One and Done or Repeat Inspections? The Differential Effect of Multiple Tax Audits

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Abstract

Making use of a rich administrative dataset on Ugandan firms' tax filings covering the period 2013–2021, this paper investigates the impact of tax audits on voluntary compliance, contrasting the effect of one versus multiple audits. Using a matched Difference-in-Differences approach with similar unaudited firms as controls, and a stacked design to address staggered treatment timing, the analysis shows that among firms that consistently file taxes over the study period, audits induce higher value-added tax (VAT) liabilities. Crucially, this is *entirely* driven by firms receiving multiple audits, underlining the importance of repeated interactions with the tax authority for fostering compliance among this set of taxpayers.

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1 Introduction

In their efforts to secure tax compliance and mobilize revenue, governments in developing countries often focus enforcement on firms in the formal sector.[1] In many developing countries, however, the formal sector is relatively small—with an estimated 86 percent of enterprises in sub-Saharan Africa operating informally, ILO (2018)—resulting in a narrow tax base. Unlike advanced economies, where the tax burden is widely distributed, a narrow tax base raises the likelihood that the same firms are audited repeatedly. Understanding how firms respond to repeated interactions with the Revenue Authority becomes central to assessing the effectiveness of the enforcement system in such a context.

The key task of this paper is to extend previous analyses of tax audit evaluations and examine how the intensity of enforcement, through multiple audits, affects the compliance of formal firms that consistently file taxes in a developing country, Uganda.[2] Studying a developing economy is important for at least three reasons. First, unlike advanced economies, this is a context where audits have been shown to be costly for firms, leading to reductions in size and firm closures (Henning and Okello, 2025). Repeated costly audits could potentially exacerbate this burden. Second, this is an environment where both tax morale and trust in the tax authority is exceptionally low (Isbell, 2022).[3] In such a context, one audit might be insufficient to change peoples' perception about the enforcement environment. Third, repeat audits are a central feature of the audit strategy in Uganda: while a vast majority of firms are never audited, a significant share (approximately one-quarter) of audited firms are audited multiple times. To the best of our knowledge, this is the first study to examine the effect of multiple audits and single audits within the same context.

The analysis combines nine years of administrative tax records and the universe of all tax audits conducted with a matched-Difference-in-Difference approach (matched-DID) to disentangle the differential effect of one versus multiple audits. Overall, the results suggest that tax audits increase VAT liabilities—and, consequently, VAT output/VAT input ratios—among firms that consistently file taxes over our study period. Importantly, however, firm behaviour varies markedly depending on the frequency of audits, with the

[1] This focus is partly due to the fact that formal firms are more visible, registered, and therefore easier to monitor and target through administrative means than individuals.

[2] What has been eloquently termed the "dosage effect" of audits.

[3] 65 percent of Ugandans believe ordinary people are taxed too much (second highest percentage, across 34 sub-Saharan African countries). More than half of Ugandan would prefer lower taxes with fewer government services, and 45 percent believe most or all tax official are corrupt (Isbell, 2022)

overall increase being driven entirely by firms that are audited repeatedly. Firms audited only once report a small (12 million Ugandan Shillings; approximately 3,300 USD) and statistically insignificant increase in VAT liabilities over the post-treatment period. By contrast, firms audited multiple times exhibit a statistically significant increase of 362 million Ugandan Shillings, or 100,000 USD. The difference in responses between the two groups is statistically significant, with equality of coefficients rejected at the 1 percent level. Our results indicate that repeated interactions with the tax authority are essential to foster compliance among firms that consistently file taxes in the context of Uganda, a representative Sub-Saharan African developing country.

The paper contributes to the literature on the revenue implications of tax audits, paying attention to whether the intensity of enforcement—through multiple audits—could lead to differential effects. Though the possibility that infrequently audited firms have significant non-compliance rates has been noted (see, for example, Slemrod and Gillitzer, 2014), the evidence on this issue remains scant.[4] In contexts where the tax base is narrow (as in Uganda), a key strategic decision for the tax authority is whether to audit the same firm—that the tax authority deemed risky—again or to focus on firms they had not previously deemed as risky. From an optimal enforcement perspective, striking the right balance between intensifying scrutiny on known firms and expanding coverage to new ones is essential for both equity and efficiency in tax administration. Previous literature focuses primarily on the effects of a single tax audit and generally find that it increases the revenue collected by governments in rich countries (Kleven et al., 2011; DeBacker et al., 2015; Advani et al., 2021; Løyland et al., 2019; DeBacker et al., 2018; Li et al., 2019; Beer et al., 2020; Boning et al., 2024; Christiansen, 2024; Harju et al., 2024).

Recently, there has been a rise in papers focusing on less developed economies (Best et al., 2021; Kotsogiannis et al., 2024; Li et al., 2019; Henning and Okello, 2025). The papers closest to ours are Kotsogiannis et al. (2024) and Henning and Okello (2025). Kotsogiannis et al. (2024) focus on a single wave of tax audits in Rwanda and show that Corporate Income Tax (CIT) liabilities increase, an effect entirely driven by comprehensive audits. Henning and Okello (2025) show that heavy tax audits in Uganda impose significant economic costs on firms, leading to reduced revenue collection, reductions in firm sales, and increases in firm exit. We build on this emerging literature in developing countries by contrasting the

[4]Reflecting perhaps the fact that repeat audits are less common in high-income countries with broad tax bases.

effect of single versus multiple audits among the firms that consistently file taxes. The reason to focus on this subgroup is three-fold. First, it is not possible to estimate the effect of multiple audits for firms that do not file taxes (since they disappear from administrative records and hence are not audited again). Second, consistent filers are typically larger firms that might be more able to absorb the cost of an audit. From an optimal enforcement perspective, it is important for the tax authority to know whether repeatedly targeting such taxpayers raises compliance. What we show is that for this subset of firms, audits—but crucially multiple audits—increase VAT liabilities. Third, this group of firms is important from a policy perspective: their VAT and CIT liabilities contribute to around 15 percent of the share of all taxes collected in a given year (2019). Understanding whether repeatedly targeting this important group of taxpayers is of interest to policymakers.

The remainder of the paper is organized as follows. Section 2 outlines a conceptual framework that incorporates the frequency of audits into the firm's perceived probability of being audited, which in turn influences their decision to comply with tax obligations. Section 3 presents the institutional setting and the data used in the analysis. Section 4 describes the methodological approach, and Section 5 presents the main findings. Section 6 provides some concluding remarks.

2 Conceptual considerations

The objective of this section is to elaborate on the theoretical ambiguity surrounding the impact of repeated audits on tax compliance. To do so, the analysis draws on the canonical Allingham and Sandmo (1972) framework, modified to incorporate the idea that audits serve as a source of information that firms use when deciding to what extent to comply with their tax obligations. In this framework, audits are not only enforcement tools, but also informational events that shape firms' beliefs about the likelihood of future audits. Depending on how firms interpret audits (as a signal of effective targeting or as a random, low-probability occurrence) their response may differ, and audit exposure may or may not generate increased compliance.

Consider a firm that decides whether, and how much, to evade their tax liabilities, a decision which is influenced by existing penalties (and the overall legal environment) if the firm is audited. Denoting the true profits of the firm by π, the firm which declares profits λ of π (with $\lambda \in [0, 1]$) pays a proportional tax, denoted by t, on those declared profits, and

so $t\lambda\pi$ are the taxes paid by the firm. If the firm is audited (which occurs with probability p—to be specified shortly) then a fine (at rate ϕ) is levied on the profits underreported $\phi\pi(1-\lambda)$. It is assumed that $\phi > t$. Profits in this case are $Z = \pi(1-t\lambda) - \phi\pi(1-\lambda)$. If, on the other hand, the firm is not audited its profits are given by $Y = \pi(1-t\lambda)$.

If firms view audits as a signal of effective targeting by the tax authority, a history of audits may increase their perceived probability of being audited again. If, on the other hand, firms believe that audits are random and subject to mean reversion, they may interpret an audit as indicating a lower likelihood of future audits. To capture these broad range of behaviors, consider the probability of perceived risk given by

$$\bar{p} = g\left(p, \frac{n}{T}, \sigma\right), \tag{1}$$

where p is the true probability, and n the number of audits, T is the number of periods (so n/T is the frequency of audits within T periods), and σ parameterises how perceptions respond to this. If $\sigma = 0$, the perceived audit probability and the true coincide ($\bar{p} = p$). If $\sigma > 0 (< 0)$ then more frequent audits increases (decreases) perceived risk.[5] The "dosage effect" of audits—in the sense of $\partial\bar{p}/\partial n$—can therefore be positive or negative.[6]

The firm is assumed risk averse[7] maximizing expected utility of profits, denoted by Π, given by

$$\Pi(\lambda, \pi, g(p, n/T, \sigma)) = g(p, n/T, \sigma)\, U(Z) + (1 - g(p, n/T, \sigma))\, U(Y), \tag{2}$$

by choosing how much profits λ to report to the Ugandan Revenue Authority, with the optimal $\lambda(\pi, p(\sigma, n/T), \pi, t)$, and so noncompliance $\lambda\pi$, being determined by the necessary

[5]Things are of course more complicated that presented here in two respects: first, σ might be firm specific both in terms of firm size but also across sectors. Secondly, the way firms perceive their likelihood of being audited again, might depend on their own experience as well as the experience of other firms, especially for VAT audits. Though the simple modelling structure here bypasses these issues, introducing them, if anything, will support the point made here: tax audits give rise to subtle processes that require careful empirical evaluation.

