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Do tax administrative interventions targeted at small businesses improve tax compliance and revenue collection? Evidence from Ugandan administrative tax data

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WIDER Working Paper 2021/17

Do tax administrative interventions targeted at small businesses improve tax compliance and revenue collection?

Evidence from Ugandan administrative tax data

Maria Jouste,[1] Milly I. Nalukwago,[2] and Ronald Waiswa[3]

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Abstract: This paper conducts an impact evaluation of the effects of two tax administration interventions—a taxpayer register expansion and education programme, and a new electronic filing system for presumptive tax—on the number of small business taxpayers and presumptive tax revenues in Uganda. Using a difference-in-differences approach and administrative data covering both presumptive taxpayers and comparable small corporate income taxpayers, we find that the number of small business taxpayers filing tax returns and presumptive tax revenues increased substantially after the interventions. We argue that the interventions complement each other because both interventions were established around the same years, and the taxpayer register expansion programme focused on not only registering but also educating taxpayers with regard to tax compliance. We analyse the cost-effectiveness of the taxpayer register expansion programme and find that the benefits outweigh the costs.

Key words: tax administration, small businesses, tax compliance, electronic filing, impact evaluation, administrative data

JEL classification: H25, H71, O17

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1 Introduction

In developing countries, weak institutions and low social norms of paying taxes create challenges for the mobilization of domestic resources (Besley and Persson 2014). Besley and Persson (2014) argue that broadening the tax base is more important for increasing tax revenues than changing tax rates. On the other hand, Best et al. (2015) show that a simplified tax regime based on turnover can lead to greater tax revenues compared with profit taxation in countries with a low tax capacity and a large informal sector. In many low-income countries, governments have established a presumptive tax regime for small and medium-sized enterprises where tax is based on a firm's turnover instead of profits, and tax rates are lower. The usual motivation for implementing a presumptive tax is that taxpayers are not obliged to keep comprehensive records of their sales and expenses, and hence tax liability is calculated from estimated turnover. In general, presumptive tax collection is low, and it does not have fiscal importance for total tax revenues. For example, in Uganda presumptive tax revenue is only 0.04 per cent of tax revenues (see Table 1). Nevertheless, simpler tax regimes can be a first step to simplifying taxpaying, inducing formalization, and making firms inclusive of social services.

Different tax regimes for small businesses are not enough on their own to reduce the informal sector in developing countries. Tax administrative innovations and the adoption of new technologies may help governments to improve tax compliance and reach a larger group of business owners. For example, simpler online filing and payment of taxes may lower the costs of paying and collecting taxes. However, technological innovations are not the only solutions to increase tax compliance. Traditional methods, such as tax education campaigns or taxpayer register programmes, are used to enhance taxpaying in developing countries. Several studies have evaluated the impacts of formalization interventions such as business registration programmes and information campaigns on firms' formalization rate, and have found that in general such interventions do not increase the number of formal firms (for literature reviews see e.g., Bruhn and McKenzie 2014; Floridi et al. 2020). Most previous studies have examined formalization interventions in Latin America and South-East Asia, and only a few have been conducted in Africa. Benhassine et al. (2018) conducted a randomized experiment whereby they introduced an 'entreprenant' legal status in Benin; they found that the new legal status on its own did not affect formalization, but when they made additional efforts, such as offering business training, formalization increased by 16.3 percentage points. Lediga et al. (2020) examined the synchronization of business and tax registers in South Africa, and they showed that although this expanded the taxpayer register, firms failed to file and pay taxes after registration, which led to low revenue gains.

In this study we analyse two different tax administrative interventions in Uganda: the Taxpayer Register Expansion Project (TREP) and the new electronic filing (e-filing) system for presumptive tax. The Uganda Revenue Authority (URA) implemented both interventions between 2013 and 2016. TREP started as a pilot programme in July 2013 in Kampala-based municipalities, and was expanded twice, in July 2014 and July 2016, to cover more municipalities. However, TREP has not yet reached nationwide coverage. The new e-filing system was introduced in July 2015 and is used nationwide.

Both TREP and the new e-filing system are targeted at small businesses. TREP is mainly a taxpayer register campaign, but it includes tax education as well. Moreover, TREP tries to harmonize the administrative systems of different governmental institutions in Uganda, and as a result to make business registration and the payment of taxes and other administrative fees easier. The key feature of TREP has been the establishment of one-stop shops where businesses can deal with several

agencies in one visit. The new e-filing system for presumptive tax is an online tax form that small businesses use to file their incomes. Previously, the presumptive tax form was an Excel form. The change from Excel to the new e-filing form made filing simpler and more transparent. In the new e-filing system, taxpayers only need to have access to URA's website, where they fill in the form, which automatically calculates the payable taxes and provides a payment receipt. The previous Excel form was more complicated because it required taxpayers not only to have Excel on their computers but also to know how to use it. After filling in the Excel form, they needed to submit it to URA's website, and then separately register the payment to get the receipt.

We analyse the impacts of these two interventions using several URA tax data sets: presumptive and corporate income tax (CIT) returns, and taxpayer registration records. First, we examine the impacts of the three TREP phases (I, II, and III) on the number of taxpayers, using the difference-in-differences (DiD) method. We compare the number of presumptive taxpayers in geographical areas where TREP I–III have been implemented with areas where TREP has never been active. Further, we estimate the effects separately for the years before and after the establishment of one-stop shops. Second, we estimate the effect of the new e-filing system on the number of taxpayers using a similar DiD approach, but in this analysis we compare presumptive taxpayers with CIT payers. In addition, we differently measure the impacts for the first and second years of the new e-filing form. Third, we use the same DiD approach to analyse the impacts of the two interventions on tax revenues. Finally, we analyse the costs and benefits of TREP. In summary, this study evaluates whether the reforms have increased tax-filing compliance and made taxpaying easier, and whether this has led to larger tax revenues while keeping the costs of the interventions reasonable.

The results of the analysis of TREP and the new e-filing system are as follows. First, we show that the number of presumptive taxpayers increased after the interventions. Our preferred DiD estimates of TREP (I–III) for the log number of taxpayers are positive and significant, varying from 0.4 to 0.8. In particular, the findings suggest that later phases of TREP, i.e. after the establishment of one-stop shops, had a large positive impact on the number of taxpayers, with an approximately 70 per cent increase or more. We find that the new e-filing system substantially increased the number of presumptive taxpayers. The increase was larger in the second year after the reform than during the e-filing form's implementation year—0.7 versus 1.5. The average estimate for all years after the reform is around 1.1, and it indicates that the new e-filing system approximately doubled the number of presumptive taxpayers.

Second, in the regressions for the new e-filing system, we find that the estimate of the interaction effect of TREP and presumptive taxpayers is positive. Based on this positive estimate, we argue that TREP and the new e-filing system have had complementary impacts. The mechanism behind the findings is presumably that at one-stop shops, taxpayers are forced to register with URA before they can apply for a trading licence, and during the same visit tax officers can educate and help taxpayers to report their incomes to URA. The new e-filing form has made filing simpler, and therefore tax officers can easily help taxpayers. In summary, the most feasible mechanisms are the enforcement and provision of information at one-stop shops, and the lowering of compliance costs. These mechanisms are described in the theory of tax compliance, which mostly emphasizes that enforcement is a key factor to improve tax compliance, although other factors are also mentioned and studied empirically (for a literature review, see Alm 2019). For instance, Alm (2019) states that taxpayers' knowledge about tax systems affects compliance, and laboratory experiments have shown that administrative services that make taxpaying easier increase tax compliance. To our knowledge, no previous studies have examined the impacts of improved tax administrative services on tax compliance in developing countries.

Third, we find that both TREP and the new e-filing system raised tax revenues. Both interventions approximately doubled presumptive tax collection. The increase in presumptive tax revenues was

larger when one-stop shops were established in TREP. Similarly, the impact of the new e-filing system was larger in the second year after the reform. We also investigate the cost-effectiveness of TREP and find that the average additional presumptive tax revenue collected from small businesses after TREP was larger than TREP's budget utilization.

Our paper contributes to the literature in several ways. First, we contribute to the increasing literature that investigates tax compliance using administrative data in developing countries by deepening the understanding of how large-scale taxpayer register programmes and simpler tax forms affect tax compliance in low-income countries and whether these interventions increase revenues in a cost-effective way. Previous studies that have investigated tax compliance using administrative data and quasi-experimental settings have mostly been from middle-income countries such as Pakistan and South Africa. For instance, using Pakistani administrative tax data, Waseem (2018, 2020) analyses how changes in tax rates and withholding mechanisms of value added tax (VAT) have impacted on tax compliance. Lediga et al. (2020) evaluate administrative interventions that synchronize business and tax registers, employing South African tax records. However, most previous studies that have used administrative data to examine tax compliance have been randomized controlled trials. For example, Mascagni et al. (2019) analyse a tax education experiment in Rwanda, and Carillo et al. (2017) examine the effectiveness of third-party information using an experimental setting in Ecuador. Furthermore, several studies have investigated the impacts of tax information letters (e.g., a novel study by Brockmeyer et al. (2019), and a literature review by Mascagni (2018)). Thus, our paper is one of the first studies to use administrative tax data and a natural experimental setting to evaluate the impact of administrative interventions in a low-income country.

Second, our paper adds to the literature on formalization interventions in developing countries, which includes studies in Latin America and South-East Asia reviewed by Bruhn and McKenzie (2014) and Floridi et al. (2020), and novel research in Africa by Lediga et al. (2020) and Benhassine et al. (2018). In particular, we extend the knowledge about how formalization interventions can impact on not only firm registration but also tax-filing compliance, and whether this can be achieved cost-effectively.

Finally, we contribute to the scarce literature evaluating electronic filing in developing countries by examining the impacts of the simplified e-filing form in Uganda. Only a few studies have investigated the impacts of electronic filing. For instance, using survey data, Yilmaz and Coolidge (2013) evaluate the compliance costs of e-filing by small and medium-sized firms in South Africa, Ukraine, and Nepal; they conclude that the compliance costs depend on the e-filing system and the compulsory or obligatory nature of the e-filing. Another example is the study conducted by Okunogbe and Pouliquen (2018). They analyse how e-filing affects small and medium-sized firms' compliance costs, tax payments, and bribe payments in Tajikistan, using an experimental setting and both survey and administrative tax data. Their results show that e-filing reduces not only compliance costs but also tax and bribe payments.

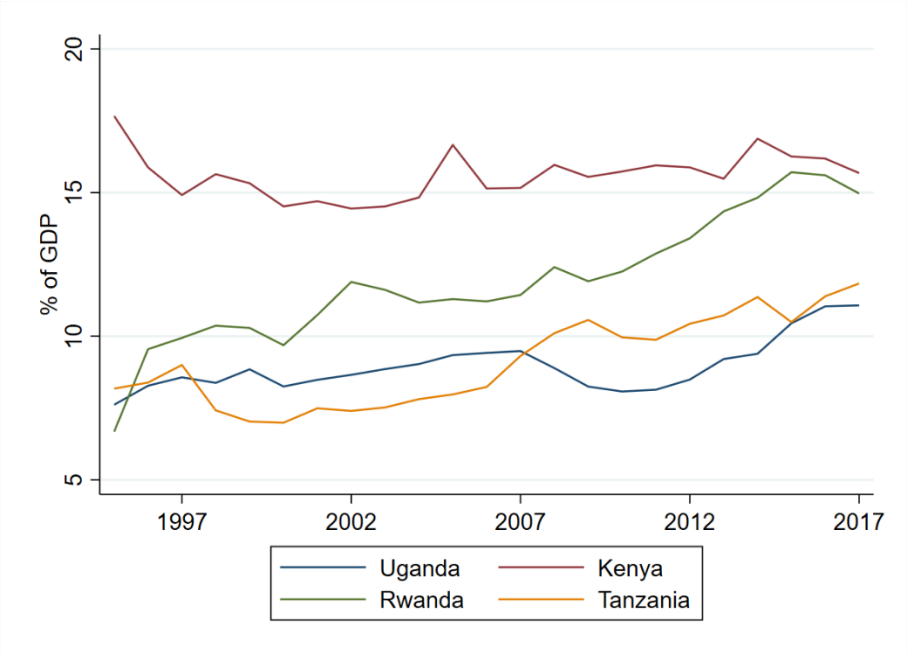
The rest of the paper is organized as follows. Section 2 provides the institutional background and explains the reforms. Section 3 describes the data and presents descriptive evidence. Section 4 presents the chosen empirical strategy. Section 5 reports the main findings and discusses the cost-effectiveness of TREP. Finally, section 6 concludes.

