Do Tax Audits have a Dynamic Impact? Evidence from Corporate Income Tax Administrative Data

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The views expressed in this paper do not necessarily reflect those of the Rwanda Revenue Authority and its Management

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Road map of presentation

- Motivation
- Objective of research and overview of results
- Data
- Conceptual framework and estimation
- Results
- Concluding remarks

Motivation

- Tax audits perform an important function in compliance and
- . . . They contribute to a level playing field and so to tax fairness
- Understanding the impact of tax audits is a pressing issue, especially for developing countries and revenue mobilization
- . . . And is also important for how to optimally design the tax audit function
  - This issue has now become more pressing for tax administrations following the challenges faced following **COVID-19**
  - . . . Which has resulted in them (re)focusing on **less** comprehensive tax audits and **more** on narrow-scope ones

Motivation cont.

- Increased willingness of tax administrations to collaborate with academics has led to important empirical research in tax audits evaluation
- Utilising data from different audit samples (random/risk-based), and different methodological approaches, research has looked at the impact of a number of policy interventions on compliance, e.g.
  - ⇒ Kleven et al., 2011; Gemmell and Ratto, 2012; Pomeranz, 2015; DeBacker et al., 2018*a*;, DeBacker et al., 2018*b*; Advani, Elming and Shaw, 2019; Løyland et al., 2019; Beer et al., 2020;
  - ⇒ Brockmeyer et al., 2019; Li, Pittman and Wang, 2019; Lediga, Riedel and Strohmaier, 2020; Best, Shah and Waseem, 2021; Waseem, 2021; Balán et al., 2021

Motivation cont.

- But thus far research has focused, predominantly, on PIT and VAT, and without assessing the different types of audits
- Zooming into the different types of audits will reveal something striking:

Audits might have a **negative** impact on compliance

The objective of this study is to assess...

- **The impact of:**
  1. Tax audits on deterring future Corporate Taxable Income (CTI) noncompliance, and
  2. Different types of tax audits on CTI noncompliance
- **Understanding and measuring this impact:**
  1. Provides a measure of the effectiveness of a tax administration's audit function over and above the 'static' (the verification stage) revenue yield of audits
  2. Knowledge of the cost of audit can provide an estimate on the (net) dollar value of CTI audits

Summary of results

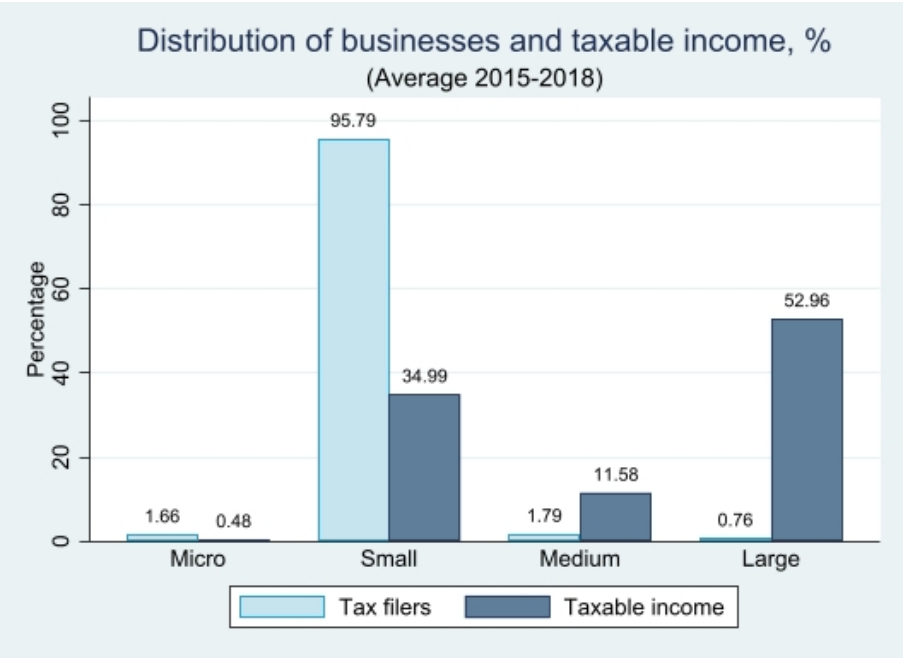
- Tax audits in Rwanda deliver sizeable pro-deterrence effects on future reporting behaviour
  - Corporate Taxable Income (CTI) declared by audited firms one year after the audit increases by **20.7%**
  - This corresponds to **12.3%** more Corporate Income Tax (CIT) paid
  - Noncompliant taxpayers drive the results
- ... But:
  - Comprehensive audits drive the pro-deterrence impact
  - Narrow-scope audits have a counter-deterrence effect after 2 years of **-23.5%** on CTI and **-9.5%** on CIT paid

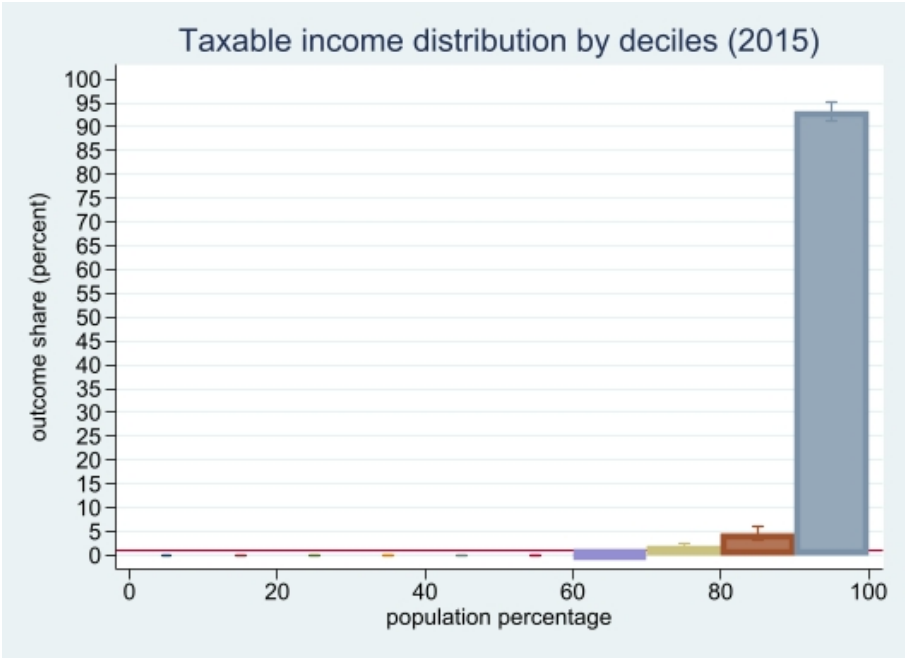
Data: Classification of businesses and CIT regimes

- Four types of businesses depending upon turnover: micro/small/medium/large
- CIT regimes:
  - CIT-real: Corporate tax rate of 30% on profits with some deductions
  - CIT-lump-sum: Simplified revenue-based tax regime 3% on turnover (small businesses)
  - CIT-flat-tax: Lump-sum tax, depending on turnover (micro-businesses)

Data: CIT cont.

