Third-Party Audits and Firms' Responses: Evidence for Ecuador

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Abstract

We study the trade-offs of delegating tax audit responsibilities to private agents in the context of a developing country. We ask if governments can collaborate with third-party auditors to increase tax compliance. Large firms in Ecuador are required to have third-party audits of their yearly balance sheets and income statements, and auditors provide a tax compliance report of the audited firms to the tax authorities. We exploit a reform that significantly reduced the asset threshold determining the statutory audit obligation and first document a large bunching response. Second, we provide suggestive evidence that bunching firms reduce their assets through reductions in the debts of their clients (accounts receivable) and in the short-term debts with their suppliers (accounts payable). We refer to this response as a *cash flow strategy* rather than classifying it as a *real* or *reporting* response. Third, we use a donut-hole RDD design to explore the effects of the audits on the audited firms. Our preliminary results indicate that firms reduce their reported costs and expenses by 24% and compensate for this with a reduction in reported revenues of 23%.

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1 Introduction

A central discussion of policymakers in developing countries is how to increase tax collection. An increase in tax revenue is key to implementing redistributive policies while reducing the dependence on more volatile sources of income such as the exploitation of natural resources and foreign aid. Tax audits are instruments to increase tax collection by detecting and deterring tax evasion. However, governments are resource-constrained; thus, expanding audits to a large group of taxpayers is not feasible.

This paper explores if governments can collaborate with third-party auditors to expand monitoring to more taxpayers while increasing tax compliance in the context of a developing country. The value of the audit relies on an independent assessment of the firm. There is, however, a possible conflict of interest on the auditor's side since they are hired by the audited firm. One must acknowledge that auditors might be incentivized to protect the interests of the hiring firm rather than give an accurate picture of its performance (Ronen 2010). The state capacity of the government is relevant when considering this problem. Audits are more likely to have positive results on middling state-capacity environments (Cuneo et al. 2023), where there is a balance between the auditor's independence problem and the bad behaviors that the auditor can detect.[1] Consistent with these findings, there is a scope for third-party auditors to improve tax compliance, especially in middle-income countries.

This paper studies the reporting behavior of firms in Ecuador that are required to undergo a third-party audit of their balance sheets, income statements, and corporate income tax returns.[2] In particular, we exploit a policy that reduced the asset threshold determining the statutory audit obligation from USD 1 million to USD 500 thousand for the audits of the accounting records starting in the fiscal year of 2017.[3] Auditors prepare a report with their certification of the firm's financial statements, and crucially for our analysis, they also prepare a tax compliance report submitted to the tax authority.

The Ecuadorian setting provides several advantages for our analysis. First, corporate tax evasion has been previously documented by Carrillo et al. (2017) and Carrillo et al. (2022). The former paper finds that if the tax authority informs firms about

[1] Cuneo et al. (2023) study the value of internal government audits as a function of state capacity. However, as the authors mention, their conclusions can be extended to third-party audits.

[2] Sole-proprietorship firms are excluded from this obligation.

[3] Ecuador is a dollarized economy since 2000 and the fiscal year is the same as the calendar year.

differences between reporting and real tax liability, they respond by adjusting their costs and revenues. This evidence shapes our expectations regarding the margins that financial audits can correct. Second, the reform in 2016 dramatically reduced the policy threshold from USD 1,000,00 to USD 500,000 and increased the yearly number of audited firms by around 75%.[4] Third, Ecuador has a high-quality administrative dataset for income statements and balance sheets at the firm level that can be linked to the registry of firms with a rich set of characteristics and to an auditor-audited firm dataset to explore the heterogeneity of the effects.

Our empirical analysis relies on three administrative datasets processed by the Superintendency of Companies, a public institution responsible for supervising Ecuadorian firms. First, we use information from balance sheets, income statements, and corporate income tax returns of the universe of formal firms in Ecuador. This dataset has a rich set of firm-level yearly variables, including assets, liabilities, equity, income, costs, expenses, and tax liability. Second, we use the firm registries from the tax authority and Superintendency of Companies that include characteristics of the firms (e.g. location, industry, etc.). Third, we use a matched auditor-audited firm dataset to determine the effectively audited firms. We match firms between the datasets through a unique ID and obtain a panel of around 78,000 formal firms per year spanning 2013 to 2019.

We document empirical patterns on the effects of third-party audits by exploiting the discontinuity in the audit obligation imposed by the asset threshold in a donut-hole regression discontinuity design (RDD) as in Benzarti and Harju (2021) and Bachas and Soto (2021). Firms can manipulate the policy threshold by reducing their assets to avoid the audit requirement. As a starting point, we use standard bunching techniques (Saez 2010; Kleven and Waseem 2013) to determine the manipulated area corresponding to the excess and missing mass regions in the bunching approach. We observe a bunching of firms below the threshold that on average reduce their assets by USD 114,000. We also provide suggestive evidence on how firms reduce their assets to elude the audit obligation. Firms adjust their balance statements through variations in accounts receivable (debts of the clients with the firms) and accounts payable (short-term debts of the firm with the suppliers). This finding suggests firms use a *cash flow strategy* rather than engaging in *real responses*.[5]

[4]Due to the change in the policy threshold, around 14,000 firms were audited each year (17% of the total number of firms), this is an increase of 6,000 firms.

[5]A real response implies that firms change their true size and a reporting response is achieved through evasion or avoidance. However, our bunching is sharp, suggesting that the response is not

Next, we exclude the manipulated region defined through the bunching approach and estimate the size of the discontinuity on outcomes of interest around the asset threshold using a donut-hole regression discontinuity design. We mainly focus on revenues and costs and expenses, the main components of the corporate income tax base. Evidence of a discontinuity in the two outcomes at the policy threshold suggests that audited firms report less costs, expenses and revenues. The discontinuity in the costs and expenses is intuitive since the auditors should correct over-reporting behaviors. In contrast, the discontinuity in revenues is puzzling because one could expect that firms under-report their revenues to lower their tax liability. However, this result is in line with the findings of Carrillo et al. (2017) and Naritomi (2019): if firms need to correct their costs and expenses, they also adjust their revenues to keep constant their tax liability. The next step of our analysis is to compute the welfare effects of this policy.

