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The Tax Side of the Pandemic: Compliance Shifts and Funding for Recovery in Rwanda

Giulia Mascagni and Fabrizio Santoro

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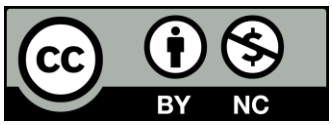

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Summary

While much knowledge is being generated on the impact of the pandemic, we still know very little on its implications on taxation in low-income countries. Yet, tax is crucial to fund crisis response and recovery, in addition to broader development plans and expanded government expenditure. This paper starts addressing this gap using a unique dataset of survey and administrative data from Rwanda. We document two significant shifts in taxpayers' views: perceptions about the fairness of the tax system improve by 40 per cent, and their attitudes to compliance become more conditional on the provision of public services of sufficiently good quality. Importantly, these shifts are accompanied by improvements in actual compliance behaviour: using data from tax returns, we show that firms that declare after the onset of the crisis are substantially more compliant than others. We then investigate public support for increasing various tax options to fund crisis response and recovery. Taxing large companies and the richest enjoy the greatest support, which, however, declines as income increases. These results allow us to make some recommendations and considerations on tax policy responses to the crisis.

Keywords: COVID-19, taxation, tax morale, tax compliance.

Giulia Mascagni is a Research Fellow at the Institute of Development Studies and Research Director of the International Centre for Tax and Development.

Fabrizio Santoro is a Research Fellow at the Institute of Development Studies and at the International Centre for Tax and Development.

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Acronyms

CIT	Corporate income tax
DiD	Difference-in-difference
LIC	Low-income countries
PIT	Personal income tax
RRA	Rwanda Revenue Authority
RWF	Rwandan Franc

Introduction

The COVID-19 pandemic is having profound economic and social implications on the whole world. Despite facing much lower case numbers and deaths related to COVID-19, low-income countries have nonetheless faced massive economic losses. While some evidence is emerging on the economic implications of the pandemic in low-income countries, it remains much more limited compared to the literature from higher-income contexts (Bishi, Grossman and Startz 2020; Djiofack, Dudu and Zeufack 2020; Egger, Jones, Justino, Manhique and Santos 2020; Goldberg and Reed 2020; Mahmud and Riley 2020; Ranchhod and Daniels 2020; Teachout and Zipfel 2020). Even more limited is our knowledge of the 'tax side' of the pandemic. Most of the evidence on tax focuses on estimating or measuring revenue losses resulting from the crisis (Arndt, Davies, Gabriel, Harris, Makrelov, Modise, Robinson, Simbanegavi, van Seventer and Anderson 2020; Bachas, Brockmeyer and Semelet, 2020; Mascagni and Lees 2021). However, many other questions remain almost entirely unanswered. Low-income countries already struggled to improve compliance and revenue before the pandemic hit. How does the current crisis affect taxpayers' attitudes to compliance and, importantly, their taxpaying behaviour? And how can governments secure sufficient funding for crisis response and recovery at a time when revenue is decreasing, despite being more needed than ever?

We aim to address these questions using a unique dataset of survey and administrative data from a nationally representative sample of about 2,000 Rwandan small and medium firms that are registered with the Rwanda Revenue Authority (RRA). Our dataset has two unique features. The first one is that it includes baseline information collected before the crisis hit Rwanda – as well as at multiple times during the crisis. This feature allows us to evaluate the crisis' impact on attitudes, perceptions, and compliance behaviour at different stages of the pandemic: before it appeared, the first peak of the crisis, a time of relaxed restrictions, and a second wave of infections, this time concentrated in the capital city. We can therefore follow shifts in perceptions and attitudes across these different phases, while controlling for all observed and unobservable individual-level characteristics that are fixed over the year covered by our data. The second unique feature of our dataset is that it includes both survey and administrative data, for the same sample and available both before and after the crisis. This allows us to check whether shifts in attitudes and perceptions translate in changes in actual behaviour.

In addition to the variables we can observe both at baseline and during the crisis, we also complemented our baseline questionnaire (which was designed before anyone knew COVID-19 would become a global pandemic) with questions aimed to capture tax issues that are specific to this crisis, such as tax relief and its beneficiaries, the role of informal contributions in crisis response, and options for increasing revenue to fund recovery. We use this unique dataset to shed light on several unanswered questions on the tax side of the pandemic in a low-income country, Rwanda.

The first set of unanswered questions that we seek to address concerns shifts in taxpayers' attitudes to compliance during the crisis. Are they less willing to comply, as paying taxes might feel like an additional burden at an already difficult time? Or are they *more* willing to comply, as the crisis made it clearer than ever that taxes are a fundamental tool to fund essential public services? Our results suggest that the crisis shifted taxpayers' attitudes towards more conditional views on compliance, making the link between taxes and public service provision more salient – as opposed to a more unconditional view on compliance, whereby taxes should be paid regardless of what the government provides in return. At the same time, we also document a strong improvement in taxpayers' views on the fairness of

the tax system. Both shifts emerge right at the beginning of the crisis, and then persist throughout (see section 3.1).

We then investigate whether those significant shifts in attitudes are associated with behavioural changes. To do this, we use administrative data from tax returns and a difference-in-difference (DiD) framework that exploits the fact that the pandemic hit Rwanda during the tax declaration period, thus potentially affecting behaviour only for those taxpayers who had not yet filed by that time. We find that compliance, measured as tax paid on reported income, increased for those firms that declared after the onset of the crisis – suggesting a shift in behaviour along with attitudes (see section 3.2).

The second set of questions regards sources of financing for crisis response and recovery. More specifically, how should crisis response be funded? And, going forward, what financing options for recovery enjoy the greatest public support? We show descriptive results on preferences for various tax options to fund recovery, from our survey data. We show that, amongst tax options to fund recovery, Rwandan firms support taxing the rich and large corporations over other sources of revenue, such as property tax or taxing everyone equally. These results lead us to make some final considerations on concrete policy options for governments of low-income countries, and Rwanda in particular (see section 4).

As we discuss in section 2, these results are found in a context where the government responded quite forcefully to the pandemic, imposing early and strict lockdowns as soon as the first cases of COVID-19 appeared in the country. In this sense, Rwanda is not dissimilar to many other low-income countries that have generally responded to the pandemic with similar restrictions to those imposed in higher-income contexts, despite much lower case numbers (Ray and Subramanian, 2020; Caselli, Grigoli, Lian and Sandri 2020; Walker *et al.* 2020). However, Rwanda stands out in other aspects. Perhaps the most important one, given the nature of the crisis, is the extensive health insurance coverage that the country managed to achieve in recent years – the highest in Africa (Barasa, Kazungu, Nguhiu and Ravishankar 2021). The Rwandan government might have also been particularly effective both in enforcing restrictions and in quickly adopting support measures, including tax relief, as the data presented in section 2 suggests. While our results are not directly applicable to other contexts, they start filling the knowledge gap on low-income countries.

Our results complement the scant but increasing literature on revenue losses – estimated or actual – associated with the COVID-19 pandemic in low-income countries (Arndt *et al*. 2020; Bachas *et al*. 2020; Mascagni and Lees 2021). These studies show that the pandemic has had a large revenue impact. For example, Arndt *et al.* (2020) estimate a 32 per cent drop across all tax types in South Africa, while Bachas *et al.* (2020) predict that tax revenue remitted by corporations in ten low and middle-income countries would drop by 1.5 per cent or 2.5 per cent of GDP under a three-month or five-month shock scenario. Estimates for Rwanda predict a 25 per cent drop in corporate income tax revenue in a three-month lockdown scenario (Lees, Mascagni, and Santoro 2020), while real-time VAT data show a contraction in this tax type of 5.3 per cent in the first three quarters of 2020 (Mascagni and Lees 2021). Our paper complements these findings by showing that, while revenue has been hit hard, the pandemic might have had positive effects on taxpayers' perceptions about the tax system – and its fairness in particular. The shift towards more conditional forms of compliance might be seen in a positive light, as a first step to spur a potential virtuous cycle whereby taxpayers are more willing to pay tax, but also demand better services in return – with broader potential benefits to government accountability, trust and transparency (Prichard, Custers, Dom, Davenport and Roscitt 2019).

In what follows, we start by presenting our unique survey dataset (section 1). We then describe the Rwandan context, its experience with the pandemic and the policy response to it, including some initial descriptive statistics from our data (section 2). Sections 3 and 4 then present our key results, respectively on shifts in compliance attitudes and behaviour, and on options to fund crisis response and recovery. Section 5 concludes.

1 The Rwanda National Taxpayer Survey

The Rwanda National Taxpayer Survey was implemented as part of a long-standing collaboration between the International Centre for Tax and Development and the Rwanda Revenue Authority. Originally, we planned for a one-off survey to take place in early 2020. Follow-up rounds were added later to capture the impact of the COVID-19 pandemic. The original purpose of the survey was to generate new analysis on taxpayer compliance that would both inform RRA's policy and contribute to the academic literature. To this aim, we designed a questionnaire that includes many of the typical questions of the survey-based literature on tax compliance, thus making it largely comparable with other studies.[1] However, our questionnaire also includes two innovative features.

First, we include three list experiments to test the validity of respondents' answers on three potentially sensitive topics: income under-reporting, the fairness of the tax system, and the professionalism of RRA staff. We then compare the results from the list experiments with more direct questions on these topics.[2] We do not find any evidence of significant biases in responses to these questions, which reassures us on the quality of our data. In Appendix 1 we discuss the details of our list experiments and their results.

Second, our survey includes detailed questions on topics that are less common in the survey-based tax compliance literature, such as taxpayer knowledge and informal contributions, that allow us to offer a more complete picture of the tax side of the pandemic.[3] We use data on both topics in section 2 to show how informal contributions have filled the financing gap in crisis response, and how tax knowledge is strongly associated with access to tax relief. More specifically, the survey includes the following key modules: (i) demographics, (ii) business characteristics, (iii) risk aversion, (iv) tax knowledge, (v) satisfaction with public services, (vi) interactions with RRA, (vii) overall tax burden, and (viii) tax compliance attitudes and perceptions.[4]

Based on this questionnaire, we conducted interviews in January and February 2020 with a nationally representative sample of 2,023 small and medium firms randomly sampled from the relevant population of taxpayers registered with the RRA for business income tax.[5] This includes firms that are registered either as corporations, thus subject to corporate income tax

1 For example, a forthcoming ICTD Working Paper reports results based on a very similar survey collected in Sierra Leone. Some of our questions on attitudes to compliance are largely comparable with the Afrobarometer survey.

2 The exact questions we use in this paper are reported in Table A1.

3 While traditionally the tax compliance literature has not focussed much on these themes, evidence on them has increased in recent years (Gangl, Kirchler, Lorenz and Torgler 2017; van den Boogaard, Prichard and Jibao 2019; Mascagni, Santoro and Mukama 2019; van den Boogaard and Santoro 2021).

4 The survey also included two additional modules, that however we do not use here: an experimental video to nudge taxpayers to better compliance attitudes and behaviour, and some follow-up questions to capture tax compliance outcomes that might be affected by the video. The video was shown to participants at the end of the survey, so it does not affect our data – particularly as we do not use any of the (few) variables collected after the video.

5 Participants were randomly sampled from the population of small and medium business taxpayers in Rwanda. We included firms registered in 20 out of 30 districts in Rwanda. We dropped the ten smallest districts to facilitate the logistics of data collection, while maintaining the national representativeness of all provinces.

(CIT), or as unincorporated firms or sole proprietorships, thus subject to personal income tax (PIT), which in this context is a tax on business profits. Although all firms are registered with the RRA, they have three broad types of compliance behaviour: 1) 23 per cent do not file declarations, although they should do so as required of all registered taxpayers; 2) 25 per cent file nil declarations, defined as reporting zero in all fields; 3) the remaining 52 per cent have a more usual behaviour where they report some sales and other information to the revenue authority. Non-filing and nil-filing both result in zero tax payments, so these taxpayers can be considered unproductive in revenue terms. These seemingly puzzling compliance behaviours are quite common in other African countries too (Santoro and Mdluli 2019; Moore 2020; Mascagni, Santoro, Mukama, Karangwa and Hakizimana 2020; Santoro, Groening, Mdluli and Shongwe 2020). Table A2 reports basic descriptive statistics for our baseline sample.

The data collected in January and February 2020 are our baseline round. At this time, we were not planning to conduct any further rounds of data collection. This changed with the appearance of COVID-19 in Rwanda, in late March 2020, when we saw an opportunity to use these data to track the implications of the crisis on the compliance variables we collected pre-pandemic. We therefore implemented three follow-up rounds of data collection on the same sample in May 2020, September 2020, and February 2021. In section 2, we describe in more detail how these data rounds map with key stages in the crisis: right after the first national lockdown, at a time of relaxed restrictions, and at the height of a second wave of infections corresponding with a second lockdown, this time localised in the capital city. Our complete dataset therefore allows us to compare key variables in a context that was essentially free of COVID-19, in early 2020, and at subsequent stages of the crisis. Crucially, we are able to do so with the same sample, since our dataset is a panel. This allows us to control for a set of characteristics, both observable and unobservable, that remain fixed over the year of our data period. By doing this, we can identify the impact of the pandemic precisely, especially since no other major event occurred in Rwanda during the data period.

Since our data are high-frequency and collected for the same sample, we tried to keep the questionnaires in follow-up rounds as short as possible, to minimise attrition and fatigue. We therefore only included key questions from the following baseline models: tax compliance attitudes and perceptions, overall tax burden, and satisfaction with public services. All other variables, mainly taxpayer and business characteristics, are only observed at baseline. This is the dataset that allows us to identify the shifts in perceptions and attitudes that we discuss in sections 3.1 and 2.2, the latter in relation to informal contributions. In addition, we also included questions that are specific to the crisis, for example on business closures, access to and awareness of tax relief, on preferred options to fund recovery, and on satisfaction with the government response to the crisis, amongst others. We use this information to set out the context of crisis response in section 2 and to discuss funding options in section 3. The key variables used in our analysis are described in the appendix.

A final note is due on attrition. Despite our efforts to minimise attrition, inevitably some respondents dropped out during the course of our data period. We have a fully balanced sample of 1,503 firms that are observed in all rounds – a 26 per cent drop compared to the baseline sample. However, all 2,023 taxpayers observed at baseline have been interviewed in at least one of the follow-up rounds, while for 85 per cent of the sample we have at least two follow-up observations. Table A3 shows that the balanced panel includes taxpayers which are quite different from those left out – they are more likely to be individuals out of Kigali, older and less educated, IT-sophisticated and tax-savvy. For this reason, we retain all taxpayers in an unbalanced panel. Also, by its design, the fixed-effect model would automatically control for all taxpayer characteristics, even those who are correlated with attrition.