2 Institutions

Uganda is a low-income country in sub-Saharan Africa: its gross domestic product (GDP) per capita in 2017 was US$2,075 purchasing power parity (World Bank 2018). It is a member of the East African Community. Tax revenue collection is low in Uganda compared with other East African Community member countries. Figure 1 shows the development of tax revenues in Uganda, Kenya, Rwanda, and Tanzania. The share of tax revenues increases after 2010 in Uganda, but it is still lower than in Kenya, Rwanda, or Tanzania. For example, in 2015 tax revenue was 10.45 per cent of GDP in Uganda, 16.26 per cent of GDP in Kenya, 15.71 per cent of GDP in Rwanda, and 10.49 per cent of GDP in Tanzania (UNU-WIDER 2020). Moreover, in 2015 the average tax revenue in sub-Saharan African countries was 15.75 per cent of GDP, which was higher than in Uganda.

As in many developing countries, the informal sector is large in Uganda. The Uganda Bureau of Statistics estimates that approximately 87 per cent of total employment is informal, and in the fiscal year 2017–18, the size of the informal sector was 51.2 per cent of GDP (Uganda Bureau of Statistics 2016, 2019). A World Bank report in 2017 studied the informal sector in the Greater Kampala area (World Bank 2017).[1] It reported that 57 per cent of firms in the Greater Kampala area were informal, and more than half of them had annual sales below the lowest tax threshold. This highlights that most of the informal firms in Kampala are microbusinesses.

Figure 1: Tax revenues in per cent of GDP for Uganda, Kenya, Rwanda, and Tanzania



Source: authors' visualization based on data from UNU-WIDER (2020).

In Uganda, citizens' access to the Internet and capacity to use information and communications technology are limited. The adult literacy rate was 76.5 per cent in 2018 (UNESCO Institute for Statistics 2020). Only 23.71 per cent of the total population use the Internet in Uganda, and there were 57.27 mobile phone subscriptions per 100 people in 2018 (International Telecommunication

[1] The report was based on the National Manpower Survey collected by the Uganda Bureau of Statistics. For more information about this survey, see World Bank (2020b).

Union 2020). Uganda's National Information Technology Survey for 2017–18 found that 70.9 per cent of individuals had a mobile phone, but only 15.8 per cent of those had a smartphone (National Information Technology Authority Uganda 2018). Moreover, 10.8 per cent of all households participating in the survey had at least one person who could access the Internet at home. The survey also asked questions related to e-governance: among all individuals, 96.6 per cent said that they interacted face to face with government officials, while only 2.3 per cent used institutional websites. In e-governance services, 62.6 per cent of all individuals had used mobile payments to pay utility bills, 49.9 per cent had used online registration to receive their taxpayer identification number (TIN), and 35.4 per cent had paid taxes online, but only 13 per cent had filed their tax returns online in the previous 12 months.

2.1 Domestic tax laws of Uganda

The domestic tax laws of Uganda consists of several tax acts,[2] among which we are interested in the Income Tax Act (of 1 July 1997, Cap 340 of the Laws of Uganda 2000) and the Value Added Tax Act (of 1 July 1996, Cap 349 of the Laws of Uganda 2000). The Income Tax Act includes the taxation of individuals, partnerships and partners, trusts and beneficiaries, and companies and shareholders. It provides tax rates for small business taxpayers (referred to as presumptive tax), individuals, companies (referred to as corporate tax), trustees and retirement funds, dividends, rents, and other special sources of income. The Value Added Tax Act contains rules about VAT.

According to the Income Tax Act, businesses can pay CIT, presumptive tax, or personal income tax, depending on the size and type of business. The tax rules are different for CIT, presumptive tax, and personal income tax. First, CIT is paid by companies[3]; for other than mining companies the tax rate is 30 per cent of taxable income, which is based on profits; this tax rate has been same since 1997. Second, presumptive tax can apply to either an individual business or a company, and the tax schedule consists of several tax rates and income thresholds (see Tables A1 and A2 in Appendix A for more details). Since 1 July 2015, businesses have been eligible to pay presumptive tax if their estimated turnover is over UGX10 million but does not exceed UGX150 million. The estimated turnover is the taxable income for presumptive taxpayers, because they are not eligible for any tax deductions or exemptions. Third, personal income tax is paid by individual businesses, and they follow personal income tax rules.[4] Taxpayers can choose between the presumptive, CIT, and personal income tax schedules, even if their turnover is between the lower and upper thresholds of the presumptive tax schedule, but in this case they need to notify the URA commissioner in writing (URA 2015).[5] If a taxpayer chooses to pay CIT or personal income tax instead of presumptive tax, they need to keep more detailed accounts, but they also have the right to apply tax deductions and exemptions.

The Value Added Tax Act determines VAT rules. The VAT rate is 18 per cent and has been unchanged since 2006 (Value Added Tax (Rate of Tax) Order 2006, of 1 July 2005). However, there have been changes in zero-rated items and the threshold value, which determines the

[2] The domestic tax acts are the Income Tax Act, the Value Added Tax Act, the Excise Duty Act, the Tax Procedures Code Act, the Stamp Duty Rates, the Lotteries and Gaming Act, the Tax Appeals Tribunals Act, and the Finance Act.

[3] A company is a body of persons, corporate or unincorporated, or a unit trust (Income Tax Act, of 1 July 1997).

[4] Personal income taxation is not the interest of this paper, and therefore we do not provide detailed information about these tax rules. For more information, see the Income Tax Act (of 1 July 1997, Cap 340 of the Laws of Uganda 2000).

[5] In general, taxpayers choose their tax regime based on their business type and whether or not they keep comprehensive accounts.

obligation to pay VAT (Value Added Tax (Amendment) Act 2015, of 1 July). The zero-tax threshold increased on 1 July 2015. Before the change, firms were exempted from paying VAT if their annual sales were below UGX50 million. After 1 July 2015, the annual sales threshold rose to UGX150 million. This means that presumptive taxpayers have been always exempted from paying VAT.

In Table 1, we present the share of tax revenues by different tax types. Domestic taxes constitute around 55 per cent of gross revenue. For example, in 2016–17[6] the largest share of domestic taxes is collected from direct taxes (32.42 per cent), of which pay-as-you-earn[7] tax covers over half. VAT has the second largest share of gross revenue (22.04 per cent) among the different tax types. Presumptive tax is by far the smallest part of tax revenues, covering only 0.04 per cent of gross revenue. Overall, the share of tax revenues by different tax types remains fairly similar from 2012–13 to 2016–17.

Table 1: Percentage shares of tax revenue by different tax types, 2012–13 to 2016–17

	2012-13	2013-14	2014-15	2015-16	2016-17
Domestic taxes	57.08	55.76	54.90	54.82	56.02
Direct taxes	32.49	31.33	32.11	32.24	32.42
CIT	7.98	5.81	7.07	6.37	5.93
Presumptive tax				0.01	0.04
PAYE	15.98	16.68	15.95	15.69	16.40
Indirect taxes	23.11	22.68	21.24	21.25	22.04
VAT	17.08	16.16	14.93	15.41	15.69
Excise duty	6.03	6.52	6.31	5.84	6.36

Note: percentage shares are calculated using gross revenue. Presumptive tax is reported separately only after 2015–16, when the new e-filing form came into effect.

Source: authors' compilation based on revenue statistics from URA.

2.2 Tax administrative reforms

The Ugandan government implemented several tax and administrative reforms targeted at small businesses between 2009 and 2018. Figure 2 summarizes the reforms and their timelines. The first administrative reform was the implementation of the e-tax system, which started in 2009; by 2012, e-tax covered all tax offices in Uganda. The second administrative reform was the three phases of TREP, starting in July 2013. Finally, in July 2015, the new e-filing system was introduced for presumptive taxpayers. The e-tax and e-filing systems and TREP are explained in more detail in subsequent sections.

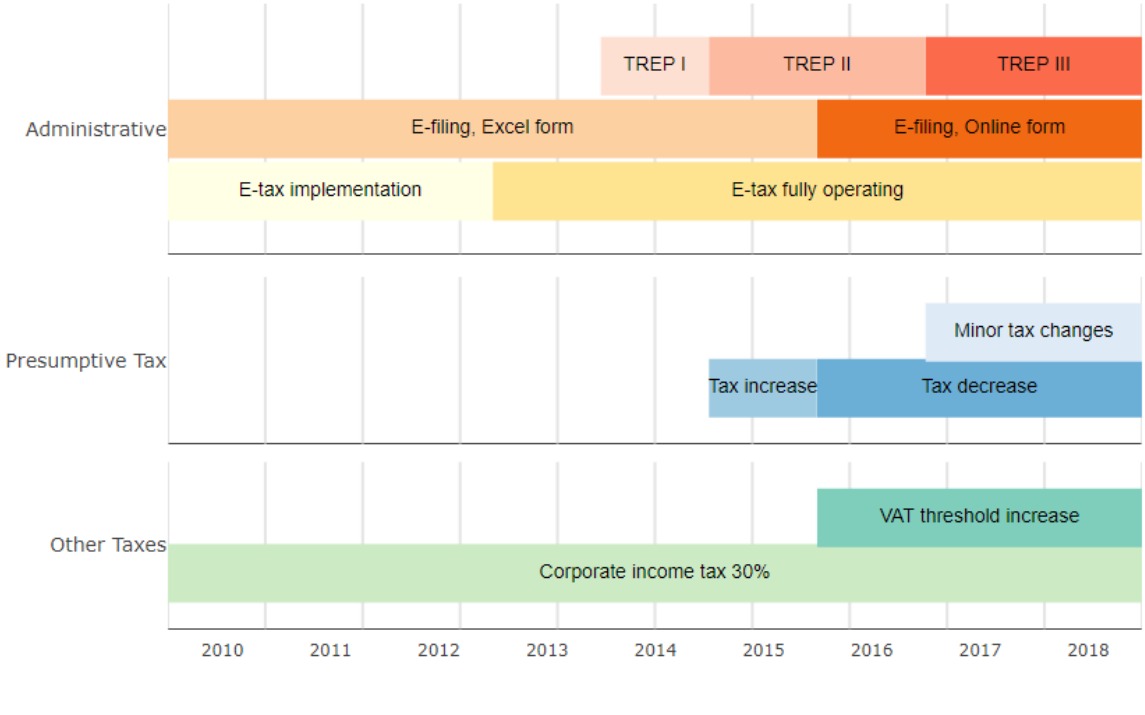
During the period when the tax administrative reforms came into effect, the Ugandan government changed the presumptive tax rate twice. The first presumptive tax reform, in July 2014, increased the tax rate from one to three per cent of estimated sales (Income Tax (Amendment) Act 2014, of 1 July). The second reform was implemented the next year. It was larger than the 2014 reform, because both the tax rate and the thresholds of the tax brackets changed (Income Tax (Amendment) Act 2015, of 1 July). The 2015 reform substantially increased the highest eligibility

[6] The fiscal year in Uganda runs from 1 July to 30 June. In this study, we refer to fiscal years using the convention '2012–13' for a fiscal year starting on 1 July 2012 and ending on 30 June 2013. Taxpayers can apply a substituted fiscal year—for example, a calendar year—if it is more convenient for the company's accounting. In these cases, the fiscal year for tax purposes is based on the end date of the tax return period. For instance, if a firm's tax return period ends on 31 December 2014, the fiscal year is referred to as 2014–15.

[7] Pay-as-you-earn is tax on employment income: employers remit tax on behalf of employees and pay it to URA.

threshold for presumptive tax, from UGX50 million to UGX150 million. At the same time, the tax rate dropped from three to 1.5 per cent. After the 2015 reform, there were minor changes in the tax schedule (Income Tax (Amendment) Act 2016, of 1 July). In this paper, we do not focus on the tax reforms; therefore, all the details of the tax changes are provided in Tables A1 and A2 in Appendix A.

Figure 2: Timeline of different reforms targeted at small businesses and presumptive taxpayers, July 2009 to July 2018



Note: the e-tax implementation period was the time when e-tax did not operate in all tax offices. The e-tax affected all tax types. E-filing, online form: new e-filing system for presumptive tax. Presumptive tax increase: increase of the tax rate and zero-tax threshold. Presumptive tax decrease: decrease of the tax rate and changes in tax bracket thresholds. For more information, see Tables A1 and A2 in Appendix A. Minor tax changes: increase in tax rate on pharmacies from UGX100,000 to UGX250,000, and exclusion of clinics from the presumptive tax regime. VAT threshold increase: registration threshold for VAT increased from UGX50 million to UGX150 million.