[6]An example might help. Suppose that the perceived probability adjusts partially following $\bar{p} = p + \sigma\left(\frac{n}{T} - p\right)$, where p is the true probability and $\sigma\left(\frac{n}{T} - p\right)$ is a belief adjustment based on the signal n/T received by the firm. Clearly, if $\sigma = 0$ then the perceived probability is equal to the true, $\bar{p} = p$, whereas if $\sigma > 0 (< 0)$ then the firm (for $n/T > p$) believes that more frequent auditing increases (decreases) the perceived probability of auditing. One can think of this as a reduced form of a richer framework (of the type discussed in Best et al. (2021) and Kotsogiannis et al. (2024)) where the firm (having some prior over the likelihood of them being audited, conditional that has been audited multiple times) receives some (noisy) signal from the Revenue Authority which updates to form the perceived probability that they will be audited again.

[7]In the context of Uganda this seems a reasonable assumption given that firms are owner-managed, medium size, and face liquidity constraints.

condition (for an interior solution)[8]

$$\Pi_\lambda\left(\lambda;\pi,g\left(p,n/T,\sigma\right)\right)=-t(1-g\left(p,n/T,\sigma\right))U_Z-\left(t-\phi\right)g\left(p,n/T,\sigma\right)U_Y=0. \tag{3}$$

Equation (3) defines $\lambda^*(n/T)$. Denoting the sufficiency condition of (3) by $\Pi_{\lambda\lambda}<0$, routine comparative statics shows that

$$\frac{\partial\lambda^*}{\partial n}=-\frac{\Pi_{\lambda n}}{\Pi_{\lambda\lambda}}=-\frac{\left(tU_Y+\left(\phi-t\right)U_Z\right)}{\Pi_{\lambda\lambda}}\frac{\partial g}{\partial n}, \tag{4}$$

and so, with $\Pi_{\lambda\lambda}<0$ (following the sufficiency condition), $\phi>t$, equation (4) takes the sign of $\frac{\partial g}{\partial n}$ which, as noted earlier, is ambiguous.

The preceding discussion highlights how information from repeated audits shapes firms' beliefs about the likelihood that profit underreporting will be detected by the Revenue Authority. Such beliefs may, in turn, affect future compliance behavior, though the direction of the effect is theoretically ambiguous.

The next sections describe the institutional context in Uganda and the dataset used in the analysis, followed by a description of the empirical methodology.

3 Institutional setting and data

3.1 The economy

Uganda is a low-income country with a low tax-to-GDP ratio. Uganda's per-capita income is $3,040 in purchasing power parity (World Bank, 2023). Its tax-to-GDP ratio—12.2 percent in 2020/21—is below the 15.6 percent average for sub-Saharan Africa and substantially lower than the 34.1 percent average for OECD countries (OECD et al., 2023). In terms of tax revenues and tax base composition, Uganda differs from other African economies with having a small share of corporate income tax out of all revenues (8 percent compared to the 22 percent average in sub-Saharan Africa), creating a somewhat more important role for VAT (30 percent compared to the 27 percent average in sub-Saharan Africa).[9]

Ugandan tax rates are comparable to those of other countries in the region. The VAT was introduced in Uganda in 1996, to replace the sales tax. Firms need to register for the VAT if their turnover exceeds 37.5 million Ugandan Shillings in any three consecutive calendar months. The standard rate of 18 percent applies to all supplies that do not qualify

[8] A subscript denotes partial derivative with respect to the corresponding variable.

[9] Own calculations based on the OECD Revenue Statistics in Africa, 2022.

for an exemption, except for the zero-rated supplies which include medicines, fertilizer and pesticides, as well as cereals produced in the country. Unprocessed foodstuffs are, in turn, exempt from VAT. The output VAT can be calculated either by applying the 18 percent rate to the taxable amount or by using the VAT fraction (18/118) when the transaction value includes VAT. If it is not specified whether VAT is included in the price, the amount is assumed to be VAT-inclusive.

VAT-registered firms have to submit monthly VAT declarations to URA for the domestic part of their business due within 15 days of the declaration. Negative liabilities can be carried over to subsequent months when less than 5 million Ugandan Shillings. Higher amounts can be claimed as a refund, but they trigger a refund audit. A penalty of 2 percent monthly compound interest applies to unpaid VAT until it is settled.

3.2 The tax audit process in Uganda

The URA primarily conducts two types of audits: comprehensive and issue audits.[10] Comprehensive audits entail an in-depth examination of all information or records relevant to the calculation of a firm's tax liability. The examination can cover all tax heads for a period up to five years in the past. Comprehensive audits typically involve three auditors and require direct interaction with firms, usually at the premises of the firm. Issue audits, in turn, are more limited in scope and pertain to specific issues in a tax return and/or a particular tax head. They are also typically restricted to focus on one year of records. Issue audits can sometimes be resolved with correspondence alone. If direct interactions are required the firm is either called for an interview at the URA offices or the auditors visit the firms premises. For the purposes of this paper, we classify a firm as audited if it receives either an issue audit or a comprehensive audit.

Firm selection into system-based audits at the URA is based on firm compliance risk profiles. Once an audit is completed a report is generated in the system. The audit report indicates the initial risks identified at the profiling stage, how they were addressed during the audit and any other risks identified in the process. It has a summary of findings and additional tax assessed (principal and penal tax) and it bears the names of the audit team leader and members. Interest is imposed on every assessment, and it is automatically

[10]There are also other types of audits (off-system audits), dealing with specific issues, such as firm (de)registration or record keeping. Softer compliance interventions, such as advisory visits, are also used, but the current paper focuses on the system-based audits, which are comprehensive and issue audits.

computed on the firm's ledger. Penalties for deliberate misreporting or absence of records is double the amount of the tax. According to URA officials, the penal interest rate charged at 24 percent has been a more significant deterrent than the penal tax, because the penal interest rate has exceeded bank of Uganda interest rates. The consequences for tax crimes have become more serious since 2021. The maximum sentence was increased from 4 to 10 years and fines also increased sharply in 2022 (Act No. 14 of 2022).

3.3 Description of the data

To compare the effect of one versus multiple audits we combine monthly VAT declaration submitted by the universe of VAT-registered firms in the period spanning 2013 to 2021, and detailed records on all audits undertaken by the various compliance offices in the same period.[11] We use VAT and CIT data from the year 2013 for the matching procedure (described in detail later).[12] The monthly VAT data are aggregated to the yearly level to capture longer-run impacts and to alleviate cyclicality issues.

There has been a relatively steady increase in the number of firms over the years, reflecting a growing economy and the broader capture of firms within the tax net.[13] The number of audits has amounted to approximately 2,000 per year, with most audits being issue audits (see Figure A.2). Audits often target more than one tax type, but 57 percent of audits cover VAT as well. Because audits are risk-based, they are much more common across larger firms declaring low values for tax bases. This is reflected in a much higher audit probability for firms with large sales and negative value added (Figure A.3). Audit adjustments (that is, detected evasion) are greater among large firms, but these firms are more compliant relative to their overall tax base (Figure A.4.)

Figure 1 illustrates the distribution of the number of audits in our estimation sample. Crucially, while 83 percent of firms are never audited, about 29 percent of audited firms are audited more than once, suggesting that repeated audits are a key feature of the audit strategy in a context like Uganda.

Appendix Table A.1 Panel A, illustrates how our estimation sample compares to the universe of VAT paying firms in Uganda over our study period. By focusing on firms that

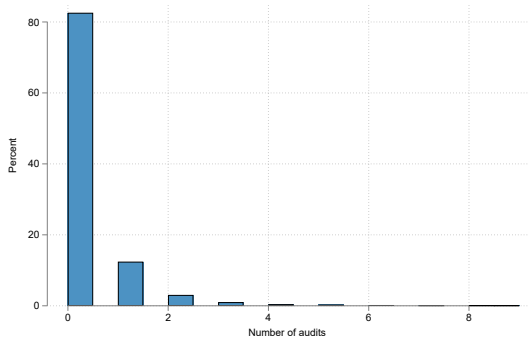
[11] For the sake of simplicity, we refer to financial years by indicating them with the first year.

[12] Though we focus our analysis on VAT, we use CIT returns for matching because they provide a richer set of variables.

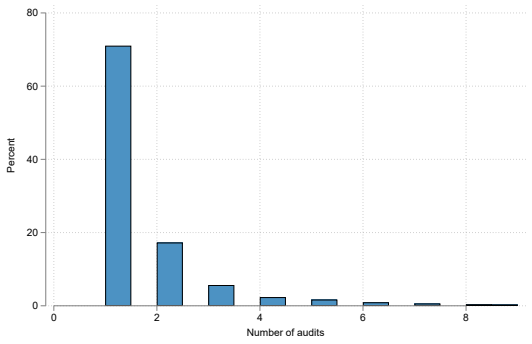
[13] For instance, the number of firms paying both VAT and CIT rose from about 10,000 to 15,000 during the analysis period (see Appendix Figure A.1).

Figure 1
Distribution of number of audits, all firms (a) and audited firms (b).