The survey data described so far have then been matched with administrative data from tax returns, thanks to unique identifiers from the taxpayer registry. Administrative data typically include a much more narrow set of variables, compared to a survey, such as: registration as a CIT or PIT taxpayer, reported income, reported expenses, tax liability, location, and some imprecise information on sectors. Crucially, the information on reported income and taxes can be used to evaluate shifts in compliance behaviour, which we do in section 3.2 – along with a more detailed description of the administrative dataset we use for that purpose.

2 Rwandan context, crisis response, and tax relief

Rwanda is a small landlocked country of nearly 13 million people. It reported a tax to GDP ratio of 14.4 per cent in 2018, slightly below the average for Sub-Saharan African countries (15.4 per cent) and above low-income countries (13.1 per cent).[6] More generally, Rwanda's performance on tax has been strong, especially considering the near absence of natural resources that often drive up tax ratios of other African countries. The RRA, established in 1998, is considered one of the most efficient and modern tax administrations on the African continent – despite facing many of the common challenges amongst low-income countries (LIC), such as a large informal sector and weak tax compliance. The main tax types in 2019, as a share of total revenue, are: VAT (33 per cent), PAYE (24 per cent), CIT and PIT (20 per cent) and excise (11 per cent) – as reported in Rwanda Revenue Authority 2020. The firms in our survey sample are registered for either PIT or CIT, which are both taxes on business profits.[7] They might also remit VAT, if they are above the relevant threshold, and PAYE, if they have employees – as well as other taxes at the national and sub-national level. One striking fact emerging from our survey, which we discuss in more detail in section 2.2, is that the typical firm in our sample is much more likely to pay fees and informal contributions at the local and community level (e.g. cleaning fees, communal work) than the formal taxes they are registered for. Our tax knowledge module confirms what other studies have already documented: tax knowledge is rather low amongst our respondents (Mascagni *et al.* 2019). The average taxpayer in our sample responded correctly to only 44 per cent of the eight basic tax questions we included in our tax quiz at baseline.

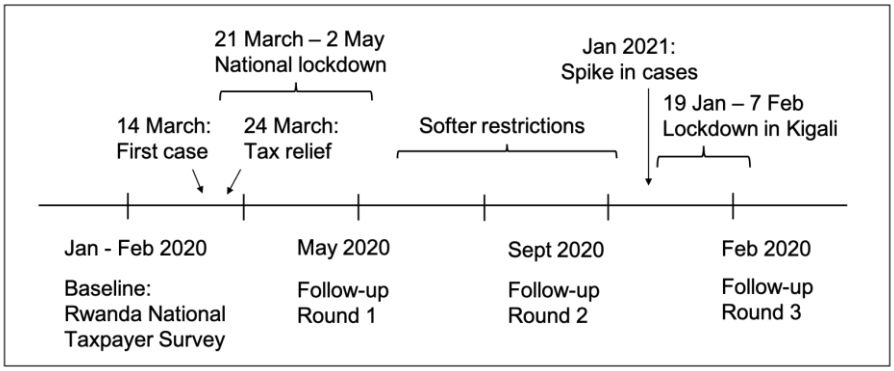
Rwanda's experience with the pandemic has been similar to other low-income African countries, where case numbers have remained relatively low but restrictions have been quite strict (Mascagni and Lees 2021). The first case of COVID-19 appeared in Rwanda on 14

[6] Source: ICTD/UNU-WIDER Government Revenue Dataset. Figures refer to tax revenue, not total revenue.

[7] PIT is a tax on un-incorporated businesses. There are three reporting regimes, depending on the business' turnover: 1) real regime, 2) lump-sum regime, and 3) flat-amount regime. Large businesses in the real regime have to submit full books of accounts to RRA, while smaller businesses are subject to less strict bookkeeping rules under the other two simplified regimes. The declaration deadline is 31 March, for the year ending on 31 December. The tax rate in the PIT real regime is progressive, depending on income: turnover below RWF 360,000 (around US$ 354) is exempted from taxation; between RWF 360,001 and RWF 1,200,000 (around US$ 1,180) is taxed at 20 per cent; higher incomes are taxed at 30 per cent. Small enterprises (turnover between RWF 12 million (around US$ 11,780) and RWF 50 million (around US$ 50,000) per tax period) are subject to a lump-sum tax of 3 per cent of turnover. Microenterprises generating a turnover of more than RWF 2 million (around US$ 1,970) and less than RWF 12 million are required to pay a flat amount between RWF 60,000 (around US$ 59) and RWF 300,000 (around US$ 295), depending on income (Rwanda Revenue Authority 2017: Articles 11 and 12). CIT is a tax on corporate business profits, which has to be declared annually by 31 March, as for PIT. Corporate income is levied at a flat rate of 30 per cent. CIT taxpayers are typically larger than PIT ones, being generally more sophisticated organisations that rely less on one individual businessperson. However, simplified regimes are also available for CIT taxpayers, although there are relatively few corporations small enough to qualify for them (RRA 2017).

March, well after we completed data collection for the baseline round. The government immediately announced some initial restrictions and a week later imposed a national lockdown, which lasted for six weeks. Our first follow-up data were collected in May 2020, shortly after the national lockdown was lifted – though some softer restrictions remained in place (e.g. on international travel and on movements outside the house, as well as a curfew). In the following months the country continued to experience low case numbers, and restrictions generally remained more relaxed. Our second follow-up round happened in this context, in September 2020, when case numbers were still below 1.5 per million people. The situation changed quite dramatically in early 2021, when the country experienced an unprecedented spike in infections – though still well below anything the typical higher-income country has experienced. Our last data round, collected in February 2021, covers this second period of increased cases and a second lockdown, which however this time only concerned the capital, Kigali. The rest of the country remained subject to softer restrictions on movement and gatherings, and a dusk to dawn curfew. Figures A1 and A2 report respectively case numbers and the stringency index for Rwanda during our data period. Figure 1 maps the key developments of the pandemic in Rwanda against our data rounds.

Figure 1 Timeline of crisis and data rounds



A recent analysis of the impact of the pandemic in Rwanda, based on data from VAT declarations, shows that economic activity contracted by 10 per cent in 2020, with the largest drop happening in correspondence with the lockdown imposed around March and April 2020 (Mascagni and Lees 2021). Our survey data, focussing particularly on small and medium firms, complement those results and confirm the severe impact of the crisis on Rwandan firms. Table 1 shows that two-thirds of firms stopped operating for reasons related to COVID-19 in the first national lockdown, while in the second one only a third did so: 35.8 per cent of firms located in Kigali, where the lockdown was implemented, and 27.8 per cent of the overall sample. These figures might suggest that, a year after the onset of the crisis, more firms were prepared to remain open and comply with distancing and other requirements, or that rules were applied somewhat more softly to contain the economic impact. Business income also dropped dramatically, as self-reported by respondents in our interviews. After an initial drop of 85 per cent compared to the baseline, average sales rebounded to about 43 per cent of pre-crisis levels, and then continued to rise – but only to 53 per cent of the pre-crisis level by February 2021. These large drops – larger than the overall figures found in other studies – are consistent with the finding that small firms, which are the focus of our survey, have been hit more than larger ones by the pandemic (Mascagni and Lees 2021). However, once we take average sales conditional on being operational, the drop is much less dramatic, as expected.[8]

[8] The fact that the drop in sales, conditional on remaining operational, is more modest might reflect the fact that the minority of firms who remained open during the lockdown picked up consumption that would otherwise have been absorbed by other firms.

In terms of policy response, the Rwandan government has been rather active to put measures in place that would mitigate the effect of the crisis. This is reflected in an exceptionally high level of satisfaction with the government response to the crisis, as gathered in the second follow-up round: over 80 per cent of our respondents rate the government response as 8 or above, out of 10, where the latter indicates an excellent response. Table 1 shows that during the national lockdown of March–April 2020, nearly 70 per cent of respondents accessed some form of relief, while nearly 41 per cent benefited from tax relief more specifically – of which tax deferrals are the most common type. After this initial crisis peak, the percentage of respondents receiving any support dropped to 22.4 per cent and increased again to 31.7 per cent in correspondence to the second wave of infections in February 2021. Tax relief decreased dramatically in September 2020, compared to May, and increased again in February. These shifts correspond both to peaks in infections, but also to the timeline of income tax declarations, which are due between January and March each year. We discuss these policy and tax responses in more detail in the next section.

Table 1 Impact of the crisis on firms and policy response

	Baseline	May '20	Sept '20	Feb '21
1. Firms closed due to COVID-19 (%)	-	66.5	11.6	27.8
2. Sales (USD)	5,947	892	2,544	3,181
3. Sales (USD) if remained open	6,255	2,058	2,895	3,755
4. Received any support (%)	-	69.8	22.4	31.7
5. Accessed any tax relief (%)	-	41.0	8.1	25.9
6. Accessed tax deferral (%)	-	39.3	4.6	23.6
7. Accessed tax waiver (%)	-	2.0	1.9	0.9
8. Accessed tax reduction (%)	-	1.3	3.3	3.1
9. Accessed local tax relief (%)	-	23.1	4.0	7.4
N obs	2,023	1,864	1,778	1,612

Notes: a full description of the variables reported here is available in Table A1. 'Sales' reports the average monthly sales for the full sample (row 2) and conditional on firms not closing due to COVID-19 (as shown in row 1) in the relevant survey round (row 3). Variables on whether taxpayers accessed various forms of tax relief are not additional, as they could have received multiple forms of tax relief. So the values at rows 6 to 9 do not have to add up to those in row 5.

2.1 Tax administration response and tax relief

In line with the broader background outlined above, the RRA has quickly adopted measures to respond to the crisis and support taxpayers. Our survey data include some information about access to tax relief, both at the national and sub-national level. We can therefore make three considerations on the tax administration response to the crisis and tax relief in particular – which set the context for the results we present in the rest of the paper, on attitudes, perceptions and behaviour.

First, we asked respondents a general question on what were the main types of support they received during the crisis. Tax relief emerged as a prominent form of support: in the first follow-up round of May 2020, 41 per cent of respondents reported having received some kind of tax relief, as reported in Table 1, followed by 'access to services' (34 per cent). The

prominence of tax relief is perhaps unsurprising given that the pandemic hit Rwanda exactly in correspondence with the tax declaration period ending on 31 March 2020 (see sections 2 and 3.2). Consistently, tax relief dropped in September and increased in February, which again corresponds to the tax declaration period for the following year (January–March 2021). Over the whole period, tax relief remained the most common kind of support. In line with the prominence of tax relief, the RRA emerged as the second most important player (after private companies and banks), when we asked respondents who the actors providing relief were.

Second, amongst various types of tax relief, by far the most common is deferrals of tax declarations and payments: they represent about 96 per cent of all forms of tax relief in wave 1 (57 per cent in wave 2 and 91 per cent in wave 3; see Table 1).[9] RRA has indeed granted taxpayers various deferrals during the crisis, for both income tax and VAT declarations. We discuss this deferral in more detail in section 3.2 as it is key to our empirical strategy. Other types of tax relief included fast-tracking VAT refunds, and a waiver of fines, penalties and interest related to late payments. Given their more specific nature, it is not surprising that these have been less widely accessed. It is also possible that take up for these more complex forms of relief might have been relatively lower, which is consistent with weak taxpayer knowledge (see section 2) and its role in determining the reach of tax relief (see below).

Third, even the more widespread relief on national taxes is still far from being accessed by the majority of taxpayers. In fact, many of our respondents did not access tax relief at all. At least for the May 2020 round, this may be due to the fact that many taxpayers had already submitted their declarations by the time the deferral was announced on 24 March (also see section 3.2). However, even considering those who had not yet filed, and could therefore have benefited from deferrals, only 56 per cent actually took it up, based on the May data round. To investigate the correlates of relief take up in more detail, we run a descriptive regression explaining access to tax relief with a number of taxpayer characteristics and perceptions, using the first follow-up data round and including only those taxpayers who had not yet filed by the time relief was available – to make sure we only capture the most relevant group. While this regression does not allow for any causal interpretation, it is still useful to provide insights on who has been reached by the relief programme and who has not. Table A4 shows that access to tax relief is greater for respondents with higher education and tax knowledge, as well as for younger taxpayers and those with better perceptions about the fairness of the tax system. These results confirm the importance of tax knowledge to allow taxpayers to take up provisions and measures that benefit them. They also highlight the importance of conducting effective communication campaigns alongside relief packages.

2.2 The role of local fees and informal contributions

Local fees and informal contributions are a common source of financing for development in LICs, especially at the local and community level (van den Boogaard, Prichard and Jibao 2018). They refer, for example, to contributions to financing public services, such as education, payments made to local chiefs and community leaders, local fees for functions like funerals and weddings, and in-kind contributions such as communal labour to clean public spaces or to carry out local development projects (van den Boogaard *et al.* 2019; Lust and Rakner 2018; Paler, Prichard, Sanchez de la Sierra and Samii 2017; Olken and Singhal 2011; Prud'homme 1992). These payments are not taxes in a strict sense, but they have a certain degree of similarity to taxes, in several dimensions: they are often compulsory, they fund essential public services, and they fill the financing gap that would otherwise be covered

[9] The deadline for submitting declarations and making payments is the same.

by public revenue, at least partly, if a sufficient amount of it was available. In fact, many LICs – including Rwanda – collect in tax less than the 15 per cent of GDP commonly cited as the minimum amount needed to fund basic government functions (Gaspar, Jaramillo and Wingender 2016). This makes these informal contributions key to obtaining a complete picture of tax systems in LIC and, more specifically, of funding options for crisis response and recovery.

Recognising their importance even in 'normal' times, our baseline survey already included some questions on local fees and informal contributions. More specifically, at baseline we asked a set of simple yes/no questions to gather whether respondents contributed or not to a number of specific payments and contributions, from a list that covers the most common types in Rwanda.[10] Our questionnaire did not include questions on the amounts of each of these contributions, as it was beyond the scope of the survey. At baseline, we also asked respondents how they rated the fairness of these contributions. Already before the crisis, we found two striking results. First, informal contributions are indeed incredibly common in Rwanda. Our respondents are, in fact, much more likely to make those informal payments than to pay formal taxes – despite our sample being entirely composed of registered taxpayers.[11] Second, fairness perceptions around these informal contributions are very high: over 87 per cent of our respondents rate them as fair or very fair, compared to 67 per cent for formal taxes.