This paper contributes to a broad literature on reforms to the tax administration and the effects on compliance (e.g. Basri et al. 2021) but more specifically to the discussion of delegating tax functions to third-parties. Previous studies have analysed the enforcement value of delegating tax collection of indirect taxes to trusted buyers (Garriga and Tortarolo 2022) or credit card companies (Brockmeyer and Hernandez 2019) through withholding and of property taxes to local elites (Balán et al. 2022).

The paper also contributes to the literature analysing responses of taxpayers to tax audits. Advani et al. (2023) and DeBacker et al. (2018) study the UK and the United States and show a long-run deterrence effect of tax audits on stable income sources in the first case and when third-party reporting is available in the second case. These studies use random audits to study tax evasion; however, size-dependent tax enforcement that targets large taxpayers is a common characteristic of modern tax systems (Bachas et al. 2019 and Almunia and Lopez-Rodriguez 2018) and it is a feature of our study.

We also speak to the literature on firms' responses to the use of third parties or third-party information to increase compliance (Naritomi 2019 and Pomeranz 2015) and to size-based policies. For example, some countries have implemented thresholds for the Value Added Tax (VAT) registration and previous work has analysed responses of firms around the threshold (Liu et al. 2021, Harju et al. 2019 and Onji 2009). Almunia and Lopez-Rodriguez 2018 and Bachas et al. 2019 analyze the responses of firms when tax enforcement targets large firms and find effects on compliance and

real, as argued by Boonzaaier et al. (2019).

productivity. Most closely related, Asatryan and Peichl (2016) study three sized-based regulations requiring firms to comply with international accounting rules, declare taxes on a monthly bases and register in the VAT. They find larger responses to the accounting regulation.

A large body of literature also studies third-party audits from an accounting perspective. This research has mainly focused on the determinants of the quality of audits like audit partner tenure and auditor rotation (e.g. Gipper et al. 2017 and Lennox et al. 2014).

The remainder of the paper proceeds as follows. Sections 2 and 3 describe the institutional background and data. We then present our empirical strategy in section 4 and discuss our result in section 5. Finally, section 6 concludes.

2 Institutional Background

2.1 Statutory Audits in Ecuador

Large firms in Ecuador are required to have a third-party audit of their year-end financial statements. Auditors revise if the firm's operations are correctly reflected in the accounting records. They can ask for additional information from the firm's manager to clarify doubts related to the financial statements. Once the revision is done, the auditor prepares two reports. The first one is submitted to the Superintendency of Companies (Supercias), a government agency responsible for supervising all firms in Ecuador.[6] This report contains the certification of the firm's financial statements and the auditor's opinion following the conventions of a regular statutory financial audit. The second report is a tax compliance report submitted to the Tax Authority. It contains the auditor's opinion regarding compliance with tax obligations and a document showing discrepancies between the reported value in the tax returns and the audited value (Figure A1). The tax compliance report is mainly focused on the corporate income tax although a general revision of the currency outflows tax (*Impuesto a la Salida de Divisas*) and of the transactions of oil and mining firms is also included.[7]

[6]Sole-proprietorship firms are not required to keep accounting records, are not under the control of SuperCias and therefore, not required to audit their financial statements. The type of companies that can be created in Ecuador and are monitored by SuperCias are mixed capital companies, limited and unlimited liability companies, limited partnership companies. SuperCias also supervises local branches of foreign companies. The Superintendency of Banks regulates companies that offer financial and banking services.

[7]Auditors also reviewed the value-added tax returns in 2017.

An asset threshold set by the Supercias determines the statutory audit obligation. Firms with assets exceeding the policy threshold in one year must hire a third-party auditor to review the following year's financial statements. In 2016, Supercias reduced the asset threshold from USD 1 million to USD 500 thousand for all firms excluding those with public partners and local branches of foreign firms. The reform was proposed on September 21, 2016, and published in the official gazette on November 11, 2016.[8] Since last-year assets determine if a firm is audited, audited firms in 2016 were the ones whose assets in 2015 exceeded USD 1 million. The policy change implied that firms with assets exceeding USD 500 thousand in 2016 started to audit their financial statements since 2017. Thus, we observe an increase in the number of audited firms starting in 2017.

SuperCias authorizes qualified accountants and accounting firms to perform statutory audits. An accounting or related degree and minimum years of experience are some of the requirements that auditors have to fulfill. The authorization of SuperCias is valid for three years, and after that period, the auditor has to apply for a renovation of her status.

Firms choose their own auditors. The audit partner's tenure is limited to 5 consecutive years.[9] After the change of the audit threshold, Supercias determined 2016 as the first year of tenure.[10]

2.2 Corporate Income Tax

The corporate income tax base in Ecuador is defined as the difference between the revenues of the firm and deductible costs and expenses. The tax rate is flat, and it was equivalent to 22% till 2017 and has increased to 25% since 2018. The tax rate increases by three percentage points if the firm does not report its shareholding composition and when a shareholder with a participation above 50% is a tax resident or is protected in a tax haven, lower tax jurisdiction, or preferential tax regime.

3 Data

The empirical analysis relies on three administrative datasets. First, we use the information on balance sheets and income statements of the universe of formal firms

[8]The 2016 reform also introduced mandatory audits for public interest companies and companies that submit consolidated balances.

[9]Tenure relation is limited to 3 consecutive years for public interests entities.

[10]For more details about the audit process, see Appendix A.

in Ecuador available on the website of the SuperCias.[11] In the first four months of each year, firms are required to submit the balance sheets and income statements of the previous year to the SuperCias. These documents have been approved by the shareholders of each company. Since 2015, SuperCias have accepted the corporate income tax returns instead of the firm's income statements and balance sheets to reduce the information that firms need to prepare for government agencies. We have a rich set of firm-level yearly variables for 2013 - 2019 that includes assets, liabilities, equity, income, costs, expenses, and tax liability.[12]

Second, we use the firm registry of Supercias and tax authority. From the former, we obtain information on the organizational form of the firm, date of creation, legal representative, and location. We use the 6-digit industry code from the latter that follows the International Standard Industrial Classification (ISIC).

Third, we use a matched auditor-audited firm dataset that allows us to determine the audited firms between 2013 - 2019. We are able to match companies between the three datasets through a unique ID number.

