma como representante del declarante | 75. Primer apellido | 76. Segundo apellido | 77. Primer nombre | 78. Otros nombres

981. Cód. Representación

Firma del declarante o de quien lo representa

997. Espacio exclusivo para el sello de la entidad recaudadora
(Fecha efectiva de la transacción)

Coloque el timbre de la máquina registradora al dorso de este formulario

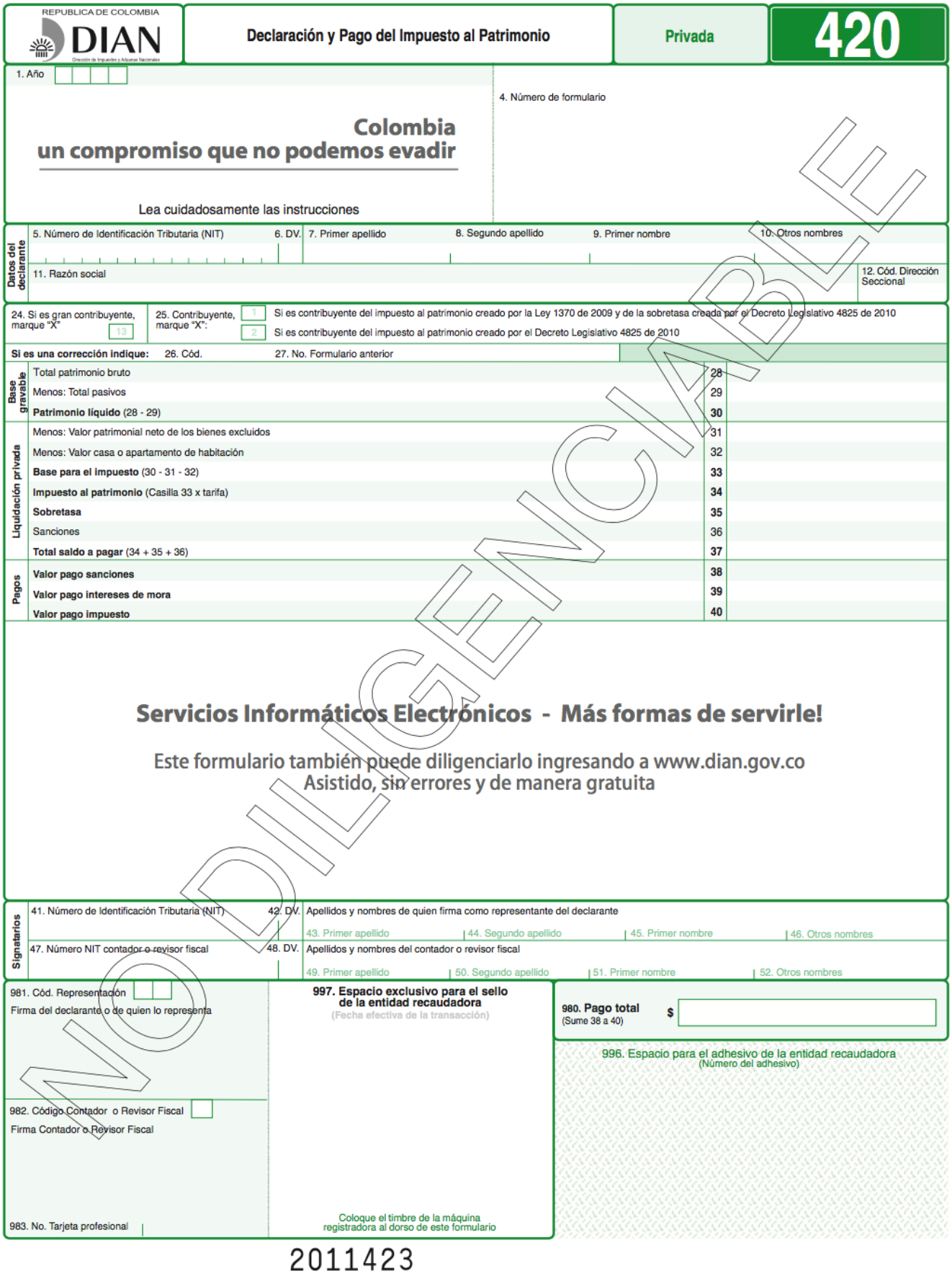
980. Pago total $
(Sume 70 a 72)

996. Espacio para el adhesivo de la entidad recaudadora
(Número del adhesivo)

Original: Dirección seccional - UAE DIAN

20114380000001

Figure F.3: Wealth Tax Form 420 (2004–2011)



REPUBLICA DE COLOMBIA

DIAN

Dirección de Impuestos y Aduanas Nacionales

Declaración y Pago del Impuesto al Patrimonio

Privada

420

1. Año

4. Número de formulario

Colombia
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Lea cuidadosamente las instrucciones

Datos del declarante

5. Número de Identificación Tributaria (NIT) | 6. DV. | 7. Primer apellido | 8. Segundo apellido | 9. Primer nombre | 10. Otros nombres