In the follow-up survey rounds, we reminded respondents of their response on the types of fees and contributions they paid and followed up by asking whether they experienced any relief with respect to these contributions, in relation to the COVID-19 crisis, and we repeated the fairness question. More importantly, we also included an additional module in all follow-up surveys to investigate the role of these contributions in the specific context of the crisis. We asked whether respondents made contributions to new projects related to the COVID-19 crisis, what kinds of projects they contributed to (e.g. community feeding programmes), what and how much they contributed (e.g. in kind or in cash), who organised them (e.g. community or religious leaders), and whether they feel these project contributions are fair. These data allow us to highlight four important facts about informal contributions and their role in crisis response, particularly in relation to COVID-related projects.[12]

First, we can confirm that informal contributions have played an important role in funding crisis response. Forty-three per cent of our respondents contributed to new COVID-related projects in May 2020 (round 1), while this figure increased to 48 per cent in September 2020 and February 2021 (rounds 2 and 3). The vast majority of contributions (about or above 90 per cent) in all survey rounds went to community feeding programmes. These programmes

[10] The list was developed in close cooperation with RRA staff and our local survey company to ensure it captured the most important types, and tested in a pilot to our main survey.

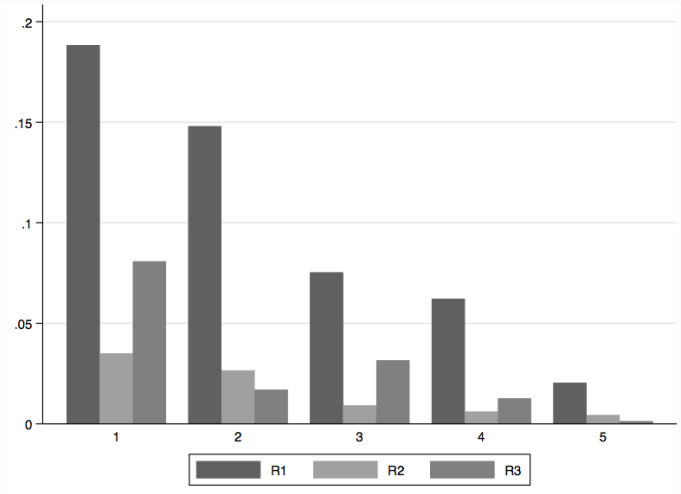
[11] While, for example, 90 per cent reported contributing through communal labour (this figure is similarly high for cleaning fees, for example), only 24.5 per cent reported paying PIT or CIT. The latter figure remains slightly below 80 per cent even once we exclude from the sample non-filers and nil-filers (see section 1). The percentage of respondents who reported making the relevant payments or contributions is as follows, in our baseline data. For local fees: cleaning fees (89 per cent), fees for official documentation (71 per cent), funeral fees (36 per cent), parking fees (34 per cent) and marriage fees (28 per cent). For informal contributions: weddings (94 per cent), Umuganda (a form of communal labour, 90 per cent), funeral-related (82 per cent), family-related (69 per cent), religious (68 per cent) and school-related (62 per cent).

[12] Our results focus on COVID-19-specific projects because other contributions are too varied to yield meaningful results without looking at the details of each specific type of contribution, which we do not have. While some contributions can be expected to increase, others will likely decrease or remain the same (e.g. weddings, communal labour). In fact, when we asked if the overall burden from these contributions increased, decreased or remained the same on average during the crisis, the majority reported that it remained the same – possibly because of variations in opposite directions depending on the specific kinds of contributions.

were mostly organised by village committees, or by local administrative units and religious leaders.

Second, these contributions are highly regressive, in line with the scant but increasing literature on this subject (van den Boogaard and Santoro 2021; Paler *et al.* 2017; Olken and Singhal 2011). Figure 2 shows the amount contributed to projects as a ratio of income, as self-reported in the survey, across quintiles of income. We focus on contributions in cash because the quantification for these is easier and requires fewer assumptions than for in-kind ones. The figure clearly shows a decreasing trend in the incidence of contributions as income increases, from about 19 per cent in the bottom quintile to about 2 per cent in the top one (both figures from round 1). While this trend is more evident in round 1, it can be observed in all rounds. Regressivity in this case is particularly striking because it refers to new projects related to COVID-19 (mostly community feeding programmes, as discussed above), and not to fees that by their own nature would be regressive (e.g. lump-sum fees charged for specific services or purposes). Notwithstanding regressivity, Figure A3 shows that the probability of making a contribution of any kind (in cash or in kind) increases with income. This indicates that richer respondents are more likely to contribute than poorer ones, but when they do, they contribute less on average than poorer ones – at least as far as in-cash contributions are concerned.

Figure 2 Incidence on income (%) of contributions to COVID-19 projects by income deciles



Notes: results based on data from the Rwanda National Taxpayer Survey.

Third, despite their regressivity, perceptions around these contributions remained strikingly positive. As many as 95 per cent of respondents viewed COVID-specific contributions as fair or very fair in rounds 2 and 3, rising from 79 per cent in round 1.

Finally, and in line with section 2.1, we explored the extent of tax relief granted for this type of contribution. While in the previous section we show that formal tax relief has been prominent during the crisis, relief has been much less common at the sub-national level, with only 24 per cent of respondents in May 2020 confirming they had received any relief for this type of payment – much lower than the corresponding figure for national taxes (41 per cent). This pattern can be observed both in Kigali and in other areas of the country: the level of tax support has been comparable across the country for national taxes, while it has been much lower for local taxes.

3 Shifts in tax compliance: attitudes and behaviour

Against the background highlighted in the previous section, we now investigate whether the crisis – and the Rwandan government's response to it – have shifted compliance attitudes and behaviour in any significant way. The methods for identifying these shifts are different for attitudes and behaviour, as the empirical framework and data are different: survey data on the former and administrative data on the latter. Importantly, however, in both cases we can observe the relevant variables before and after the shock (see section 1). We provide more detailed notes on methods in the respective sections.

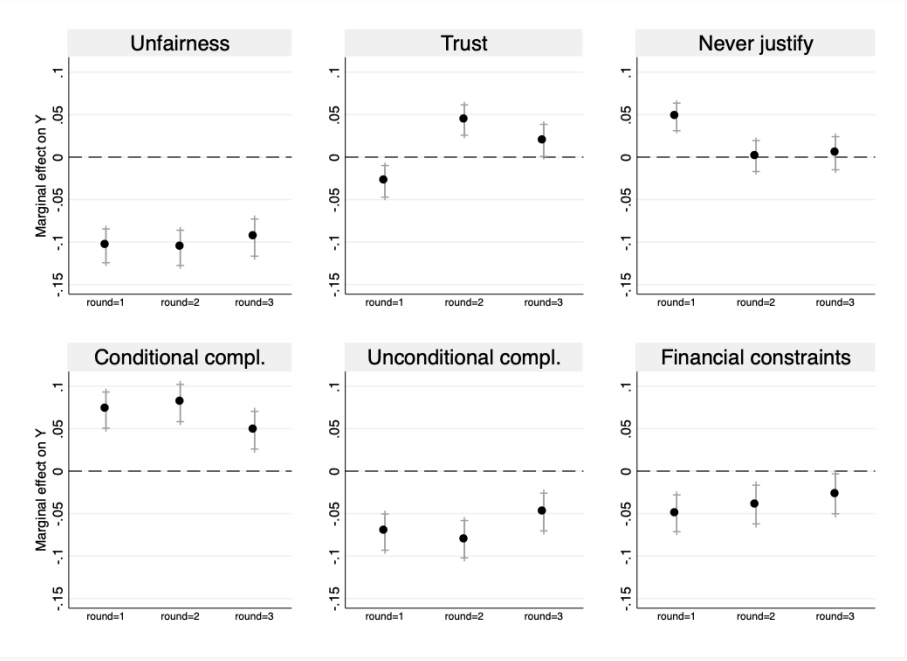
3.1 Tax attitudes and perceptions

To identify shifts in attitudes and perceptions, we exploit the panel nature of our data and the fact that we can observe periods both before and after the onset of the crisis, as described in section 1. More precisely, we run a set of fixed effects regressions to evaluate the impact of different stages of the crisis on six outcomes of interest: perceptions about the unfairness of the tax system, trust in the RRA, compliance attitudes conditional on receiving public services of good quality, unconditional compliance attitudes (which is the alternative statement to the one on conditional compliance, as reported in Table A1), the acceptability of reduced compliance due to financial constraints and, finally, whether taxpayers believe evasion is never justified (another indicator of unconditional compliance). These outcomes are defined more precisely in the discussion below and the exact questions they refer to, as well as their measurement, are reported in Table A1. The regressions we estimate are based on equation 1, where Y_{it} is one of the relevant outcomes listed above. The coefficients of interest are β_1, β_2, and β_3, which capture the effect of three dummy variables corresponding to each follow-up data round: May 2020 ($round1$), September 2020 ($round2$) and February 2021 ($round3$). γ_i captures the fixed effects: all the observable and unobservable factors that remain fixed over time, within individual respondents, during our data period. They include factors such as gender, location, sector, and even other characteristics such as the level of education or business practices. While some of these variables may change over longer periods of time, we can reasonably expect very little or no variation over the year of our data period – especially as no other major event occurred in Rwanda in addition to the pandemic. In addition to fixed effects, we also control for business income ($bincome$), as self-reported by respondents during the survey, which saw drastic variations during the crisis, as described in section 3. $\boldsymbol{\varepsilon}_{it}$ is an error term.

$$Y_{it} = \beta_0 + \beta_1 round1 + \beta_2 round2 + \beta_3 round3 + \beta_4 bincome + \gamma_i + \epsilon_{it} \qquad (1)$$

Figure 3 plots the coefficients on $round1$, $round2$ and $round3$ estimated based on equation 1, with the relevant confidence intervals. The dotted line represents the baseline value of each relevant variable. Since the baseline round is the excluded category in equation 1, all other rounds' coefficients are evaluated in comparison to it. Each individual graph in Figure 3 corresponds to a separate regression on the dependent variable indicated at the top of each one. These results point to significant shifts in all variables, which we discuss in turn in the next few paragraphs. We also report the full regression results in Table A5.

Figure 3 Shifts in attitudes and perceptions



Notes: results based on Rwanda National Taxpayer Survey. Graphs show coefficients on *round*1, *round*2 and *round*3 (see equation 1) from fixed effects regressions on the relevant outcome, indicated at the top of each graph.

Unfairness refers to a true/false question asking whether the tax system is unfair. While this is a direct question, the list experiment mentioned in section 1 does not point to any significant bias in responses to this direct question, as we discuss in more detail in Appendix 1. Compared to baseline, perceptions around the fairness of the tax system improve significantly at the onset of the crisis in May 2020 (round 1). The magnitude is large: given the baseline level of 0.26, a decrease of 0.1 (the coefficient on round 1) in taxpayers reporting the system is unfair represents a 40 per cent improvement in this indicator.[13] This shift persists, with a similar magnitude, at the other stages of the crisis that we capture in rounds 2 and 3. Relatedly, Figure A4 shows that a similar positive shift can also be observed for the informal contributions described in section 2.2.

Trust captures whether respondents have trust that the RRA acts in the interest of taxpayers like them (see Table A1). In round 1, we observe a significant shift in a negative direction, with trust in the RRA decreasing by 3.5 per cent compared to a baseline level of 83 per cent (see Table A5). The shift in trust then changes direction over time, with a significant increase in round 2, somehow offsetting the negative impact in round 1, and an additional (but only borderline significant) increase in round 3. It is worth noting that the baseline level is already very high, thus potentially leaving less margin for improvement.

The outcome *conditional compliance* captures attitudes to compliance conditional to public services, in the context of fiscal exchange or reciprocity. The relevant question required respondents to choose between the following two statements: 1) taxpayers must pay their taxes to the government regardless of the quality of public services; or 2) taxpayers could refuse to pay taxes if they were not receiving public services of adequate quality.[14] Figure 3 first reports results on a binary variable capturing agreement with the second statement (*conditional compliance*), as well as the exactly specular result when considering agreement

[13] Given that the question is framed around unfairness, a negative coefficient represents an improvement in perceptions about the fairness of the tax system.

[14] See footnote above.

with the first one (*unconditional compliance*). This indicator shows a large and significant shift away from unconditional compliance and towards more conditional views of compliance. The latter increase by 35 per cent in round 1, compared to the baseline level of 20 per cent. This shift persists in the following rounds as well.[15]

Importantly, while conditional attitudes to compliance improve, the vast majority of respondents (80 per cent) keep agreeing more with the statement on unconditional compliance (statement 1 above) – though less so than at baseline. This links to an alternative outcome variable on unconditional compliance, labelled *never justify* in Figure 3. It captures a separate question, which is standard in this literature (D'Arcy 2011; Fjeldstad, Schulz-Herzenberg and Sjursen 2012; Isbell 2017; McCulloch, Moerenhout and Yang 2021), where respondents are asked whether they think it is justifiable for some people not to pay taxes on their income (see Table A1). Consistently with the two-statements choice discussed above, the baseline level of this indicator is very high (85 per cent), indicating that the prevalent attitude to compliance in Rwanda is of unconditional nature. While this indicator also sees a modest but significant increase in May 2020 (5.5 per cent compared to baseline), right at the onset of the crisis, it then settles back to its baseline level in rounds 2 and 3. This result is consistent with the significant and persistent shift from unconditional to conditional compliance attitudes, while this alternative measure of unconditional compliance only shows a small increase and then reverts back to the baseline level after round 1.[16] Similarly to trust, it is possible that the high baseline level might imply a more limited margin for improvement.

Finally, the outcome variable *financial constraints* refers to a question aimed to measure the extent to which compliance might be affected by businesses' financial constraints and their ability to pay taxes. More specifically, respondents had to choose between the following two statements: 1) taxpayers should always declare their full income for tax purposes, regardless of their financial constraints; or 2) taxpayers in financial distress could declare less income in order to pay a smaller tax.[17] Figure 3 plots results on a binary variable capturing agreement with the second statement. Results show a sizeable and significant decline in agreement with this statement, and conversely an increase in agreement with the idea that taxpayers should contribute what they owe regardless of their financial constraints. This suggests that taxpayers strengthened their willingness to pay despite the financial drawbacks produced by the crisis. This provides an interesting comparison with *conditional compliance*: while the financial constraints brought about by the crisis do not change attitudes to compliance (if anything, they see a slight improvement), the crisis makes the link with public services more salient – thus increasing conditional compliance, linked to fiscal exchange and reciprocity.