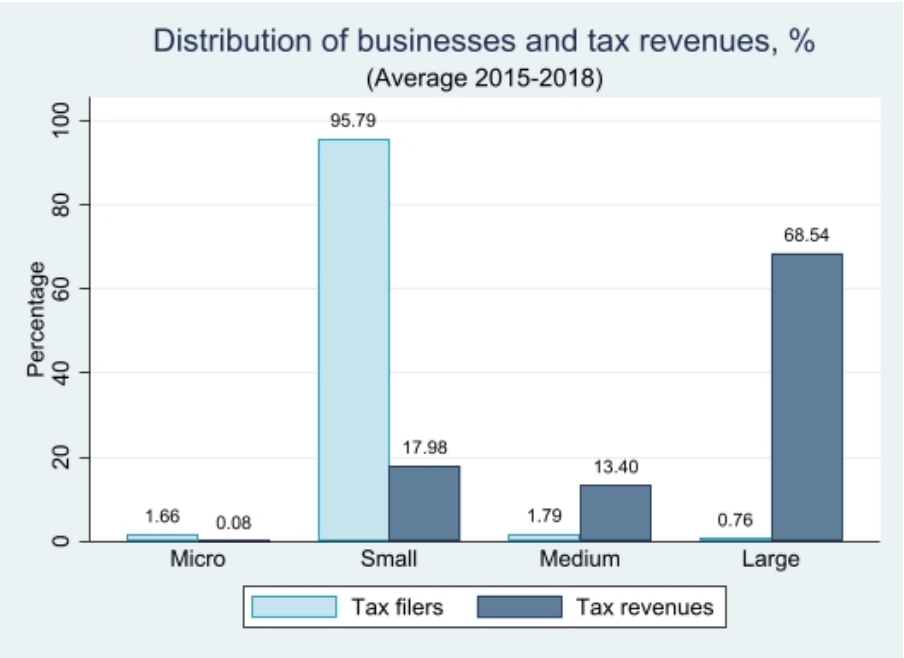
- Most corporate taxable income comes from large businesses

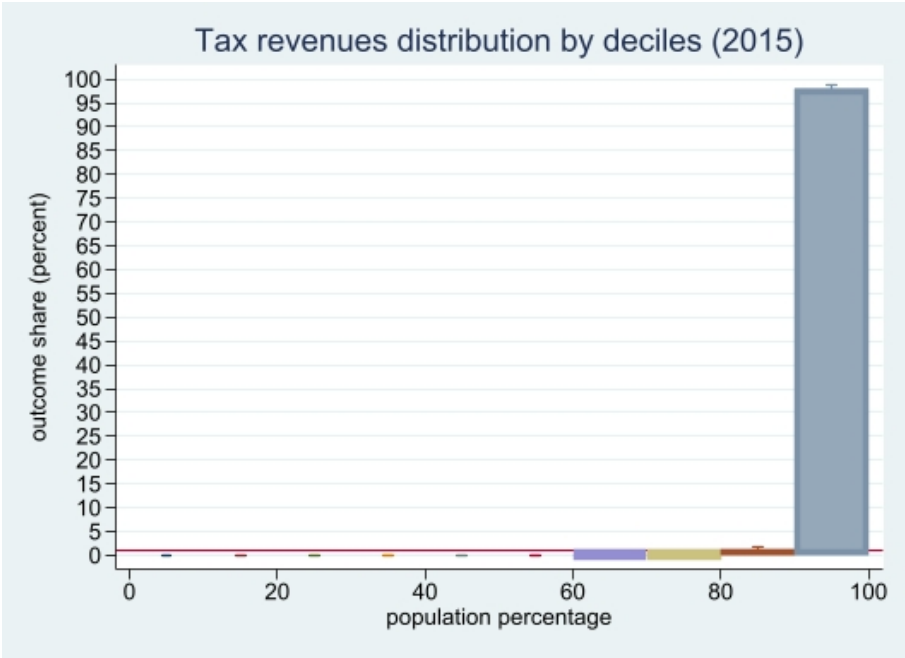




Data: CIT cont.

- And therefore most corporate tax revenue comes from large businesses



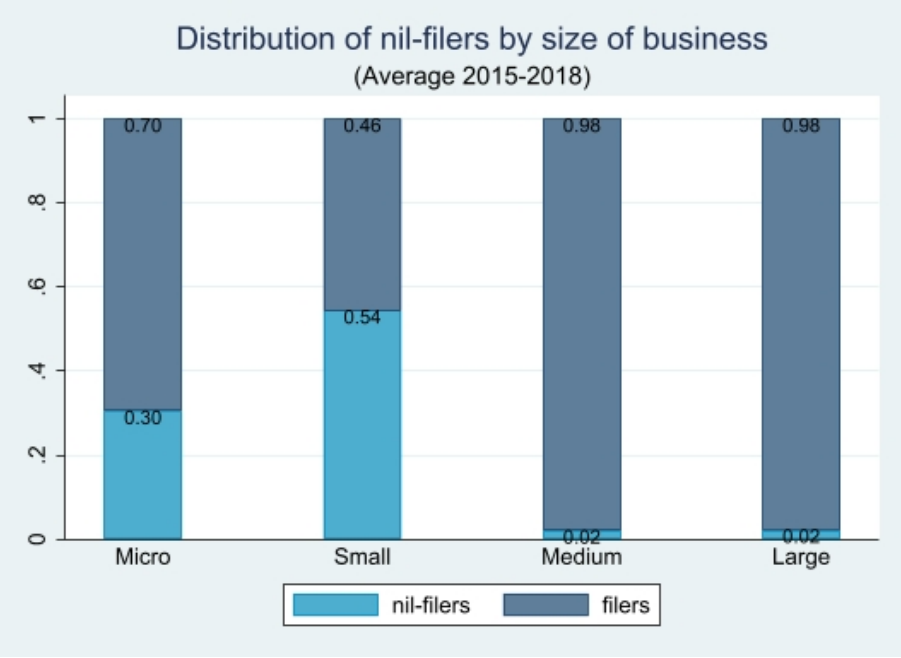


Data: CIT

- Data consists of the universe of (over the years 2013-2018):
  - The universe of CIT administrative income declarations of incorporated businesses
  - The universe of risk-based/audit outcomes (verification/fines etc)
  - Tax disputes (closed cases) arising as a consequence of 2015 audit wave

Data: CIT cont.

- Significant share of CIT filers are nil-filers (0 sales and 0 across of items)



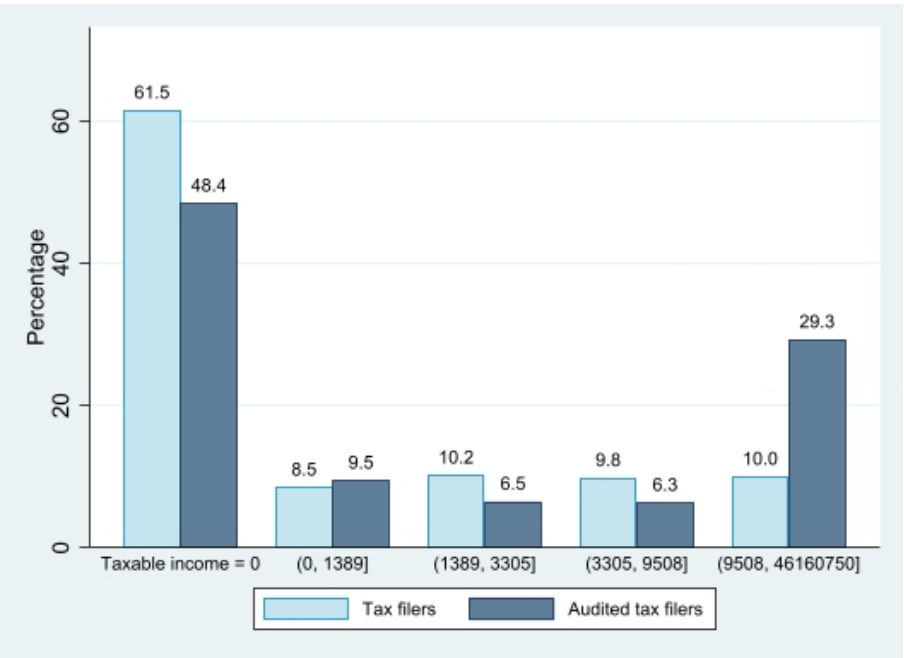
Data: **Audits** cont.