We exclude mixed capital companies, unlimited liability companies, and local branches of foreign firms unaffected by the policy threshold we study. With this restriction, we lose around 0.8% of our dataset. The final dataset contains 545,746 firm-year observations corresponding to an average of 78,000 firms per year. Figure 1 shows the empirical assets distribution in the pre and post-policy reform periods. Before the policy change (Panel A), we do not observe a bunching behavior around the USD 500 thousand asset threshold. However, once the asset threshold determining the audit obligation changed, we notice an excess of firms below the threshold (Panel B).[13]

Table 1 presents descriptive statistics for the period before the reform. We observe an average of 72,170 firms per year for a total of 216,509 firm-year observations.

The first column of the table provides the average outcomes of the group of firms that are not audited before 2016 but would be audited under the change in the asset threshold. These firms have assets that exceed the new threshold (USD 500 thousand) and are below the old threshold (USD 1 million). We observe that these are large firms whose average outcomes are located between the 75th and 90th percentile of

[11] We do not have information on sole-proprietorship firms and firms that are not required to keep accounting records. However, they are not subject to the audit obligation.

[12] Even though it is possible to use other years after 2019, we ended our analysis before the COVID-19 pandemic affected the economic activity.

[13] Figure A3 shows a bunching behavior under the threshold of USD 1 million.

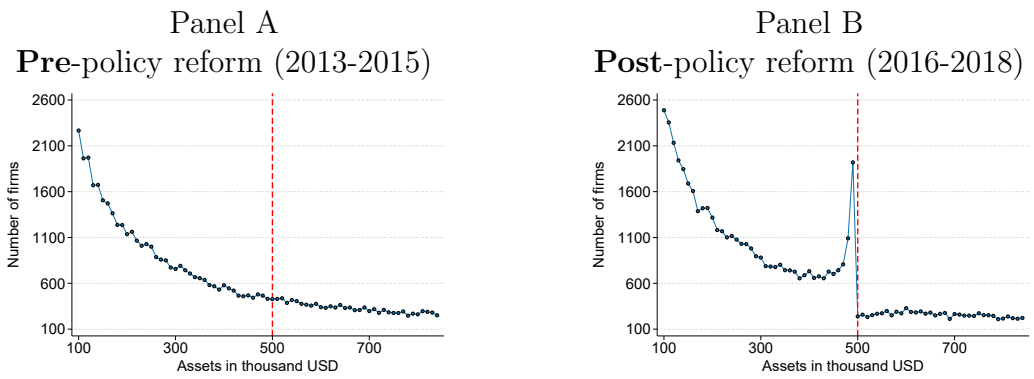

Figure 1. Empirical Asset Distribution

Notes: To construct the empirical asset distribution before and after the policy reform, we group firms in USD 10,000 asset bins and plot the frequency of firms within each bin. The red dashed line is located at USD 500,000 which is the level of assets that determines the audit obligation since 2016. We did not include 2019 in the post-policy reform graph to have two graphs with observations of three years before and after the implementation of the policy.

the corresponding distribution.[14]

Table 1. Summary Statistics, Pre-policy reform period

	Firms with assets >= 500 thd and <1 million	**Mean**	**25%**	**50%**	**75%**	**90%**
Gross Assets	740	1,357	25	52	339	1,305
Liabilities	492	800	0.1	22	197	817
Equity	252	560	0.8	9.5	89	458
Revenues	1,191	1,493	0	36	354	1,597
Costs and expenses	1,151	1,395	0	38	336	1,510
Wage bill	94	80	0	0.5	31	120
Firm-year observations	*18,964*			*216,509*		
Unique firms	*6,321*			*72,170*		

Notes: This table reports summary statistics for the outcomes of interest in the pre-policy reform period (2013 - 2015). The first column presents the mean value of the outcomes for the group of firms with assets between USD 500 thousand and USD 1 million that are affected by the reduction of the asset threshold. The 25% percentile of some of the outcomes is 0 because we have not restricted the dataset to the firms that have reported a positive revenue (an indication that the firm was active).

Firms can be audited by auditing firms or by self-employed auditors with relevant academic degrees (e.g. accountants). In Table A1, we observe important increases in the number of auditors since 2017. There were 25% more auditing parties in 2017

[14]Not all these firms will be audited because they reduce their assets to avoid the audits. We will explain this in the empirical section.

than in 2016 and 47% more between 2018 and 2016. The smaller increase in 2017 is explained due to imperfect compliance with the audit obligation. Auditing firms represent on average 40% of the total auditing agents, however their participation decreases since 2016. They audit more firms than the median number audited by self-employed. Further, the median number of audited firms increased for both groups, especially in 2018.

4 Empirical Design

The empirical strategy is divided into two parts. First, we define the asset area manipulated by firms that avoid the audits. We use standard bunching techniques introduced by Saez (2010) and Chetty et al. (2011) and adapted for the presence of notches by Kleven and Waseem (2013). According to the bunching approach, the manipulated region would correspond to the bunching and missing mass areas.

Second, we identify the effects of the audits on different outcomes of the audited firms by exploiting the discontinuity at the USD 500 thousand cutoff. The level of assets can be manipulated by the firms therefore, we do not use a standard RDD approach. We exclude the firms that bunch around the asset threshold and use a dount-hole RDD as Bachas and Soto (2021) and Benzarti and Harju (2021).

4.1 Defining the manipulated area: Bunching Estimation

We expect to observe firms bunching below the threshold to avoid the audits and a corresponding missing mass above the threshold in response to the new asset threshold. These two regions of the distribution, the bunching and missing mass regions are delimited by a lower bound (a_L) and an upper bound (a_U).

We construct the density we would have observed without the reform that changed the asset threshold. This counterfactual density is estimated by fitting a flexible polynomial to the observed density but excluding observations in the bunching and missing mass regions.