Source: authors' visualization based on internal URA documents, the Income Tax Act (of 1 July 1997, including Income Tax (Amendment) Acts of 2014, 2015, 2016, all of 1 July), and the Value Added Tax (Amendment) Act 2015 (of 1 July).

E-tax system and filing tax returns: the e-filing reform of July 2015

URA established the e-tax system in 2009. It was first introduced as a pilot programme in three tax offices in 2009, from where it was gradually rolled out to other tax offices. By the end of the fiscal year 2011–12, the e-tax system was in place in every tax office in Uganda. The e-tax system is an online platform where citizens can report their incomes for tax purposes, pay taxes, and register as taxpayers. On registration, a taxpayer receives the TIN that is used in the e-tax system.

Taxpayers are subject to filing their tax returns using the e-tax system. In general, the filing is done using downloadable Excel forms from the URA website. After downloading the Excel form, a

taxpayer[8] completes the return form, which is different for different types of taxpayers. For instance, a CIT form includes more spreadsheets to complete than a presumptive tax form, because CIT payers are obliged to keep comprehensive accounts. When the return is successfully completed, the taxpayer submits it to URA's e-tax system.

URA redesigned the e-tax system for presumptive taxpayers, and in July 2015 it introduced a new e-filing system for presumptive tax returns. The new e-filing system does not include an Excel form; instead, taxpayers can directly file their tax returns using an online form on URA's e-tax website. Before July 2015, presumptive tax returns were filed using the Excel form described above. The new e-filing form is only for presumptive tax returns; all other tax returns are filed using Excel forms.

The new e-filing system for presumptive taxpayers also contains other features besides the completion of returns on the online form. First, the online form includes payment instructions at the end of the filing. The system generates a receipt that taxpayers can print and submit to the bank, or they can use other payment methods such as mobile money or credit cards. Second, taxpayers can use the same e-filing system if they want to amend their submitted tax return. However, if a taxpayer wants to decrease the annual turnover submitted in an earlier return in the same year, they need to visit their tax office in person. Finally, one helpful feature is that when taxpayers insert their estimated annual sales into the e-filing form, it automatically calculates the payable taxes. Taxpayers can observe how their payable taxes change if they change their incomes while they fill in the form.

TREP

The Ugandan government launched TREP in July 2013 to encourage citizens, particularly small businesses, to register as taxpayers and receive a TIN. TREP is jointly organized by URA, the Uganda Registration Services Bureau (URSB), Kampala Capital City Authority, and local governments. The objectives of TREP are to formalize businesses, educate them about taxes, reduce compliance costs, and harmonize different government agencies' revenue and tax administration systems (URSB 2017).

The first phase of TREP (TREP I) started in July 2013 (fiscal year 2013–14) in Kampala-based municipalities (see Table 2). The second phase, TREP II, followed in the fiscal year 2014–15 in municipalities located in the Wakiso district. The last phase, TREP III, expanded the project to 30 municipalities outside the Kampala and Wakiso districts in July 2016. TREP III did not lead to coverage of the whole country, and in 2018 there were municipalities that were not included in the project.

In TREP, various working methods have been used (described in Appendix B) to boost the registration of taxpayers. In general, the timeline for TREP was as follows: (1) engage local councils, leaders, and stakeholders in the municipalities; (2) make an agreement that TREP can start; (3) decide which TREP methods to use in the municipalities. In the first two years, the main working method was door-to-door visits. Door-to-door visits continued in all three TREP phases, but new methods were introduced as well (see Appendix B). In 2015–16, the working methods expanded to the establishment of ten one-stop shops in Kampala. At a one-stop shop, business owners can register their businesses with different authorities, become taxpayers, and even file and pay their taxes, all in one visit. In 2015–16, the first public awareness campaigns—for instance,

[8] Under the Income Tax Act (of 1 July 1997, Cap 340 of the Laws of Uganda 2000), a taxpayer is any person who obtains income subject to tax. A taxpayer may be, for instance, a company, an individual, or a trustee.

client sensitization workshops and radio talk shows—were launched (see Table 3). In 2016–17, one-stop shops were established in all the other 34 TREP municipalities outside Kampala, and more types of public awareness campaigns were used to reach a larger group of taxpayers (see Tables 2 and 3).

TREP has been mainly targeted at small businesses, because the level of compliance among these businesses is very low and URA has faced challenges to increase tax revenue collection from them. However, TREP may have had some impact on medium-sized and larger businesses and individual businesses, because some working methods—e.g., radio talk shows and newspaper strips—are visible to everyone.

Table 2: TREP implementation: start dates and municipalities

TREP I: operational from 1 July 2013	TREP II: operational from 1 July 2014	TREP III: operational from 1 July 2016				
Kampala-based municipalities	Municipalities in Wakiso district	Municipalities outside Kampala and Wakiso				
1 Makindye	1 Entebbe	1 Arua	7 Ishaka-Bushenyi	13 Kasese	19 Lugazi	25 Tororo
2 Central	2 Makindye Ssabagabo	2 Busia	8 Jinja	14 Kisoro	20 Masindi	26 Mbarara
3 Nakawa	3 Kira	3 Fort Portal	9 Kabale	15 Kitgumu	21 Mbale	27 Mityana
4 Kawempe	4 Nansana	4 Gulu	10 Kamuli	16 Koboko	22 Ntungamo	28 Moroto
5 Rubaga		5 Hoima	11 Kapchorwa	17 Kumi	23 Rukungiri	29 Mubende
		6 Iganga	12 Masaka	18 Lira	24 Soroti	30 Mukono

Source: authors' compilation based on documents from URA.

Table 3: Summary of TREP awareness campaigns

	2015-16	2016-17	2017-18
Stakeholder engagements	27	77	104
Quarterly messages to staff	1	7	0
Client sensitization workshops/tax clinics	116	35	151
Public notices	0	17	8
Newspaper strips	0	24	14
Barazas	0	1	0
Radio advertisements	0	4,677	7,700
Public van communications	0	36	7
Radio talk shows	30	24	30
TV scripts	0	60	105
Press briefings	1	1	0

Note: the column '2017–18' shows campaigns as at the end of December 2017. See Appendix B for more information about the nature of the different awareness campaigns.

Source: authors' compilation based on documents from URA.

3 Data and descriptive evidence

We use administrative tax data from URA's e-tax system. The data includes presumptive tax returns from July 2009 to June 2018, and CIT returns[9] from July 2009 to June 2017. The presumptive tax returns data consists of two separate data sets, because in July 2015 the new e-filing form changed how data was generated in URA's database. In addition to the returns data, we add an address variable for CIT payers from the non-individual TIN registration form.[10]

These data sets are appended and merged to create the final harmonized data set for the analysis. We exclude a minor number of outliers from our analysis: for example, we drop observations that have negative taxes or where the presumptive taxpayer's turnover is above the highest threshold for presumptive tax (either UGX50 million or UGX150 million, depending on the fiscal year). Next, we exclude a small number of CIT return observations that do not have a clear address variable, because our estimations require information about firms' geographical locations. Finally, we drop taxpayers who have shifted from presumptive tax to the CIT regime or vice versa, because we want to keep the treatment (presumptive) and control (CIT payers) groups clean and uncompromised by such shifts.[11]

Table 4 presents summary statistics on the main outcome variables from presumptive and CIT returns data between 2012–13 and 2017–18. The presumptive taxpayers are on average small businesses with a turnover under UGX20 million and payable tax under UGX250,000. The CIT payers have larger average turnovers and payable tax than the presumptive taxpayers. Naturally, the large difference in payable tax comes from the different tax rules. The CIT data that we use covers only taxpayers with a turnover less than or equal to UGX400 million.

Table 4: Summary statistics from presumptive tax and CIT returns data, 2012–13 to 2017–18

Year	Average turnover		Average payable tax		Number of taxpayers (total)	
	Presumptive	CIT	Presumptive	CIT	Presumptive	CIT
2012-13	13,709,442	68,029,973	118,765	3,225,070	549	11,372
2013-14	16,617,642	64,120,527	148,750	2,190,842	1,868	14,779
2014-15	11,282,286	62,647,449	257,547	2,086,218	2,175	17,160
2015-16	6,731,984	57,042,328	212,467	2,163,511	5,716	20,364
2016-17	16,864,458	53,655,654	223,858	1,948,385	24,738	21,260
2017-18	19,310,028		220,399		38,367	

Note: statistics on presumptive taxpayers are generated using all observations in the presumptive tax returns data. Statistics on CIT payers are from the data set that covers only firms with turnover less than or equal to UGX400 million. All monetary values in UGX.

Source: authors' calculations based on URA administrative tax returns data.

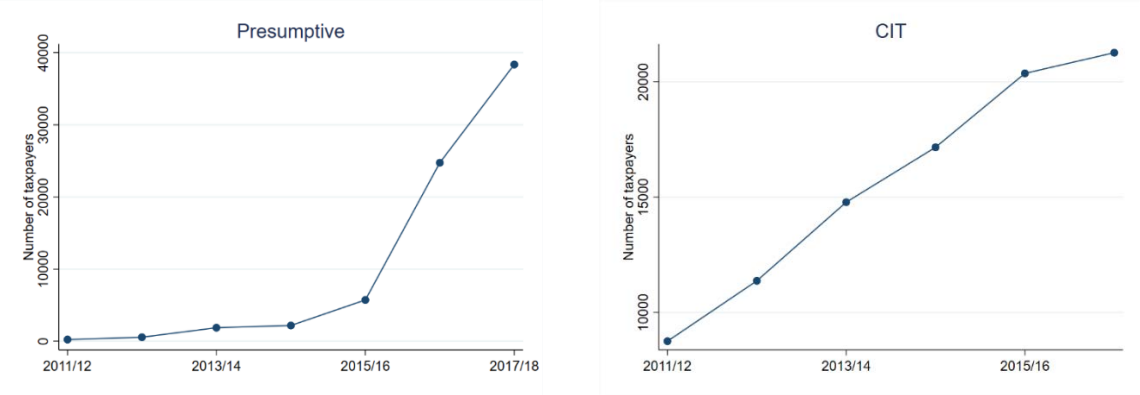
Table 4 shows a rapid increase in the number of presumptive taxpayers between 2015 and 2016. In the fiscal year 2016–17, the presumptive tax returns data has over 24,000 observations. By contrast, the number of CIT payers grows more constantly over the years. Figure 3 visualizes the clear difference in growth of the numbers of observations in the two data sets.

[9] We refer to CIT returns when the returns are extracted from income tax return forms for non-individuals in URA's e-tax system.

[10] For example, companies apply for TINs using the non-individual TIN registration form.

[11] The dropped firms represent around 4.5 per cent of total observations in the data.

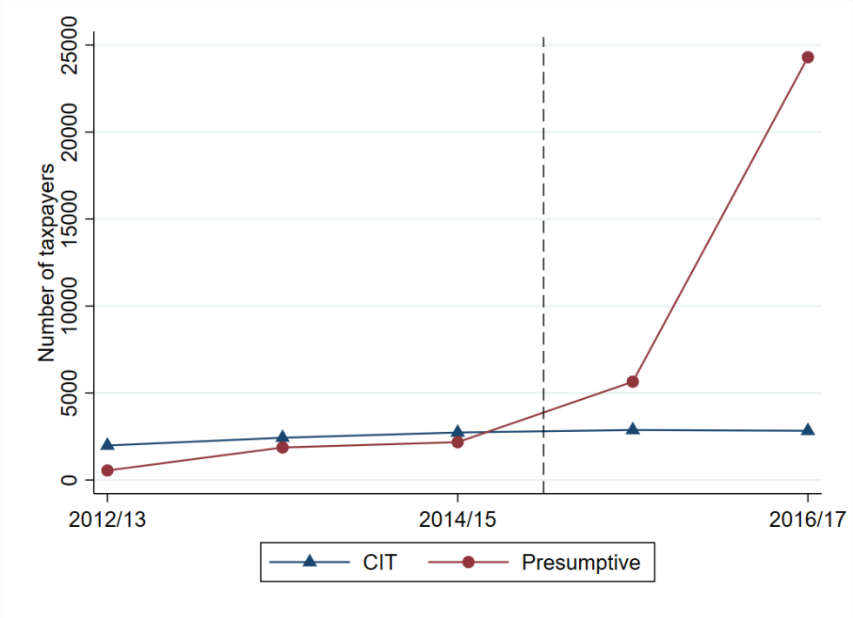
Figure 3: Number of taxpayers from presumptive tax and CIT returns data, 2011–12 to 2017–18



Note: the left panel presents the number of presumptive taxpayers, and the right panel presents the number of CIT payers with turnover less than UGX400 million.