These results, taken together, show that the pandemic generated significant shifts in some attitudes and perceptions around tax. The largest ones are towards better perceptions about the tax system's fairness and more conditional views on compliance, implying a stronger link between the quality of public services and tax payments. These shifts can be seen as a positive impact of the crisis, as fairness, trust, and reciprocity (i.e. the link between taxes and public services) are key to improving taxpayer quasi-voluntary compliance, through improved trust, accountability and transparency of tax systems – all of which should, ultimately, also allow for sustainable increases in tax revenue (Luttmer and Singhal 2014; Prichard *et al.* 2019). The results on financial constraints are consistent with these positive shifts and

[15] Since the two outcomes of conditional and unconditional compliance come from the same question, and indeed they are alternatives, the relevant coefficients almost exactly mirror each other.

[16] Note that this question on 'never justify' is not directly related to the other one, so we would not expect a direct relation to the shifts observed on 'conditional compl.' and 'unconditional compl.'. The small (in round 1) and non-significant (in rounds 2 and 3) effect in this indicator is consistent with the previous results.

[17] Taxpayers could also decide not to agree with either, but this option was not read out to them.

confirm that taxpayers appreciate the importance of tax compliance even at times of financial distress.

These shifts fit particularly well in the Rwandan context, where taxpayers are generally aware that taxes are the main source of funding for healthcare (70 per cent are aware of this in round 1) and are largely satisfied with the healthcare system (75 per cent are very or somewhat satisfied with it, while 85 per cent feel confident the healthcare system can help if they get sick). The improvements in attitudes that we document here might also be linked to the prompt and strong positive response of the Rwandan government, both generally and more specifically on tax (see section 2). In fact, our data from round 3 suggest that our respondents believe that both solidarity and patriotism have increased during the crisis (see Figures A5 and A6) – which is consistent with the positive shifts in attitudes we document here.[18] Similar 'rally round the flag' effects of the pandemic have been documented in other contexts, largely in European countries (Schraff 2020; Baekgaard, Christensen, Madsen and Mikkelsen 2020; Kritzinger, Foucault, Lachat, Partheymuller, Plescia and Brouard 2021).[19] However, it is unclear whether these shifts persist over the longer term, both in our study and in the broader literature (Johansson, Hopmann and Shehat 2021). What we can show is that, at least over the period we can observe, the shifts in fairness (with both formal and local/informal contributions) and conditional compliance are not only an immediate 'rally round the flag' effect, but they also persist at times when the crisis was less acute in Rwanda (i.e. round 2). There is certainly a need for more research to investigate longer term effects, and we indeed intend to keep collecting follow-up data and update the analysis to capture subsequent phases.

Finally, we check whether these shifts are driven by particular groups. We explore heterogeneity on location (Kigali vs. other provinces), gender, CIT or PIT (as described in section 2), compliance categories (nil-filers, non-filers and active taxpayers, as defined in section 1), and firm size based on self-reported business income. The results are reported in figures A7 to A11. We see no clear differences in any significant direction, except for some expected minor differences that, however, do not appear to be systematic across groups. For example, while the shift in fairness is the same across PIT and CIT payers, the latter (which are also larger firms) don't experience the same shift towards conditional compliance (see Figure A7). However, we are reluctant to read much into these results, both because no systematic pattern emerges, and because estimates are affected by smaller sample sizes (especially for CIT and the top quintile; see section 1). It is also worth noting that taxpayers in Kigali see an increase in the 'never justify' variable in round 3, corresponding to the second lockdown, localised in the capital, as compared to those in the provinces (Figure A8). This is consistent with the increase in this variable we observe during the first national lockdown (round 1 in Figure 3).

In addition, we also check whether having been affected by the crisis through business closure or having accessed relief affect the way in which perceptions shift. Again, we do not observe any major difference across these groups, except for a slightly weaker improvement in unconditional compliance amongst those experiencing a business closure or receiving tax relief, but only in round 1. At the same time, firms experiencing a closure in round 1 are more likely to increase their trust in the RRA. Results on these additional dimensions of heterogeneity are reported in tables A6 and A7. These results show that the shifts we

[18] Questions on perceptions around solidarity and patriotism were only included in round 3, to help interpret and unpack the results on shifts in other perceptions.

[19] These studies largely focus on trust in government rather than the broader set of perceptions we use here. Our results on trust do not show a rally round the flag effect in the first round, but there is an increase in the second round, as shown in Figure 3. Similar studies focussing on crises in low-income countries are scarce, but the ones that are available show that such effects are far from guaranteed in these contexts (Crisman 2020).

document here are not simply due to respondents' satisfaction with having received tax relief – instead, they are more widespread across the population and consistent with general increases in solidarity and patriotism, as discussed above.

3.2 Compliance behaviour

Are the improvements in attitudes and perceptions, documented in the previous section, associated with better compliance behaviour? To answer this question, we use administrative data that we can match to the survey sample, as described in section 1. The dataset is composed of income tax declarations submitted by taxpayers to the RRA for fiscal years 2012 to 2019. We focus on income taxes because our sample includes taxpayers registered for PIT or CIT, both taxes in business income, while only a portion of the sample also pay other taxes like the VAT (see section 1).

CIT and PIT declarations are filed annually and refer to the fiscal year running from January to December. Taxpayers are then allowed three months after the end of the fiscal year, until the end of March, to submit their declaration. The last year of available data refer to fiscal year 2019 and the relevant declarations were filed in the first three months of 2020. This implies that actual economic activity as reported in these declarations was not affected by the crisis, as it had already happened in 2019. However, there might be a compliance response to the crisis, reflected in reporting behaviour, as reporting for 2019 happened in early 2020. In section 3.1 we show that, already in May 2020, taxpayers' views had shifted towards better perceptions on the fairness of the tax system and more conditional attitudes to tax compliance, making the link with public services more explicit. If these shifts were to translate into actual behaviour, taxpayers might be more compliant than they would have been otherwise, in absence of the crisis, notwithstanding the same level of real economic activity. This is the hypothesis we aim to test in this section.

To this aim, we exploit the fact that the pandemic hit Rwanda during the declaration period, which ends on 31 March. More specifically, the first case was confirmed on 14 March, the lockdown was imposed on 21 March, and tax relief was announced and made available from 24 March, as summarised in Figure 1. By the time these events happened, some taxpayers had already filed their declaration for 2019, while others had not yet done so. We can therefore use these dates as cut-offs to divide taxpayers between those who filed their declaration in a world in which COVID-19 was largely a 'foreign' issue, and those who filed after the pandemic had become very much a Rwandan problem as well. Our main specification uses the 24 March cut-off because by this time government action, both through general restrictions and tax relief more specifically, would have made the pandemic, and its link to taxes, visible and salient to all Rwandan firms. However, we also test the robustness of our results to other cut-off choices. Based on our preferred cut-off, our sample splits roughly equally between the 'control' and 'treatment' groups.

Exploiting this feature, we use a difference-in-difference (DiD) framework to identify if those in the treated group – who filed in a context where COVID-19 was present in Rwanda – show any significant difference in behaviour compared to those in the control group – who filed before the pandemic became a salient national problem in Rwanda. In other words, firms that declared on or before 24 March are in the control group, while those that filed after are 'treated'. Treatment and control groups are defined each year to identify those who submit their declarations before or after the cut-off in each year – a feature we come back to later.

The dependent variable is the tax liability remitted by each taxpayer, which can be observed in the administrative dataset.[20]

Similarly to survey data, we can observe tax outcomes before the pandemic – fiscal years 2018 and earlier – and after the pandemic – year 2019, for which declarations were filed in early 2020. We estimate equation 2 using a fixed effects model, where Y_{it} is the outcome of interest (tax liability) at time t for firm i, $\beta_k 24march_{it}$ is a set of coefficients capturing whether the firm filed before or after the cut-off (i.e. our treatment) in the relevant year, $\beta_2 income_{it}$ is a control for business income, and ϕ_t and γ_i are time and firm fixed effects. The coefficient of interest is $\beta_{2019} 24march_{it}$. We expect interaction terms between the treatment variable and years prior to 2019 to be non-significant (more on this below).

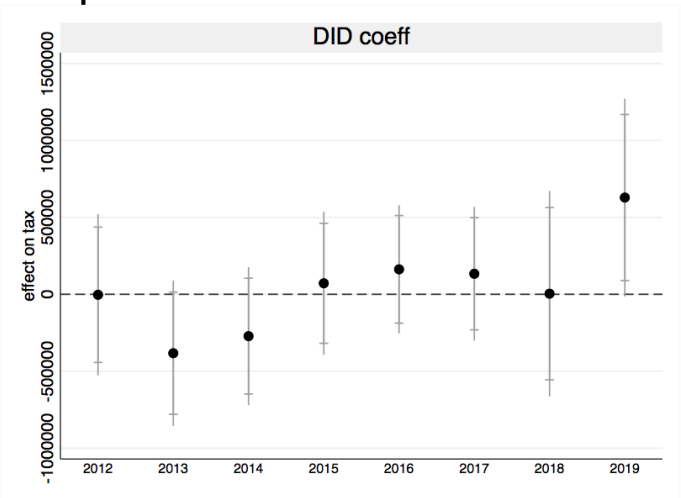
$$Y_{it} = \alpha + \sum_{k=2012}^{2019} \beta_k (24march_{it} \times Year_k) + \beta_1 24march_{it} + \beta_2 income_{it} + \varphi_t + \gamma_i + \epsilon_{it} \quad (2)$$

Figure 4 reports the coefficients on the interaction terms (i.e. β_{2012} to β_{2019}) obtained by estimating equation 2 on administrative data from tax returns. We only include firms from the survey sample that submitted a declaration for fiscal year 2019 and 2018 at least, plus as many years as available before that.[21] The results show a significant shift in tax liability for treated taxpayers, who declared after 24 March 2020, for the declaration referring to 2019 – while in previous years the control and treatment groups behave in a statistically indistinguishable way (more on this below). The coefficient is also very large: a point estimate of RWF 625,418 (around US$ 615) Rwandan Francs, compared to a sample average of RWF 941,996 (around US$ 926) in 2019 (Table A11 shows the full regression results). This result remains qualitatively the same if we exclude nil-filers from the sample (Figure A12), if we drop the control for business income (Figure A13), or if we use the alternative cut-off date of 14 March (Figure A14) or 21 March (Figure A15). These results seem to suggest that the pandemic also resulted in a shift in compliance behaviour, in addition to the shifts in perceptions and attitudes documented in section 3.1. More in detail, the effect on tax seems to be driven by an increase in reported business income, as shown in Figure A16, rather than by under-claiming of expenses, reported in Figure A17.

[20] While the decision to file a return is an important dimension of compliance, we are unable to consider this outcome as, by definition, we do not observe the date on which a non-filer submits their return, as they just do not. The date of submission is the key variable used to identify treated and untreated taxpayers in the DiD framework. When this information is not available, as for non-filers, we cannot set up any DiD regression.

[21] We also include nil-filers, for which tax liability is zero. We also run a robustness test excluding them, which yields largely consistent results.

Figure 4 Shifts in compliance behaviour



Notes: results based on RRA's administrative data, for the survey sample. Graphs show difference-in-difference coefficients (treat x year) from a fixed effects regression.

Furthermore, we explore the heterogeneity of our results across groups. The most interesting result here is on business size, defined as deciles of sales. Figure A21 shows that the effect on behaviour seems to be largely driven by firms in the top decile, while there is no statistically significant effect for those in deciles 1 to 9.[22] This would also help make the large effect size we found in Figure 4 more plausible: any change coming primarily from large taxpayers would necessarily be quite large, in absolute value, compared to the average of the full sample. It is, however, in contrast with the lack of substantial differences in the way larger or smaller taxpayers shift their attitudes and perceptions during the crisis (see section 3.1). Similarly to the results on perceptions, we do not find many systematic or significant differences across other sub-groups, such as PIT/CIT, gender, or location (Figures A18 to A22).[23]

The analysis of taxpayer behaviour presented here is useful to check whether shifts in perceptions are associated with changes in behaviour. However, it suffers from more limitations compared to the analysis of section 3.1. A methodological note is therefore in order. One of the key assumptions for DiD estimations to be valid is that units display parallel trends pre-treatment. Our setting, however, is not a standard DiD one, because the treatment status is defined every year depending on whether the taxpayer filed their declaration before or after the cut-off – although, as we explain below, the majority of taxpayers stick with either the treatment or the control group across years. In this setting, the non-significance of interaction terms pre-2019 in Figure 4 is not a standard test for parallel trends. It shows, however, that filing before or after the cut-off does not imply any differences in tax liability per se, after controlling for fixed effects, in 'normal' years. On the contrary, it does have a significant association with higher tax liability in 2019 – the year for which the relevant declarations were filed in the first three months of 2020. The key element for identification is therefore that this effect is due to the pandemic. This is plausible, as there was no other event that could explain particularly high tax liabilities in fiscal year 2019 (e.g. higher than usual economic growth) or any event, other than the pandemic, that could have led to

[22] The effect on the top decile sub-group is only borderline significant, but the estimation by sub-groups also suffers from smaller business size, especially so the sub-group composed of the top decile only.

[23] We do find that the effect seems to be driven primarily by taxpayers registered in Kigali (i.e. the majority of our sample, Figure A19) and male respondents (Figure A20), as well as taxpayers who are active or non-filers at baseline, while nil-filers don't seem to respond (Figure A22). However, as for perceptions, these results suffer from smaller sample size and are therefore to be taken with caution.

increased compliance during the declaration period in 2020 (e.g. a government campaign).[24] Identification remains, nonetheless, a limitation that requires further analysis.

While we cannot directly test the parallel trend assumption with our specification, we provide two sets of descriptive statistics that might help confirm the validity in our results. First, Tables A8, A9, and A10 show differences between taxpayers who file before and after the cut-off. While these two groups are indeed different across a wide set of variables, these differences are consistent across years, rather than being specific to 2019. For example, taxpayers who file after the cut-off are generally larger firms, so they are also more likely to be CIT payers, VAT registered, and have employees. Consistently, they are also more sophisticated firms, in the sense that respondents are more educated, have higher tax knowledge, are more likely to use accountants and have bank accounts, amongst others. Since these differences are observed in all years, rather than just for declarations submitted in 2020, they should not be responsible for our result. The second statistic is the share of 'treated' taxpayers in 2020 that are also 'treated' in previous years. This figure provides an indication of the extent to which the treatment group changes composition over time. Seventy-two per cent of those who filed after the cut-off for fiscal year 2019 also did so for 2018, and 58 per cent also did so for 2017.[25] The majority of firms are therefore in the treatment group each year, although some do switch groups across years, which is largely expected.[26] While these results are somewhat reassuring, the fact that the effect on behaviour is largely driven by large taxpayers requires more analysis, to rule out the possibility that our findings are simply driven by the possibility that large taxpayers filed after the cut-off in this specific year (2020), by chance or for reasons we are unaware of. Indeed, our results are not robust to winsorising or dropping outliers (top 1 per cent), although they are confirmed if we simply drop the largest five firms (Table A12).[27]

However, we also note that the largest taxpayers (top 1 per cent) consistently file after the cut-off each year. This suggests that, while our result remains largely dependent on the largest taxpayers, they are not simply due to the declaration timing of a handful of large firms. Another encouraging result comes from preliminary findings obtained by applying the same empirical framework to the universe of taxpayers, rather than only those who took part in our survey. With this broader sample size, we confirm our significant result on taxpayer behaviour, which now remains robust to winsorising the top 1%.[28]

[24] Also see Mascagni and Lees 2021 for an analysis of economic performance in Rwanda in recent years, including the pandemic year.