We group observations in asset bins of USD 10,000 and estimate the following regression:

$$n_j = \sum_{i=0}^{p} \beta_i (assets_j)^i + \sum_{i=a_L}^{a_U} \gamma_i 1[assets_j = 1] + v_j \tag{1}$$

where n_j is the number of firms in bin j, $assets_j$ is the asset level in bin j and p

is the order of the polynomial. The counterfactual distribution is computed as the predicted values of equation 1 excluding the contribution of the dummies in the area between a_L and a_U.[15]

The bunching mass, B, is the *surplus* of firms in the area between the asset threshold, a^*, and a_L resulting from the comparison of the actual and counterfactual distribution. Thus, B is measured as $\hat{B} = \sum_{j=a_L}^{a*}(n_j - \hat{n_j})$. Similarly, the missing mass, M is measured as the difference between the number of firms that we would have observed above the threshold, in the absence of the threshold, and the number of firms we actually observe, $\hat{M} = \sum_{j>a*}^{a_u}(\hat{n_j} - n_j)$. a_L is defined visually at the asset level where firms start to bunch. a_U is the asset level that makes the bunching mass to be equal to the missing mass ($\hat{B} = \hat{M}$) and it is determined through an iterative procedure. We normalize B by the average counterfactual distribution in the bunching region (n_0) to compare our results across different specifications and obtain the excess mass, $b = \hat{B}/\hat{n}_0$.

Figure 2 shows the asset distribution and the estimated counterfactual around the USD 500 thousand threshold based on an 8th-degree flexible polynomial. The estimated parameters are displayed in the top-right corner of the figure. The dashed blue lines are located at the lower bound of the bunching mass area and the upper bound of the missing mass area. The dashed red line marks the location of the policy threshold. The bunching mass is 3.94 larger than the counterfactual distribution. This is because there are around four times more firms in the bunching than the number one would observe without reforming the policy threshold.[16]

We observe that bunching starts at USD 440 thousand and the estimated upper bound of the missing mass region is USD 630 thousand. These two limits of the manipulated region will be excluded in the donut-hole RDD design. We present robustness checks to our main specification in Table A2. Our estimated excess mass is robust to changes in the order of the polynomial, bandwidth, and bin size.

The sharp bunching suggests that this is not a real response as explained by Boonzaaier et al. (2019). Thus, we also provide suggestive evidence on how firms that bunch reduce their assets in Table 2. *Bunchers* are the firms that in 2015 have assets between USD 500 and USD 750 thousand and in 2016 are located in the

[15]The counterfactual distribution is computed as $\hat{n_j} = \sum_{i=0}^{p} \beta_i (assets_j)^i$.

[16]Figure A3 presents the same exercise for the policy threshold of USD 1 million. We observe that bunching starts at USD 950 thousand and there are five times more firms in the bunching region. It is worth noting that the firms that bunch at the USD 1 million threshold are different firms than those that are the new bunchers under the USD 500 thousand threshold.

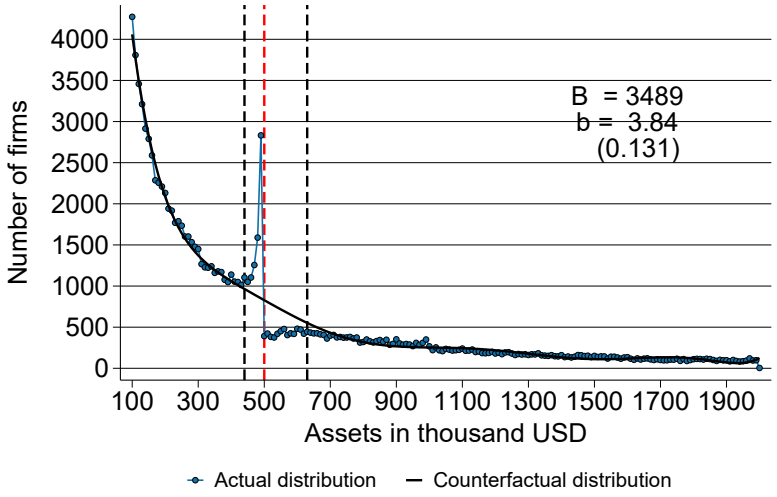

Figure 2. Asset bunching estimation, 2016 - 2019

Notes: The red dashed line is located at the policy threshold (USD 500 thousand), and the black dashed lines are located at the limits of the bunching and missing mass regions. To construct the counterfactual distribution, we group the assets in bins of USD 10,000. We visually determine that bunching starts at USD 440,000 and fit a polynomial of eight order. Following standard bunching techniques (Kleven and Waseem 2013), we compute that there are 4 times more firms than the number of firms we would observe without the asset threshold. Bootstrapped standard errors are in parenthesis.

bunching region (with assets between USD 440 thousands and USD 500 thousand). *Non-bunchers* are the rest of firms that in 2015 had assets between USD 500 and USD 750 thousand. We compute the average variation of their balance sheet's accounts between 2015 and 2016 and test if the difference of the variations between the two groups is statistically significant different from zero.

Bunchers reduce their assets on USD 113 thousand on average. Current assets and current liabilities mainly explain this reduction and accounts receivable (debts of the clients with the firms) and accounts payable (short-term debts of the firm with the suppliers) present the most important variations. This finding suggests firms use a *cash flow strategy* to reduce their assets rather than engaging in *real responses*.

4.2 Donut-hole RDD

A standard RDD cannot be implemented since the firms can manipulate the assets to avoid the audit obligation. Therefore, we use the bunching technique to determine a donut-hole region formed by the bunching and missing mass regions. Firms in the donut-hole region are excluded before implementing the conventional RDD.

	Average Δ in accounting records 2015 - 2016 USD thousands		
	non-buncher (N=1478)	buncher (N=766)	difference
Δ **Assets**	0.05	-113	113***
Δ Cu. Assets	5.67	-85.02	89.70***
Δ Cash	3.52	-7.92	11.44***
Δ Accounts Rec.	17.20	-54.30	71.50**
Δ LT. Assets	-5.17	-29.04	23.86***
Δ **Equity**	-30.67	-21.67	-8.99*
Δ Capital Stock	3.42	0.65	2.77
Δ **Liabilities**	-7.81	-95.26	87.46***
Δ Cu.Liabilities	-3.29	-71.60	68.32***
Δ Accounts Pay.	-6.31	-59.81	53.50***
Δ LT. Liabilities	-4.48	-20.85	16.38**

Table 2. Responses of bunchers and non-bunchers, 2015 - 2016
Notes: * p<0.1, ** p<0.05, *** p<0.01.