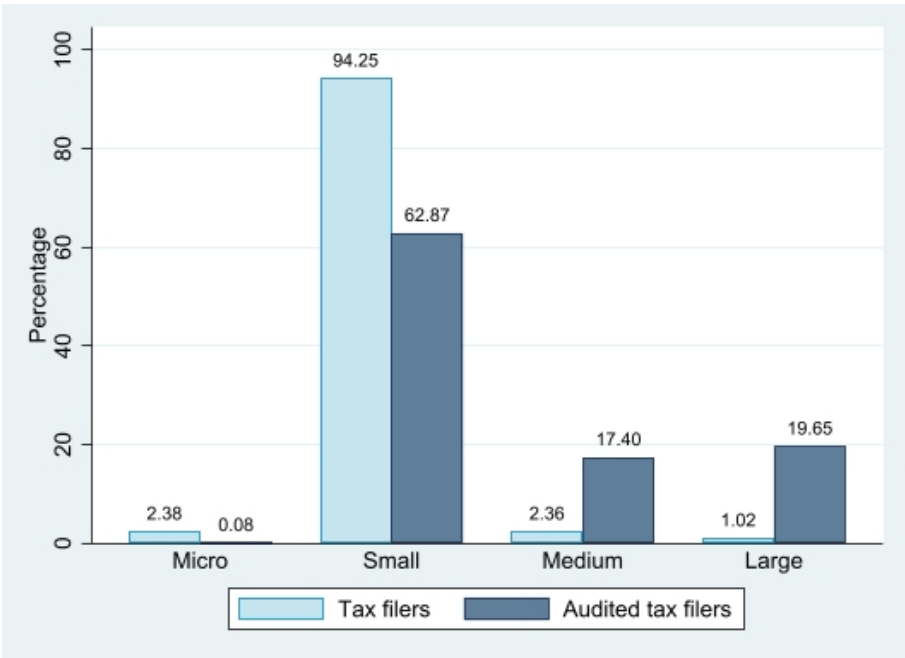
- **Narrow-scope audits (63%):** They are conducted using information already submitted to RRA and usually focused on a single tax type, single aspect or single tax period (and desk-based)
- **Comprehensive audits (37%):** They are in-person, in-depth and time-intensive across tax bases

Variable	Obs	Measurement Unit	Mean	Std.Dev	Min	Max
Audit outcome	435	1000 US $	101.15	969.81	0	19,369.84
Total fines	435	1000 US $	56.36	585.85	0	11,621.90
Total audit outcome	435	1000 US $	157.50	1555.13	0	30,991.74
Total audit outcome (%)	435	% Potential tax base	62.23	42.27	0	100

Data: **Audits** cont.

- Audits follow U-shape across the taxable income distribution





Data: **Risk scores** cont.

- RRA performs risk-based audit selection
  - Assigning risk scores to all tax declarations, including VAT, and also accounting for the likelihood of revenue yield
  - This is useful information used in the empirical analysis

Assessing the impact of audits: What can we expect?

- Theoretically, impact of audits on future compliance is ambiguous
- Compliance might increase, as audited taxpayers (especially noncompliant) might think that they will be audited again
- Compliance might reduce, as audited taxpayers might think that 'lightning does not strike twice'
- Important is therefore what taxpayer believe, regarding the likelihood of them being audited, and this belief is formed with information obtained from the audit themselves (accuracy of 'strike rate')

The hypothesis is that the more 'accurate' audits are the more impact they will have on future compliance

How to estimate the impact?

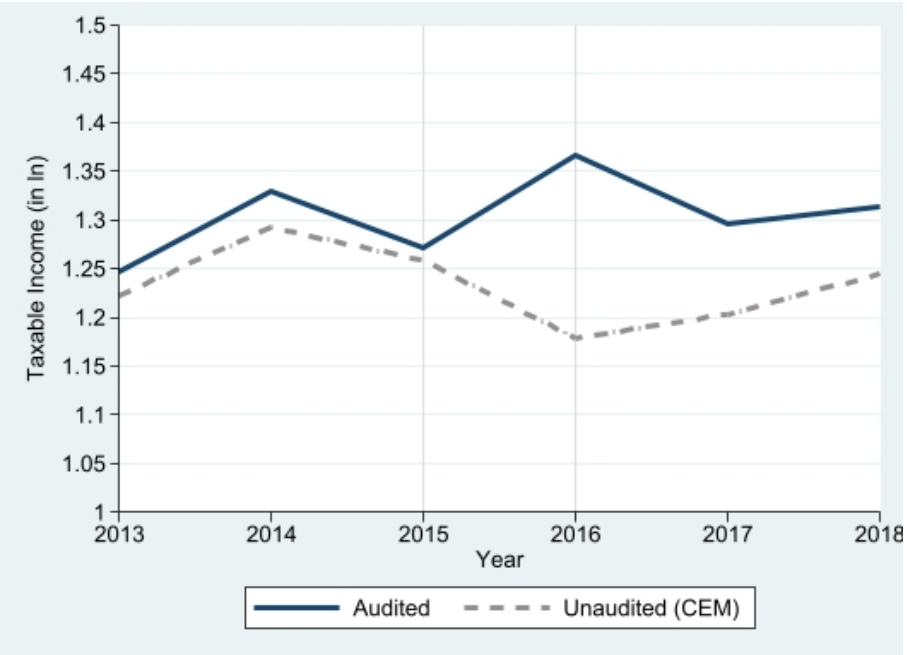
- Bad news: Assessing audits requires to know how an audited business would have behaved, had it not been audited, something which is not observable in the data
- Good news: There are methods which can estimate this (robustly)
- Approach: We combine 'matching methods' with a 'difference-in-difference approach'