Source: authors' calculations based on URA administrative tax returns data.

Figure 4: Number of taxpayers from presumptive tax and CIT returns data in the analysis of the new e-filing system



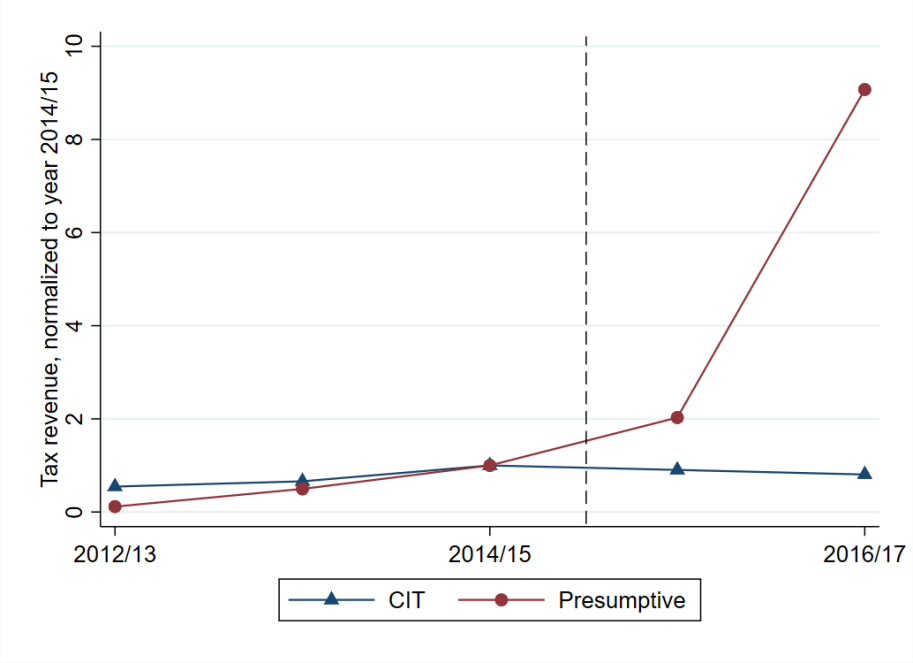
Note: figure includes presumptive taxpayers with turnover less than UGX50 million, and CIT payers with turnover between UGX150 million and UGX400 million. The dashed line indicates July 2015, when the new e-filing form came into force. The figure is descriptive and not intended to be used to analyse the significance of pre-reform time trends (cf. Figure 7).

Source: authors' calculations based on URA administrative tax returns data.

To evaluate the new e-filing system, we further restrict the data to cover only presumptive taxpayers whose turnover is UGX50 million or less, and CIT payers with turnover between UGX150 million and UGX400 million. In the next section we explain our chosen methodology in detail. The number of taxpayers shown in Figure 3 is larger than in Figure 4 because Figure 4 shows only the trend in the number of taxpayers using the restricted data. Thus, Figure 4 visualizes more clearly that one year after the introduction of the new e-filing form, presumptive taxpayers with turnover of UGX50 million or less have a massive growth in numbers compared with CIT payers with turnover of UGX150–400 million. Similarly, tax revenues from these presumptive

taxpayers grow more than tax revenues from CIT payers, as seen in Figure 5. We normalize the value of tax revenue in 2014–15 to one. This allows us to compare the trend in tax revenues instead of showing different levels of tax revenues.

Figure 5: Tax revenues from presumptive tax and CIT returns data in the analysis of the new e-filing system



Note: tax revenues are normalized to value one in year 2014–15 to visualize the development of tax revenues. The figure includes presumptive taxpayers with turnover less than UGX50 million, and CIT payers with turnover between UGX150 million and UGX400 million. The dashed line indicates the reform time of July 2015.

Source: authors' calculations based on URA administrative tax returns data.

4 Empirical strategy

In this section, we explain the research design that we use to evaluate the impacts of the administrative interventions—i.e. TREP and the new e-filing system—on the number of taxpayers and tax revenues. First, we estimate the effects of TREP using the DiD approach and employing area-based variation, which comes from the municipal-level TREP implementation schedule. Second, we concentrate on the new e-filing system and its impacts by using a similar DiD approach. Because the new e-filing system affects all presumptive taxpayers countrywide, we use CIT payers as a control group. Finally, we describe how we use the same DiD methods to analyse the impacts of TREP and the new e-filing system on tax revenues.

4.1 Estimation of TREP

We conduct a DiD analysis to estimate the impact of TREP on the number of taxpayers. In this paper, we focus on TREP's effects on presumptive taxpayers, since TREP is mainly targeted at small informal businesses, for which the presumptive tax schedule is designed. Therefore, we only use presumptive tax returns data in this analysis.

TREP was implemented in phases in different municipalities (see Table 2), and it did not reach countrywide coverage. Thus, the phased implementation of TREP creates a natural experimental setting where some municipalities are treated by TREP and some are not. To compare the numbers

of taxpayers in the treated and control municipalities, we aggregate the individual-level presumptive tax returns data to industry*geographical area cells where a geographical unit is a county,[12] which includes municipalities, and an industry unit is a one-digit International Standard Industrial Classification (ISIC) code. The outcome variable is the number of taxpayers in the industry*geographical area cell in a year.

Because we are investigating how the number of presumptive taxpayers changed due to TREP, we restrict our data to presumptive taxpayers who were able to pay presumptive tax between 2012–13 and 2017–18. This leaves us with taxpayers whose turnover was less than UGX50 million, which was the highest threshold for eligibility to pay presumptive tax before July 2015. In addition, this restriction allows us to control for the presumptive tax reforms, since the tax reforms similarly affected this group of presumptive taxpayers.

We analyse the three phases of TREP separately because TREP started in different years in different municipalities. For this reason, we have three treatment groups: (1) municipalities where TREP I is active; (2) municipalities where TREP II is active; (3) municipalities where TREP III is active. Our control group is the rest of the counties, where TREP has never been active.

We use data from 2012–13 to 2017–18 because the e-tax was fully implemented by the end of the fiscal year 2011–12, and 2017–18 is the last year for which we have complete data. As a result, we have only one pre-reform year to use for the analysis of TREP I (the first TREP implementation phase), while TREP II has two pre-reform years, and TREP III has four.

The estimated DiD equation is:

$$Log\ N_{c,t} = \beta_0 + \sum \beta_{1,c} Cell_c + \sum \beta_{2,t} Year_t + \beta_3 (TREP_c x After_t) + \varepsilon_{c,t} \quad [1]$$

$N_{c,t}$ is the number of taxpayers in cell c (c=industry*geographical area) in year t. $Cell_c$ is a dummy variable to control for permanent differences between industry*geographical areas. $Year_t$ are year controls. $TREP_c$ is one if a geographical area in cell c is a municipality where TREP I–III is active, and zero if a county belongs to the control group. The interaction variable $TREP_c x After_t$ takes value one if cell c is treated by TREP I–III and the observation is after the treatment year, which is 2013–14 for TREP I, 2014–15 for TREP II, and 2016–17 for TREP III. The coefficient β_3 is the variable of interest.

In addition to the analysis of the overall effect of different TREP phases, we divide the post-reform period into two parts to capture the effects of different treatment methods in TREP I–III. The first part includes years when there were no one-stop shops in place; the second part contains years after the establishment of the one-stop shops. For TREP III we have only one $After_t$ variable, because one-stop shops were set up at the same time as TREP started in the municipalities. Thus, different $After_t$ variables identify the impacts of different treatments of TREP.

To identify the impact of TREP, the treated and control municipalities need to have parallel trends in the number of taxpayers in the absence of the treatment. We test this hypothesis indirectly by checking whether the parallel trends were the same in the period before TREP started. Another

[12] In Uganda, geographical areas comprise regions, districts, counties, subcounties, and parishes, in descending order based on the size of the administrative unit. County-level units are municipalities, which are mostly urban centres (e.g., Mbarara municipal council), and other, more rural areas, including smaller towns (e.g., Serere county).

concern regarding identification is that e-filing and tax reforms were introduced at the same time as TREP, which might affect the outcome. However, the implementation of the new e-filing system and tax reforms covers all presumptive taxpayers, and therefore it should affect the treatment and control groups similarly. To the best of our knowledge, there were no other reforms or shocks during 2012–18 besides those already mentioned. Furthermore, we assume that no spillovers occurred between the treated and control municipalities.

4.2 Estimation of the new e-filing system

The new e-filing system replaced the old Excel-based e-filing form for presumptive tax in July 2015, and it affected all presumptive taxpayers similarly. Therefore, we cannot use area-based treatment and control groups to estimate the impact of the new e-filing system on the number of taxpayers, as we do in the analysis of TREP. Instead, we employ firms that pay CIT as a control group. From the CIT returns data we include only firms with a turnover between UGX150 million and UGX400 million in our analysis, because these firms have never been eligible to pay presumptive tax. Because the new e-filing only impacted on presumptive returns, we use the presumptive tax returns data to create a treatment group. We restrict the presumptive tax returns data to taxpayers with a turnover under UGX50 million, because they were eligible to pay presumptive tax in the estimation period 2012–13 to 2016–17.

We aggregate taxpayer-level data to industry*geographical area level using districts and TREP areas (shown in Table 2) as geographical area variables, and one-digit ISIC codes as industry variables. The best option would have been to use a county as a geographical unit, as in the analysis of TREP, but we do not have county-level information in the CIT returns data. The only information that is in the data is on districts and municipalities. Because TREP was implemented in municipalities, the municipal variable in the CIT returns data is needed to create a TREP area variable in order to control for the TREP that was implemented during our estimation period. Moreover, to compare the numbers of taxpayers in the presumptive and CIT returns data, we further aggregate the data to industry*geographical area*(presumptive or CIT) cells. In this way, we create an outcome variable: the number of taxpayers in a cell in a year.

We use two DiD equations. The first equation includes a simple control variable if TREP I–III is active; the second equation extends the first by adding the interaction term for the active TREP and a treatment group (i.e. presumptive). The estimated equations are:

$$Log\ N_{c,t} = \beta_0 + \sum \beta_{1,c} Cell_c + \sum \beta_{2,t} Year_t + \beta_3 (Presumptive_c x After_t) + \beta_4 (Presumptive_c x Year_{2014/15}) + \beta_5 TREP_Active_{c,t} + \varepsilon_{c,t} \quad [2]$$

$$Log\ N_{c,t} = \beta_0 + \sum \beta_{1,c} Cell_c + \sum \beta_{2,t} Year_t + \beta_3 (Presumptive_c x After_t) + \beta_4 (Presumptive_c x Year_{2014/15}) + \beta_5 TREP_Active_{c,t} + \beta_6 (TREP_Active_{c,t} x Presumptive_c) + \varepsilon_{c,t} \quad]3]$$

$N_{c,t}$ is the number of taxpayers in cell c (c=industry*geographical area*(presumptive or CIT)) in year t. $Cell_c$ are time-invariant fixed effects for industry*geographical area*(presumptive or CIT) cells. $Year_t$ are dummies for each fiscal year. $Presumptive_c$ is one if cell c is industry*geographical area*presumptive, and zero if it is industry*geographical area*CIT.[13] The interaction variable $Presumptive_c x After_t$ takes value one if cell c is from the presumptive data and the year is after the introduction of the new e-filing system (i.e. July 2015).

[13] The main effect of $Presumptive_c$ is not needed, because the cell dummies include it.

$Presumptive_c xYear_{2014/15}$ controls for the presumptive tax reform. $TREP_Active_{c,t}$ is a time-varying variable to capture the effect of TREP; it takes value one if cell c consists of a geographical area where TREP is implemented and year t is after TREP is active, and it is zero when either a geographical area is not impacted on by TREP or the year is before TREP started.[14] In Equation [3], we add the interaction term $TREP_Active_{c,t} xPresumptive_c$, which is one if cell c is industry*geographical area*presumptive and $TREP_Active_{c,t}$ is one. This interaction captures the complementary effects of TREP and the new e-filing system on the number of taxpayers. In both equations, the variable of interest is β_3, the interaction term of being treated by the new e-filing system and the post-reform period. In addition to the basic analysis, we investigate the timing of the new e-filing system by estimating the first and second years after the reform separately.