11. Razón social | 12. Cód. Dirección Seccional

24. Si es gran contribuyente, marque "X" 13

25. Contribuyente, marque "X":
1 Si es contribuyente del impuesto al patrimonio creado por la Ley 1370 de 2009 y de la sobretasa creada por el Decreto Legislativo 4825 de 2010
2 Si es contribuyente del impuesto al patrimonio creado por el Decreto Legislativo 4825 de 2010

Si es una corrección indique: 26. Cód. | 27. No. Formulario anterior

Base gravable	Total patrimonio bruto	28	
	Menos: Total pasivos	29	
	Patrimonio líquido (28 - 29)	30	
Liquidación privada	Menos: Valor patrimonial neto de los bienes excluidos	31	
	Menos: Valor casa o apartamento de habitación	32	
	Base para el impuesto (30 - 31 - 32)	33	
	Impuesto al patrimonio (Casilla 33 x tarifa)	34	
	Sobretasa	35	
	Sanciones	36	
	Total saldo a pagar (34 + 35 + 36)	37	
Pagos	**Valor pago sanciones**	38	
	Valor pago intereses de mora	39	
	Valor pago impuesto	40	

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Signatarios

41. Número de Identificación Tributaria (NIT) | 42. DV. | Apellidos y nombres de quien firma como representante del declarante
43. Primer apellido | 44. Segundo apellido | 45. Primer nombre | 46. Otros nombres

47. Número NIT contador o revisor fiscal | 48. DV. | Apellidos y nombres del contador o revisor fiscal
49. Primer apellido | 50. Segundo apellido | 51. Primer nombre | 52. Otros nombres