We run a regression model of the following form:

$$log(y_{it}) = \gamma + \delta 1(assets^d_{i,t-1} > 0) + \beta_1 assets^d_{i,t-1} + \beta_2 assets^d_{i,t-1} 1(assets^d_{i,t-1} > 0) + \epsilon_{i,t} \quad (2)$$

where y_{it} is the outcome of firm i in year t and $assets^d_{i,t-1} = assets_{i,t-1} - 500,000$ is the asset distance to the cutoff and the running variable. The latter corresponds to period t-1 because assets reported in t-1 determine if the firm is audited in period t.

Our estimated coefficient of interest is δ since we want to test whether there are statistically significant discontinuities on outcomes of interest around the asset threshold. The optimal bandwidth selection techniques (e.g. Calonico et al. 2020) do not perform well in our case because our missing mass region is large. Instead, we use alternative bandwidths and report the estimated coefficients for all the cases.

5 Results

Figure 3 shows the first-stage estimate of the impact of the asset threshold on the probability of being audited. We plot the probability of being audited for firms by USD 10,000 asset bins in the pre-policy period (hollow circle) and post-policy period (solid circle). We only observe a clear discontinuity in the audit probability that increases in 80 percentage points in the years after the policy is implemented. This probability for the above-threshold firms is not equal to 1 because there is imperfect compliance with the audit obligation in 2017 as can be seen in Figure A4. Figure A5 shows almost perfect compliance for 2018 and 2019. However, we decide to use a fuzzy donut-hole RDD to include 2017 in our analysis.

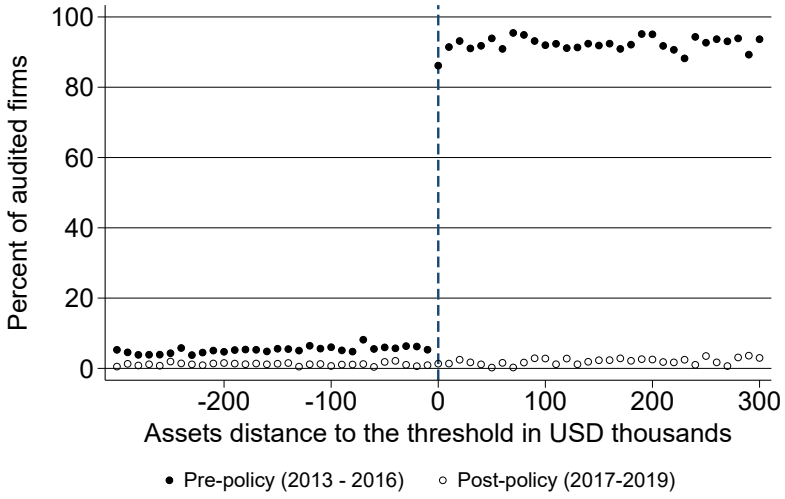

Figure 3. Audit Probability below and above the USD 500 thousand asset threshold

Notes: We group firms in USD 10,000 asset bins and compute the percentage of firms that are audited within each bin. Hollow circles correspond to 2013 - 2015 (pre-policy period) while solid circles correspond to 2017 - 2019 (post-policy period).

Figure 4 plots the effect of the asset threshold on firm's costs and expenses. We decided to add costs and expenses in one variable because expenses are more relevant for the services sector while costs are important for the non-services sector. We estimate the discontinuity in costs and expenses using equation 2 and find that firms reduce their reported costs and expenses by 24.3%. The evidence of a discontinuity in the variable at the threshold could indicate that auditors correct over-reporting behavior. We also repeat this exercise for the pre-policy period, our placebo sample, and we find an insignificant discontinuity (Figure A6).

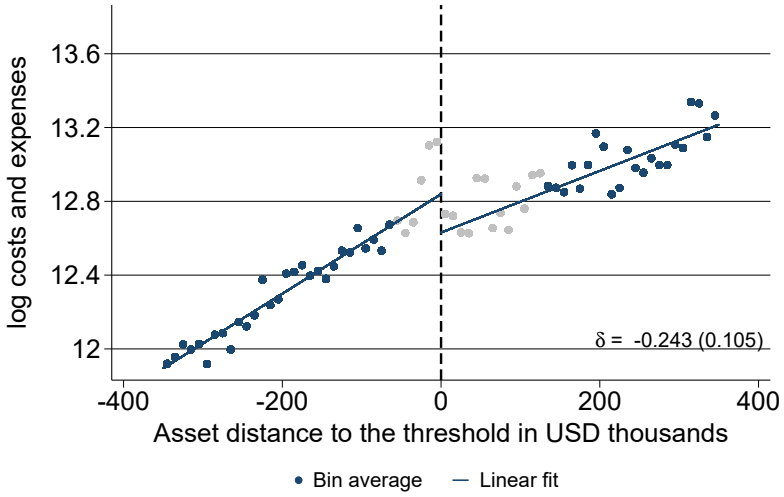

Figure 4. The effect of audits on costs and expenses

Notes: The figure shows the effect of the asset threshold on costs and expenses (in logs). Firms are grouped in USD 10,000 asset bins for the graphs.

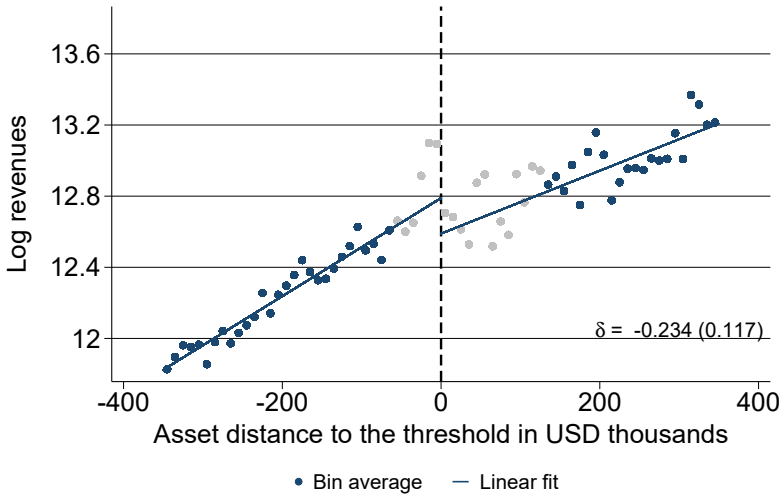

Figure 5. The effect of audits on revenues

Notes: The figure shows the effect of the asset threshold on revenues (in logs). Firms are grouped in USD 10,000 asset bins for the graphs.