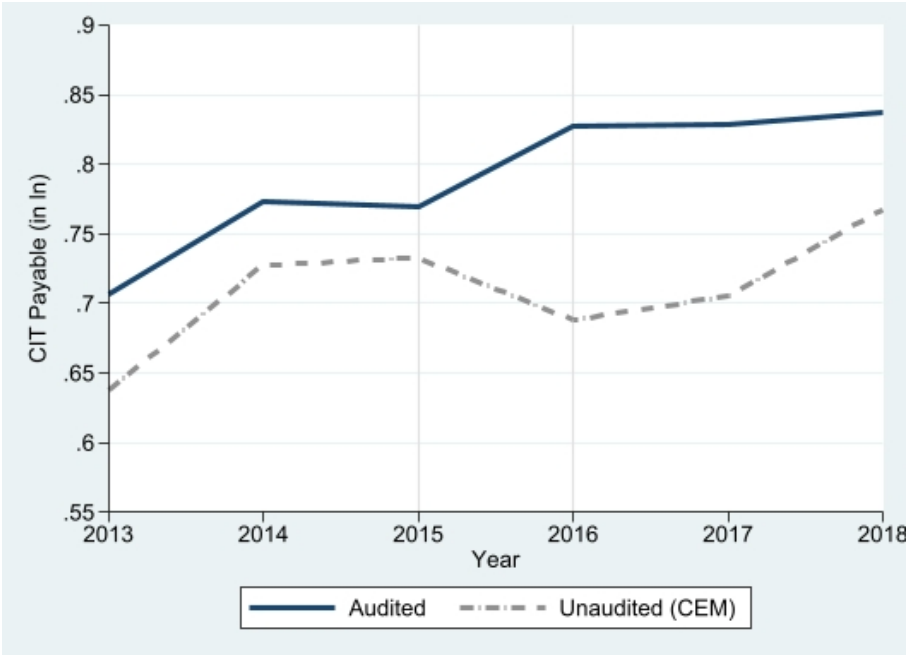
Main Results – Aggregate

Dependent Variable	Corporate Taxable Income			Corporate Income Tax payable		
Years after the audit	1	2	3	1	2	3
Matching estimator	(1)	(2)	(3)	(4)	(5)	(6)
Coarsened Exact Matching	**0.175**	0.080	0.056	**0.103**	0.087	0.033
	(0.023)***	(0.147)	(0.111)	(0.017)***	(0.107)	(0.081)
Kernel - MHD	**0.208**	0.003	0.025	**0.124**	0.030	0.012
	(0.023)***	(0.147)	(0.111)	(0.017)**	(0.107)	(0.081)
Kernel - PSM	**0.148**	-0.074	-0.145	**0.119**	0.023	-0.059
	(0.081)*	(0.107)	(0.117)	(0.059)**	(0.073)	(0.081)
Nearest Neighbour	**0.297**	0.125	0.195	**0.147**	0.079	0.097
	(0.099)***	(0.120)	(0.143)	(0.072)**	(0.084)	(0.096)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results in graphs





Note: *Aggregate impact* of audits on audited taxpayers (under CEM): Taxable income in ln (left panel); CIT Payable in ln (right panel)

Main Results – Audit type

Dep. Variable	Corporate Taxable Income			Corporate Income Tax payable		
Years after audit	1	2	3	1	2	3
Type of Audit	(1)	(2)	(3)	(4)	(5)	(6)
Comprehensive	**0.285**	0.130	-0.040	**0.246**	0.136	0.030
	(0.162)*	(0.228)	(0.241)	(0.128)*	(0.185)	(0.161)
Narrow-scope	0.020	**-0.235**	**-0.170**	0.006	**-0.095**	**-0.078**
	(0.030)	(0.066)***	(0.046)***	(0.026)	(0.047)**	(0.042)*

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Conclusions

- Tax audits in Rwanda deliver a sizeable pro-deterrence effect on future reporting behaviour
  - Corporate Taxable Income declared by audited firms one year after the process increases by **20.7%** (Corporate Income Tax (CIT) payable by **12.3%**)
  - Noncompliant taxpayers drive the results
- ... But:
  - Comprehensive audits drive the pro-deterrence impact
  - Narrow-scope audits have counter-deterrence effect after 2 years (**-23.5%** on TI, **-9.5%** on CIT)
- Several robustness analyses corroborate these results

Conclusions cont.

- Are the results transferable to other tax administrations with the same characteristics (external validity)?

  $\Rightarrow$ The results suggest yes!

- Must be emphasized that what the results point to is that the effectiveness of auditing requires careful evaluation

  $\Rightarrow$ Frequently, policies enacted have unintended consequences and to avoid those they must be carefully evaluated

Thank you for listening

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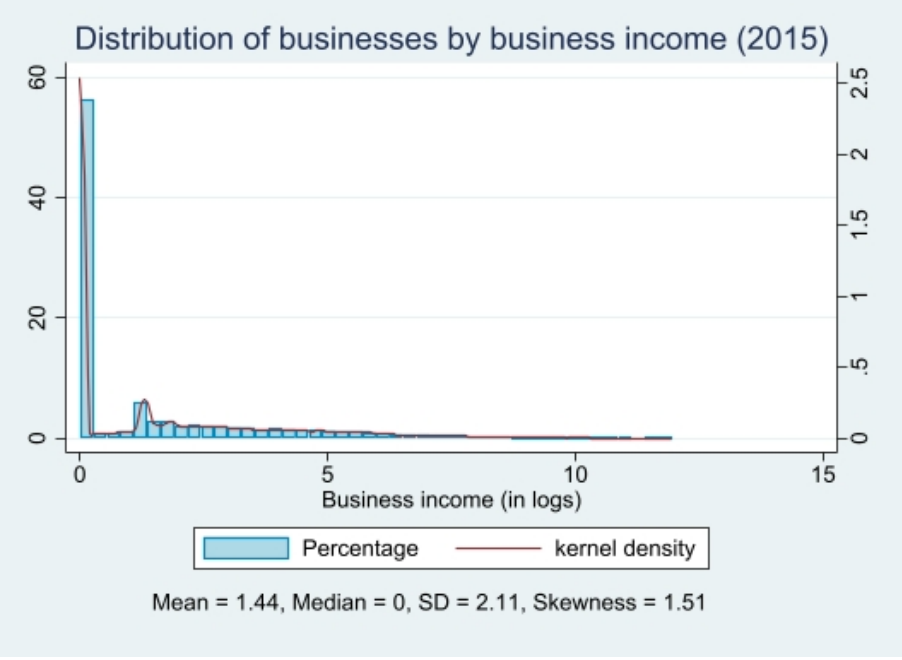
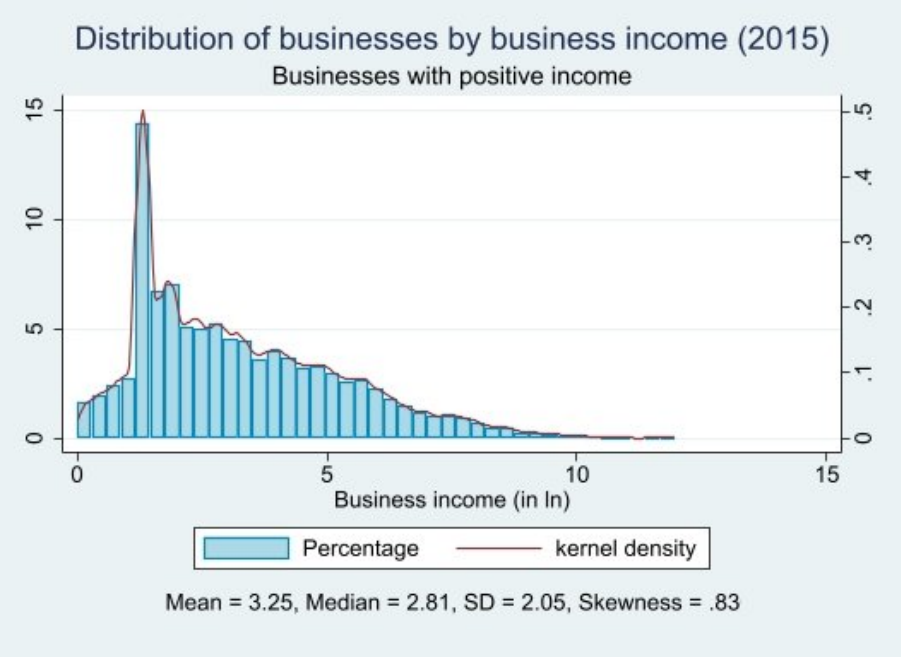
Data: CIT