[25] This percentage becomes smaller for earlier years, as we have fewer observations.

[26] It is largely expected that firms might file on different dates each year, so the exact date might fall before or after the specific cut-off date in different years. However, Tables A8, A9, and A10 show that firms that declare before and after the cut-off show some generally consistent patterns – which is compatible with individual firms switching groups over time.

[27] The same mixed evidence arises when we use alternative cut-offs. Tables omitted for the sake of brevity.

[28] This is works in progress, results will be available in a later version of this work.

4 Options to fund response and recovery

Finally, we turn to the second set of questions we mentioned in the introduction. More specifically: what options do governments in LICs have to fund crisis response and recovery? And how much public support do they enjoy? As anticipated in section 1, the follow-up waves include information that can help us answer this question. However, the methodology in this section is purely descriptive as the relevant sections of our questionnaire were only designed and implemented after the onset of the crisis.

As anticipated in the introduction, recent evidence has shown that tax revenue can be expected to decline in low-income countries, as a result of the crisis. Two studies in particular have quantified these impacts for Rwanda: Mascagni *et al.* 2020 estimate a 25 per cent loss in CIT revenue corresponding to a three-months lockdown, while Mascagni and Lees 2021 measure a 5.3 per cent loss in VAT revenue in the first three quarters of 2020. To these, one would need to add further losses on other tax types, most notably trade taxes that have been projected to be the most affected tax type during the pandemic (Arndt *et al.* 2020). Interestingly, Rwandan taxpayers are fully aware of the need to increase tax revenue to respond to the crisis. In the second follow-up round we asked them whether they think the government needs more revenue to respond to the crisis. The vast majority (90 per cent) responded that indeed more revenue is needed.

Against this background, it is both urgent and relevant to reflect on options to increase revenue in the aftermath of the crisis. In this section, we report descriptive patterns on taxpayers' preferences for different tax options to fund the response to the pandemic. In all three follow-up survey rounds, we invited respondents to think about any kind of help and support that the government was currently providing in the context of the COVID-19 crisis, such as food provision, cash transfers and improvement in the health service. We then asked how the government should get funding for these additional expenses. We provided a range of options: more taxes on everyone, more taxes on the richest, more taxes on the largest businesses, more taxes on properties, additional foreign aid or loans, and voluntary contributions. Respondents were required to express whether they agreed or disagreed that each option should be used to increase revenue in the context of the crisis. Responses on each option were therefore independent of each other, rather than being alternatives or ranked choices. This data allow us to highlight three main results.

First, and perhaps unsurprisingly, the preferred options seem to be non-tax ones: foreign and voluntary sources of revenue – with support of about 90 per cent and 96 per cent respectively. These preferences are also quite consistent over time, as depicted in Figure 5. The high support for foreign aid might seem at odds with the national rhetoric of fiscal self-reliance promoted by the government, where the country is meant to rely less on foreign funding and more on domestic revenue mobilisation to fund development efforts. However, the exceptional circumstance of a global pandemic makes it less surprising that Rwandans call for international solidarity to face the crisis. On the other hand the support for voluntary contributions is fully in line with the very high perceptions of the fairness of informal contributions that we documented in section 2.2. While voluntary and informal contributions are not the same, we can expect a large degree of overlap between them.[29] We can therefore draw some links with the results of section 2.2. Most importantly, to the extent that our results on regressivity apply to voluntary contributions as well, this financing option is particularly problematic as it would bear more heavily on those with lower incomes. Partly

[29] Informal contributions are often voluntary in the sense that there is no formal law mandating their payment, but there are social norms and community pressure to pay them that make them at least partly coercive.

related to its incidence amongst lower-income segments, it is also unclear whether in practice informal and voluntary contributions can generate a volume of resources large enough to substantially contribute to recovery.

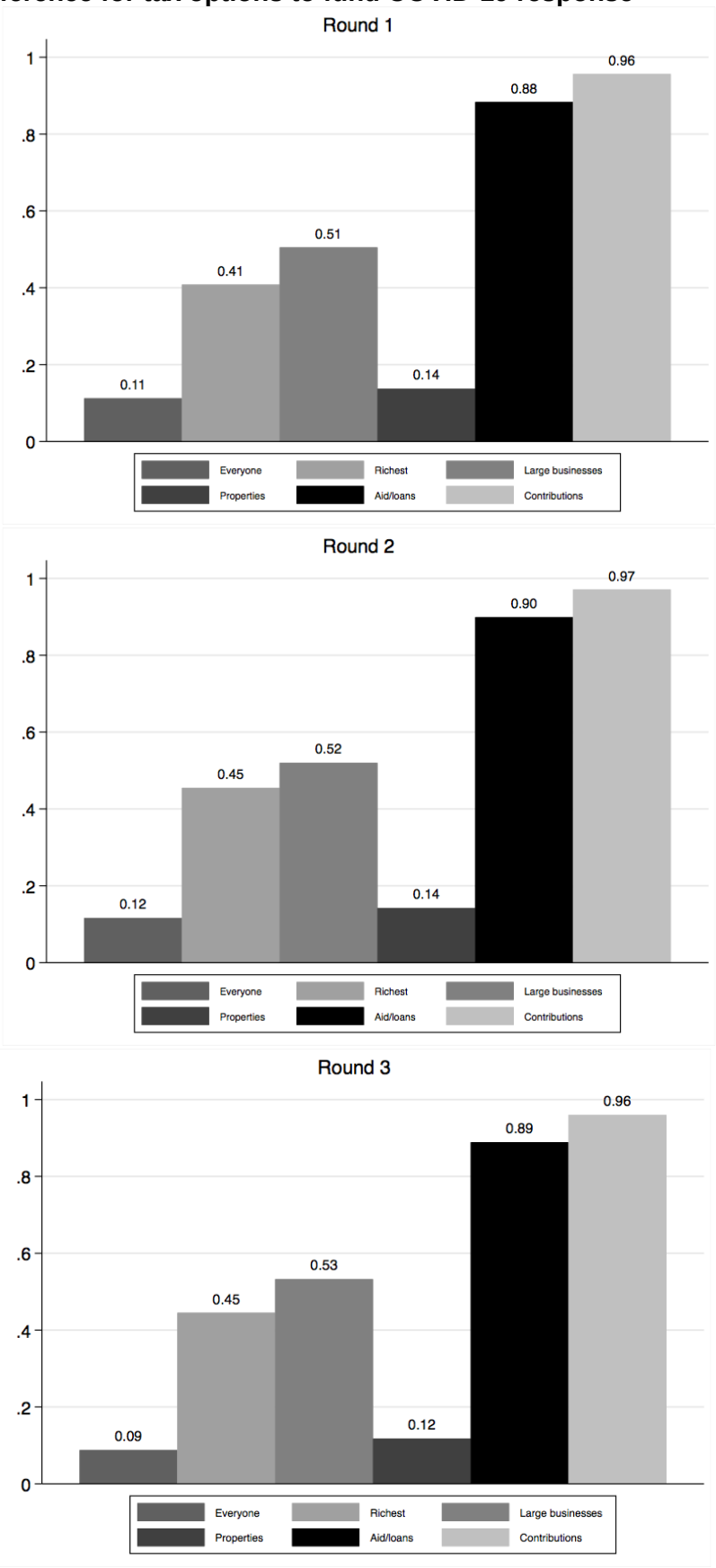
Second, amongst the tax options, taxing large businesses and taxing the richest are the options that enjoy the greatest support, at 52 per cent and 45 per cent respectively in May 2020. In comparison, support for increasing taxes on property or on everyone equally are much lower: 13 per cent and 11 per cent respectively in the first follow-up round. Interestingly, support for property taxes diverges substantially from taxing the richest, although property taxes are a key tool to tax higher-income and wealth individuals in low-income countries (Goodfellow 2017). These figures on support for various tax options have changed very little across the survey rounds, as shown in Figure 5. An important exception is support for taxing the richest, which increased by about 10 per cent from the onset of the crisis (41 per cent) to round 3 (45 per cent). It is also interesting that, despite this increase, there is still a sizeable portion of the population that would not support more taxes on the better off – at least not without a clear communication campaign to explain the background and rationale.[30] For this portion of respondents, we asked a few follow-up questions about their lack of support for taxing the richest. Many (83 per cent) believe the richest are affected by COVID-19 like everyone else, while for 18 per cent the richest are already over-taxed.[31] This finding fits with the perceptions we captured at baseline and in round 3: the majority of taxpayers (78 per cent at baseline and 67 per cent in round 3) believe that the richest already pay more taxes than smaller taxpayers – a belief that is largely true, but that does not necessarily imply progressivity.[32]

[30] The fact that there is generally quite a lot of disinformation around tax suggests that such a campaign might actually be an important element in determining public awareness and support.

[31] These figures are not meant to add up to 100 as respondents could choose multiple answers.

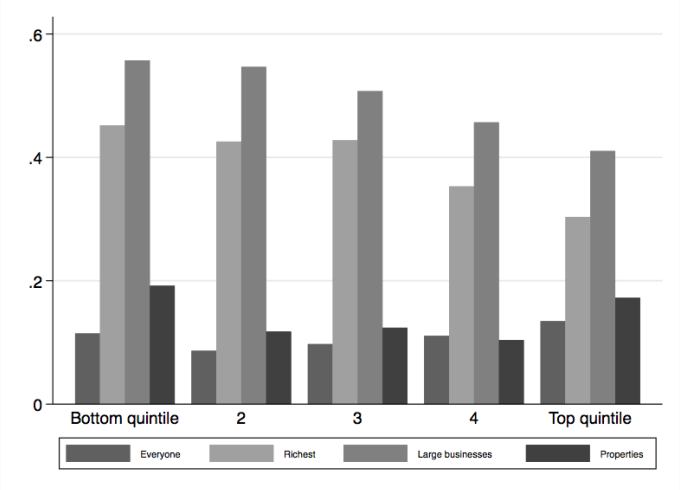
[32] The largest firms contribute the vast majority of tax revenue in Rwanda, as in other low-income countries. However, there are several high-income individuals that escape the tax net altogether (Kangave, Nakato, Waiswa, Nalukwago and Zzimbe 2018).

Figure 5 Preference for tax options to fund COVID-19 response



Third, we checked how these figures look when we disaggregate responses by quintiles of reported income. Perhaps unsurprisingly, support for taxing the richest, as well as large corporations and property, decreases with income quite substantially, as shown in Figure 6. While Figure 6 is based on round 1, these figures look very similar in other rounds.[33] Illustratively, support for taxing the richest is about 40 per cent in the bottom quintile, increases slightly in the second one, then decreases gradually across the income distribution to reach a level at the top that is 30 per cent lower (equivalent to about 12 percentage points) compared to the bottom of the distribution. These results suggest that political resistance to extending tax collection amongst the richest individuals might be high especially amongst the most powerful in society, which are often those with higher incomes.[34]

Figure 6 Preferences for tax options by income quintiles



Notes: results based on data from the Rwanda National Taxpayer Survey.

5 Conclusions

This paper starts to fill the knowledge gap on the impact of the pandemic in low-income countries, and particularly on its 'tax side'. First, we provide some background facts on the crisis and the response to it in Rwanda. For example, in section 2.1 we show that, despite the Rwandan government's swift response, many taxpayers still failed to access relief – and the probability of doing so is related to taxpayer knowledge. We also document the important role of informal contributions in funding crisis response, and their regressivity.

Second, the core of our analysis (section 3.1) shows that the crisis in Rwanda led to shifts in some perceptions about tax that can be seen as being positive for long-term revenue mobilisation: citizens' perceptions about the fairness of the tax system improved, and their views on compliance became more conditional on the provision of public services of sufficiently good quality. Importantly, these shifts are associated with improvements in actual behaviour, as taxpayers tended to comply more with their tax obligations after the onset of the crisis (section 3.2).

[33] Figures omitted for the sake of brevity.

[34] Our data on solidarity show that perceptions around it are quite stable across the distribution, suggesting feelings of solidarity are spread across the whole population, including higher-income individuals.

Third, in section 4 we use our data to reflect on the available tax options to increase revenue. We find that support for taxing the richest and large companies is higher than other taxes, but still relatively low. The former has however increased during the crisis, perhaps indicating a shift in support towards taxing the better off. Perhaps unsurprisingly, support for taxing the rich and large companies decreases as the income of respondents increases. This points to the possibility that policymakers might find substantial resistance especially from higher-income people, which would be largely expected.

Taken together, these results suggest that, while the crisis presented unprecedented challenges, it might have also brought about new opportunities. In particular, it might allow policymakers in low-income countries to strengthen the fiscal contract and to improve equity by taxing higher-income groups more effectively. However, to be successful these policy changes might need to be accompanied by clear and effective communication campaigns to improve knowledge and awareness of basic features of the formal tax system and informal contributions, particularly around progressivity and fairness. Consistent with other evidence, there seems to be a lot of misinformation amongst citizens about both formal and informal taxes (sections 2.2 and 2.1).

Finally, our study is certainly a starting point for more research, rather than being fully conclusive in itself. We would like to highlight particularly three directions of research that directly stem from our analysis. First, our results refer to Rwanda and are not necessarily applicable to other contexts (see the introduction). Similar studies from other countries are needed to find common patterns or interesting contrasts – especially as concerns shifts in perceptions, attitudes, and behaviour. Second, more work is needed on the political, social, economic and psychological aspects of improving tax compliance and increasing revenue from the higher-income segments in society. Third, more research is needed on the role of information and knowledge in relation to both formal and informal taxes, during but also beyond the crisis.