(a) All firms



(b) Audited firms



Notes: In Panel (a) this figure shows the percentage of firms receiving audits related to VAT over our study (2013-2021). In Panel (b) we show the same percentage, but restricted to firms audited at least once. The sample is restricted to firms that filed VAT taxes at least once during our study period.

consistently file taxes over the study period we estimate effects on a sample of relatively large firms in Uganda.[14] Firms that consistently file taxes have more than double the amount of sales, assets and purchases. They also report significantly higher VAT liabilities demonstrating why this set of firms is important for revenue collection considerations.

Panel B of Table A.1 shows that audited firms' observable characteristics differ significantly from unaudited firms', allowing us to exploit these features in a matched Difference-in-Difference design. Firms that are audited are much larger—they have more than 3 times higher sales, 6 times more assets—but lower VAT liabilities, which is also insignificant. Firms audited more than once are *even* larger than those audited only once during the analysis period, and differences remain statistically significant except for VAT liabilities.

4 Estimation strategy

To estimate the impact of audits on future reporting behaviour we combine a Difference-in-Difference (DID) approach with matching. This strategy aims to address the presence of a selection bias in the treatment assignment driven by risk-based audit selection. The idea behind matching is to pair each member of the treatment group with a set of observa-

[14]This is similar, but not exactly the same, as restricting the analysis to a balanced sample over the entire period (2013 – 2021). The sample of each stack of firms (described in more detail later) is balanced, but a firm is included even if it does not file taxes outside the time restrictions of the stack. This maximizes power, while ensuring that our results are not driven by firms dropping out of the tax system.

tionally equivalent control group members. By holding the confounding factors constant, the difference between the outcome variable of audited (treated) firms and matched unaudited (control) firms is a direct estimate of the treatment effect that does not rely on any parametric assumptions (see, for example, Guo and Fraser, 2015; Imbens and Rubin, 2015; Heckman et al., 1998).

We use a stacked approach (see Cengiz et al., 2019) and combine it with Coarsened Exact Matching (CEM, see Iacus et al., 2011, 2012). In this way the analysis evaluates the Average Treatment effect on the Treated (that is, the audited) firms (ATT) fully exploiting the multiple waves of audits to obtain a comprehensive event study evaluation.[15] This method is suitable to analyse frameworks with a variation in the timing of treatment, where the parallel trends assumption holds potentially only after conditioning on observed covariates (due to, for example, selection bias). That being said, our results remain quantitatively and qualitatively similar without matching.

Our approach can be synthesized as follows. First, we implement data preprocessing using CEM to stratify firms based on relevant pre-treatment observable characteristics (Iacus et al., 2011, 2012).[16] For the stratification, we use four progressively less parsimonious sets of pre-treatment covariates with the more comprehensive set composed of the business industry, according to the International Standard Industrial Classification (ISIC), the type of business (that is, natural person versus legal entity), firm's riskiness—accounted for through the sales/purchases ratio and the sales growth decile recorded for the first available year (2014)—and size measured in terms of sales quartiles in the first available year (2013). Second, individual stacks are created based on each audit wave, grouping firms treated in each wave with firms never treated, and restricting to firms that consistently file taxes over the estimation period for the stack. Finally, all the stacks are appended together in the same dataset.[17] Firms audited in 2013 and 2021 are excluded, as these cohorts do

[15]This matched version of the Stacked Event Study Design (Stacked-ES) entails comparing within each stack (year of audit), an individual cohort of audited firms to appropriately matched control units who were not audited throughout the entire sample period, avoiding comparisons between late to early audited firms that might bias a standard Two-Way Fixed Effects estimate if effects vary across treated cohorts (Goodman-Bacon, 2021).

[16]More details on this can be found in Kotsogiannis et al., 2024, 2025. For a discussion on alternative matching techniques, see, among others: Abadie, 2005; Wooldridge, 2002, 2007; Stuart, 2010; Cattaneo, 2010; King et al., 2011; Imbens and Rubin, 2015; Guo and Fraser, 2015; Iacus et al., 2019.

[17]See Appendix B for a detailed description of the method and the main results of the CEM balancing procedure (Tables B.1–B.3). Particularly, in the specification using the most comprehensive set of matching covariates (Panel D in Table B.1–B.3), the multivariate imbalance is reduced to just around 14 percent of its original level, indicating greater homogeneity in pre-treatment covariates across treatment cohorts.

not have pre- or post-treatment observations, respectively, which limits their contribution to the estimation of dynamic effects.

The analysis proceeds by estimating the following CEM-improved stacked event study model

$$Y_{ist} = \sum_{\substack{k=-4 \\ k\neq -1}}^{4} \beta_k AUDIT_{is} \times \mathbb{1}\{t_s = k\} + \theta_i + \tau_{ts} + \varepsilon_{ist}, \tag{5}$$

where Y_{ist} is the VAT liability for firm i, in stack s at relative time t.[18] $AUDIT_{is}$ is an indicator for whether a firms' first audit occurred in audit wave/stack s and $\mathbb{1}\{t_s = k\}$ are indicators from 4 years before to 4 years after treatment. τ_{ts} and θ_i account, for time-by-stack and firm fixed effects, respectively and ε_{ist} is the error term. β_k represents the period specific pre- and post-treatment effects (excluding $k = -1$, which serves as the reference period), and are our key coefficients of interest. Standard errors are provided by clustering at the firm level. The equation is estimated with different set of weights resulting from the CEM stratification. We discuss robustness in Section 5.3.

As is standard in the literature, when we discuss aggregate effects, we estimate the Difference-in-Difference regression that is analogous to the event-study specification, formally written as

$$Y_{ist} = \beta_{DD} AUDIT_{is} \times \mathbb{1}\{t_s \geq 0\} + \theta_i + \tau_{ts} + \varepsilon_{ist}. \tag{6}$$

As discussed earlier, the analysis measures impacts on the intensive margin in a balanced panel, and does not consider the implications of audits for possible firm exits.[19] The resulting estimates for this, typically larger, set of taxpayers are of key interest to tax authorities. First, large taxpayers constitute a major part of the revenue base, so understanding how they react to tax audits is crucial for revenue collection efforts. Second, given that firms can exit and operate informally in this environment (Henning and Okello, 2025), it is important for authorities to understand the effect of repeatedly targeting this larger group of taxpayers. Firm exit and informality could undermine formal sector growth, distort competition, and weaken the broader real economy.

Univariate imbalance also decreases substantially across most covariates, further supporting the quality of the match. This is achieved while retaining a high proportion of observations in the region of common support (93 percent of audited firms and 84 percent of matched control units).

[18] Throughout the analysis, the top and bottom 0.1 percent of VAT liability in each year are winsorized to ensure that results are not unduly influenced by outliers.

[19] For an analysis of this margin see Henning and Okello (2025), who find that audits increase the likelihood of firms exiting the VAT and CIT base.

5 Results

This section presents the results from our analysis on both aggregate VAT liabilities and, crucially, compares the effect of a single versus multiple audits.

5.1 Aggregate tax liabilities

The analysis begins by documenting the overall effects of audits on VAT liabilities. Table 1 reports the aggregate post-treatment ATT for VAT liabilities, while Figure 2 presents the event-study results on the impact of audits for the same outcome. Results are shown for five alternative specifications. Column (1) reports the results of an unweighted stacked model (equation 6). Columns (2)-(4) report results from CEM-weighted stacked models based on four alternative, and progressively less parsimonious, sets of stratification variables (equation 6 using CEM weights). Set I is based on exact matching the ISIC business industry across the cohort of treatment, Set II adds the type of business, while Set III includes two variables used typically in risk scoring processes (that is, the sales/purchases ratio and the sales growth decile). Finally, Set IV also accounts for the size of the business.

Table 1
Aggregate Impact of Audits on VAT liability

	Unweighted (1)	CEM Set I (2)	CEM Set II (3)	CEM Set III (4)	CEM Set IV (5)
DD coefficient	192.113***	197.035***	194.529***	174.409***	146.484**
	(52.659)	(56.816)	(56.960)	(58.027)	(63.403)
N	178837	162664	162356	156160	139279
Distinct firms	6438	5152	5143	4967	4488
Average in Control in pre-period	6.603	8.928	8.868	8.499	8.960
Average in Treated in pre-period	-60.143	-39.542	-39.542	-46.874	-24.529
R-squared	0.54	0.55	0.55	0.61	0.58

Notes: This table reports results for the effect of audits on the VAT liabilities reported by firms over the 4 years following the audit. Column (1) presents the results from running equation 6 on the stacked sample of firms. Columns (2)-(5) report the results of running equation 6 using different set of weights based on the CEM stratifications described in Section 4. The outcome variable, VAT liability is measured in millions of Ugandan Shillings, and winsorized at the top and bottom 0.1 percent for each year. Set I uses exact matching on ISIC industry. Set II add type of business (individual/firm). Set III uses the sales to purchase ratio and the one year sales growth decile. Set IV also includes sales deciles. Robust standard errors (clustered at the firm level) are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Overall, our estimates show that audits lead to a statistically significant increase in VAT liabilities reported by firms that consistently file taxes and were audited compared to the control group. Depending on the estimator employed, the point estimates of the

aggregate post-audit treatment effect ranges between 146 and 197 million Ugandan Shillings (US$41,000 - US$55,000). To provide a sense of the magnitude of these results, we compare the estimated impact to the average tax liabilities reported by treated firms in the year prior to treatment within the matched sample based on Set IV of matching variables (Column 5). For this specification, the estimated effect corresponds to an average increase of 512 percent in VAT liabilities, relative to the absolute value of the average pre-treatment VAT liabilities, which stood at -24.5 million Ugandan Shillings. The large relative impact reflects the very low base of reported revenues in our matched samples during the year prior to treatment. In particular, many firms reported negative value added, which substantially reduces the pre-treatment averages. This pattern highlights not only the initially low levels of declared activity among audited firms but also suggests considerable scope for revenue recovery through enforcement. The presence of negative value added further indicates possible underreporting or aggressive tax planning, underscoring the importance of audits in revealing the true tax base and supporting broader revenue mobilization efforts. The size of the response of VAT liabilities corresponds approximately to 1 percent of the mean of total sales reported by audited firms at baseline (14.1 billion Ugandan Shillings, see Table A.1 for audited firms).