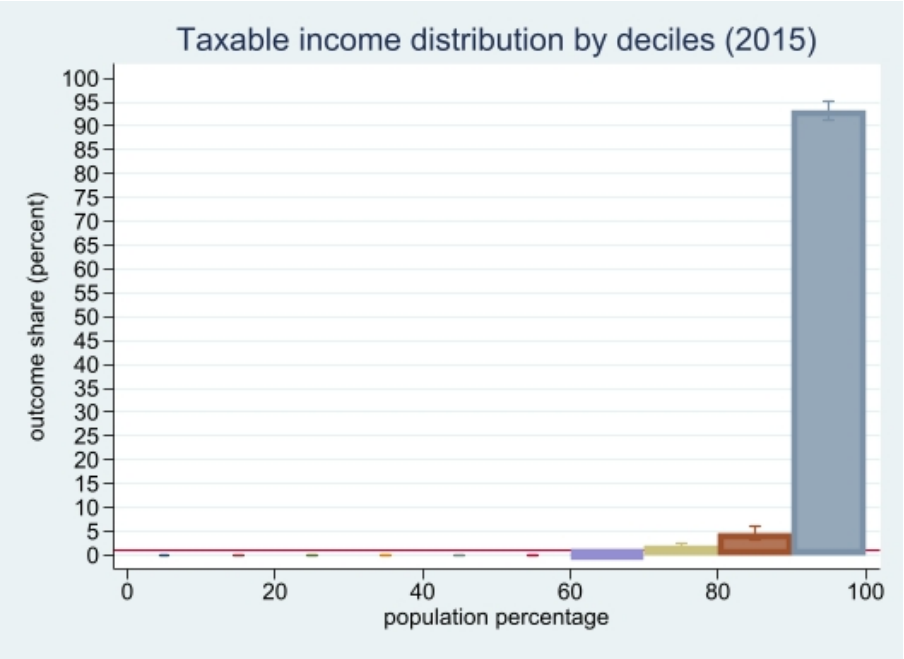


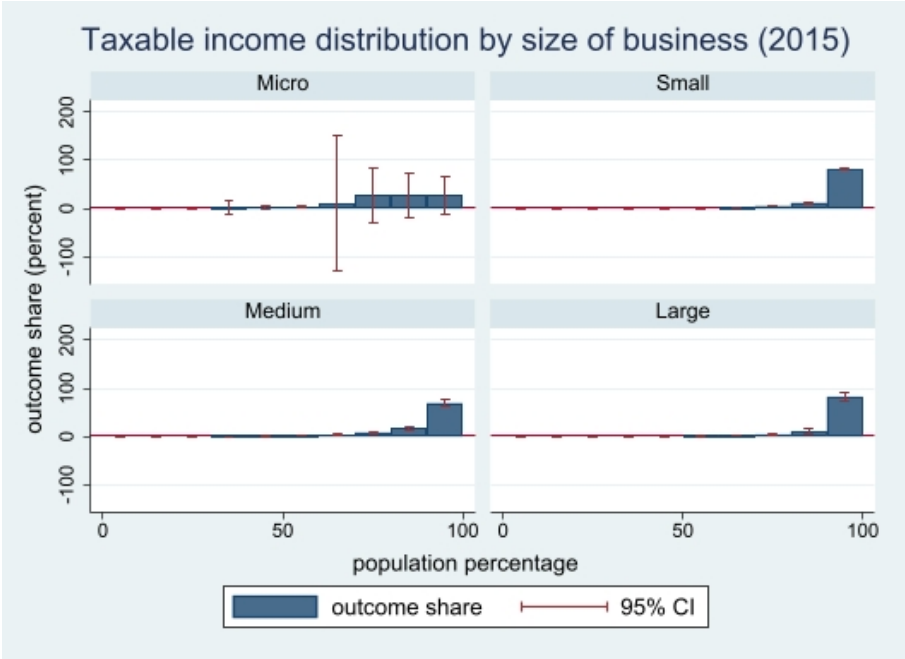


Number of CIT filers by fiscal year (2013-2018)

Tax period	2013	2014	2015	2016	2017	2018
Total number of CIT declarations	13,778	24,405	29,174	32,572	36,793	40,490

More on CIT data



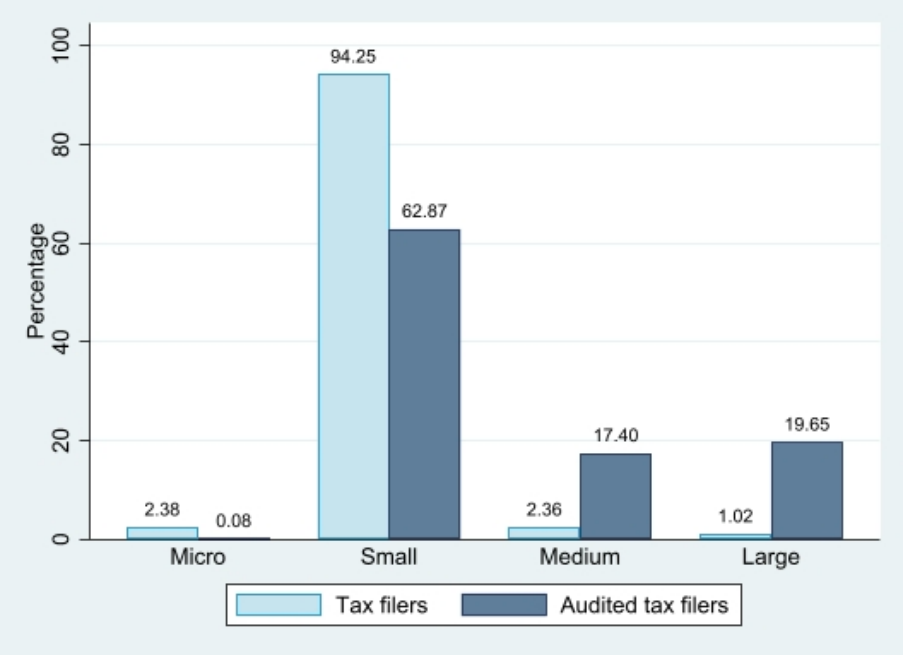


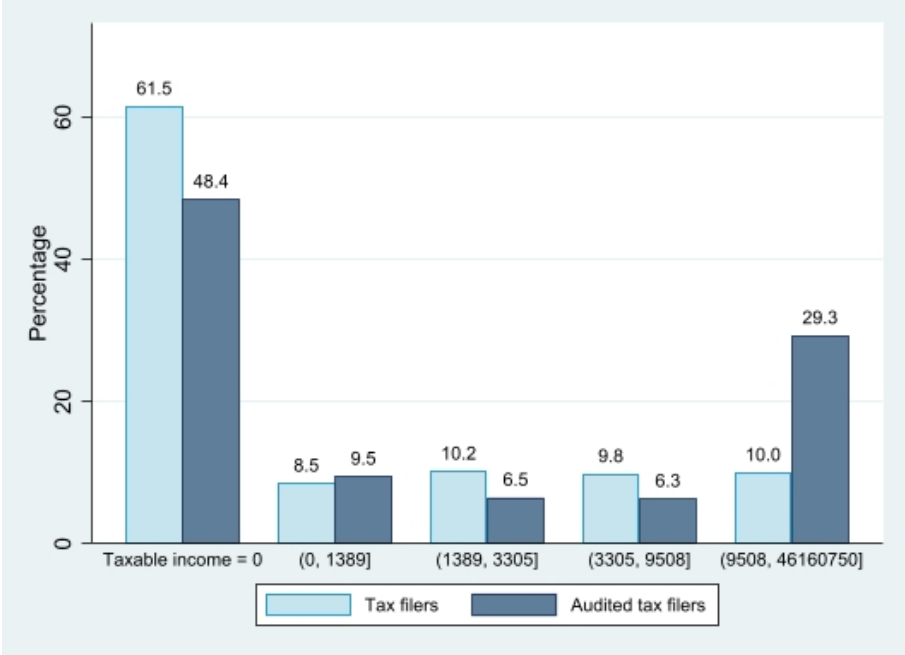
Note: Authors' calculations based on data provided by RRA

- Firms in the tenth decile report more than 90% of taxable income (left-hand-side panel).
- The majority of reported income across firm type is reported by the top deciles of their corresponding distribution (right-hand-side panel).