Appendices

Appendix 1 List experiments

List experiments or item-count techniques provide an alternative way of asking sensitive questions, which is meant to be less vulnerable to bias. Using these techniques, respondents are asked to indicate the number of items on a list of behaviours they engage in or agree with. In other words, they are asked to report the total number of items and not to indicate which specific items they agree with. The experiment consists in providing some respondents with a list that contains a set of items which are by design not controversial, while randomly assigning other respondents to a list with an additional sensitive item. By measuring the difference in the number of items selected by the two groups of respondents, one can estimate the average level of support for or incidence of the sensitive item within the sample (Imai 2011). In the survey we also ask the sensitive questions directly and thus are able to compare how the list experiments perform compared to those more direct questions. We use list experiments to check for biases in questions related to three topics: income under-reporting, the fairness of the tax system, and the professionalism of the RRA.

Income under-reporting. The non-sensitive item list included *I met a client or business partner in person*, *I have travelled out of Rwanda for business*, *I did NOT use my phone to make business calls* and *All my clients are based in Rwanda*. In the treatment list, we added the following sensitive item: *I did not report all my sales in my tax return*. The results do not show any increase in self-reported tax evasion between the count in the non-sensitive item list (1.76) and the sensitive item list (1.74). The only sub-group who shows an increase in the outcome is the nil-filers one, even if the increase is small (5 per cent) and not statistically significant. All the other sub-groups, such as PIT/CIT, gender and location do not show any change in item counts when the sensitive item is added. Thus, the findings of the list experiment are generally inconclusive.

Fairness. The non-sensitive item list included *I am proud to be a Rwandan citizen*, *It is easy to file taxes*, *I do NOT know any other trader/businessman* and *It is pretty hard to understand the tax system*. Results show an increase in the item count when the sensitive item (*The tax system is unfair*) is added to the non-sensitive item list, from 1.99 to 2.18. That means that about 20 per cent of the sample thinks that the tax system is unfair. However, this result is slightly lower than what emerged from the direct question. This means that there seems to be no bias on the taxpayers' side in reporting unfairness. Some groups experience a more prominent disclosure of unfairness perceptions, such as CIT (24 per cent), taxpayers outside of Kigali (26 per cent), male taxpayers (23 per cent) and active taxpayers (23 per cent). Non-filers are the least likely to believe that the system is unfair (8 per cent).

Trust in and perceived professionalism of RRA. The non-sensitive list was the same as the one above, while the sensitive item was *Sometimes RRA officials are incompetent/ unprofessional*. Results show that about 24 per cent of the sample believes that RRA is unprofessional: a slightly higher percentage than for the indicator on trust, but in line with the results on the incidence of bribes – another direct question we have in our survey. We find a higher incidence of this perception for CIT (24 per cent), outside of Kigali (27 per cent), male taxpayers (23 per cent) and nil-filers (29 per cent). The latter in particular is in line with the greater distrust that nil-filers have towards RRA. While perceptions of professionalism and trust are generally good, even in the list experiment, there is some scope for improvement in this area as a sizeable minority of taxpayers view the RRA as unprofessional.

Overall, the list experiments do not reveal large or significant biases in our survey data.

Appendix 2 Tables

Table A1 Variables description

Variable	Survey question	Description	Baseline	Round1	Round2	Round3
Firms closed due to COVID-19	What is the current status of your business?	=1 if temporarily or permanently closed by government measures or due to regulatory or operational challenges related to COVID-19	-	66.5	11.6	27.8
Self-reported revenue (USD)	How much did you sell over the last month?	Rwandan Francs amounts converted into USD	5,966	892	2,544	3,181
Received any support	In the last 2 months, have you received food, cash or any other support from the authorities or other groups/ associations/ companies that you did not usually receive before the crisis?	=1 if Yes	-	69.8	22.4	31.7
Accessed any tax relief	In the last 2 months, did you experience any of the following tax relief for the formal taxes you usually pay?	=1 if Yes to any of the 3 reliefs below	-	41.0	8.1	25.9
Accessed tax deferral	In the last 2 months, did you experience any of the following tax relief for the formal taxes you usually pay?	= 1 if Yes to delayed fling/paying deadline		39.3	4.6	23.6
Accessed tax waiver	In the last 2 months, did you experience any of the following tax relief for the formal taxes you usually pay?	= 1 if Yes to tax waiver	-	2.0	1.9	0.9
Accessed any tax reduction	In the last 2 months, did you experience any of the following tax relief for the formal taxes you usually pay?	= 1 if Yes to tax reduction	–	1.3	3.3	3.1
Accessed any local tax relief	In the last 2 months, did you experience any of the following relief for the local fee you usually pay?	= 1 if Yes to any of the 3 reliefs as above	–	23.1	4.0	7.4
Unfairness	According to you, is the following statement true or false: The tax system is unfair.	= 1 if True	16.7	15.4	15.6	25.8
Trust	How much trust or mistrust do you have that the RRA acts in the interest of taxpayers like you?	= 1 if a lot of trust or some trust	83.3	80.3	88.7	86.9
Financial constraints	Which of the following statements is closest to your view? Statement 1: Taxpayers should always declare their full income for tax purposes, regardless of their financial constraints. Statement 2: Taxpayers in financial distress could declare less income in order to pay a smaller tax.	= 1 if Yes to statement 2	27.6	23.8	24.1	25.8
Conditional/ unconditional compliance	Statement 1: Taxpayers must pay their taxes to the government, regardless of the quality of public services. Statement 2: Taxpayers could refuse to pay taxes if they are not receiving public services of adequate quality.	= 1 if Yes to statement 2	19.6	25.7	28.4	25.7
Never justify	Please tell me for following statement whether you think it can always be justified, never be justified, or something in between. The range goes from 1 (never justified) to 5 (always justified): Some people not paying the taxes on their income.	= 1 if never justify	90	85.2	4.0	86

Table A2 Sample summary statistics at baseline

	N	Mean	SD	Min	Max
Declaration reports tax> 0	2023	0.52	0.50	0.00	1.00
Nil-filer	2023	0.25	0.43	0.00	1.00
Non-filer	2023	0.23	0.42	0.00	1.00
PIT payer	2023	0.75	0.43	0.00	1.00
CIT payer	2023	0.25	0.43	0.00	1.00
Based in Kigali	2023	0.62	0.48	0.00	1.00
VAT registered	2023	0.20	0.40	0.00	1.00
Female	2023	0.34	0.48	0.00	1.00
Rwandan	2023	0.97	0.18	0.00	1.00
Respondent is owner	2023	0.82	0.39	0.00	1.00
Business is operative	2023	0.87	0.34	0.00	1.00
Has tax accountant	2023	0.19	0.39	0.00	1.00
Hours spent on tax	1811	4.01	8.23	0.00	80.00
Has EBM	2023	0.12	0.32	0.00	1.00
Keeps books	2023	0.46	0.50	0.00	1.00
Has no employees	2018	0.54	0.50	0.00	1.00
Monthly sales (USD)	1655	5,966	44,645	0.00	932,923
N	2023				

Notes: Summary statistics based on Rwanda National Taxpayer Survey at baseline. EBM is electronic billing machine.

Table A3 Mean differences by number of follow-up rounds

	Less than 3		3 rounds		
	Mean	Obs.	Mean	Obs.	Difference
Active	0.52	500	0.52	1503	0.00
Nil-filer	0.28	500	0.24	1503	0.05**
Non-filer	0.19	500	0.24	1503	-0.05**
PIT	0.66	520	0.78	1503	-0.12***
CIT	0.34	520	0.22	1503	0.12***
Kigali	0.75	520	0.58	1503	0.17***
VAT reg.	0.26	520	0.18	1503	0.08***
Female	0.39	500	0.33	1503	0.07***
Age group	3.20	497	3.34	1501	-0.14***
Educ. level	5.62	483	4.98	1464	0.64***
Rwandan	0.95	500	0.97	1503	-0.02***
No social media	0.17	500	0.26	1503	-0.09***
No TV	0.27	500	0.26	1503	0.01
Owner	0.79	500	0.82	1503	-0.03
Operative	0.85	500	0.87	1503	-0.02
Tax accountant	0.25	500	0.16	1503	0.08***
Hours on tax	5.08	435	3.64	1358	1.44***
Has EBM	0.15	500	0.10	1503	0.05***
Info from RRA	0.57	500	0.51	1503	0.06***
Books	0.52	500	0.44	1503	0.07***
Emails	0.24	500	0.15	1503	0.09***
Bank	0.38	500	0.30	1503	0.08***
Trade	0.65	500	0.68	1503	-0.02
No employees	0.53	498	0.55	1500	-0.02
Monthly sales USD	8792.30	382	5149.16	1256	3643.14
N	2023				

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ based on t-test of statistical significance of mean differences.

Table A4 Determinants of getting access to formal tax relief in round 1

	(1) Demo + business	(2) Perceptions	(3) All
Female	0.02		0.01
	(0.04)		(0.04)
Age	-0.04**		-0.04**
	(0.02)		(0.02)
High education	0.10*		0.10*
	(0.05)		(0.05)
Kigali	0.02		0.02
	(0.04)		(0.04)
Trade	0.01		0.01
	(0.04)		(0.04)
CIT	0.08		0.08
	(0.05)		(0.05)
Books	-0.00		0.00
	(0.05)		(0.05)
Tax accountant	0.01		0.00
	(0.05)		(0.05)
Tax knowledge	0.03***		0.03**
	(0.01)		(0.01)
Monthly sales	0.02		0.01
	(0.01)		(0.01)
Uses social media	0.08		0.07
	(0.06)		(0.06)
Get info from RRA	0.07*		0.06
	(0.04)		(0.04)
Trust RRA		-0.05	-0.04
		(0.05)	(0.05)
Audit 100%		0.01	-0.01
		(0.04)	(0.04)
Bribe in audit		-0.05	-0.04
		(0.05)	(0.05)

Unfair system		-0.13***	-0.10**
		(0.05)	(0.05)
Never justify evasion		0.02	0.03
		(0.06)	(0.06)
Mean of dep. Variable	0.56	0.56	0.56
R-sq.	0.121	0.037	0.136
Observations	592	592	592

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses. All coefficients are OLS estimates from a LPM. High education is an indicator for whether the taxpayer has post-secondary education. Tax knowledge is a score ranging from a min 0 to a max of 8 and indicates the correct answers given in a 8-item quiz on tax. Uses online tools takes value 1 if the taxpayer is registered for e-tax and/or mobile declaration. Get info from RRA indicates whether the taxpayer receives information on tax matters from RRA staff or RRA official channels. Trust in RRA is an indicator variable for whether the taxpayer has a lot or some trust that the RRA acts in the interest of taxpayers like them. Audit 100% takes value 1 if the perceived probability of getting audited by RRA is 100%. Bribe in audit is an indicator for whether the taxpayer thinks that side payments are required with RRA during an audit. Unfair system takes value 1 if the taxpayer perceives the tax system to be unfair. Never justify evasion indicates whether the taxpayer believes evading taxes is never justifiable.

Table A5 Changes in tax attitudes over time, single waves – FE

	(1)	(2)	(3)	(4)	(5)	(6)
	Unfairness	Trust	Never justify	Cond. Compl.	Uncond. Compl.	Fin. constraints
May '20	-0.10***	-0.03**	0.05***	0.07***	-0.07***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
September '20	-0.11***	0.04***	0.00	0.08***	-0.08***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
January '21	-0.09***	0.02*	0.00	0.05***	-0.05***	-0.03*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Monthly sales	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Y	0.26	0.83	0.85	0.20	0.80	0.28
R-sq.	0.023	0.011	0.006	0.009	0.009	0.004
Observations	6969	7269	7258	6998	6998	6986

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. FE: fixed effects.

Table A6 Changes in tax attitudes over time, single waves – FE

	(1)	(2)	(3)	(4)	(5)	(6)
	Unfairness	Trust	Never justify	Cond. Compl.	Uncond. Compl.	Fin. constraints
May '20	-0.11***	-0.09***	0.07***	0.05***	-0.05***	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
September '20	-0.11***	0.04***	0.00	0.08***	-0.08***	-0.04**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
January '21	-0.09***	0.03**	-0.00	0.05***	-0.05***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Business Closure	-0.02	-0.02	0.02	0.01	-0.01	0.05*
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
May '20*Closure'	0.02	0.12***	-0.06**	0.02	-0.02	-0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Sep '20*Closure	0.02	0.04	-0.01	-0.01	0.01	-0.08*
	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
Monthly sales	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Y	0.26	0.83	0.85	0.20	0.80	0.28
R-sq.	0.023	0.017	0.006	0.009	0.009	0.005
Observations	6969	7269	7258	6998	6998	6986

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7 Changes in tax attitudes over time, single waves – FE

	(1)	(2)	(3)	(4)	(5)	(6)
	Unfairness	Trust	Never justify	Cond. Compl.	Uncond. Compl.	Fin. constraints
May '20	-0.12***	0.02	0.07***	0.08***	-0.08***	-0.06***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
September '20	-0.10***	0.05***	-0.00	0.08***	-0.08***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
January '21	-0.09***	0.03**	-0.00	0.06***	-0.06***	-0.02
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Tax relief	-0.02	-0.00	0.02	-0.04	0.04	-0.02
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
May '20*Tax relief'	0.05*	0.02	-0.08***	0.03	-0.03	0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Sep '20*Tax relief'	-0.03	0.01	0.06	0.02	-0.02	-0.02
	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.06)
Monthly sales	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Y	0.26	0.83	0.85	0.20	0.80	0.28
R-sq.	0.023	0.006	0.009	0.010	0.010	0.004
Observations	6834	6997	7117	6861	6861	6850

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8 Mean differences by filing before or on/after 25 March 2020

	Before		On/after		
	Mean	Obs.	Mean	Obs.	Difference
	Administrative data				
PIT	0.75	740	0.60	645	0.16***
CIT	0.25	740	0.40	645	-0.16***
Kigali	0.65	740	0.61	645	0.04
VAT reg.	0.19	740	0.38	645	-0.19***
Total tax	152446.88	740	1847834.62	645	-1695387.74
Total income	29572273.06	740	1.69e+08	645	-1.39e+08***
Nil return	0.36	740	0.21	645	0.15***
	Survey data				
No employees	0.58	738	0.42	643	0.16***
Monthly sales (USD)	2818.21	596	13349.27	530	-10531.06***
High education	0.36	524	0.50	452	-0.14***
Uses online tools	0.59	740	0.70	645	-0.11***
Uses a tax accountant	0.17	740	0.31	645	-0.14***
Hours on tax	3.93	671	5.19	564	-1.26**
EBM use	0.09	740	0.22	645	-0.13***
Tax knowledge	3.64	740	3.99	645	-0.35***
Trust in RRA	0.86	721	0.82	634	0.04*
Has a bank account	0.29	740	0.44	645	-0.15***
N	1385				

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. High education is an indicator variable for whether the taxpayer has post-secondary education. Uses online tools takes value 1 if the taxpayer is registered for e-tax and/or M-declaration. Tax knowledge is a score ranging from a min 0 to a max of 8 and indicates the correct answers given in a 8-item quiz on tax. Trust in RRA is an indicator variable for whether the taxpayer has a lot or some trust that the RRA acts in the interest of taxpayers like them.