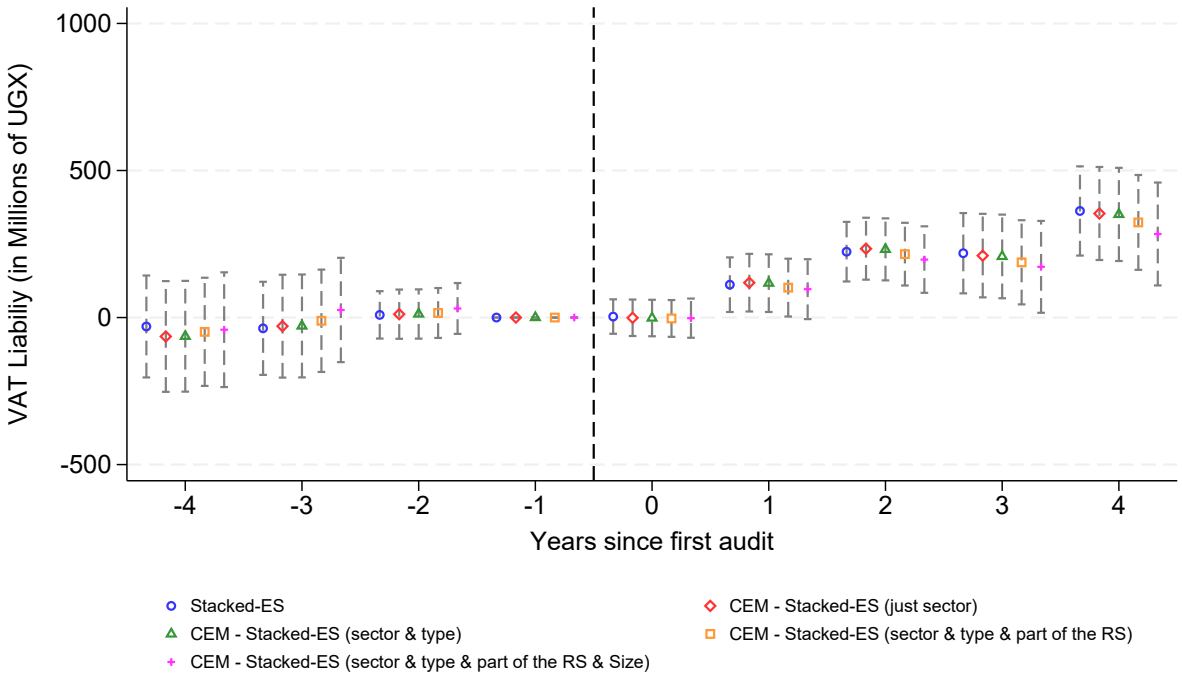
Figure 2 reports the results from estimating equation (5) for the same outcome variable. Across all specifications, there is no evidence of violations of the parallel trends assumption, which supports the validity of the identification strategy. Robustness checks are discussed in Section 5.3.

The results clearly indicate that audits exert a pro-deterrence effect among firms filing VAT in Uganda. However, since the effects only become significant (across all specifications) from the second year onward—and given that repeat audits are a central feature of the Ugandan audit system—it is important to understand the role of multiple audits in this context. This issue is addressed next.

5.2 Audit frequency: Single versus multiple audited

To examine the effect of one versus multiple audits on compliance we split the audited (treated) firms into two groups. One contains all the firms that were only audited once, the second includes all the firms audited multiple times. We compare both sets of treated firms to the unaudited firms. In other words, the comparison group for both treated groups is identical. The leave-out period for all estimations is the period before the *first* audit.

Figure 2
The Dynamic impact of audits on reported VAT liabilities



Note: This figure reports the results from running equation 5 on reported VAT liabilities. We present event-study for each of the weights presented in Table 1 The excluded category is the last period before treatment (T=-1); 95 percent confidence intervals are shown and based on S.E. clustered at the firm level. VAT liabilities are reported in millions of Ugandan Shillings, and are winsorized at the top and bottom 0.1 percent of each year.

The event-study results are presented in Figure 3, while the overall ATT is presented in Table 2. For ease of comparison we only present our preferred specification (equation (5) with CEM weights from Set IV).[20]

Our results indicate that repeat audits are essential for promoting compliance among the set of taxpayers that consistently file taxes, and hence are relatively large. Firms audited only once do not report significant increases in VAT liability in any period after the audit. Aggregating across all periods, the ATT is economically small (12 million Ugandan Shillings) and statistically insignificant. In stark contrast, firms receiving multiple audits over the study period report significantly larger VAT liabilities starting in the second year post-audit, with the effect increasing over time. Aggregating across all periods, the ATT for multiple-audited firms is 361 million Ugandan Shillings and statistically significant at

[20]However, results are robust to alternative specifications as well, see Figure C.1 in the Appendix.

the 1 percent level. We can reject that the coefficient for single audited firms is the same as multiple audited firms at the 1 percent significance level (p-value = 0.007). The size of the response is equivalent to 1.5 percent of baseline sales for multiple audited firms (as compared to 0.15 percent for single audited firms).[21]

Finally, we take our analysis further and estimate the differential effect for firms receiving 2 audits, 3 audits, and 4 or more audits. Results are presented in Appendix Figure A.5. This part of the analysis should be interpreted as suggestive given a lack of power. That being said, our results indicate that after the 2nd audit there does not seem to be substantial additional gains from auditing the taxpayer more times. Indeed, the coefficients for 3 audits and 4 or more audits are both economically and statistically similar to the coefficient on 2 audits.

Several mechanisms could explain this result, but one particularly compelling interpretation is through the framework of belief updating. As discussed in Section 2, compliance behaviour is influenced by the perceived probability of detection (equation (1)), which in turn depends on audit frequency. It is reasonable to assume that the signalling content of multiple audits is stronger than that of a single audit. Accordingly, some firms may revise their perceived audit probability upward only after experiencing a second audit, implying that more frequent audits increase the perceived risk of detection (and, in the context of Section 2, $\sigma > 0$). By contrast, a single audit may be viewed as an exceptional event rather than a signal of heightened scrutiny, leading firms to maintain a lower perceived audit probability ($\sigma < 0$). Repeated audits, however, are more likely to be perceived by firms as deliberate and targeted, conveying that the tax authority has reliable information and is actively monitoring firm behaviour. In the context of low trust in government, a single audit may be insufficient to change perceptions and encourage compliance, whereas multiple audits provide a stronger informational signal, shaping perceived audit likelihood more effectively.[22]

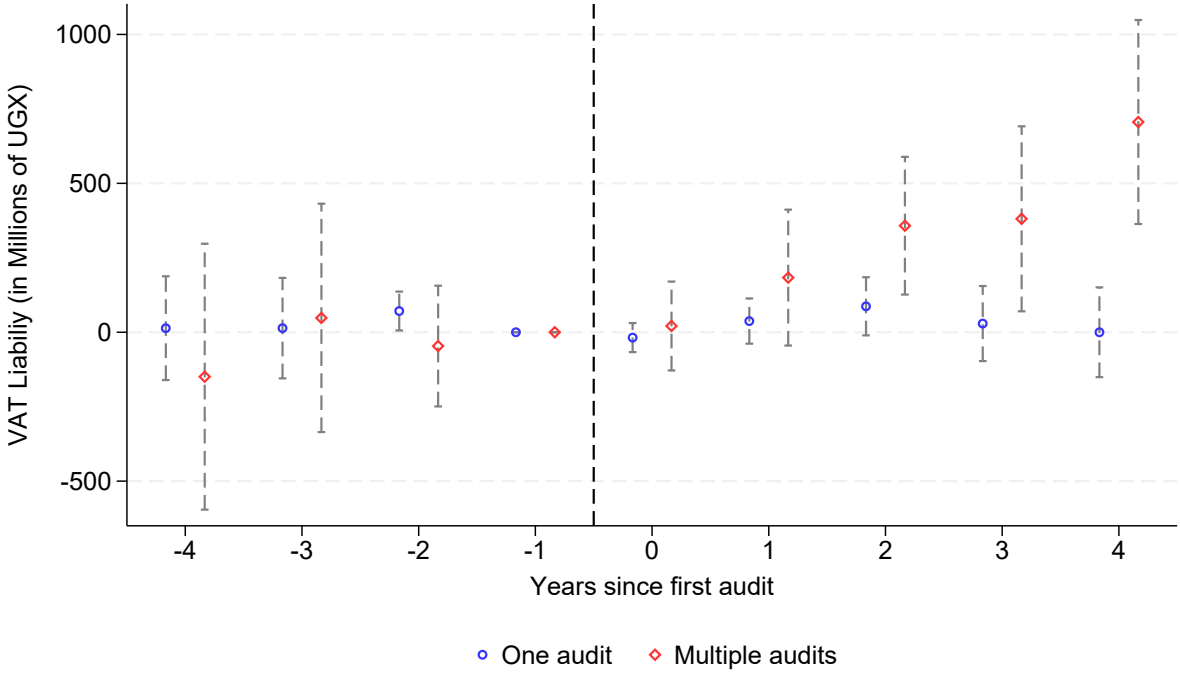
From a policy perspective, these findings highlight a fundamental trade-off in audit strategy. On the one hand, if a single audit increases compliance, targeting the same taxpayer repeatedly would be inefficient. On the other hand, if it does not, repeat audits

[21] See Appendix Table A.1 for single and multiple-audited firms.