Figure 5 plots the response to the audit obligation on revenues. We also estimate a statistically significant discontinuity implying that firms above the threshold reduce their reported revenues in 23.4%. This adjustment is puzzling because one could have expected that firms under report their sales. However, other studies (Carrillo et al.

Outcomes (logs)	Costs and expenses	Revenues
δ	-0.243	-0.234
	(0.105)	(0.117)
N below	28050	28184
N above	5381	5396

Table 3. RDD coefficient for costs and expenses and revenues
Notes: * p<0.1, ** p<0.05, *** p<0.01.

2017, Naritomi 2019 and Asatryan and Peichl 2016) have found that firms subject to a higher enforcement in developing countries adjust the two margins (revenues and costs and expenses) to reduce the impacts on the tax liability. Table 3 shows the results.

In our main specification, we restrict our analysis to observations between USD 150 thousand (left bandwidth) and USD 850 thousand (right bandwidth). The manipulated region that is excluded from the estimation is located between USD 440 thousand and USD 630 thousand.[17] Figures A7 and A8 present the estimated RDD coefficient under different values of the upper bound of the excluded region and of bandwidths. The coefficient is robust to changes in the left bandwidth and the upper bound of the manipulated region; nevertheless, when we reduce the right bandwidth, it is less precisely estimated. This is explained because when assets increase, we observe less firms. Thus, changes in the right bandwidth would imply less information is used for the estimation.

6 Conclusion

In this paper we study the effects of collaborating with third-party auditors to perform tax audits. We first characterize the bunching response to the reform of the asset threshold that determines the audit obligation. The sharp bunching and the fact that firms reduce their accounts payable and accounts receivable suggest that they engage in *cash flow strategies*. We then proceed to estimate the effects of the audits on the audited firms. Firms reduce both costs and expenses and revenues by 24% and 23%, respectively. Next steps of our analysis include exploring the heterogeneity of the effects to understand under what conditions third-party audits are valuable for the government.

[17] Note again that this upper bound was estimated using the bunching approach.

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A Audit process: Additional information

Figure A1. Tax Compliance Report

INFORME DE CUMPLIMIENTO TRIBUTARIO Índice

RAZÓN SOCIAL: COMPAÑÍA XYZ S.A.
RUC: XXXXXXXXXXXX
EJERCICIO FISCAL: 2018

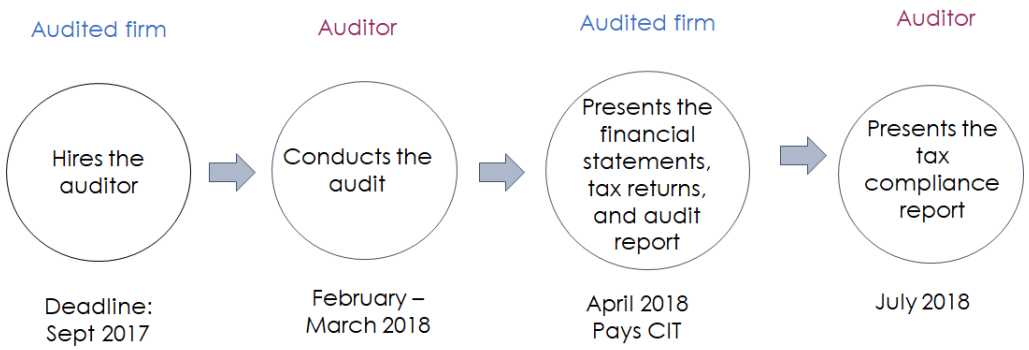
ANEXO No. 4
DETALLE DE LA DECLARACIÓN DE IMPUESTO A LA RENTA

Datos de la declaración del Impuesto a la Renta (a)			Datos de la contabilidad			Diferencias
Número de Casillero	Nombre del Casillero	Valor declarado	Código de cuenta contable	Nombre de la Cuenta	Valor total del ejercicio fiscal auditado	
		{1}	(b)		{2}	{3}={2-1}
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00
		0.00			0.00	0.00

NOTAS :
a. Corresponde al número, nombre y valor del casillero del formulario 101 en el que se efectuó la declaración del impuesto a la renta y presentación de estados financieros para sociedades y establecimientos permanentes. Informar únicamente los casilleros en donde se registraron valores.
b. Los códigos de cuentas deberán ser ingresados al máximo detalle posible, de tal forma que los componentes de cada casillero se puedan identificar claramente.
c. En caso de existir diferencias u observaciones, se debe revelar la explicación de las mismas, tanto al pie de este anexo, como en la parte de Recomendaciones sobre Aspectos Tributarios.

Notes: This appendix of the tax compliance report shows the discrepancies between the reported and audited values. The taxpayer reports the code, the account's name, and the value declared in the corporate income tax return in the first three columns of the table. She reports the accounting code, the account's name, and the audited value in columns four to six. The last column shows the discrepancies (if any) between the value reported in the tax return and the audited value.

Figure A2. Audit process

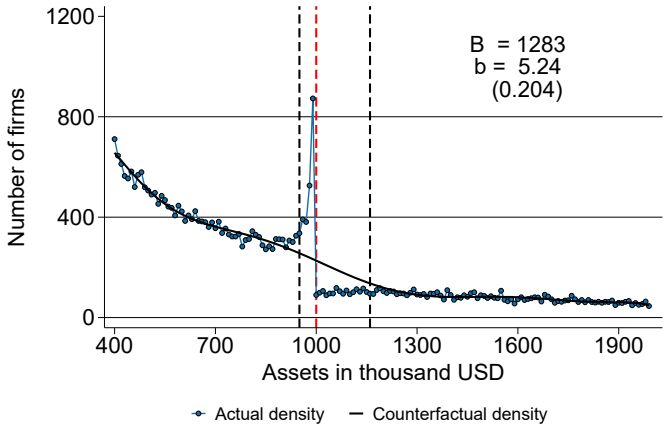


Notes: This figure illustrates the audit process of a firm required to audit the financial statements and balance sheets of 2017. The firm can hire the auditor till September 2017 and inform the auditor's name to Supercias within the next 30 days after hiring. The audit is conducted approximately between February and March of 2018, after the shareholders' approval of the balance sheets and financial statements of 2017. In April 2018, the audited firm presents its financial statements and audited report to the Supercias. Further, the firm presents the corporate income tax (CIT) returns to the tax authority and pays the CIT in the same month. In July 2018, the auditor presents the tax compliance report to the Tax Authority.