Table A9 Mean differences by filing before or on/after 25 March 2019

	Before		On/after		
	Mean	Obs.	Mean	Obs.	Difference
	Administrative data				
PIT	0.76	640	0.65	923	0.11***
CIT	0.24	640	0.35	923	-0.11***
Kigali	0.65	640	0.62	923	0.03
VAT reg.	0.20	640	0.30	923	-0.09***
Total tax	118718.70	640	863434.11	923	-744715.41
Total income	18961228.82	640	1.07e+08	923	-8.80e+07**
Nil return	0.37	640	0.29	923	0.09***
	Survey data				
No employees	0.59	638	0.46	920	0.13***
Monthly sales (USD)	3409.78	512	10280.84	751	-6871.06**
High education	0.36	524	0.50	452	-0.14***
Uses online tools	0.60	640	0.65	923	-0.04*
Uses a tax accountant	0.17	640	0.25	923	-0.08***
Hours on tax	4.14	574	4.62	822	-0.48
EBM use	0.11	640	0.16	923	-0.05**
Tax knowledge	3.70	640	3.76	923	-0.06
Trust in RRA	0.84	625	0.83	905	0.01
Has a bank account	0.28	640	0.41	923	-0.13***
N	1563				

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. High education is an indicator variable for whether the taxpayer has post-secondary education. Uses online tools takes value 1 if the taxpayer is registered for e-tax and/or M-declaration. Tax knowledge is a score ranging from a min 0 to a max of 8 and indicates the correct answers given in an 8-item quiz on tax. Trust in RRA is an indicator variable for whether the taxpayer has a lot or some trust that the RRA acts in the interest of taxpayers like them.

Table A10 Mean differences by filing before or on/after 25 March 2018

	Before		On/after		
	Mean	Obs.	Mean	Obs.	Difference
		Administrative data			
PIT	0.72	535	0.49	469	0.22***
CIT	0.28	535	0.51	469	-0.22***
Kigali	0.55	535	0.61	469	-0.05*
VAT reg.	0.23	535	0.43	469	-0.19***
Total tax	133389.54	535	478000.32	469	-344610.78***
Total income	17937106.28	535	1.39e+08	469	-1.21e+08***
Nil return	0.33	535	0.30	469	0.03
		Survey data			
No employees	0.53	532	0.36	468	0.17***
Monthly sales (USD)	2997.85	429	16841.12	376	-13843.27***
High education	0.36	524	0.50	452	-0.14***
Uses online tools	0.65	535	0.68	469	-0.03
Uses a tax accountant	0.19	535	0.36	469	-0.16***
Hours on tax	4.00	481	6.07	404	-2.07***
EBM use	0.13	535	0.23	469	-0.10***
Tax knowledge	3.75	535	3.91	469	-0.16
Trust in RRA	0.86	521	0.82	463	0.04
Has a bank account	0.31	535	0.50	469	-0.19***
N	1004				

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. High education is an indicator variable for whether the taxpayer has post-secondary education. Uses online tools takes value 1 if the taxpayer is registered for e-tax and/or M-declaration. Tax knowledge is a score ranging from a min 0 to a max of 8 and indicates the correct answers given in a 8-item quiz on tax. Trust in RRA is an indicator variable for whether the taxpayer has a lot or some trust that the RRA acts in the interest of taxpayers like them.

Table A11 Impact of tax deferral on income tax remitted

	(1)	(2)	(3)
	Main	w/out income	w/out nil-filers
Treat*2019	628,561*	764,943*	734,345*
	(327,912)	(405,529)	(438,469)
Treat*2018	4,033	87,561	-142,248
	(340,152)	(320,060)	(517,174)
Treat*2017	133,410	142,589	87,080
	(221,510)	(237,601)	(296,103)
Treat*2016	162,304	207,386	106,781
	(212,548)	(224,606)	(282,401)
Treat*2015	71,521	120,315	84,437
	(236,818)	(246,132)	(312,555)
Treat*2014	-271,952	-151,556	-496,684
	(228,748)	(220,076)	(338,772)
Treat*2013	-382,937	-313,786	-521,087
	(241,134)	(269,072)	(328,487)
Treat*2012	-3,133	149,159	140,832
	(267,160)	(261,465)	(350,377)
Treat	-76,540	-134,709	-82,983

	(195,492)	(212,600)	(270,003)
Income	0.002		0.002
	(0.002)		(0.002)
Year dummies	Yes	Yes	Yes
Control Mean	528,042	528,042	761,081
R-sq.	0.028	0.005	0.027
Observations	5650	5650	3920

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A12 Impact of tax deferral on income tax remitted

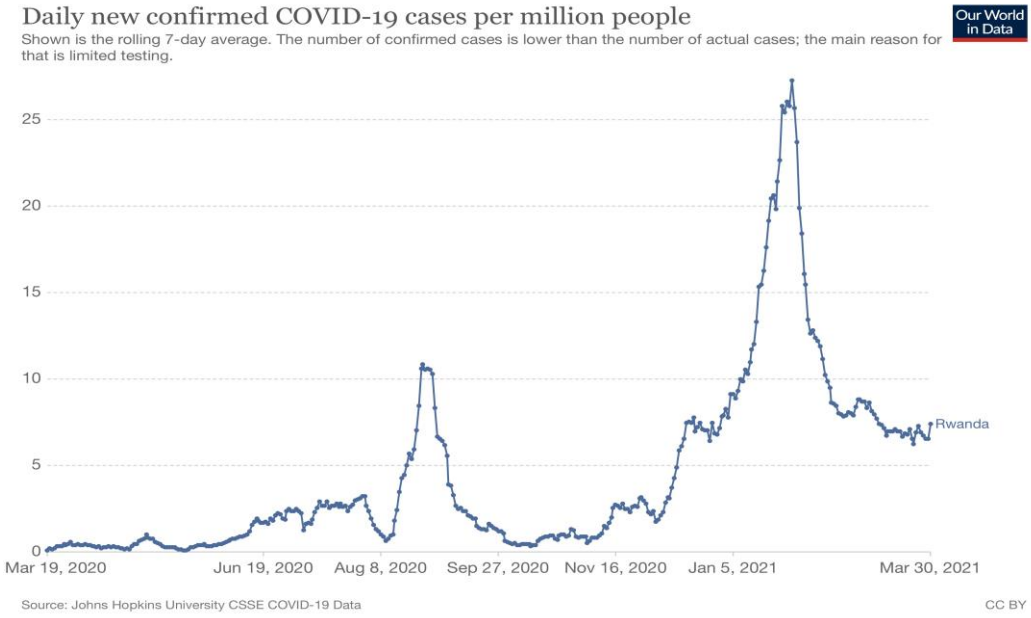
	(1)	(2)	(3)
	Winsorise Top 1pc	Drop Top 1pc	Drop Top 5 firms
Treat*2019	185,783	91,523	386,744*
	(178,925)	(169,190)	(224,713)
Treat*2018	136,497	41,989	281,265
	(179,008)	(171,231)	(211,088)
Treat*2017	9,885	8,285	141,489
	(190,956)	(186,856)	(226,454)
Treat*2016	75,943	32,052	187,718
	(178,863)	(165,995)	(215,557)
Treat*2015	40,706	73,830	102,834
	(196,713)	(181,058)	(238,627)
Treat*2014	-168,639	-105,326	-199,785
	(187,590)	(175,181)	(215,579)
Treat*2013	-329,954	-246,058	-346,708
	(213,183)	(197,801)	(254,352)
Treat*2012	-792	-11,575	86,440
	(182,707)	(191,580)	(251,216)
Treat	-17,582	14,333	-111,055

	(176,031)	(169,152)	(201,328)
Income	0.002*	0.002*	0.002*
	(0.002)	(0.002)	(0.002)
Year dummies	Yes	Yes	Yes
Control Mean	272,682	208,864	318,158
R-sq.	0.056	0.043	0.048
Observations	5650	5610	5648

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix 3 Figures

Figure A1 Confirmed cases of COVID-19 per million people in Rwanda

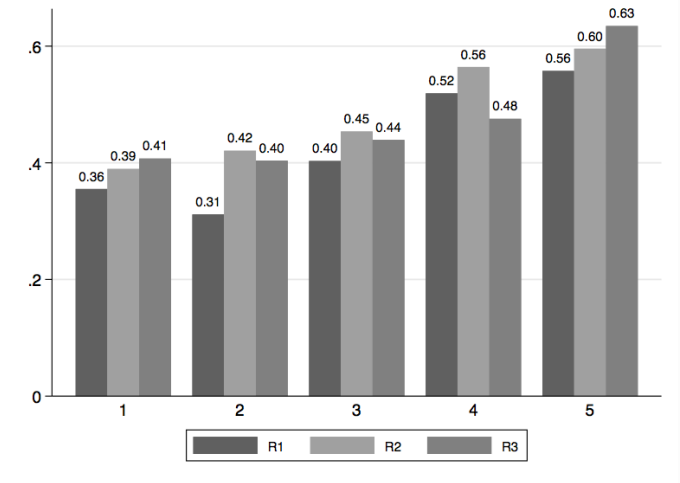


Source: Our World in Data 2021.

Figure A2 Stringency index in Rwanda

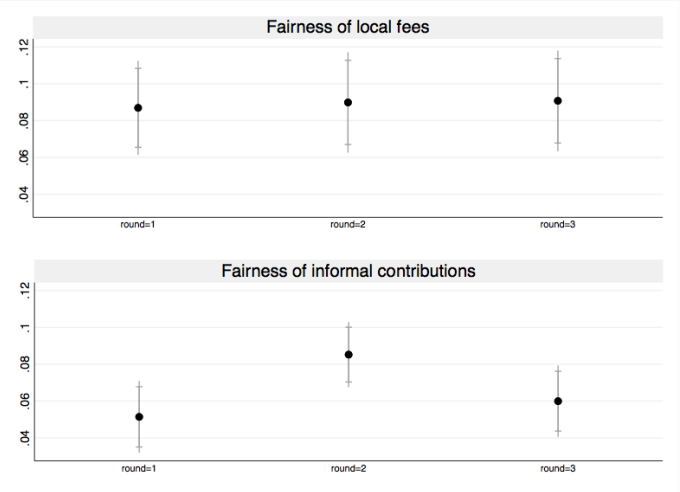
Source: Our World in Data 2021.

Figure A3 Likelihood of contributing to new COVID-19 projects



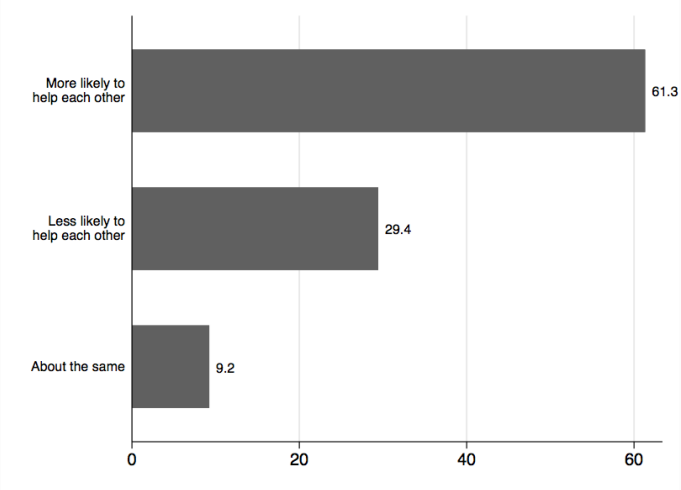
Notes: results based on data from the Rwanda National Taxpayer Survey.

Figure A4 Shifts in perceptions about the fairness of informal contributions



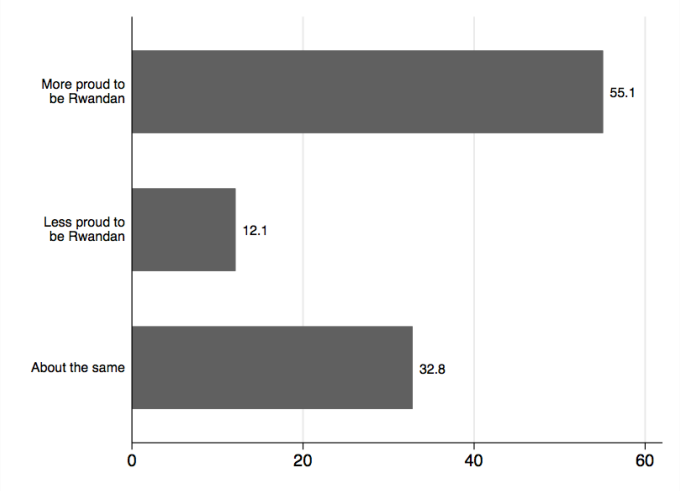
Notes: results based on Rwanda National Taxpayer Survey. Graphs show coefficients from fixed effects regressions on the relevant outcome, indicated at the top of each graph. We can measure outcomes thanks to a question on the overall fairness of all informal contributions (i.e. not those on projects specific to the crisis), which we included in all survey rounds, including baseline. This change is relatively sizeable: 13% and an average of 8% of baseline levels of local fees and informal contributions, respectively.

Figure A5 Change in solidarity one year after COVID-19 outbreak



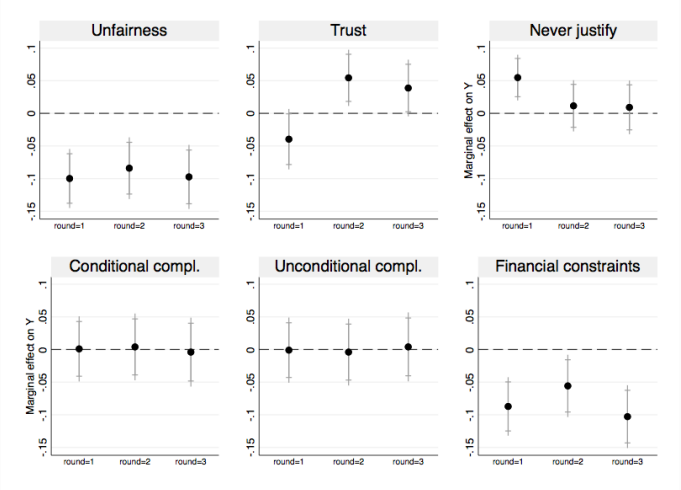
Notes: results based on data from the Rwanda National Taxpayer Survey. Survey question reads: Comparing the period before COVID and today, would you say that people are now: more likely to help each other/less likely to help each other/about the same.