[22] This interpretation aligns with findings by Kotsogiannis et al. (2024), who document that narrow-scope audits in Rwanda are not sufficient to deliver compliance in the absence of follow-up enforcement, attributing this to a combination of the mechanical nature of these audits, the information conveyed to taxpayers and the lack of subsequent enforcement.

would be essential for inducing durable increases in VAT liabilities. Large firms may require repeated enforcement signals to adjust their beliefs about the enforcement environment. Moreover, firms that have never been audited often include smaller businesses that may struggle to absorb audit costs, potentially leading to adverse consequences for both firm survival and revenue collection (Henning and Okello, 2025).[23] Balancing these considerations is therefore crucial for designing audit policies that maximize compliance and revenue collection without imposing undue economic disruption.

Figure 3
The Dynamic impact of audits on reported VAT liabilities, Audit Frequency



Note: This figure reports the results from running equation 5 with CEM weights from set IV, on reported VAT liabilities. We present results separately for firms receiving one or multiple audits. The excluded category is the last period before the first audit (T=-1). We use CEM weights from set IV, which include matching on ISIC codes, firm type, sales/purchase ratio, one year sale growth deciles, and firm sale deciles. 95 percent confidence intervals are shown and based on S.E. clustered at the firm level. VAT liabilities are reported in millions of Ugandan Shillings, and are winsorized at the top and bottom 0.1 percent of each year.

[23]The firms analyzed in Henning and Okello (2025) are still relatively large, they lie at the 80th percentile of the formal firm-sales distribution. However, they are smaller than the firms analyzed here, where the median firm lies at the 85th percentile of the firm-sales distribution in 2019.

Table 2
Aggregate Impact of Audits by audit frequency

	All	By audit frequency	
		One	Multiple
	(1)	(2)	(3)
DD coefficient	146.484**	11.912	361.895***
	(63.403)	(55.265)	(125.846)
N	139279	134389	131551
Distinct firms	4488	3930	3587
Average in Control in pre-period	8.960	8.960	8.960
Average in Treated in pre-period	-24.529	78.325	-190.608
R-squared	0.58	0.60	0.58

Notes: In this table we present the result of audits on VAT liability separately for firms receiving one and multiple audits. In Column (1) we present the result from running equation 6 with CEM weights from set IV (equivalent to Column (5) in Table 1). In Column (2) we present the result for firms that only received one audit over our study period, while Column (3) presents results for firms that received multiple audits. Throughout we use CEM weights from set IV, which include matching on ISIC codes, firm type, sales/purchase ratio, one year sale growth deciles, and firm sale deciles. Robust standard errors (clustered at the firm level) are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.3 Robustness

We conduct a series of robustness checks to verify that our results are not sensitive to key adjustments. All results can be found in Appendix C.

Alternative weights: We have already shown that the overall ATT is not sensitive to different weighting schemes. In Appendix Figure C.1 we also show that the effect for single audits and multiple audits is not sensitive to different weighting schemes.

Alternative estimator: Next, we follow the approach proposed by Callaway and Sant'Anna (2021) (CSDID) on the same matched sets. In Appendix Figure C.2 we present results for an unweighted version (in Panel (a)) and a version using CEM weights from set IV (in Panel (b)). We repeat the same exercise for multiple and single audits in Panel (a) and (b) of Appendix Figure C.3. Throughout, the CSDID estimation method provides results that are both qualitatively and quantitatively similar to the main analysis.[24]

[24]This approach allows itself for the use of different estimators for the ATT building on the previous matched-DID literature and in particular on outcome regression models (Heckman et al., 1997, 1998), inverse probability weighting schemes (Abadie, 2005) and doubly-robust methods (Sant'Anna and Zhao, 2020). We present the results for the Sant'Anna and Zhao (2020) estimator.

Winsorization: Next, we verify that our results are not driven by our choice of winsorization. In Appendix Table C.1 we present four alternative winsorizations of the outcome variable, ranging from no winsorization to winsorizing the top and bottom 2 percent for each year. While the size of the coefficient reduces, results remain statistically significant throughout. Winsorization is conducted on the full dataset of firms that filed at least one VAT return in a given year.

6 Concluding remarks

Enhancing the efficiency of tax systems poses a significant challenge for revenue authorities worldwide, especially in developing countries IMF (2015). Central to domestic revenue mobilization is an understanding of the role operational audits play in deterring future non-compliance.

In this paper we investigate the effect of audits among firms that consistently file taxes over our study period, some of the largest taxpayers in Uganda. We find that audits, overall, have a pro-deterrence effect for this set of firms. However, this effect is entirely driven by firms that are audited multiple times, highlighting that one audit is insufficient to encourage compliance among large taxpayers in Uganda.

Our findings contrast starkly with recent work on the US, which shows that a single audit has long-lasting effects on individual taxpayers' compliance (Boning et al., 2024). This is perhaps due to the fundamentally different institutional environment of a developing country, such as Uganda, compared to the US. When tax morale is low (Isbell, 2022), a single audit may be insufficient to change peoples' beliefs about the enforcement environment they operate in. Our findings indicate that this is an important consideration for tax authorities in developing countries to bear in mind when designing enforcement strategies.

The study also identifies areas for future research. Focusing on the diffusion of audits through the network—explored in, for example, Gamannossi degl'Innocenti and Rablen (2020) and Boning et al. (2020)—identifying the role of central traders/firms is a worthwhile extension. The impact of an audit can manifest itself through social and economic networks, the latter arising in, for example, VAT systems where businesses are linked through a sequence of transactions.[25] And if comprehensive information about the costs of

[25]Discussed in Pomeranz (2015), further explored in Almunia et al. (2023) and Alexopoulos et al. (2025). Spatial spillovers could also occur due to geographic proximity to the audited firm, as addressed in Lediga et al. (2020) and more recently in Nouwoue (2023).

the audit function to the revenue authority were available, a nuanced cost/benefit analysis about different types and audit frequency could be carried out.

Tax audits are inherently complex processes, and with the increasing availability of rich administrative data, research has begun to explore their impacts in greater depth. We hope that our work, demonstrating the importance of repeat audits for taxpayers that consistently file taxes, is a meaningful addition to our understanding of the importance of audits for compliance in developing countries.

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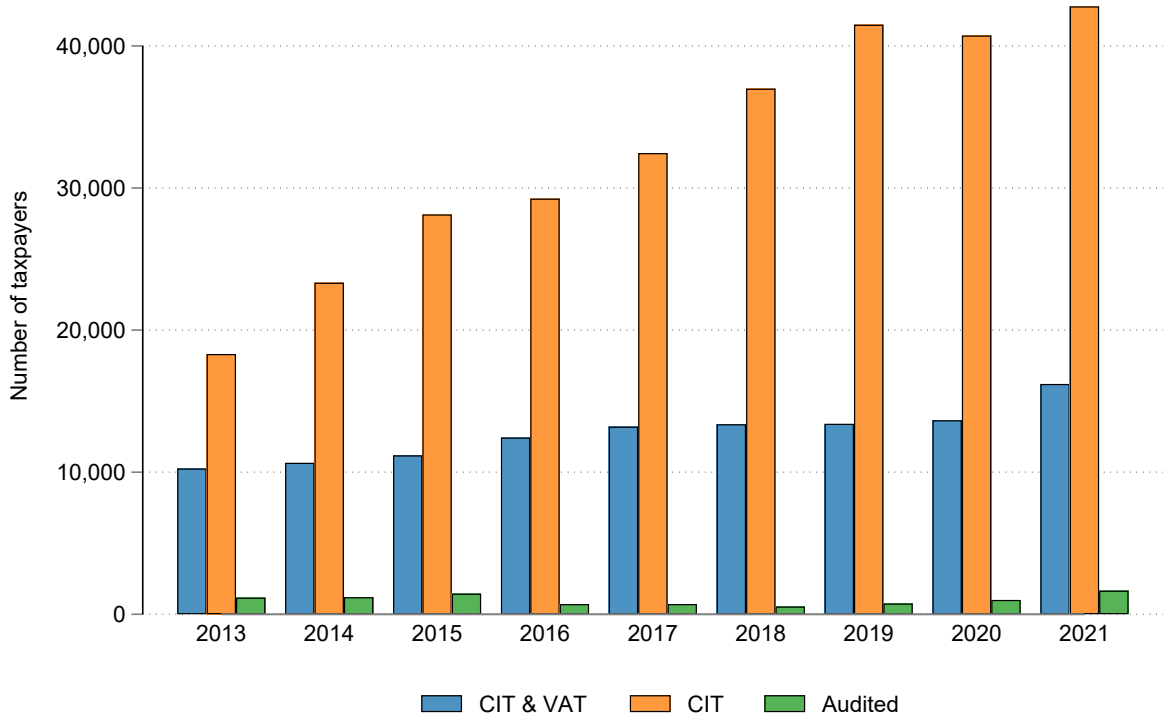
Online Appendices