The underlying assumption for the DiD approach is that the treatment and control groups would have similar trends over time in the absence of the treatment. We test this assumption indirectly by estimating the treatment effect for the pre-reform period, and we visually show whether the trend is similar for the treatment and control groups. Furthermore, the control group needs to be independent of the reform, i.e. not affected by the new e-filing system. In general, a firm can switch between the presumptive and CIT regimes. Therefore, we drop taxpayers who shifted between the CIT and presumptive tax regimes from the data before aggregating the data in cells. As a further robustness check, we test whether the specification of the control group changes the results.[15]

One possible problem in the identification is that other reforms happened at the same time as the new e-filing system came into effect. In 2012–17 the presumptive tax schedule was changed twice, and from 2013 onwards TREP was rolled out. First, we control for the presumptive tax rate change by using the presumptive tax rate change in 2014–15 as a proxy for the change in 2015–16. Without this control, the interaction term β_3 would capture the impacts of both the change of the e-filing system and the decline in tax rates because the two reforms came into force at the same time in July 2015. Second, we control for the effect of TREP. Although TREP is mainly designed for small businesses that pay presumptive tax, it might impact on CIT payers, because advertising campaigns such as radio talk shows are publicly broadcasted. Furthermore, small corporations might also have visited the one-stop shops. As a result, we control for TREP for both the treatment and control groups in equation [2].

4.3 Estimation of tax revenues

We evaluate the impact of TREP and the new e-filing system on tax revenues using the same DiD approach as described in Sections 4.1 and 4.2. The outcome variable in the regression is payable taxes, rather than the number of taxpayers.

Obviously, the presumptive tax reforms affect revenue calculations. For example, the tax reform in 2015–16 decreased the presumptive tax rate, but it also changed the tax bracket thresholds (see Tables A1 and A2). Both changes have direct effects on the tax revenues collected from presumptive taxpayers. As a robustness check, we calculate payable presumptive taxes from turnover using a constant presumptive tax rate for all years. This controls for tax reforms and shows how tax revenues develop due to changes in the number of taxpayers.

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[14] For example, $TREP_Active_{c,t}$ is one when cell c has the Wakiso district and Entebbe municipality as a geographical area and year t is 2016–17.

[15] For example, we use CIT returns data that includes all firms with turnover under UGX400 million before aggregating the data at the cell level.

5 Results

5.1 Number of taxpayers

In this section, we present our results regarding how the administrative interventions affected the number of taxpayers. We show our main findings first for the different TREP phases, and second for the new e-filing system.

TREP

Table 5 shows the DiD estimation results for TREP I–III. The outcome variable is the log number of taxpayers, and we use geographical area*industry aggregated data, as explained in the previous section. The results show that TREP I has a positive and statistically significant impact on the log number of taxpayers. The estimate is larger when one-stop shops are established than in the earlier years of TREP I (0.809 versus 0.473). Similarly, the estimate of TREP III is positive and significant. TREP III has only one after-treatment period because all TREP methods, including the one-stop shops, were introduced at the same time in July 2016. In contrast to TREP I and III, the estimates of TREP II depend on the treatment. TREP II has a positive and statistically significant impact on the log number of taxpayers (0.478) when we compare all post-reform years with pre-reform years, but when we separate the after-reform variable into two, the results change. In the first years after the introduction of TREP II, we do not find a significant impact on the log number of taxpayers. The estimate becomes positive only after the establishment of one-stop shops (0.751). In summary, the log number of presumptive taxpayers increases more in treatment areas than in control areas in most of the specifications, and the largest impact, approximately 70 per cent or more, is after the establishment of one-stop shops. The results highlight the importance of in-person services. This is not a surprising finding in Uganda, since the National Information Technology Survey in 2017–18 found that almost 97 per cent of individuals said they preferred to meet government officials face to face (National Information Technology Authority Uganda 2018).

To investigate the sensitivity of the results, we run the DiD regression without cell dummies. Columns (1), (5), and (9) of Table 5 show that the estimates are positive and significant in all TREPs, but the size of the effect changes if cell dummies are or are not included. The estimates are therefore slightly sensitive to additional control variables.

We visualize the development of the treatment effect in Figure 6. The left panel shows that TREP II did not have a significant impact at the beginning, but after the introduction of one-stop shops in July 2016 the effect becomes positive. The right panel shows that TREP III had a positive impact from the beginning, since TREP III started with one-stop shops. However, there is already a small positive effect before TREP III started, which might have been caused by the new e-filing system, which was launched in July 2015. Overall, both panels support the findings from the DiD estimation shown in Table 5. Moreover, Figure 6 verifies that in general the parallel trend assumption holds, and we can employ the DiD approach. One caveat is that we cannot provide visual evidence for TREP I, since it has only one pre-reform year, which is omitted if we estimate the treatment effect by year.

Table 5: DiD estimation results of TREP: log number of taxpayers

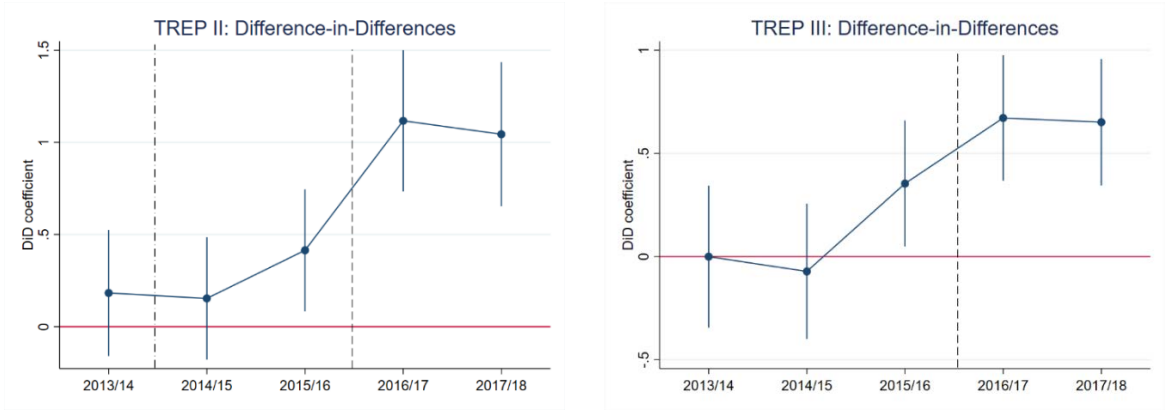
	TREP I: Kampala				TREP II: Wakiso				TREP III: Other municipalities	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	After	After	$After_1$	$After_2$	After	After	$After_1$	$After_2$	After	After
$TREP_c$*$After_t$	0.881***	0.732***	0.473**	0.809***	0.728***	0.478**	0.193	0.751***	0.466***	0.779***
	(0.174)	(0.233)	(0.188)	(0.288)	(0.119)	(0.217)	(0.201)	(0.289)	(0.077)	(0.088)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cell dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
R-squared	0.267	0.838	0.923	0.851	0.145	0.765	0.792	0.822	0.169	0.799
Observations	3,006	3,006	377	2,714	2,823	2,823	658	2,309	3,744	3,744
	377 taxpayers in TREP I area in 2012/13				88 taxpayers in TREP II area in 2013/14				1,382 taxpayers in TREP III area in 2015/16	

Note: columns (1–4) present the estimates for TREP I in Kampala. Column (1) shows estimates using the after variable, which includes all after-treatment years, not including cell dummies. Estimates in column (2) are the same as in column (1), but with cell dummies. Column (3) presents estimates for 2013–14 to 2014–15. Column (4) presents estimates for 2015–16 to 2017–18. Columns (5–8) show the estimates for TREP II in the Wakiso district. Column (5) presents estimates without cell dummies using the after variable, which includes all after-treatment years. Column (6) includes cell dummies. Columns (7) and (8) divide the after-treatment variable into two and show the results for 2014–15 to 2015–16 and 2016–17 to 2017–18 accordingly. Columns (9) and (10) show the estimates without and with cell dummies for TREP III in 30 municipalities using 2016–17 to 2017–18 as after-treatment years. The number of observations is different in each column because we separately estimate regressions for $After_1$ and $After_2$ variables. Robust standard errors in parentheses.[16] *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations based on URA administrative tax returns data.

[16] In addition to robust standard errors, we estimate the DiD model using clustered standard errors at the geographical area level as a robustness check. We cluster at the area level because it is likely that the error terms for businesses within clusters are correlated. Clustered standard errors are on average around 60 per cent larger than robust standard errors. However, the estimates are still significant in most of the specifications. Moreover, we use aggregated data that eliminates business-level variation in clusters, and thus we use robust standard errors as our default specification in all regressions in this paper.

Figure 6: Event study plot for TREP II and III



Note: the right panel shows the event study chart for TREP II, the left panel for TREP III. The dashed line indicates when one-stop shops were established, and the dash-dotted line in TREP II shows when TREP started in the Wakiso district (July 2014). The treatment effect is the coefficient of the interaction term $TREP_g xYear_t$ from the simple DiD regression without cell dummies, but including $TREP_g$ and $Year_t$ dummies.

Source: authors' calculations based on URA administrative tax returns data.

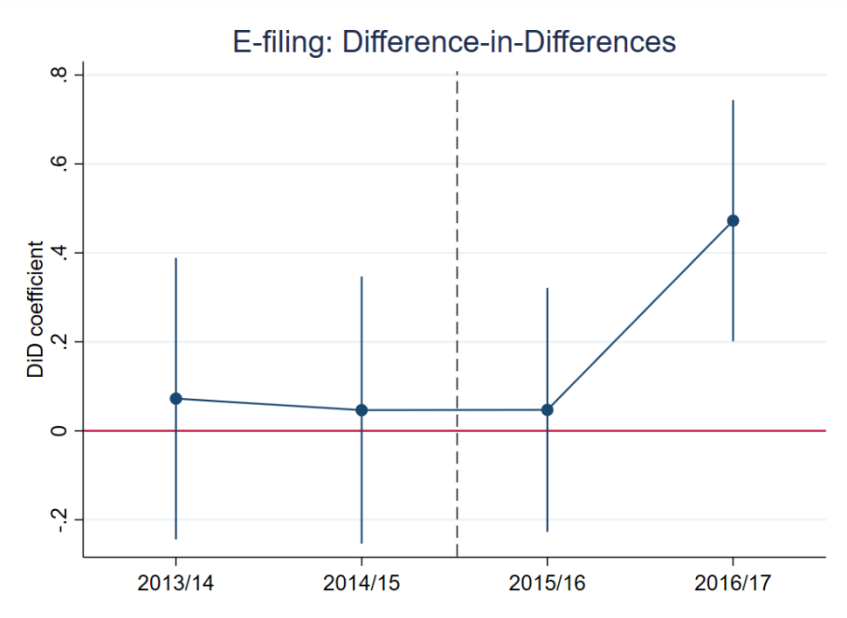
The new e-filing system

We first visualize the impact of the new e-filing system. Figure 4 shows that the number of presumptive taxpayers increased rapidly after the introduction of the new e-filing system, whereas there was no increase in the number of CIT payers. Figure 7 presents the development of the estimated treatment effect using the simple DiD regression with treatment and year dummies. It shows that the treatment effect is positive only in the second year after the introduction of the new e-filing system. This evidence suggests that the new e-filing system increased the number of presumptive taxpayers. Moreover, both figures show that in the pre-reform years, the treatment and control groups have similar trends, and hence the DiD approach is suitable to measure the size of the impact.

Table 6 presents the main findings of the DiD estimation. The results suggest that the new e-filing system was successful: the number of presumptive taxpayers more than doubles after the intervention when we compare all post-reform years with the pre-reform period (see columns (2–4)). The estimates are larger when we add more control variables to the regression. In the simplest specification, in column (1), the estimate is substantially smaller, at only 0.238. This implies that estimates are especially sensitive to cell controls, because the estimate increases to 1.315 when we add cell dummies (see column (2)).

We test whether the treatment effect is different for the first and second years after the reform. We find that the effect on the log number of taxpayers is larger in the second year than in the first year after the reform (see columns (5–10) in Table 6). Similarly for all after-years, the results are smaller without cell dummies.

Figure 7: Event study plot for the new e-filing system



Note: the dashed line shows the time of the treatment (July 2015). The treatment effect is estimated from the simple DiD regression without cell dummies. The treatment effect is the coefficient of the interaction term $Presumptive_g xYear_t$ from the simple DiD regression without cell dummies but including $Presumptive_g$ and $Year_t$ dummies.

Source: authors' calculations based on URA administrative tax return data.