Back to main CIT data.

More on Audit data



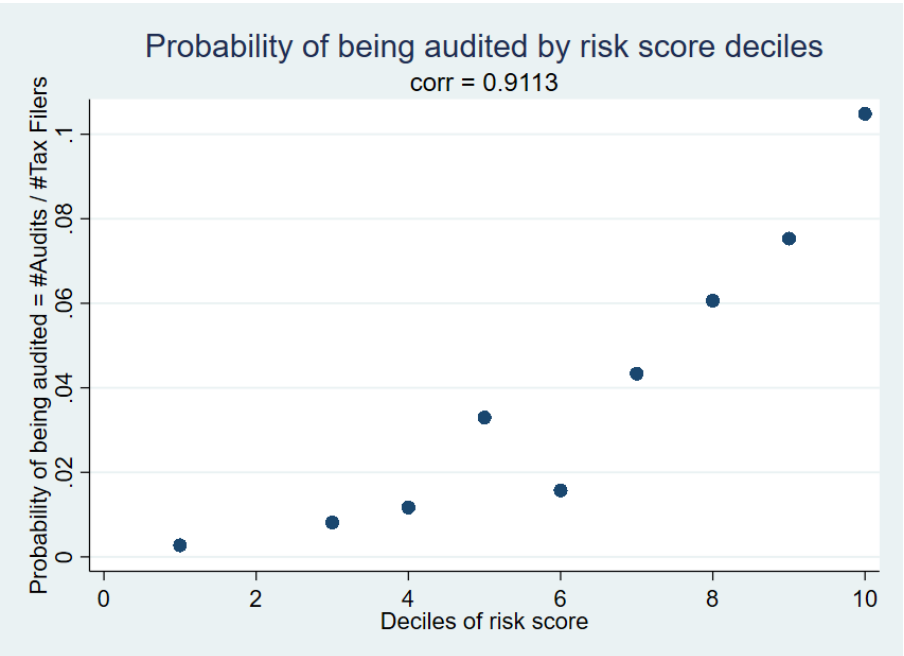


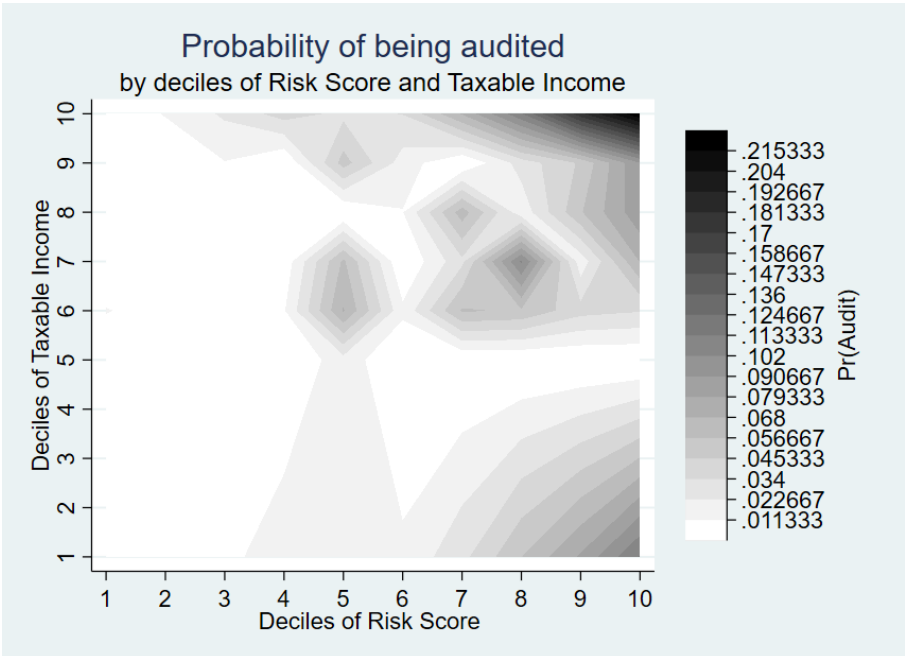
Note: Authors' calculations based on data provided by RRA

- Left-hand-side panel reports the distribution of audits by size and firms by size.
- Right-hand-side panel shows the distribution of firms and audits by deciles of taxable income

Back to main audit data.

Risk Scores and probability of being audited





Note: Authors' calculations based on data provided by RRA.

Back to main risk scores.

Empirical Strategy: matching methods

- **Exact Matching** matches a treated unit to all control units with the same covariate values
  - **Pros:** perfectly balanced matched data
  - **Cons:** very few matches
- **Approximate matching methods:** specify a metric to find control units that are close to the treated unit (e.g. PSM, MHD).
  - **Pros:** convenient synthetic measures do overcome EM limitations
  - **Cons:** the user has to set the size of the matching solution ex ante, then check for balance ex post
- **Coarsened Exact Matching (CEM):** temporarily coarsens variables into meaningful groups, exact match on these coarsened data (through a "bin signature") and then balance original matched data through weights
  - **Pros:** coarsening bounds the maximum imbalance through an ex ante choice. CEM tends to perform better in balancing and can improve other matching methods
  - **Cons:** as any other matching method, trade-off balance/size

Back to main matching estimators

Empirical Strategy: sample selection

Step	Description	Control Sample	% Δ	Audit Sample	% Δ	Total Sample	% Δ
0	Universe of CIT filers in 2015	28,619	-	435	-	29,174	-
1	Drop outliers with effective tax rate >1	28,610	99.97%	435	100.00%	29,165	99.97%
2	Failure to file timely before treatment	11,203	39.16%	424	97.47%	11,627	39.87%
3	Violation of (pre&post 2015) non-audit restrictions	10,859	96.93%	362	85.38%	11,221	96.51%
4	Final matched sample after CEM	5,577	51.36%	304	83.98%	5,881	52.41%

Note: Authors' calculations based on data provided by RRA.

Back to main matching estimators

Empirical Strategy: balance performance

Panel A: Overall imbalance, Multivariate L_1	
L_1 statistic pre CEM:	0.61
L_1 statistic post CEM:	0.28

Panel B: Univariate imbalance

	L_1 pre CEM	L_1 post CEM
Aggregate Risk Score	0.48	0.12
Taxable income 2013	0.14	0.08
Taxable income 2014	0.19	0.07
Taxable income 2015	0.18	0.06

Note: The table depicts L_1 statistics for multivariate and univariate imbalance as defined in Iacus et al. (2011). Back to main imbalance.