B Additional tables and figures

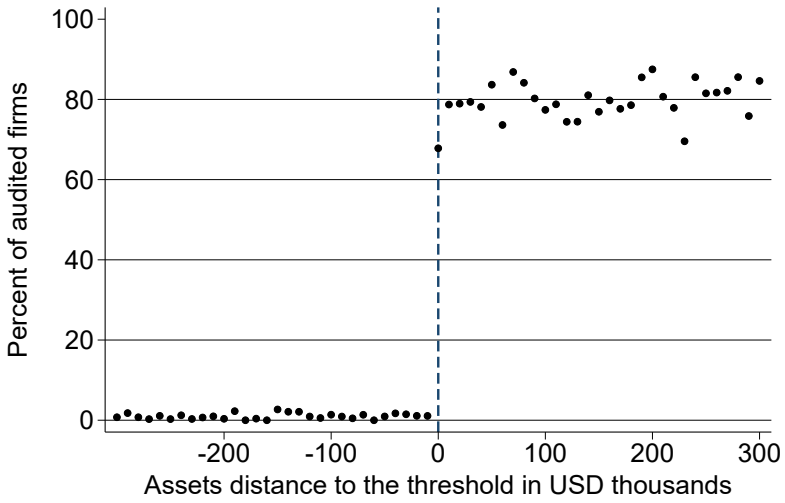
B.1 Figures

Figure A3. Asset bunching estimation, 2013 - 2015



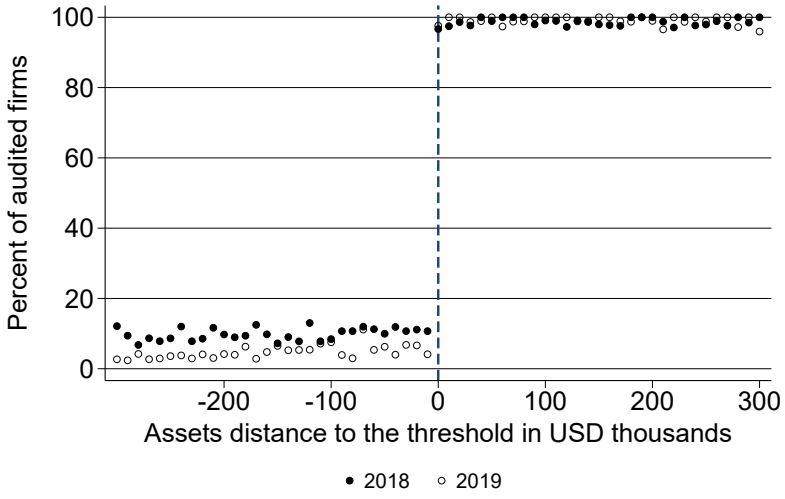
Notes: The red dashed-line is located at the policy threshold (USD 1 million) and the black dashed-lines are located at the limits of the bunching and missing mass regions. To construct the counterfactual distribution, we group the assets in bins of USD 10,000. We visually determine that bunching starts at USD 950,000 and fit a polynomial of 8th order. Following standard bunching techniques (Kleven and Waseem 2013), we compute that there are 5.24 more firms than the number of firms we would observe without the asset threshold. Bootstrapped standard errors are in parenthesis.

Figure A4. Audit Probability below and above the USD 500 thousand asset threshold in 2017



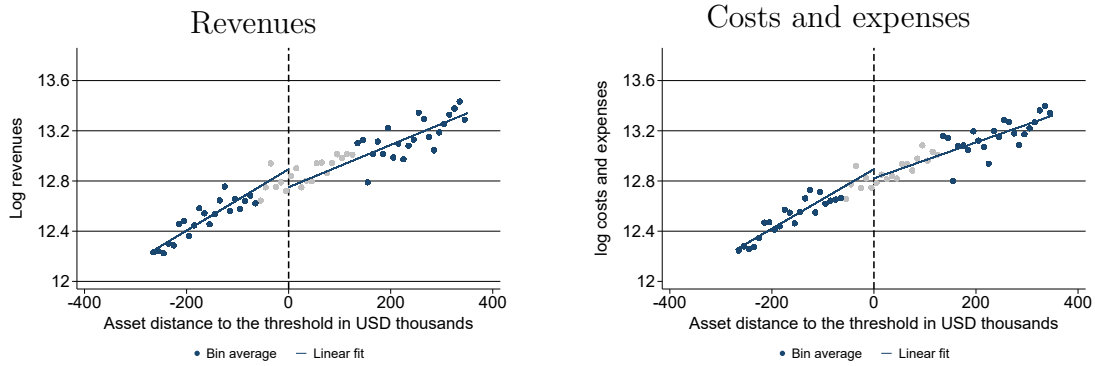
Notes: The figure shows the audit probability below and above the threshold for firms group in USD 10,000 asset bins. The probability for the above-threshold firms indicates that compliance was imperfect in 2017.

Figure A5. Audit Probability below and above the USD 500 thousand asset threshold in 2018 and 2019



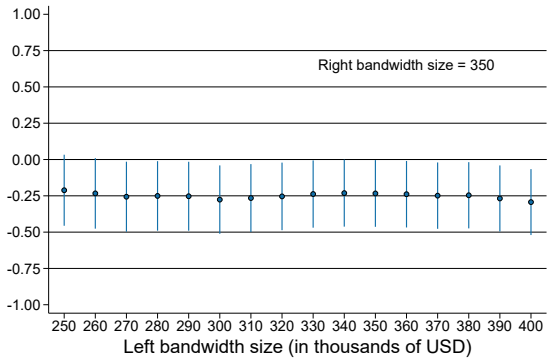
Notes: The figure shows the audit probability below and above the threshold for firms group in USD 10,000 asset bins. The probability for the above-threshold firms indicates that compliance was very high in 2018 and 2019.