Table 6: DiD estimation results of the new e-filing system: log number of taxpayers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	After	After	After	After	$After_1$	$After_1$	$After_1$	$After_2$	$After_2$	$After_2$
$Presumptive_c$*	0.238***	1.315***	1.430***	1.006***	0.002	0.752***	0.676***	0.428***	2.083***	1.578***
$After_t$	(0.078)	(0.073)	(0.085)	(0.084)	(0.093)	(0.091)	(0.096)	(0.091)	(0.109)	(0.124)
$TREP_Active_{c,t}$			0.299***	-0.229***		0.362***	0.143*		0.379***	0.076
			(0.052)	(0.051)		(0.080)	(0.082)		(0.064)	(0.058)
$TREP_Active_{c,t}$				1.055***			0.511***			0.763***
*$Presumptive_c$				(0.083)			(0.151)			(0.137)
$Presumptive_c$*			0.277***	0.138*		0.210***	0.135*		0.299***	0.198**
$After_{2014/15}$			(0.078)	(0.077)		(0.069)	(0.073)		(0.082)	(0.081)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cell dummies	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
R-squared	0.033	0.864	0.868	0.881	0.004	0.913	0.914	0.045	0.915	0.919
Observations	3,904	3,904	3,904	3,904	2,522	2,522	2,522	2,944	2,944	2,944
				2,175 presumptive taxpayers in 2014-15						

Note: column (1) presents basic DiD estimations for the log number of taxpayers. Column (2) shows DiD estimates for the log number of taxpayers and includes cell dummies. Column (3) adds controls for $TREP_Active_{c,t}$ and the presumptive tax rate change. Column (4) includes the $TREP_Active_{c,t}$*$Presumptive_c$ interaction variable. Columns (5–10) show results separately for the first and second years after the reform, and with and without different control variables. $After_1$ is the year 2015–16, and $After_2$ is 2016–17. The number of observations differs in each column because we separately estimate regressions for the $After_1$ and $After_2$ variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations based on URA administrative tax returns data.

We control for whether TREP is active for both the treatment and control groups, and we estimate the interaction of TREP and the treatment group.[17] In all specifications with active TREP, the DiD estimates are positive and significant. When we estimate the interaction between active TREP and presumptive taxpayers in column (4), the DiD estimate is smaller compared with regressions with cell dummies or active TREP (columns (2) and (3)). The coefficient of $TREP_Active_{c,t}xPresumptive_c$ is positive, and it is larger than the coefficient of $TREP_Active_{c,t}$. This supports findings from the analysis of TREP for presumptive taxpayers. As a result, we argue that the new e-filing form and TREP have complementary effects, because both increase the number of presumptive taxpayers.

The complementary effect of TREP and the new e-filing system is clearer in the second year after the introduction of the new e-filing system. The second year is the fiscal year 2016–17, and it is the year when the one-stop shops were established in most of the municipalities. Therefore, the mechanism behind the complementary effect is most likely related to the one-stop shops. At a one-stop shop, taxpayers register their businesses with different authorities one by one. They first start their registration with the URSB. Second, they receive a TIN from URA. Finally, they can apply for a trading licence from Kampala Capital City Authority or local government. In principle, this system forces taxpayers to register with URA. Moreover, TREP includes client sensitization workshops and tax education at one-stop shops, where tax officers can teach and help businesses to file their returns using the new e-filing form. As a result, one-stop shops can have a major role in the complementary effect.

Tax rates were reduced at the same time as the new e-filing system was introduced. We proxy changes in taxes by adding the variable $Presumptive_cxYear_{2014/15}$, which takes value one when the year is 2014–15, and a cell is presumptive taxpayers. In 2014–15, tax rates increased from one to three per cent. We test whether this affected the number of taxpayers. In Table 6, the coefficient of a proxy variable is positive, which is counter-intuitive in light of results from other studies. For instance, Waseem (2018) found that a large increase in tax rates reduced the number of partnerships filing returns in Pakistan; he argued that the increase led partnerships to migrate to informality or switch to other business types. In our analysis, the positive coefficient implies that the tax increase led to larger tax-filing. Because the coefficient is a proxy, it means that in the opposite situation, where tax rates are reduced, the number of taxpayers should decrease—which is opposite to the findings by Waseem (2018). Therefore, we interpret the positive coefficient as follows: in 2014–15 the number of presumptive taxpayers slightly increased, as shown in Figure 3, and this was a result of the positive effect of TREP I (see column (3) in Table 5). We conclude that the tax reform did not have an impact on the number of taxpayers.

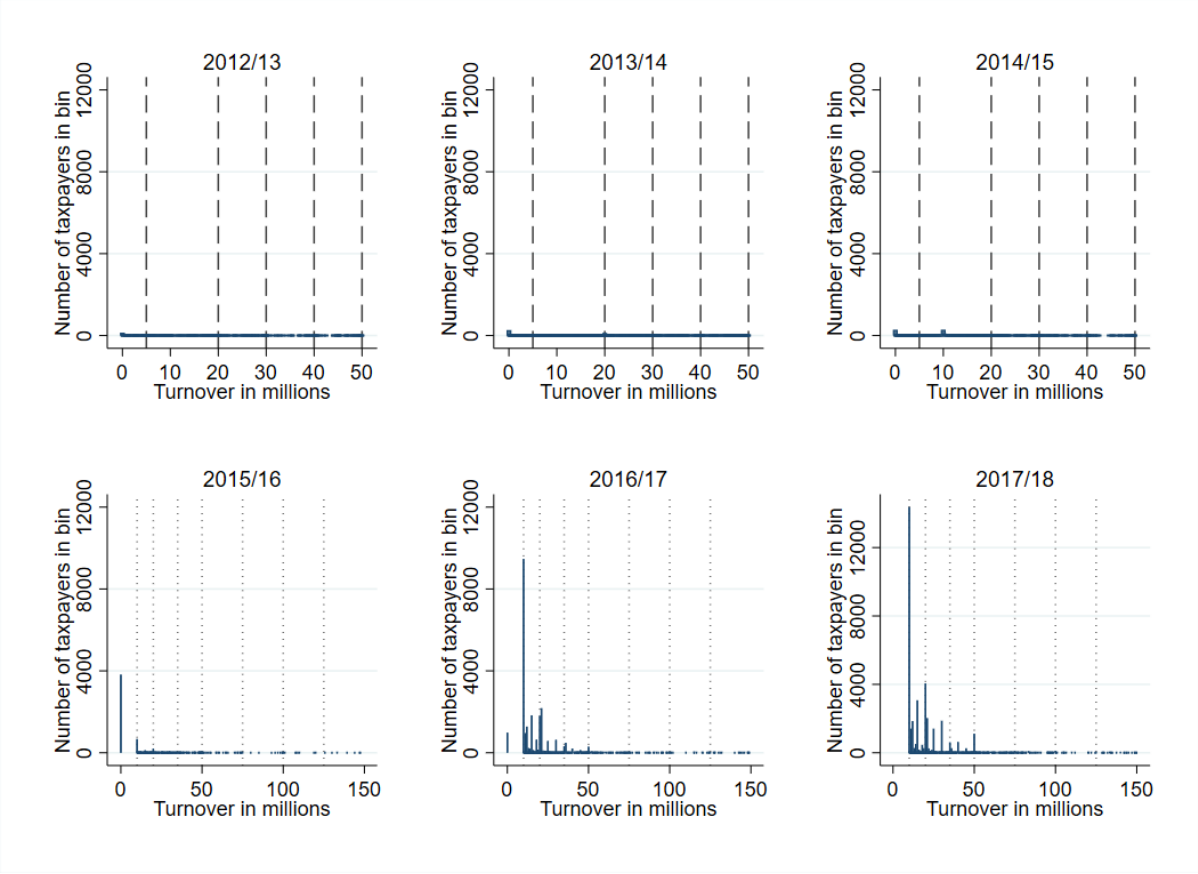
To further study the mechanism behind the increased number of presumptive taxpayers, we examine the distribution of presumptive taxpayers and how persistently they report their incomes to URA. Figure 8 indicates that most of the new presumptive taxpayers report the lowest possible taxable amount of turnover, which was UGX10 million from 2015–16 onwards. Furthermore, we investigate the persistence of presumptive taxpayers, and we find that most of the presumptive firms report their incomes to URA only in one year and not in the next year. Overall, TREP and the new e-filing system successfully enhance the formalization of businesses, but they do not manage to keep small businesses on board. The reason for this might be the low enforcement

[17] We control for active TREP for the control group because when we analyse the effect of TREP for small CIT payers using a similar model to Equation [1], we find mixed results. The results for TREP I and II are small, positive, and significant, but for TREP III the estimate is not significant.

capacity of tax officials. In general, enforcement operations in low-income countries with limited administrative capacity focus on large firms, from which most of the tax revenues naturally arise.

We test the robustness of the estimation results using different groups of CIT payers as a control group. The tested groups are CIT payers with turnovers of (1) UGX0–150 million, (2) over UGX0 but less than UGX150 million, and (3) UGX0–400 million. The results do not change significantly in any different specification of the control group, and the estimate is around one for all groups when we compare all pre-reform years with post-reform years. Figure 3 supports this finding, because it shows that the growth of CIT payers whose turnover is between UGX0 and UGX400 million was constant from 2011–12 to 2016–17.

Figure 8: Distribution of presumptive taxpayers, 2012–13 to 2017–18



Note: vertical lines mark the thresholds of tax brackets in fiscal years. The size of the bin is UGX100,000. All monetary values are in UGX.

Source: authors' calculations based on URA administrative tax returns data.

5.2 Tax revenues

The objectives of TREP and the new e-filing system were mainly to formalize businesses and make taxpaying easier, thus reducing compliance costs. As a result of increased formalization, the tax revenues collected from small businesses might have increased. In this section, we evaluate three possible channels through which presumptive tax revenues might have increased. First, higher presumptive tax rates might increase tax revenues. Second, the presumptive tax base might have been expanded. Third, more small businesses might have become taxpayers.

To evaluate these possible channels, we first examine the impacts of TREP and the new e-filing system on payable taxes, using a similar DiD estimation as in section 5.1, and we provide

descriptive evidence of how presumptive tax revenues developed between 2012–13 and 2017–18. Second, we discuss the potential increase in the presumptive tax base.

We evaluate the impact of TREP and the new e-filing system on payable taxes as these are observed in the returns data. Table 7 shows that the results of the different TREPs are significant in most of the specifications. Columns (1), (5), and (9) present the estimates when we do not add cell dummies. These estimates are significant and vary from 0.5 for TREP III to 1.26 for TREP I. When we include cell dummies, the results change: the estimate of TREP I drops to 1.02, TREP II becomes insignificant, and TREP III rises to 0.784. Further, we separately investigate the effects of TREP before and after the establishment of the one-stop shops by dividing the post-TREP period into two for TREP I and II. In both TREPs, the estimates are larger for the years when one-stop shops were in place. In summary, our results show that TREP increased presumptive tax revenues by approximately 70 per cent or more in most of the specifications.

Table 7: DiD estimation results for TREP: log payable taxes

	TREP I: Kampala				TREP II: Wakiso				TREP III: Other municipalities	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	After	After	$After_1$	$After_2$	After	After	$After_1$	$After_2$	After	After
$TREP_c$*$After_t$	1.255***	1.021***	0.210	1.216***	0.977***	0.501	0.250	0.746*	0.502***	0.784***
	(0.233)	(0.358)	(0.377)	(0.388)	(0.193)	(0.334)	(0.498)	(0.402)	(0.092)	(0.100)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cell dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
R-squared	0.302	0.849	0.899	0.861	0.143	0.787	0.860	0.843	0.180	0.815
Observations	2,919	2,919	290	2,698	2,703	2,703	538	2,257	3,607	3,607

Note: columns (1–4) present the estimates for TREP I in Kampala. Column (1) shows estimates using the after variable, which includes all after-treatment years, not including cell dummies. In column (2), we add cell dummies. Column (3) presents estimates for 2013–14 to 2014–15. Column (4) presents estimates for 2015–16 to 2017–18. Columns (5–8) show the estimates for TREP II in the Wakiso district. Column (5) presents estimates without cell dummies using the after variable, which includes all after-treatment years. Column (6) shows the same estimates as column (5), but with cell dummies. Columns (7) and (8) divide the after-treatment variable into two and show the results for 2014–15 to 2015–16 and 2016–17 to 2017–18 accordingly. Columns (9) and (10) show the estimates for TREP III in 30 municipalities, using 2016–17 to 2017–18 as the after-treatment years without and with cell dummies. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations based on URA administrative tax returns data.