Inference I

Still substantially debated issue in this context:

- Standard bootstrapping usually applied but not generally justified:
  - Valid for Kernel-based methods (asymptotically linear) (Bodory et al., 2020; Abadie and Imbens, 2008)
  - Not valid for Nearest-Neighbour (Abadie and Imbens, 2008); Abadie and Imbens (2006) provide heteroskedasticity-consistent analytical solution; wild bootstrapping is also justified (Bodory et al., 2020)
- Wooldridge (2007, 2002) has shown that ignoring the first-stage estimation of the selection probabilities when performing inference yields to more conservative standard errors for IPTW
- Iacus, King and Porro (2019) argue that when ex-ante stratification solutions are employed (as, for example, for CEM) these concerns are misplaced and unaltered regression standard errors are correct

Inference II

- Given these premises, we provide inference by reporting alternative SEs for any specification:
  - **CEM and IPTW:** robust SEs (clustered by tax center), bootstrapped SEs (clustered by tax center) based on 500 replications
  - **Kernel PSM and Kernel MHD:** bootstrapped SEs (based on 200 and 500 replications)
  - **Nearest-neighbour MHD:** heteroskedasticity-consistent SEs proposed by Abadie and Imbens (2006), wild bootstrapped SEs based on 500 replications
  - **For all specifications:** given CEM preprocessing, we additionally report stratified bootstrapped SEs (based on 500 replications and CEM strata)

Back to main results.

Main Results – ATT by Audit Outcome

	Determined Noncompliant						Determined Compliant					
Dep. Variable	Taxable Income			CIT payable			Taxable Income			CIT payable		
After audit	I	II	III	I	II	III	I	II	III	I	II	III
Estimator	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CEM	0.166	0.086	0.049	0.097	0.105	0.036	0.248	0.039	0.123	0.152	-0.051	0.006
	(0.034)***	(0.172)	(0.123)	(0.020)***	(0.123)	(0.089)	(0.151)	(0.260)	(0.217)	(0.120)	(0.168)	(0.125)
	(0.040)***	(0.229)	(0.138)	(0.025)***	(0.162)	(0.100)	(0.176)	(0.303)	(0.277)	(0.141)	(0.197)	(0.169)
	(0.097)*	(0.121)	(0.129)	(0.068)	(0.188)	(0.093)	(0.116)**	(0.212)	(0.245)	(0.079)*	(0.137)	(0.148)
Kernel - MHD	0.212	0.022	0.033	0.128	0.058	0.023	0.089	-0.043	-0.072	-0.008	-0.089	-0.015
	(0.080)***	(0.101)	(0.106)	(0.055)**	(0.069)	(0.073)	(0.174)	(0.281)	(0.199)	(0.093)	(0.164)	(0.120)
	(0.090)**	(0.108)	(0.106)	(0.061)**	(0.075)	(0.075)	(0.178)	(0.267)	(0.209)	(0.099)	(0.164)	(0.117)
	(0.085)**	(0.100)	(0.100)	(0.056)**	(0.072)	(0.069)	(0.168)	(0.257)	(0.200)	(0.091)	(0.150)	(0.115)
Kernel - PSM	0.152	-0.042	-0.098	0.124	0.055	-0.023	0.058	-0.351	-0.372	0.029	-0.260	-0.248
	(0.086)*	(0.110)	(0.122)	(0.060)**	(0.078)	(0.087)	(0.155)	(0.283)	(0.336)	(0.109)	(0.179)	(0.216)
	(0.093)	(0.116)	(0.129)	(0.064)*	(0.082)	(0.091)	(0.164)	(0.298)	(0.346)	(0.109)	(0.192)	(0.222)
	(0.086)*	(0.105)	(0.112)	(0.065)*	(0.075)	(0.077)	(0.139)	(0.266)	(0.302)	(0.093)	(0.170)	(0.206)
Nearest	0.320	0.182	0.206	0.184	0.141	0.087	0.351	-0.009	0.14	0.151	-0.083	0.054
Neighbour	(0.143)**	(0.146)	(0.188)	(0.102)*	(0.118)	(0.140)	(0.207)*	(0.309)	(0.315)	(0.141)	(0.186)	(0.196)
	(0.144)**	(0.249)	(0.156)	(0.090)**	(0.184)	(0.083)	(0.260)	(0.216)	(0.251)	(0.151)	(0.119)	(0.173)
	(0.129)**	(0.156)	(0.174)	(0.093)**	(0.110)	(0.118)	(0.212)*	(0.311)	(0.339)	(0.122)	(0.184)	(0.202)

Note: Alternative standard errors are reported in parentheses for any specification. CEM: robust standard errors (clustered by tax center), bootstrapped standard errors (clustered by tax center) based on 500 replications, and stratified bootstrapped standard errors based on 500 replications; Kernel - MHD and Kernel - PSM: bootstrapped standard errors based on 200, 500 replications and stratified bootstrapped standard errors based on 500 replications; Nearest Neighbour: heteroskedasticity-consistent analytical standard errors proposed by Abadie and Imbens (2006), wild bootstrapped standard errors based on 500 replications and stratified bootstrapped standard errors based on 500 replications; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Back to main results.

Conceptual framework

- We utilise idea that taxpayer uses available information to update beliefs regarding probability of being audited
- Prior belief on p but also information obtained $\tilde{p}$ is used to update audit probability
- For certain prior-posterior distributions (e.g. Beta-Binomial)

$$E(p|\tilde{p}) = \left(\frac{\frac{1}{Var(p)}}{\frac{1}{Var(p)} + \frac{1}{E(Var(\tilde{p}|p))}} \right) E(p) + \left(\frac{\frac{1}{E(Var(\tilde{p}|p))}}{\frac{1}{Var(p)} + \frac{1}{E(Var(\tilde{p}|p))}} \right) \tilde{p}$$

- Expected p is thus a weighted average of taxpayer's:
  - Prior mean of the probability of being audited $E(p)$ and
  - Information obtained from the audit $\tilde{p}$
    - With the weights depending on the precision of the prior distribution $1/Var(p)$ and of the information obtained from audit $1/E(Var(\tilde{p}|p))$
  - We can show that

$$\frac{\partial E(p|\tilde{p})}{\partial(\frac{1}{E(Var(\tilde{p}|p))})} < 0, \tag{1}$$

    if and only if $E(p) > \tilde{p}$
  - And thus more 'noise' implies a smaller expected probability of auditing

Conceptual framework

- Take Allingham and Sandmo (1972) model, where taxpayer maximises expected utility

$$\max W = E\left(p|\tilde{p}\right) U(Z) + \left(1 - E(p|\tilde{p})\right) U(Y),$$

- Where $Z = y(1-t) - \pi t(y-x)$ and $Y = y - tx$
- From Allingham and Sandmo (1972) We know that an increase in the (expected) probability of auditing $E\left(p|\tilde{p}\right)$ reduces underreporting
- Allow for updating we have that
  - If audit is informative (that is, high level of $1/E(Var(\tilde{p}|p)$), taxpayer puts more weight in updating their beliefs and so (1) holds
- And so . . . noncompliance increases. . . as information is 'noisy' for the taxpayer

Back to results by type of audits.

Robustness checks

Several additional sensitivity analyses are performed to test the robustness of the findings. We follow two main avenues:

1. Regression specifications for the outcome variables controlling for residual imbalance:
   - weighted regression models based on the weights calculated with our baseline models;
   - double-robust regression adjustment models (IPW-RA)
2. Stricter selection of the matched sample through the CEM stratification by employing two alternative less parsimonious sets of matching variables for our baseline models

The results corroborate our main findings. here Back to conclusions.