Figure A6. Placebo: Effects of the audit threshold in the pre-policy period

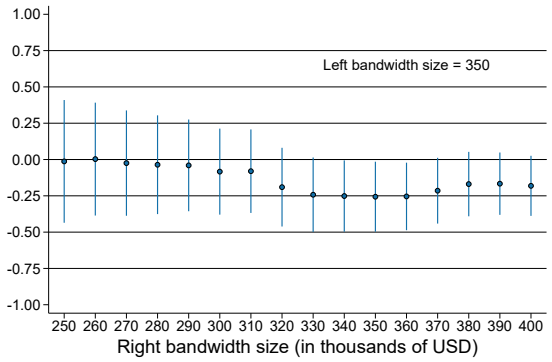


Notes: The figure shows the effect of the asset threshold on costs and expenses (in logs) in the pre-policy period (placebo test). Firms are grouped in USD 10,000 asset bins for the graphs.

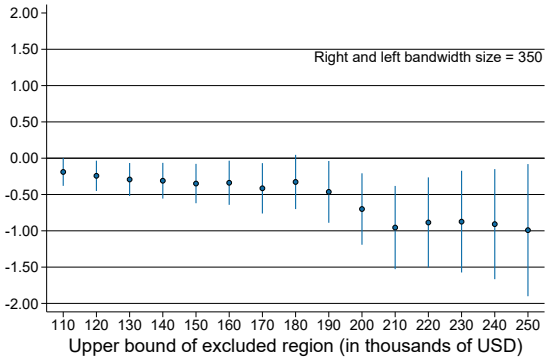
Figure A7. Robustness checks: Discontinuity coefficient of log revenues



(a) Changes to the left bandwidth



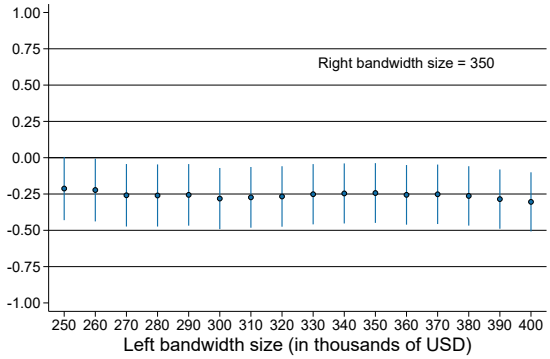
(b) Changes to the right bandwidth



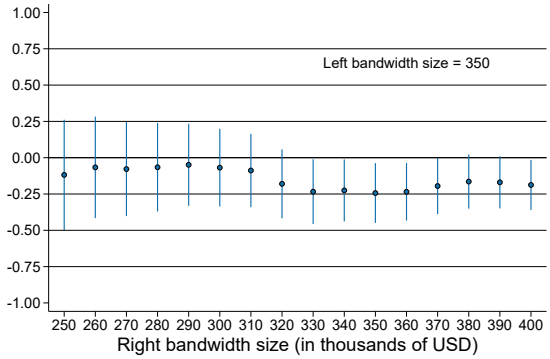
(c) Changes to the upper bound of the excluded region

Notes: These group of figures show the estimated discontinuity of revenues (in logs) when we change the left bandwidth, right bandwidth, and the upper bound of the excluded region.

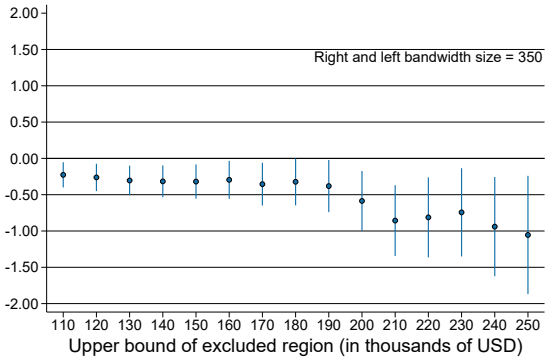
Figure A8. Robustness checks: Discontinuity coefficient of log costs and expenses



(a) Changes to the left bandwidth



(b) Changes to the right bandwidth



(c) Changes to the upper bound of the excluded region

Notes: This group of figures presents the estimated RDD coefficient of the log costs and expenses under different values of the upper bound of the excluded region and of the bandwidths.

B.2 Tables

Table A1. Descriptive statistics of auditors and auditing firms

Year	Number of unique auditors	% of auditors that are firms	Median number of firms audited by self-employed	Median number of firms audited by firms
2013	516	40	15	38
2014	549	41	17	42
2015	563	43	16	42
2016	599	41	15	42
2017	754	38	20	46
2018	883	36	29	59
2019	840	40	23	53

Notes: Table A1 presents descriptive statistics of auditors and auditing firms. We can observe a significant increase in the number of auditors between 2016 and 2017 and 2017 and 2018. Firms represent around 40% of the total number of agents doing auditing activities. Still, the median number of firms they audit is greater than the median number audited by self-employed auditors.

Table A2. Excess mass (b) with different specifications

	$b_{2016-2019}$	b_{2016}	b_{2017}	b_{2018}	b_{2019}
Main specification	3.84	4.17	3.83	3.83	3.51
	(0.131)	(0.26)	(0.176)	(0.164)	(0.151)
Polynomial order= 7	4.36	4.63	4.41	4.34	4.02
	(0.209)	(0.271)	(0.217)	(0.187)	(0.190)
Lower bound = USD 450,000	3.68	4.03	3.78	3.59	3.47
	(0.120)	(0.187)	(0.143)	(0.133)	(0.127)
Bin size= 9,000	5.26	5.74	5.34	5.07	4.48
	(0.554)	(0.568)	(0.650)	(0.671)	(0.191)

Notes: This table presents the estimates of the excess mass (b) under different specifications and years. We change the order of the polynomial, the lower bound where the bunching starts and the bin size to show that the bunching is robust to these alternative specifications.