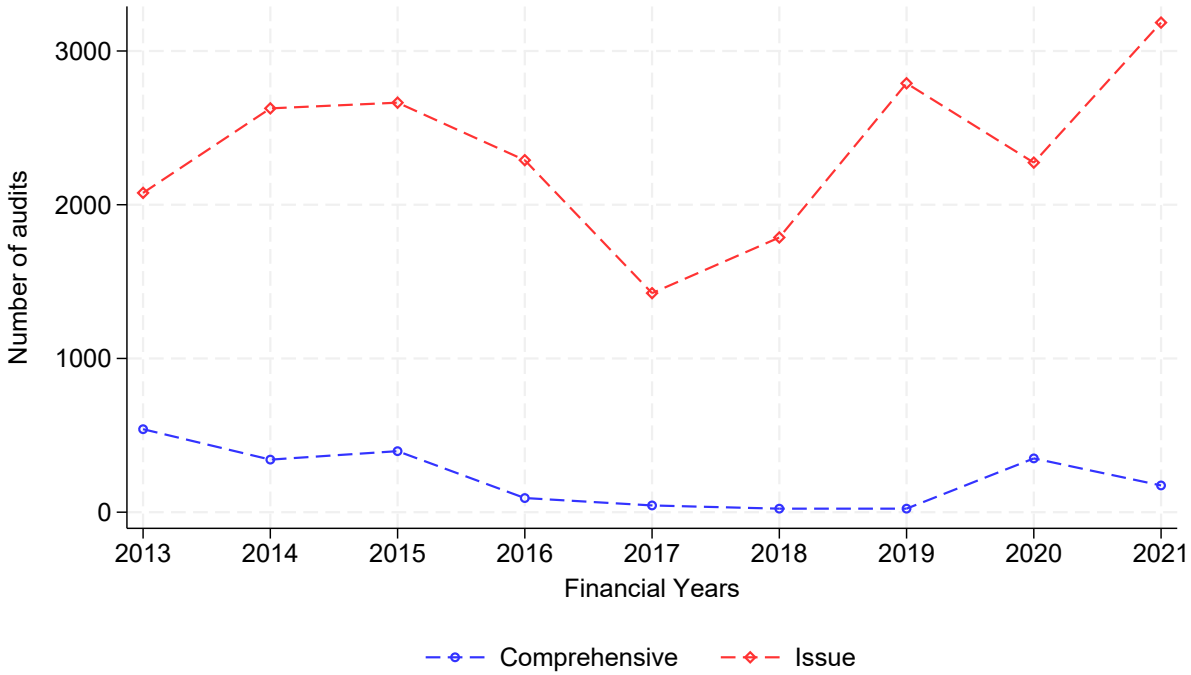
A Further Descriptive Information & Analysis

Figure A.1
Number of taxpayers



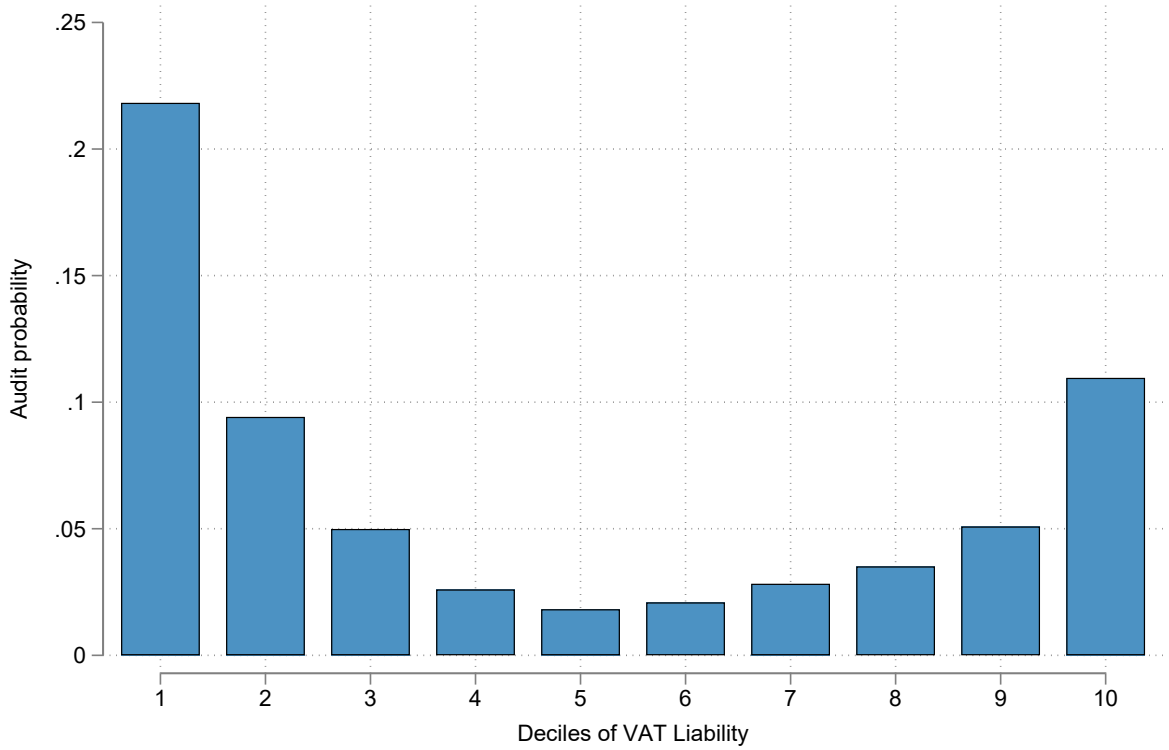
Notes: This figure displays the number of taxpayers that file different set of taxes and were audited. In our analysis focus on the set of taxpayers that filed VAT at least once during our study period.

Figure A.2
Number of Audits by audit type



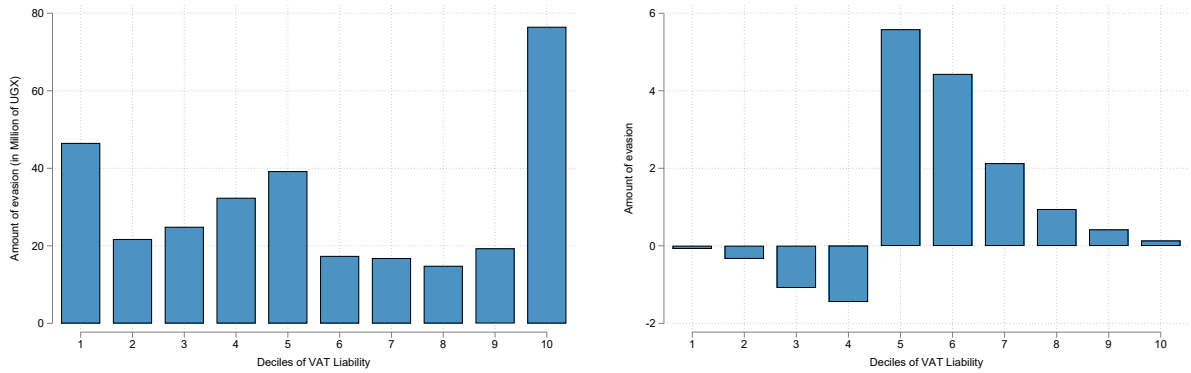
Notes: This figure displays the number of audits conducted every financial year for each type of audit. If a taxpayer is audited multiple times during the same financial year, we count each audit separately.

Figure A.3
Audit probability by decile of VAT Liability



Notes: This figure displays the share of firms being audited within each decile of VAT liability. We calculate the decile separately for each financial year and then compute the average share of firms being audited within each decile across all the financial years (2013–2021). In the lowest deciles, the value-added tax obligation is negative; that is, firms are in a refund position.