Sensitivity analysis I

Weighted regression models

Dependent Variable	Taxable Income			CIT payable		
Years after the audit	I	II	III	I	II	III
Matching estimator	(1)	(2)	(3)	(4)	(5)	(6)
CEM	0.315***	0.246	0.253	0.210**	0.232	0.184
	(0.095)	(0.197)	(0.212)	(0.091)	(0.151)	(0.169)
Kernel - MHD	0.279***	0.020	0.051	0.173***	0.056	0.031
	(0.094)	(0.126)	(0.127)	(0.054)	(0.081)	(0.084)
Kernel - PSM	0.191*	-0.029	-0.063	0.137**	0.065	-0.004
	(0.104)	(0.135)	(0.136)	(0.067)	(0.090)	(0.097)
Nearest Neighbour	0.525***	0.353	0.419	0.298**	0.245	0.258
	(0.169)	(0.291)	(0.369)	(0.142)	(0.225)	(0.279)

Note: Standard errors [(1) of main table] are reported in parentheses. Covariates: the risk score assigned to the taxpayer each of the three years before treatment, the taxable income reported in 2014 and 2013, the VAT paid on inputs reported each of the three years before treatment, a set of indicator variables for the tax centre, the sector of activity and the finer classification of the section of activity (according to the ISIC classification), dummies for diverse type of income reported each of the three years before treatment and a dummy for CIT tax return reported after the deadline during the year of the audit process.

Sensitivity analysis II

Double-robust regression adjustment models

Dependent Variable	Taxable Income			CIT payable		
Years after the audit	I	II	III	I	II	III
Matching estimator	(1)	(2)	(3)	(4)	(5)	(6)
IPW-RA (set I)	0.141**	-0.003	-0.032	0.111*	0.092	0.042
	(0.071)	(0.191)	(0.137)	(0.058)	(0.140)	(0.103)
IPW-RA (set II)	0.115*	-0.047	-0.080	0.092*	0.052	-0.000
	(0.066)	(0.170)	(0.139)	(0.055)	(0.122)	(0.103)

Note: Robust standard errors (clustered by tax center) are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Two sets of covariates are employed. Set I includes the risk scores for the latest two pre-treatment years, reported taxable income declared in the year before treatment and a dummy for the sector of activity. Set II also includes dummies for diverse type of income reported each of the three years before treatment, a dummy for CIT tax return reported after the deadline during the year of the audit process and a dummy identifying the three tax centers in Kigali.

Sensitivity analysis III

Double-robust regression adjustment models - Type of audits

Dependent Variable	Taxable Income			CIT payable		
Years after the audit	I	II	III	I	II	III
Type of Audit	(1)	(2)	(3)	(4)	(5)	(6)
Set I						
Comprehensive	0.384*	0.172	0.107	0.317**	0.172	0.155
	(0.167)	(0.226)	(0.274)	(0.133)	(0.194)	(0.211)
Desk Issue	0.019	-0.238***	-0.177***	0.005	-0.099**	-0.086**
	(0.029)	(0.065)	(0.045)	(0.028)	(0.048)	(0.041)
Set II						
Comprehensive	0.297**	0.127	0.115	0.250**	0.137	0.168
	(0.120)	(0.160)	(0.266)	(0.097)	(0.140)	(0.204)
Desk Issue	0.017	-0.231***	-0.170***	0.007	-0.093*	-0.080**
	(0.028)	(0.065)	(0.040)	(0.028)	(0.049)	(0.039)

Note: Robust standard errors (clustered by tax center) are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Sensitivity analysis IV

Main Results – Aggregate *ATT* (using Set II of matching covariates)

Dependent Variable	Taxable Income			CIT payable		
Years after the audit	I	II	III	I	II	III
Matching estimator	(1)	(2)	(3)	(4)	(5)	(6)
CEM	0.296***	0.202	0.229	0.175***	0.160	0.133
	(0.058)	(0.176)	(0.146)	(0.047)	(0.132)	(0.114)
Kernel - MHD	0.279***	0.100	0.115	0.160***	0.088	0.072
	(0.086)	(0.103)	(0.109)	(0.057)	(0.071)	(0.072)
Kernel - PSM	0.198**	-0.131	-0.137	0.138**	-0.025	-0.059
	(0.085)	(0.111)	(0.121)	(0.060)	(0.080)	(0.082)
Nearest Neighbour	0.421***	0.265**	0.336**	0.260***	(0.179)**	0.187
	(0.133)	(0.116)	(0.158)	(0.098)	(0.080)	(0.115)

Note: Standard errors [(1) of main table] are reported in parentheses. Set II of matching covariates includes the initial set of control variables and dummies for the sector of activity (according to ISIC classification). The matched set of observations include 263 treated units (73%) and 4406 untreated units (40.6%). Multivariate imbalance measure before CEM equals 0.62 and after CEM reduces to 0.34 (55% of initial imbalance).

Sensitivity analysis V

Main Results – *ATT* by audit type (using Set II of matching covariates)

Dependent Variable	Taxable Income			CIT payable		
Years after the audit	I	II	III	I	II	III
Type of Audit	(1)	(2)	(3)	(4)	(5)	(6)
Desk Issue	0.094***	-0.183***	-0.132***	0.045**	-0.061	-0.063**
	(0.021)	(0.056)	(0.032)	(0.020)	(0.047)	(0.031)
Comprehensive	0.394***	0.223	0.006	0.329***	0.206	0.067
	(0.149)	(0.222)	(0.207)	(0.121)	(0.180)	(0.133)

Note: Robust standard errors (clustered by tax center) are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Set II of matching covariates includes the initial set of control variables and dummies for the sector of activity (according to ISIC classification). The matched set of observations include 263 treated units (73%) and 4406 untreated units (40.6%). Multivariate imbalance measure before CEM equals 0.62 and after CEM reduces to 0.34 (55% of initial imbalance).

Sensitivity analysis VI

Main Results – *ATT* by audit type (IPTW), Group 1: Nil-filers (all sizes) & Medium-Large firms declaring positive income

Dependent Variable	CTI reported			CIT payable reported		
Years after the audit	I	II	III	I	II	III
Type of Audit	(1)	(2)	(3)	(4)	(5)	(6)
Comprehensive	0.267**	0.072	-0.105	0.252***	0.117	-0.020
	(0.111)	(0.226)	(0.165)	(0.092)	(0.187)	(0.122)
Desk Issue	0.199***	0.005	0.115	0.081***	-0.014	0.023
	(0.061)	(0.103)	(0.073)	(0.026)	(0.085)	(0.076)

Note: Robust standard errors (clustered by tax center) are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Sensitivity analysis VII

Main Results – *ATT* by audit type (IPTW), Group 2: Small firms declaring positive income

Dependent Variable	CTI reported			CIT payable reported		
Years after the audit	I	II	III	I	II	III
Type of Audit	(1)	(2)	(3)	(4)	(5)	(6)
Comprehensive	-0.524***	-0.822***	-1.459***	-0.396***	-0.516***	-0.1
	0.132)	(0.042)	(0.257)	(0.092)	(0.025)	(0.0
Desk Issue	-0.052	-0.322***	-0.125	-0.035	-0.130**	-0.0
	0.107)	(0.070)	(0.085)	(0.083)	(0.063)	(0.0

Note: Robust standard errors (clustered by tax center) are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Back to main robustness.