In Table 8, we show similar DiD estimates of payable taxes for the new e-filing system. In columns (1–4) we estimate the overall effect for post-reform years, and in columns (5–10) we look separately at impacts for the first and second years after the reform. These results are sensitive to different control variables. When we do not include cell dummies, the estimate is negative and/or insignificant. After we include cell dummies, control for active TREP, or include the interaction between active TREP and the treatment group, the estimates change to positive (around 1.0). A similar pattern is seen when we look separately at the first and second years after the reform. The largest positive effect—1.65–2.1, depending on the specification—is for the second year after the introduction of the new e-filing system. Overall, the new e-filing system with TREP increased presumptive tax revenues (see columns (4), (7), and (10)).

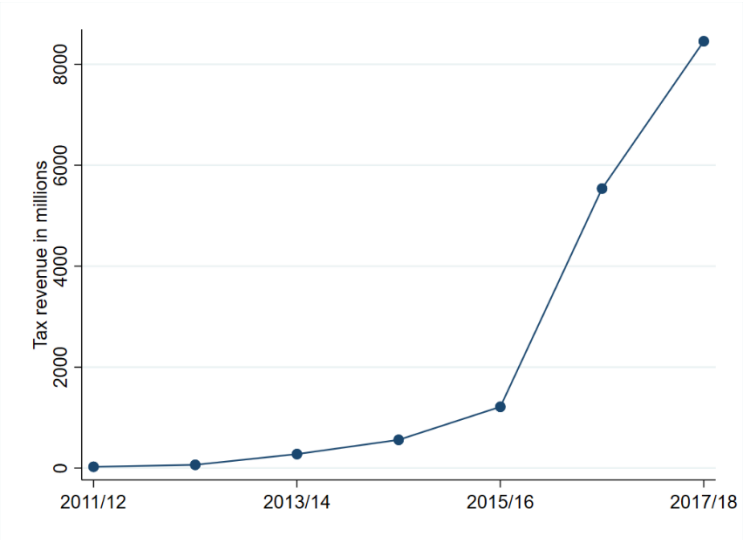
Table 8: DiD estimation results for the new e-filing system: log payable taxes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	After	After	After	After	$After_1$	$After_1$	$After_1$	$After_2$	$After_2$	$After_2$
$Presumptive_c$*	-0.120	1.138***	1.407***	0.996***	-0.359**	0.736***	0.587***	0.086	2.087***	1.649***
$After_t$	(0.131)	(0.125)	(0.148)	(0.155)	(0.162)	(0.173)	(0.183)	(0.152)	(0.199)	(0.253)
$TREP_Active_{c,t}$			0.368***	-0.209		0.419**	0.041		0.426***	0.147
			(0.088)	(0.130)		(0.164)	(0.215)		(0.143)	(0.200)
$TREP_Active_{c,t}$				1.038***			0.934***			0.668**
*$Presumptive_c$				(0.146)			(0.268)			(0.265)
$Presumptive_c$*			0.629***	0.481***		0.624***	0.471***		0.578***	0.484***
$After_{2014/15}$			(0.155)	(0.155)		(0.147)	(0.157)		(0.170)	(0.171)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cell dummies	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
R-squared	0.245	0.861	0.864	0.869	0.269	0.882	0.883	0.220	0.892	0.893
Observations	3,182	3,182	3,182	3,182	1,933	1,933	1,933	2,342	2,342	2,342

Note: column (1) presents simple DiD estimations without cell control variables. Column (2) shows DiD estimates including cell dummies. Column (3) adds controls for $TREP_Active_{c,t}$ and the presumptive tax rate change, and column (4) for $TREP_Active_{c,t}$*$Presumptive_c$. Columns (5–10) show results separately for the first and second years after the reform, without and with different control variables. $After_1$ is the year 2015–16, and $After_2$ is 2016–17. The number of observations is different in each column because we separately estimate the regressions for the $After_1$ and $After_2$ variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations based on URA administrative tax returns data.

Figure 9: Tax revenues calculated from presumptive tax returns data, 2011–12 to 2017–18



Note: tax revenues are calculated from variable payable taxes. All monetary values are in UGX.

Source: authors' calculations based on URA administrative tax returns data.

Figure 9 visualizes the trend in tax revenues calculated from presumptive tax returns data from 2011–12 to 2017–18. This tax revenue represents the revenues if all payable taxes in tax returns had been paid. The tax revenue increases substantially after 2015–16. Figure 9 is remarkably similar to the left side of Figure 3, which shows the trend in the number of presumptive taxpayers. Therefore, we argue that the increase in presumptive tax revenues is mainly due to the increased number of taxpayers, rather than to any changes in presumptive tax policy (in the next section we investigate this in more detail). We showed in section 5.1 that both TREP and the new e-filing system increased the number of presumptive taxpayers. Moreover, the estimation results in this section suggest that the amount of payable taxes increased in active TREP areas and after the introduction of the new e-filing form.

One possible reason for the increased tax revenues is the wider presumptive tax base. In 2015–16, the upper threshold for presumptive tax increased from UGX50 million to UGX150 million. Figure 8 presents the distribution of presumptive taxpayers from 2012–13 to 2017–18, and it shows that the number of presumptive taxpayers between UGX50 million and UGX150 million is very low in all years. Therefore it is reasonable to assume that the tax revenues shown in Figure 9 did not increase due to the change in the upper threshold alone.

Robustness checks

In the analysis of tax revenues, we need to take into account the presumptive tax rate reforms in 2014–15 and 2015–16. In 2014–15, the presumptive tax rate changed from one to three per cent; in 2015–16 the tax rates were reduced on average to 1.5 per cent. Therefore, as a robustness check, we estimate the effect on payable taxes, which we calculate from estimated sales using a hypothetical marginal tax rate (MTR) of 1.7 per cent for every year. This hypothetical MTR is an average presumptive tax rate for all years. We also use UGX10 million as a zero-tax threshold.

In Tables 9 and 10, we show the results of TREP and the new e-filing form using the hypothetical MTR for all years. The results are similar to those found in the previous section, when we did not control for the change in marginal tax rates (see Tables 7 and 8). Therefore, we can conclude that the presumptive tax rate changes had no effect on presumptive tax revenues.

Table 9: Robustness check for TREP: DiD estimation results of log payable taxes when the marginal tax rate is the same for all years

	TREP I: Kampala				TREP II: Wakiso				TREP III: Other municipalities	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	After	After	$After_1$	$After_2$	After	After	$After_1$	$After_2$	After	After
$TREP_c$*$After_t$	0.924***	0.763*	0.154	0.834**	0.924***	0.315	0.070	0.591	0.605***	0.982***
	(0.234)	(0.398)	(0.486)	(0.414)	(0.195)	(0.389)	(0.491)	(0.466)	(0.093)	(0.116)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cell dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
R-squared	0.193	0.824	0.873	0.837	0.109	0.788	0.861	0.839	0.142	0.815
Observations	2,730	2,730	265	2,525	2,512	2,512	370	2,213	3,393	3,393

Note: columns (1–4) present the estimates for TREP I in Kampala. Column (1) shows estimates using the after variable, which includes all after-treatment years, not including cell dummies. In column (2), we add cell dummies. Column (3) presents estimates for 2013–14 to 2014–15. Column (4) presents estimates for 2015–16 to 2017–18. Columns (5–8) show the estimates for TREP II in the Wakiso district. Column (5) presents estimates without cell dummies using the after variable, which includes all after-treatment years. Column (6) shows the same estimates as column (5), but with cell dummies. Columns (7) and (8) divide the after-treatment variable into two and show results for the years 2014–15 to 2015–16 and 2016–17 to 2017–18 accordingly. Columns (9) and (10) show the estimates for TREP III in 30 municipalities using 2016–17 to 2017–18 as the after-treatment years, without and with cell dummies. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations based on URA administrative tax returns data.

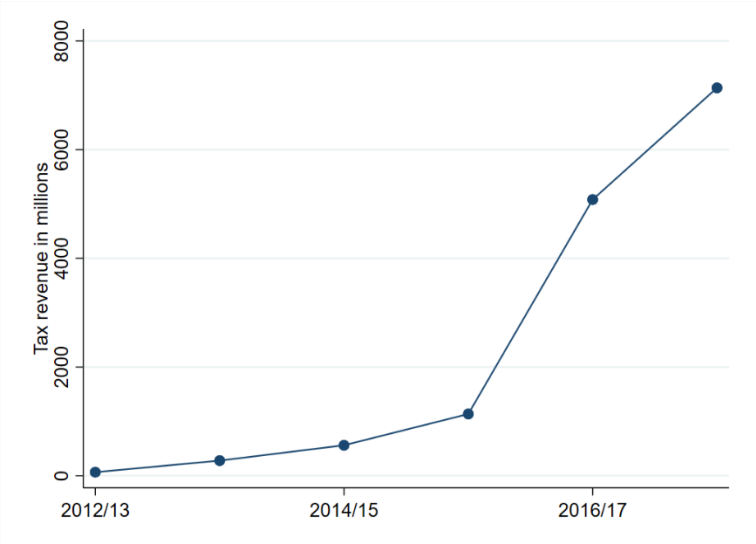
Table 10: Robustness check for the new e-filing system: DiD estimation results of log payable taxes when the marginal tax rate is the same for all years

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	After	After	After	After	$After_1$	$After_1$	$After_1$	$After_2$	$After_2$	$After_2$
$Presumptive_c$*	0.060	1.188***	1.176***	0.783***	-0.250	0.268*	0.244*	0.299**	2.088***	1.812***
$After_t$	(0.130)	(0.132)	(0.131)	(0.135)	(0.160)	(0.143)	(0.145)	(0.151)	(0.180)	(0.232)
$TREP_Active_{c,t}$			0.350***	-0.246*		0.237	0.127		0.386***	0.205
			(0.099)	(0.135)		(0.161)	(0.208)		(0.147)	(0.199)
$TREP_Active_{c,t}$				1.133***			0.272			0.452*
*$Presumptive_c$				(0.153)			(0.264)			(0.269)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cell dummies	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
R-squared	0.155	0.833	0.835	0.842	0.185	0.861	0.861	0.132	0.875	0.875
Observations	3,008	3,008	3,008	3,008	1,775	1,775	1,775	2,300	2,300	2,300

Note: column (1) presents simple DiD estimations without cell control variables. Column (2) shows DiD estimates including cell dummies. Column (3) adds controls for $TREP_Active_{c,t}$, and column (4) for $TREP_Active_{c,t}$*$Presumptive_c$. Columns (5–10) show results separately for the first and second years after the reform, without and with different control variables. $After_1$ is the year 2015–16, and $After_2$ is 2016–17. The number of observations is different in each column because we separately estimate the regressions for the $After_1$ and $After_2$ variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations based on URA administrative tax returns data.

Figure 10: Tax revenues calculated from presumptive tax returns data from 2012–13 to 2017–18, for taxpayers with turnover UGX0–50 million only



Note: tax revenues are calculated from variable payable taxes. All monetary values are in UGX.

Source: authors' calculations based on URA administrative tax return data.

Altogether, the increase in presumptive tax revenues shown in Figure 9 is thus mainly due to the increase in the number of taxpayers. The DiD estimation results in Tables 7 and 8 show that tax revenues from presumptive taxpayers whose turnover is UGX0–50 million increased because of TREP and the new e-filing system. Furthermore, the results of the robustness checks in Tables 9 and 10 support this argument, because they show that presumptive tax reforms do not affect the results. On the other hand, widening the presumptive tax base in 2015–16 naturally increased presumptive tax revenues; but as shown in Figure 8, only a few new presumptive taxpayers had a turnover between UGX50 million and UGX150 million. Moreover, Figure 10 supports this argument, because it shows that the increase in tax revenues is mainly due to presumptive taxpayers

whose turnover is between UGX0 and UGX50 million, and therefore the main result is that the increase in tax revenues is due to the new e-filing system and TREP.

5.3 A cost-benefit analysis of TREP

In this section, we analyse the costs and benefits of TREP. First, we compare presumptive tax revenues in active TREP and control areas for the years before and after TREP. This DiD represents the additional presumptive tax revenue assessed because of TREP. We use this simplified approach to calculate the additional revenue because we use a similar approach to calculate the cost of TREP. Second, we calculate the average costs of TREP from URA's budget for TREP. Finally, we discuss whether TREP has benefits not only for the revenue authority but also for businesses, and how cost-effective it is.