981. Cód. Representación

Firma del declarante o de quien lo representa

982. Código Contador o Revisor Fiscal

Firma Contador o Revisor Fiscal

983. No. Tarjeta profesional

997. Espacio exclusivo para el sello de la entidad recaudadora
(Fecha efectiva de la transacción)

Coloque el timbre de la máquina registradora al dorso de este formulario

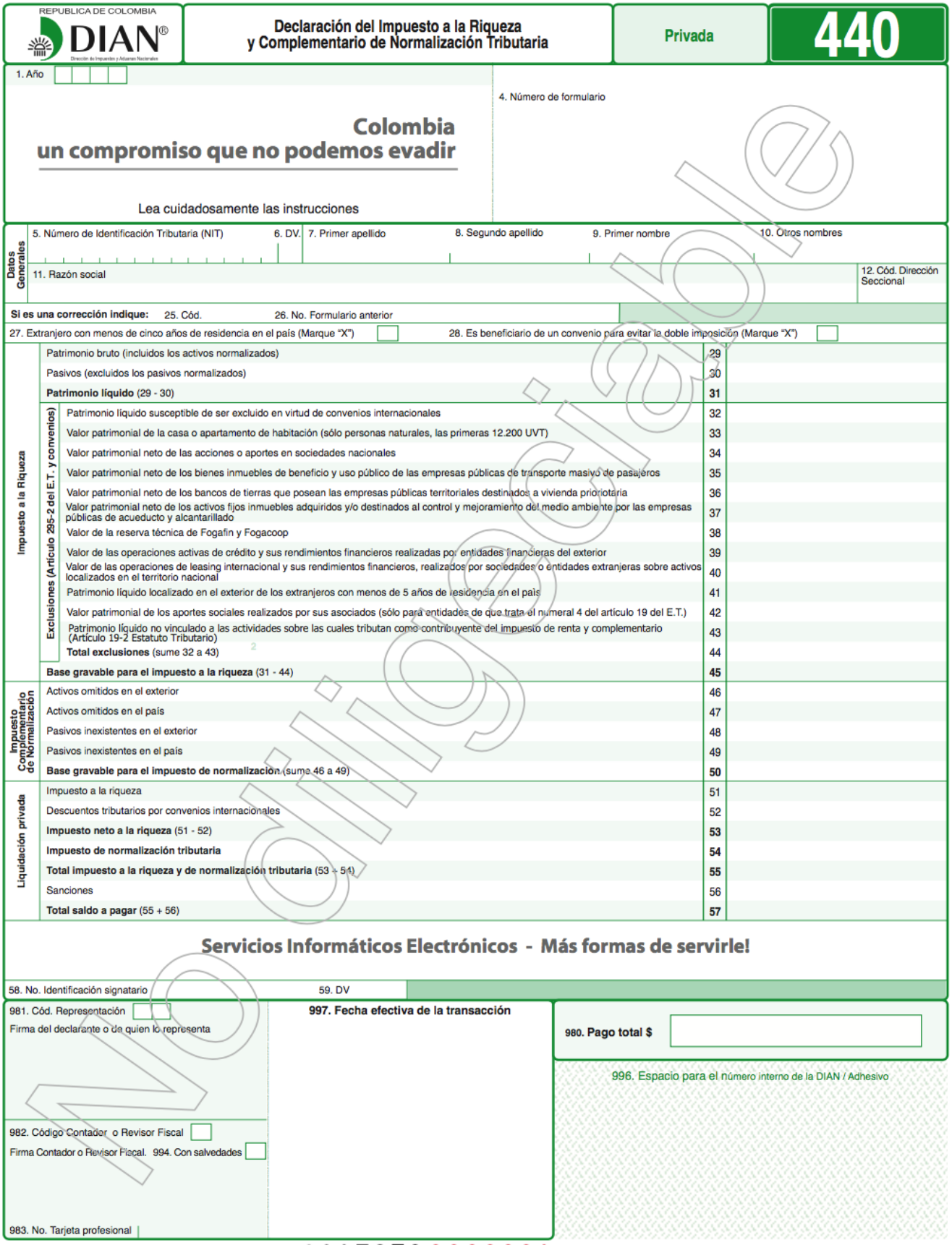
980. Pago total
(Sume 38 a 40) $

996. Espacio para el adhesivo de la entidad recaudadora
(Número del adhesivo)

2011423

NO DILIGENCIABLE

Figure F.4: Wealth Tax Form 440 (2015–2018)



REPUBLICA DE COLOMBIA

DIAN®

Dirección de Impuestos y Aduanas Nacionales

Declaración del Impuesto a la Riqueza y Complementario de Normalización Tributaria

Privada

440

1. Año

4. Número de formulario

Colombia un compromiso que no podemos evadir

Lea cuidadosamente las instrucciones

Datos Generales

5. Número de Identificación Tributaria (NIT) | 6. DV. | 7. Primer apellido | 8. Segundo apellido | 9. Primer nombre | 10. Otros nombres

11. Razón social | 12. Cód. Dirección Seccional

Si es una corrección indique: 25. Cód. | 26. No. Formulario anterior

27. Extranjero con menos de cinco años de residencia en el país (Marque "X") | 28. Es beneficiario de un convenio para evitar la doble imposición (Marque "X")

Impuesto a la Riqueza

Patrimonio bruto (incluidos los activos normalizados)	29	
Pasivos (excluidos los pasivos normalizados)	30	
Patrimonio líquido (29 - 30)	**31**	
Exclusiones (Artículo 295-2 del E.T. y convenios) Patrimonio líquido susceptible de ser excluido en virtud de convenios internacionales	32	
Valor patrimonial de la casa o apartamento de habitación (sólo personas naturales, las primeras 12.200 UVT)	33	
Valor patrimonial neto de las acciones o aportes en sociedades nacionales	34	
Valor patrimonial neto de los bienes inmuebles de beneficio y uso público de las empresas públicas de transporte masivo de pasajeros	35	
Valor patrimonial neto de los bancos de tierras que posean las empresas públicas territoriales destinados a vivienda prioritaria	36	
Valor patrimonial neto de los activos fijos inmuebles adquiridos y/o destinados al control y mejoramiento del medio ambiente por las empresas públicas de acueducto y alcantarillado	37	
Valor de la reserva técnica de Fogafin y Fogacoop	38	
Valor de las operaciones activas de crédito y sus rendimientos financieros realizadas por entidades financieras del exterior	39	
Valor de las operaciones de leasing internacional y sus rendimientos financieros, realizados por sociedades o entidades extranjeras sobre activos localizados en el territorio nacional	40	
Patrimonio líquido localizado en el exterior de los extranjeros con menos de 5 años de residencia en el país	41	
Valor patrimonial de los aportes sociales realizados por sus asociados (sólo para entidades de que trata el numeral 4 del artículo 19 del E.T.)	42	
Patrimonio líquido no vinculado a las actividades sobre las cuales tributan como contribuyente del impuesto de renta y complementario (Artículo 19-2 Estatuto Tributario)	43	
Total exclusiones (sume 32 a 43)	44	
Base gravable para el impuesto a la riqueza (31 - 44)	**45**	

Impuesto Complementario de Normalización

Activos omitidos en el exterior	46	
Activos omitidos en el país	47	
Pasivos inexistentes en el exterior	48	
Pasivos inexistentes en el país	49	
Base gravable para el impuesto de normalización (sume 46 a 49)	**50**	

Liquidación privada

Impuesto a la riqueza	51	
Descuentos tributarios por convenios internacionales	52	
Impuesto neto a la riqueza (51 - 52)	**53**	
Impuesto de normalización tributaria	**54**	
Total impuesto a la riqueza y de normalización tributaria (53 + 54)	**55**	
Sanciones	56	
Total saldo a pagar (55 + 56)	**57**	

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58. No. Identificación signatario | 59. DV

981. Cód. Representación

Firma del declarante o de quien lo representa

997. Fecha efectiva de la transacción

980. Pago total $

996. Espacio para el número interno de la DIAN / Adhesivo

982. Código Contador o Revisor Fiscal

Firma Contador o Revisor Fiscal. 994. Con salvedades

983. No. Tarjeta profesional

No oficial