Figure A.4
Detected evasion



(a) Absolute evasion (b) Relative evasion

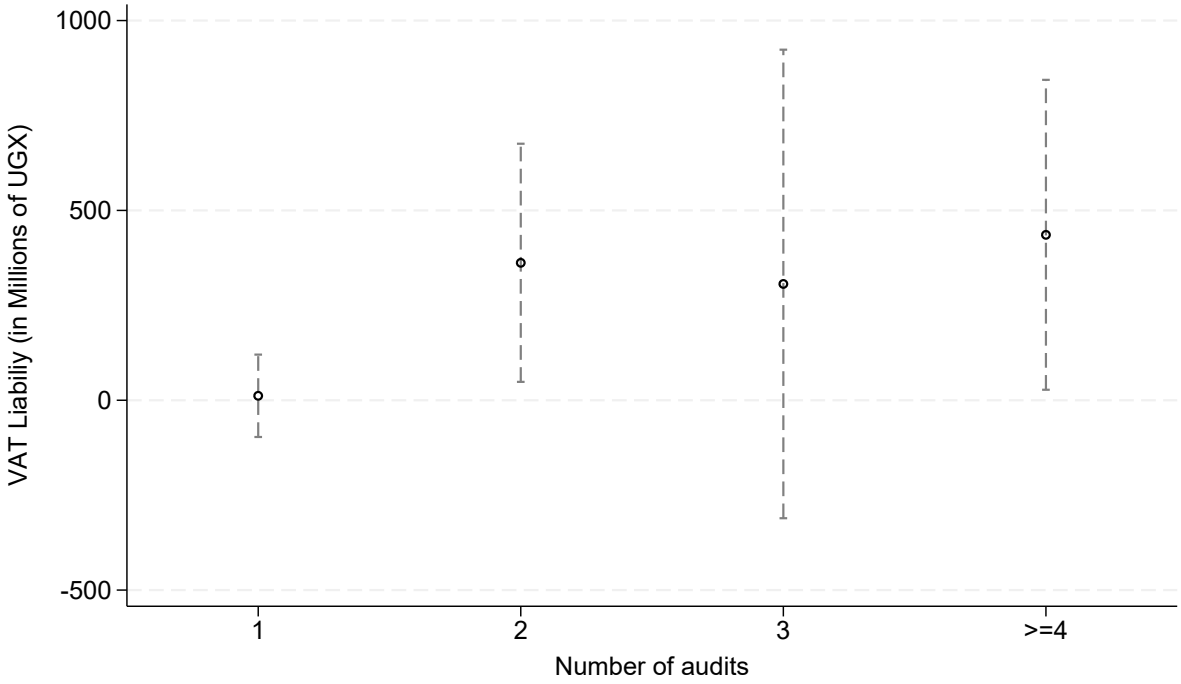
Notes: This figure displays the average amount of detected evasion from an audit (in Panel (a)) and the average amount of detected evasion relative to the firms tax liability in that year (in Panel (b)) for each ecile of VAT Liability. Relative evasion is winsorized at the top and bottom 1 percent. In the lowest deciles, the value-added tax obligation is negative; that is, firms are in a refund position.

Table A.1
Summary Statistics

	Mean (1)	Std. dev. (2)	Mean (3)	Std. dev. (4)	Coeff (5)	Std. err. (6)
			Panel A: All vs balanced			
	All firms		Unbalanced		Balanced vs Unbalanced	
Total Sales	3,050	(32,122)	1,392	(18,084)	4,575***	(602)
Cost Of Sales	2,289	(24,020)	1,122	(15,693)	3,219***	(431)
Total Assets	3,524	(72,618)	1,319	(32,422)	5,987***	(1,320)
Output VAT	440	(4,525)	159	(1,099)	603***	(82)
Input VAT	324	(3,179)	130	(839)	415***	(57)
VAT liability	-14	(2,173)	-65	(899)	109***	(33)
Number of observations	147921		94294		53627	
Number of firms	29021		22583		6438	
			Panel B: Audited vs unaudited			
	All balanced		Unaudited		Audited vs Unaudited	
Total Sales	5,003	(40,413)	1,837	(11,980)	12,225***	(1,871)
Cost Of Sales	3,618	(28,176)	1,531	(10,647)	8,059***	(1,281)
Total Assets	4,998	(69,721)	1,164	(9,973)	14,584***	(3,310)
Output VAT	580	(4,782)	219	(1,458)	1,393***	(221)
Input VAT	420	(3,434)	177	(1,387)	938***	(155)
VAT liability	-30	(2,586)	-24	(792)	-23	(121)
Number of observations	6438		4771		1667	
Number of firms	6438		4771		1667	
			Panel C: Multiple vs single audited			
	All audited		Single audit		Multiple vs single	
Total Sales	14,062	(76,082)	7,583	(65,718)	16,849***	(4,080)
Cost Of Sales	9,590	(51,910)	4,663	(39,194)	12,814***	(2,906)
Total Assets	15,748	(134,387)	8,004	(105,505)	20,039***	(7,496)
Output VAT	1,612	(8,991)	1,024	(7,435)	1,528***	(492)
Input VAT	1,115	(6,277)	593	(3,111)	1,358***	(379)
VAT liability	-47	(4,902)	178	(4,607)	-585**	(255)
Number of observations	1667		1026		641	
Number of firms	1667		1026		641	

Notes: This table presents summary statistics and comparisons for the different set of samples we work with in the paper. In *Panel A* we compare the firms that consistently file taxes within their stack against all firms that filed VAT taxes at some point between 2013 and 2021. Because there is no clean baseline we use information from all financial years available. In *Panel B* we compare firms that were audited against firms that were not audited among firms that filed consistently within their stack. For each firm we use information from the year prior to the first audit year. For firms in the control group that are in multiple stacks we use information from the first stack where they appear as a control. In *Panel C* we compare firms audited nce against firms audited multiple times. Similar to Panel B, use information from the first year prior to the first audit. All numbers are in millions of Uganda Shillings. Standard errors in Column (6) are heteroskedasticity robust and clustered at the firm level.

Figure A.5
Effect on reported VAT liability by number of audits



Notes: This figure displays the results from running equation 6 with CEM weights from set IV, separately for firms receiving 1, 2, 3, and 4 or more audits. CEM weights from set IV include matching on ISIC codes, firm type, sales/purchase ratio, one year sale growth deciles, and firm sale deciles. The control group throughout is the set of firms that are never audited. The outcome variable, VAT liability is measured in millions of Ugandan Shillings, and winsorized at the top and bottom 0.1 percent for each year. Robust standard errors (clustered at the firm level) are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B Outcomes of the CEM procedure

Various matching techniques are discussed in existing literature, aiming to strike an equilibrium between enhancing balance on relevant pre-treatment covariates and maintaining a reasonable matched sample size (see, among others, King et al., 2011; Imbens and Rubin, 2015; Guo and Fraser, 2015). Our choice is Coarsened Exact Matching (CEM) due to its robust statistical properties, outperforming common methods like Propensity Score Matching and Mahalanobis Distance Matching in reducing initial imbalances.[1]

Moreover, CEM algorithm is extremely intuitive. It groups pre-treatment variables into meaningful bins based on user-defined thresholds or standard binning algorithms.[2] Units with the same bin signature are placed in a stratum, and control units within each stratum are weighted to match the number of treated units. Strata without both treated and control units are removed. Using these weights, we employ a Difference-in-Differences (DID) approach to estimate equations (5)-(6).

Table B.1
Summary of the CEM matching procedure: Matching summary

	Non-audited (1)	Audited (2)
Panel A: Set I of covariates		
All	7435	2530
Matched	7417	2530
Unmatched	18	0
Panel B: Set II of covariates		
All	7435	2530
Matched	7391	2530
Unmatched	44	0
Panel C: Set III of covariates		
All	7435	2530
Matched	7028	2493
Unmatched	407	37
Panel D: Set IV of covariates		
All	7435	2530
Matched	6255	2352
Unmatched	1180	178

Notes: The table depicts the matching summary of the CEM procedure for each set of matching covariates.

[1]CEM also minimizes model dependence, estimation error, bias, variance, and other criteria, while optimizing the trade-off between sample size and balance (see Iacus et al., 2011, 2012; Blackwell et al., 2009; King et al., 2011; King and Nielsen, 2019 for more details and formal proofs, and Iacus et al., 2019 for a discussion on the inference theory).

[2]Specifically, for the categorical variables (ISIC industry and type of business) we perform exact matching and we use deciles or quartiles for the other variables.

Table B.2
Summary of the CEM matching procedure: Overall imabalance, Multivariate L_1

	L_1
	(1)
Panel A: Set I of covariates	
Pre Matching	0.114
Post matching	0.000
Panel B: Set II of covariates	
Pre Matching	0.130
Post matching	0.000
Panel C: Set III of covariates	
Pre Matching	0.216
Post matching	0.050
Panel D: Set IV of covariates	
Pre Matching	0.376
Post matching	0.055

Notes: The table reports the L_1 statistics for multivariate imbalance as defined in Iacus et al. (2011) for each set of matching covariates.

Table B.3
Summary of the CEM matching procedure: Differences across treatment cohorts

	L_1 (1)	Mean (2)	Min (3)	25% (4)	50% (5)	75% (6)	Max (7)
Panel A: Set I of covariates							
Pre matching							
ISIC Industry	0.114	-0.776	0.000	-1.000	0.000	-2.000	0.000
Post matching							
ISIC Industry	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Panel B: Set II of covariates							
Pre matching							
ISIC Industry	0.114	-0.776	0.000	-1.000	0.000	-2.000	0.000
Firm Type	0.071	0.071	0.000	0.000	0.000	0.000	0.000
Post matching							
ISIC Industry	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Firm Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Panel C: Set III of covariates							
Pre matching							
ISIC Industry	0.132	-0.779	0.000	0.000	0.000	-2.000	1.000
Firm Type	0.091	0.091	0.000	0.000	0.000	0.000	0.000
Sales/Purchases	0.011	41.514	0.000	0.009	0.120	0.565	1.081e+04
Sales Growth Decile	0.060	0.037	0.000	0.000	0.000	0.000	0.000
Post matching							
ISIC Industry	0.000	-0.000	0.000	0.000	0.000	0.000	0.000
Firm Type	0.000	-0.000	0.000	0.000	0.000	0.000	0.000
Sales/Purchases	0.024	2.255	0.000	0.040	2.610	.	.
Sales Growth Decile	0.000	-0.000	0.000	0.000	0.000	0.000	.
Panel D: Set IV of covariates							
Pre matching							
ISIC Industry	0.132	-0.779	0.000	0.000	0.000	-2.000	1.000
Firm Type	0.091	0.091	0.000	0.000	0.000	0.000	0.000
Sales/Purchases	0.011	41.514	0.000	0.009	0.120	0.565	1.081e+04
Sales Growth Decile	0.060	0.037	0.000	0.000	0.000	0.000	0.000
Size (Sales Decile)	0.246	0.438	0.000	1.000	0.000	1.000	0.000
Post matching							
ISIC Industry	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Firm Type	0.000	-0.000	0.000	0.000	0.000	0.000	0.000
Sales/Purchases	0.022	2.141	0.000	0.086	2.136	.	.
Sales Growth Decile	0.000	-0.000	0.000	0.000	0.000	0.000	.
Size (Sales Decile)	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: For each set of matching covariates, the table reports the L_1 statistics for univariate imbalance, as defined in Iacus et al. (2011), and differences across treatment cohorts in the distribution of the matching covariates before and after CEM.