In Table 11, we show revenue calculations for TREP I and III. We only calculate tax revenues for TREP I and III because TREP II did not have a significant impact on payable taxes (see Table 9). The average additional tax revenue from TREP I is around UGX11.4 million and from TREP III almost UGX3 million per year and cell.[18] However, the additional tax revenue from TREP III may be upwardly biased, because Figure 6 shows an increasing trend in pre-reform years. To sum up, the average additional tax revenues from TREP per year and cell are around UGX14 million.

Table 11: Average tax revenues per cell in TREP I and III areas

	TREP I	**Control**	**Difference**
Before (2012-13 to 2014-15)	7,282,978	503,738	6,779,240
After (2015-16 to 2017-18)	42,259,840	1,373,424	40,886,416
Difference	34,976,862	869,686	34,107,176
Yearly average			11,369,059
	TREP III	**Control**	**Difference**
Before (2012-13 to 2015-16)	1,477,894	392,476	1,085,418
After (2016-17 to 2017-18)	8,146,134	1,342,768	6,803,366
Difference	6,668,240	950,292	5,717,498
Yearly average			2,858,974
Average additional revenue from TREP I and III per year			14,228,033

Note: average revenues are calculated for presumptive taxpayers whose turnover is under UGX50 million. Taxpayers who are in TREP I and III areas only are included in this analysis because those areas have a significant increase in tax revenues based on the DiD estimations (see Table 9). All monetary values are in UGX.

Source: authors' calculations based on URA administrative tax return data.

Next, we present average expenditures on all TREP areas in Table 12. The calculated average yearly expenditure on TREP per cell is around UGX1.5 million, which is only 11 per cent of the average additional tax revenue per year and cell.

[18] A cell here refers to the same cell variable (=geographical area*industry) as we have used in previous sections.

Table 12: Average expenditure per cell on all TREP areas

	Average expenditure on TREP per cell
2015-16	1,861,751
2016-17	1,143,223
2017-18	1,618,082
Yearly average	1,541,019

Note: average expenditure is calculated by dividing the TREP budget by the number of cells per year.[19] All monetary values are in nominal UGX.

Source: authors' calculations based on internal URA documents.

Our cost-benefit analysis presents only simplified back-of-the-envelope calculations. We do not use a similar DiD approach as in previous sections, because estimates from regressions would be harder to compare with the simple costs of TREP. Moreover, we do not have information regarding how costs are divided and utilized in different TREP municipalities, since we know only the total expenditure on TREP. The simplified analysis illustrates that the average additional revenue gained from TREP is much higher than the sum that URA has spent on TREP yearly. Against this background, TREP has been a successful intervention for increasing presumptive tax revenues. However, when we look at the bigger picture, presumptive tax revenues are a minor part of all tax revenues in Uganda. Hence, the main objective of TREP was to formalize businesses—not to increase revenue collection—which URA has done cost-effectively.

One caveat on our analysis is that we only have information about tax returns and not tax payments. The problem is that taxes paid are usually lower than tax assessed in tax returns. For example, in URA's official statistics, the presumptive tax collection in 2016–17 was UGX4.46 billion, but when we calculate payable presumptive taxes using the returns data, the amount is UGX5.54 billion (URA 2017). The difference between payments and returns is around 20 per cent. If we take this into consideration and lower the presumptive tax revenue by 20 per cent, the average additional tax revenue from TREP I and III is around UGX11 million. This value is still substantially larger than the costs of TREP.

Although TREP is mainly targeted at small businesses, there might have been spillover effects on medium-sized and large corporations, and on individual businesses such as the self-employed. Many methods used in TREP are public, such as radio advertisements and newspaper messages, and they can reach many citizens. Therefore, the expenditure on TREP is not only used to formalize small businesses. This means that TREP may have been even more cost-effective than we have calculated.

Besides its benefits for the revenue authority, TREP also has benefits for taxpayers. For taxpayers, TREP and especially the one-stop shops have enabled easier access to the services of government agencies, which saves taxpayers time and money. The 2017–18 National Information Technology Survey found that 96.6 per cent of individuals preferred to meet government officials in person (National Information Technology Authority Uganda 2018). Thus one-stop shops provide the face-to-face services that citizens demand. In addition, taxpayers benefit from formalization because when they become formalized, they gain access to financial and business services, and public goods such as social security. Moreover, TREP enhances the taxpaying culture in Uganda by informing people about taxes, which might benefit the country in a broader way.

[19] The TREP budget is in nominal values, and we do not take inflation into account. Inflation was 4.78 per cent per year on average from 2014 to 2018 (World Bank 2020a). If we were to make inflation adjustments, the average yearly expenditure would become lower.

Another caveat on our cost-benefit calculation for TREP is that we only take account of URA's expenditure on TREP as a cost. However, other costs can arise for taxpayers when they become formalized, because they need to pay taxes, which lowers their disposable income. This cost-benefit analysis does not value the lost consumption of taxpayers, and therefore the costs of TREP may be larger than we have calculated.

This cost-benefit analysis could be used as a starting point for calculating the optimal enforcement elasticity of tax revenue. Keen and Slemrod (2017) introduced the concept of the enforcement elasticity of tax revenue, and built a theoretical and empirical framework for analysing the optimality of administrative interventions. The cost-benefit ratio—around 1:10, in our estimation—is the first part of the enforcement elasticity; the second part would be the compliance costs estimates. Most likely TREP has reduced taxpayers' compliance costs, but the estimation of compliance costs is beyond the scope of this paper.

6 Conclusion

Small businesses are a large and important part of the economy in developing countries, but they mostly operate informally. The formalization of small businesses is a potential source for revenue authorities to increase domestic revenue mobilization. However, reaching small businesses, convincing them to become formalized, an enforcing that formalization is a difficult task.

In this study we evaluate the impact of two administrative interventions, TREP and a new electronic filing system for presumptive tax, on the number of small businesses and on revenue collection, using the DiD method. We use Ugandan administrative tax data covering both presumptive and CIT payers from 2012–13 to 2017–18. Furthermore, we conduct a cost-benefit analysis of TREP using simplified back-of-the-envelope calculations and URA's TREP budget.

We find that both TREP and the new e-filing system substantially increased the number of presumptive taxpayers, and almost doubled the presumptive tax revenue collection. Our results suggest that these reforms have had complementary effects, because at one-stop shops taxpayers cannot avoid registering with URA, and tax officers can help taxpayers to file their returns using the new e-filing system. Overall, our findings highlight that both TREP and the new e-filing system have enhanced the formalization and tax compliance of small firms in Uganda.

The results of the cost-benefit analysis show that the additional average tax revenue from TREP was almost ten times higher than URA's yearly TREP budget. In our analysis, we showed that this result holds even if we use payment data instead of returns data. Moreover, in light of TREP's other benefits, such as its potential spillover effects on medium-sized businesses and the improvement of taxpayers' access to services, we conclude that TREP is a highly cost-effective initiative.

The adoption of advanced technologies in tax administration is a promising development for low-income countries. Technologies can improve weak administrative capacity by reducing costs and increasing efficiency. In addition, better services and more inclusive methods to enhance formalization can complement technological improvements. We have shown that a large-scale taxpayer registration programme targeted at small businesses, complemented by simplified tax-filing, may be a cost-effective intervention to increase tax compliance and revenue collection in Uganda. Further studies of similar interventions in developing countries using administrative data would be needed to generalize the results of this paper to other countries.

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Appendix A

Table A1: Tax rates for small business taxpayers in Uganda, 2002–03 to 2017–18

Fiscal year	Effective from	Turnover in millions	Tax rate
2015-16 to 2017-18	1 July 2015	0-10	0%
		10-50	***
		50-75	937,500 or 1.5 %
		75-100	1,312,500 or 1.5%
		100-125	1,687,500 or 1.5%
		125-150	2,062,500 or 1.5%
2014-15	1 July 2014	0-10	0%
		10-20	450,000 or 3%
		20-30	750,000 or 3%
		30-40	1,050,000 or 3%
		40-50	1,350,000 or 3%
2003-04 to 2013-14	1 July 2002	0-5	0%
		5-20	100,000
		20-30	250,000 or 1%
		30-40	350,000 or 1%
		40-50	450,000 or 1%

Note: tax rates for turnover between UGX10 million and UGX50 million are lump sum amounts, presented in Table A2. These tax rates depend on business sector and location of business. The effective tax rates are either a lump sum or percentage amount, whichever is lower. The upper value of a tax bracket is included in that tax bracket; when it is exceeded, the taxpayer is switched to the next tax bracket. All monetary values are in UGX.

Source: authors' interpretation of the Income Tax Act (of 1 July 1997, including Income Tax (Amendment) Acts 2003, 2014, 2015, and 2016, all of 1 July).

Table A2: Tax rates as lump sum amounts for small business taxpayers for different turnover brackets, locations, and business sectors, 2015–16 to 2017–18

Location	Business sector	Turnover 10-20 million	Turnover 20-35 million	Turnover 35-50 million
Kampala city and divisions of Kampala	General trade	250,000	400,000	500,000
	Carpentry/metal workshops	250,000	400,000	500,000
	Garages	300,000	450,000	550,000
	Hair and beauty salons	300,000	400,000	550,000
	Restaurants or bars	300,000	450,000	550,000
	Drug shops (=pharmacies)	250,000	350,000	500,000
	Others	200,000	300,000	450,000
Municipalities	General trade	150,000	300,000	400,000
	Carpentry/metal workshops	150,000	300,000	400,000
	Garages	200,000	350,000	450,000
	Hair and beauty salons	200,000	350,000	450,000
	Restaurants or bars	200,000	350,000	450,000
	Drug shops	150,000	300,000	400,000
	Others	150,000	350,000	400,000
Towns and trading centres	General trade	100,000	200,000	300,000
	Carpentry/metal workshops	100,000	200,000	300,000
	Garages	100,000	250,000	350,000
	Hair and beauty salons	100,000	250,000	350,000
	Restaurants or bars	100,000	250,000	350,000
	Drug shops	100,000	200,000	300,000
	Others	100,000	250,000	300,000

Note: the upper value of a tax brackets is included in that tax bracket; when it is exceeded, the taxpayer is switched to the next tax bracket. All monetary values are in UGX.

Source: authors' interpretation of the Income Tax (Amendment) Acts (2015, 2016, both of 1 July).

Appendix B: TREP working methods

TREP includes several different working methods to sensitize taxpayers. Here we briefly explain what these different methods are.

One-stop shops are service centres that include representatives from URA, URSB, Kampala Capital City Authority, and local governments. In general, one-stop shops are located in local government offices in municipalities and districts, but there are also one-stop shops at URA's offices. All one-stop shops have at least one officer from each agency (i.e. URA, URSB, and local government), but there are more officers in busy locations. The one-stop shop is equipped with service desks, computers, and barcode readers that are used to complete registrations. The one-stop shops usually serve local businesses, but a client from any part of the country can visit and register in any one-stop shop.

Stakeholder engagements are meetings between TREP officers and local councils and leaders. In the engagement sessions, TREP officers explain the kinds of activities they perform within their localities. The objective of the meetings is to win the support of local councils and leaders.

Quarterly messages to staff are messages about URA's recent developments, which URA headquarters sends quarterly to other URA offices.

Client sensitization workshops are meetings where URA tax officers educate businesses and individuals on how to file and pay taxes.

Public notices are news items giving information and guidelines, which URA's media teams produce for publication in newspapers and social media. These give more detailed information about taxes and other obligations.

Newspaper strips are shorter messages or news items with a special focus on one topic. They are published several times or regularly in newspapers. They are like advertisements, but informative.

Barazas are organized public meetings (larger events) where URA officers educate taxpayers about certain taxes, and afterwards participants can ask questions related to the topic. These events provide a platform for taxpayers to air their concerns, ask questions, etc.

Radio advertisements are short advertisements on local radio stations in local languages.

Public van communications are advertisements on public vans.

Radio talk shows are talk shows about registration and taxes, on both local and national stations.

TV scripts are like advertisements but longer, and are shown on local and national TV channels.

Press briefings are events that URA organizes to inform the press.

Door-to-door registration of businesses involves TREP officers going door to door and issuing tax assessments. At this point, business owners that refuse to cooperate are registered for taxes by force. However, URA has no legal authority to close a business without a TIN, since URA can only close a business after issuing tax assessments and if the taxpayer has failed to pay. In contrast, local governments can close a business if it does not have a business licence. URA and local government officers go from door to door together, and any business found without a business licence is closed and directed to go to a one-stop shop to get a licence. Before the licence is given, the business is first required to register for a TIN and pay the taxes assessed.