Specifically, CEM is applied to stratify the sample based on variables described in Section 4, and the results of the matching procedures are presented in Tables B.1-B.3. For each set of matching covariates, these tables include a summary of matched and unmatched observations (B.1), a measure of multivariate imbalance reduction (B.2), and univariate imbalance statistics for each matching variable together with the difference at the mean and other relevant points of the covariates' distribution across treatment cohorts (B.3). The imbalance measures are based on the L_1 difference between the multivariate or univariate histogram of matching variables across treatment cohorts (see Iacus et al., 2011 for a formal definition). In short, L_1 is bounded between 0 and 1—with higher values indicating higher imbalance—and it is an index that should be evaluated in relative rather than absolute terms by comparing the values before and after the stratification process.

Across all tables, these measures show substantial reduction in imbalance after CEM (for example, reducing the multivariate imbalance to just around 14 percent of initial imbalance in the more inclusive set of matching variables), indicating increased homogeneity in the pre-treatment covariates across treatment cohorts while maintaining a high number of matched observations.

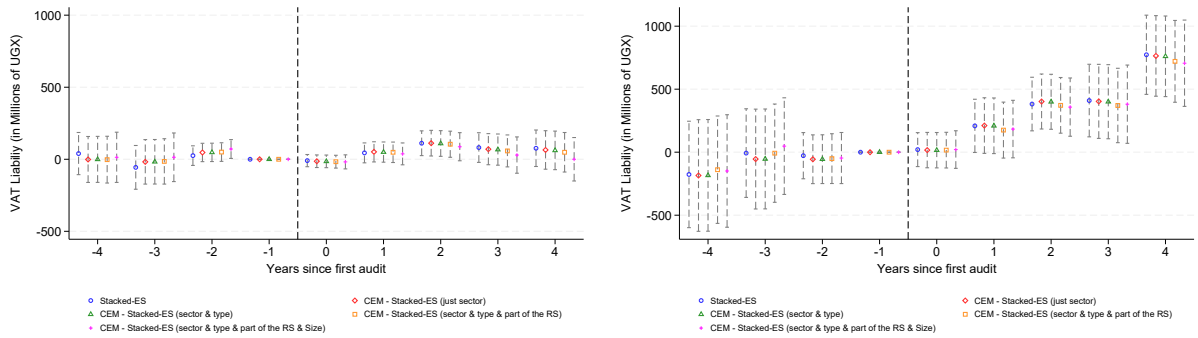
C Robustness analysis

C.1 Alternative weights – single and multiple audits

Figure C.1
Event study estimates for the impact of audits on reported VAT liability using different set of weights

(a) One audit

(b) Multiple audits



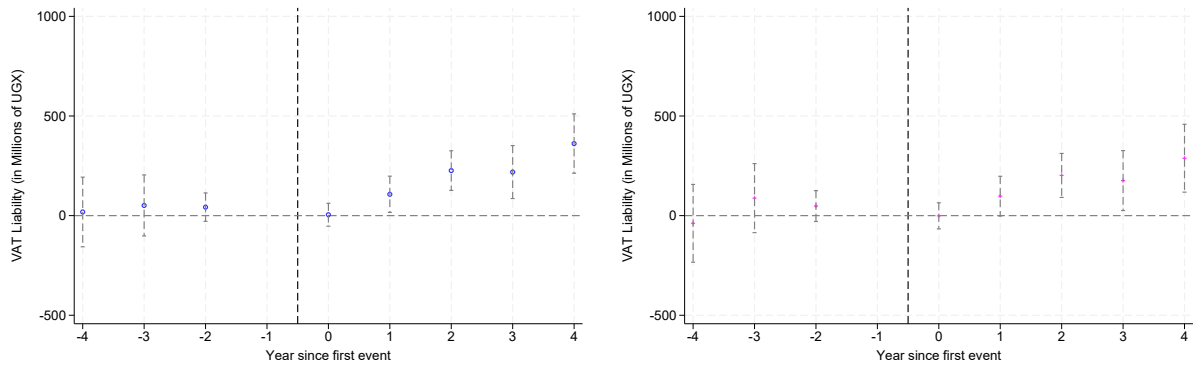
Notes: This figure report results from running equation 5 for each set of weights presented in table 1. We present results for firms receiving one audit in Panel (a) and firms receiving multiple audits in Panel (b). The excluded category is the last period before the first audit (T=-1); 95 percent confidence intervals are shown and based on S.E. clustered at the firm level.

C.2 Alternative estimator: Callaway - Sant'Anna approach

Figure C.2
Event study estimates for the impact of audits on reported VAT liability

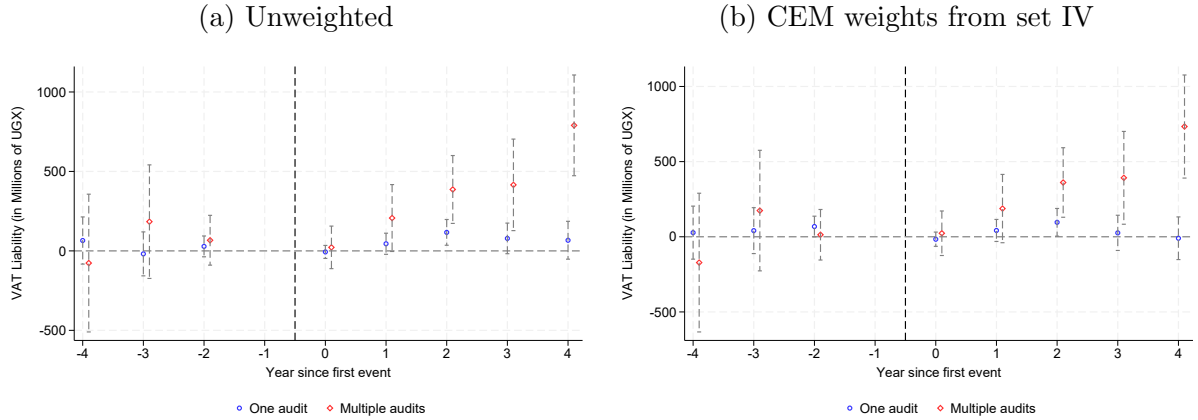
(a) Unweighted

(b) CEM weights from set IV



Notes: This figure report results from running equation 5 with CEM weights from set IV using the approached developed by Callaway and Sant'Anna (2021). CEM weights from set IV include matching on ISIC codes, firm type, sales/purchase ratio, one year sale growth deciles, and firm sale deciles. The excluded category is the last period before the first audit (T=-1); 95 percent confidence intervals are shown and based on S.E. clustered at the firm level.

Figure C.3
Event study estimates for the impact of audits on reported VAT liabilities, one vs multiple



Notes: This figure report results from running equation 5 with CEM weights from set IV using the approached developed by Callaway and Sant'Anna (2021). CEM weights from set IV include matching on ISIC codes, firm type, sales/purchase ratio, one year sale growth deciles, and firm sale deciles. We report results separately for firms receiving one audit and firms receiving multiple audits. The excluded category is the last period before the first audit (T=-1); 95 percent confidence intervals are shown and based on S.E. clustered at the firm level.

C.3 Winsorizations

Table C.1
Unweighted regression with different choices of winsorization.

	None	Winsorize top and bottom...			
		0.1%	0.5%	1%	2%
	(1)	(2)	(3)	(4)	(5)
DD coefficient	355.021***	192.113***	69.034***	37.991***	17.152**
	(115.258)	(52.659)	(19.547)	(13.059)	(7.971)
N	178837	178837	178837	178837	178837
Distinct firms	6438	6438	6438	6438	6438
Average in Control in pre-period	0.967	6.603	4.430	4.338	4.445
Average in Treated in pre-period	-47.123	-60.143	-91.049	-85.737	-69.467
R-squared	0.62	0.54	0.53	0.52	0.51

Notes: This table reports results from running equation 6 without any weight for different winsorization choices of the outcome variable. Column (1) presents results when the outcome variable is winsorized. Column (2) – (5) present results for progressively more strict winsorization choices. The outcome variable, VAT liability is measured in millions of Ugandan Shillings. Robust standard errors (clustered at the firm level) are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.