Figure A6 Change in patriotism one year after COVID-19 outbreak

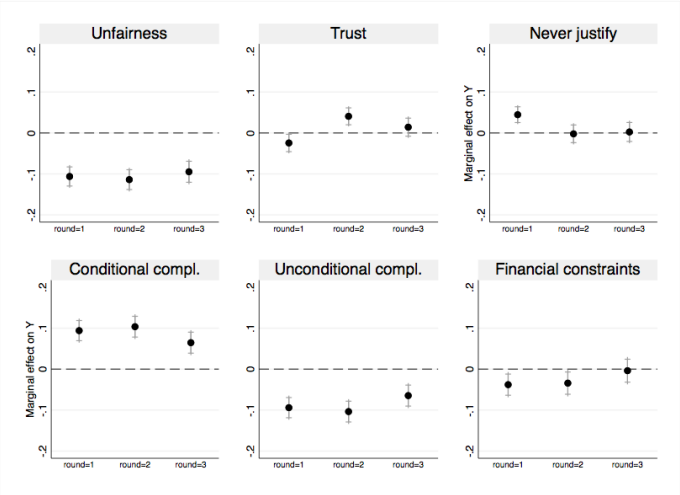


Notes: results based on data from the Rwanda National Taxpayer Survey. Survey question reads: Comparing the period before COVID and today, would you say that people are now: more proud to be Rwandan/less proud to be Rwandan/about the same.

Figure A7 Shifts in attitudes and perceptions: CIT vs. PIT

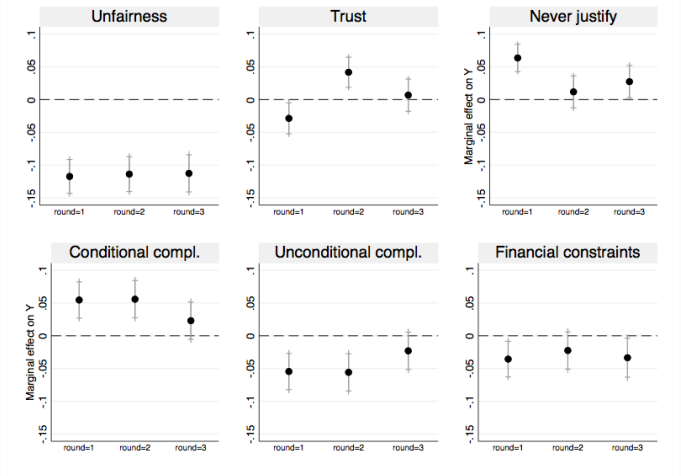


(a) CIT payers

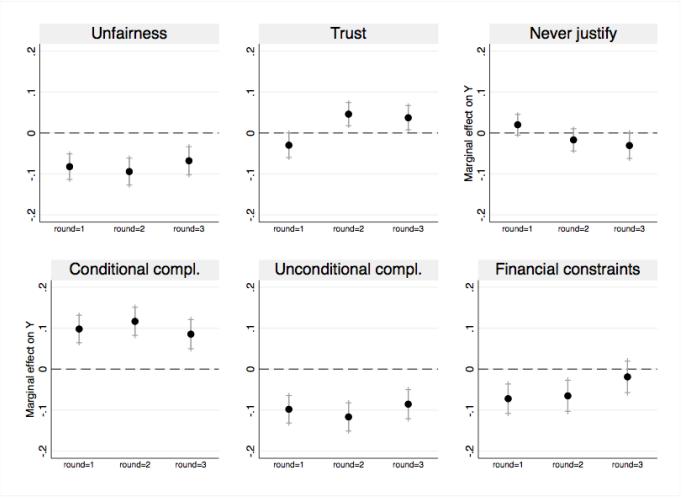


(b) PIT payers

Figure A8 Shifts in attitudes and perceptions: Kigali vs. provinces

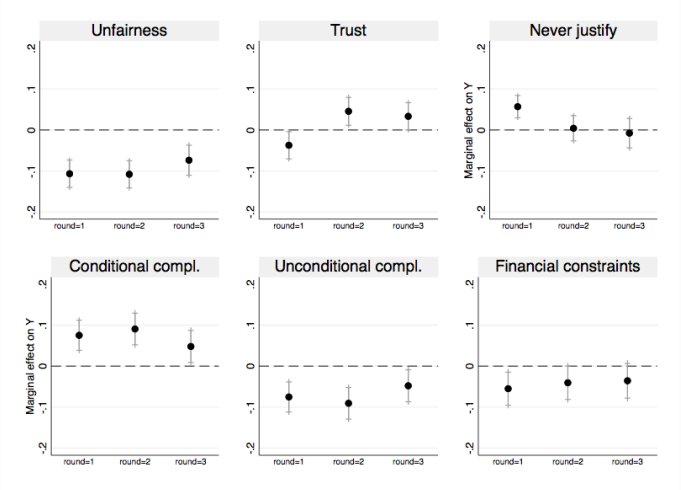


(a) Kigali

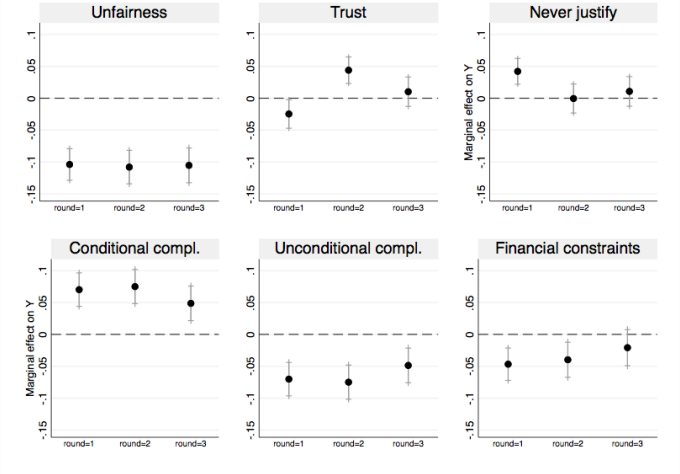


(b) Provinces

Figure A9 Shifts in attitudes and perceptions: female vs. male

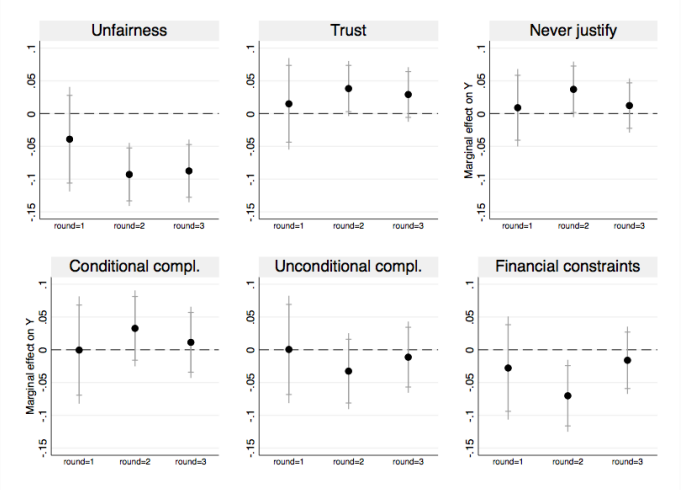


(a) Female

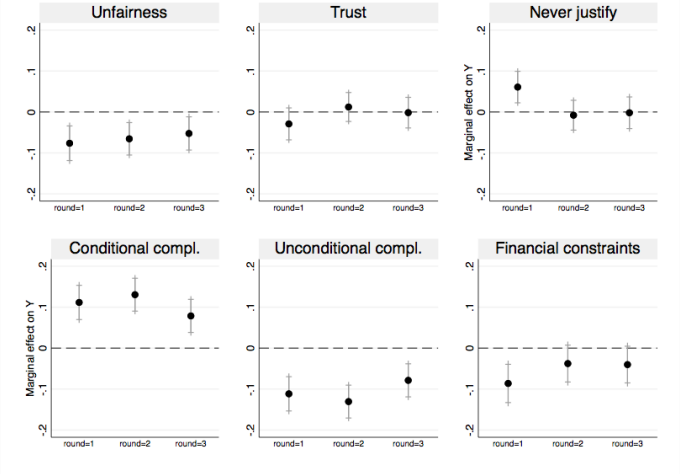


(b) Male

Figure A10 Shifts in attitudes and perceptions: top quintile vs. rest

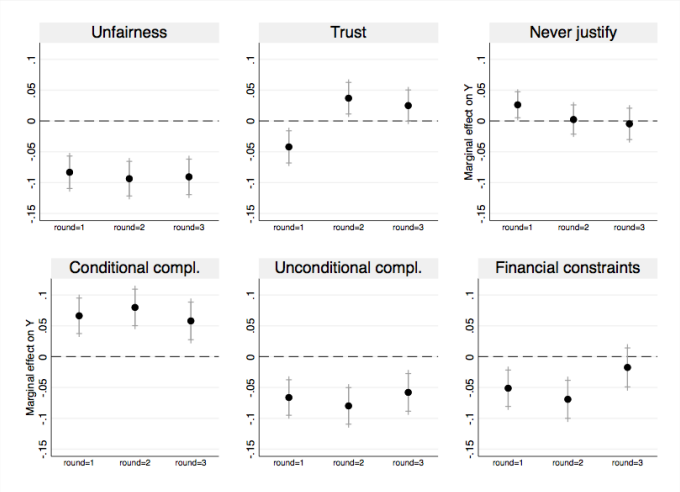


(a) Top quintile

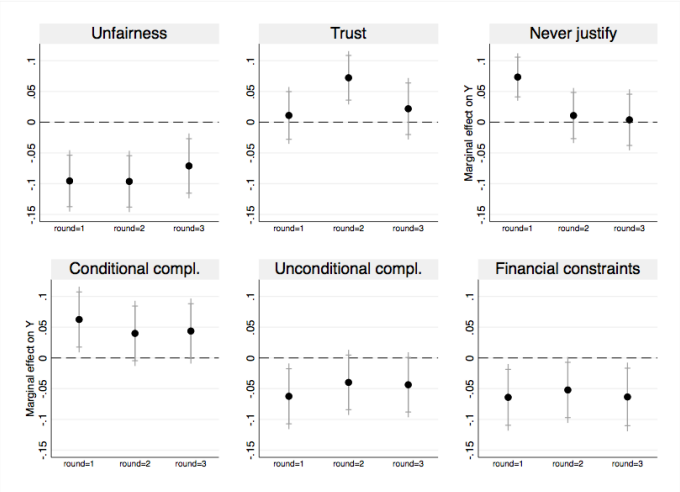


(b) 1-4 quintiles

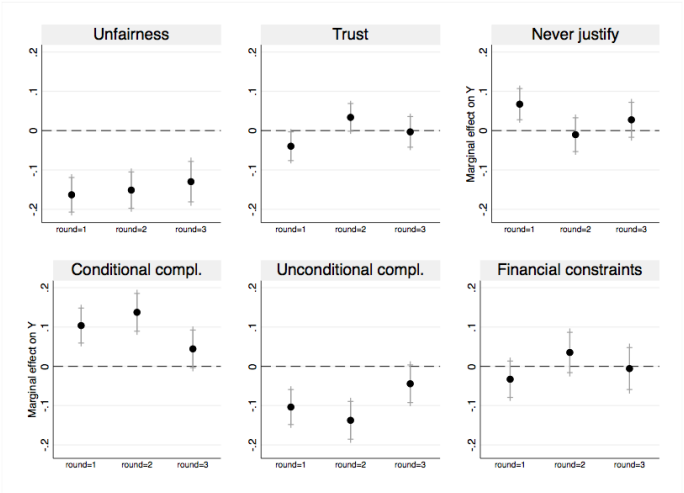
Figure A11 Shifts in attitudes and perceptions: compliance categories



(a) Actives at baseline

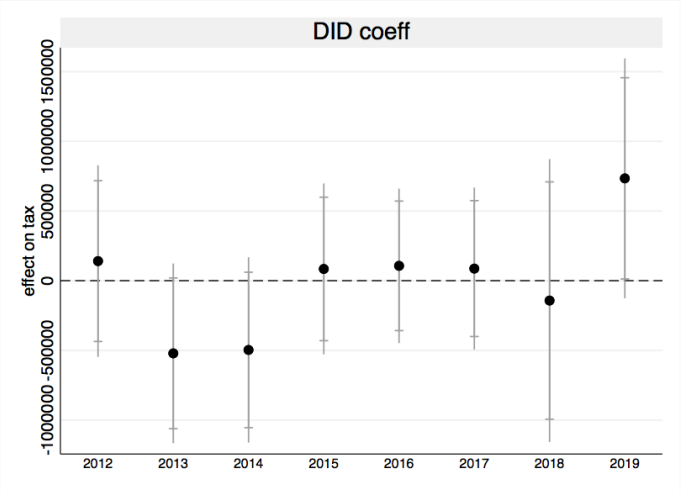


(b) Nil-filers at baseline



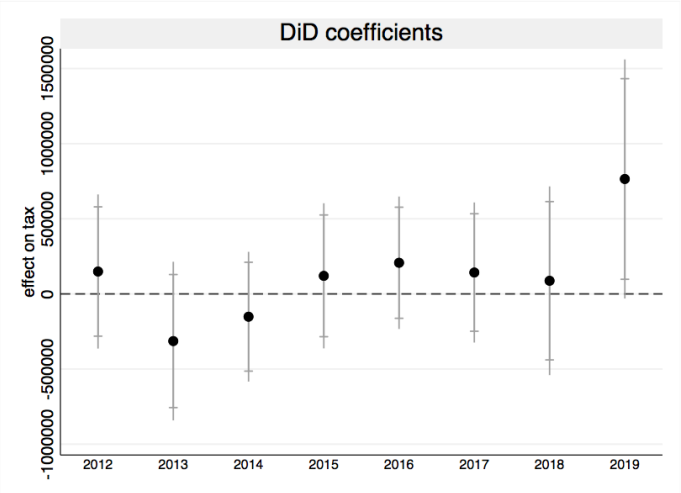
(c) Non-filers at baseline

Figure A12 Shifts in compliance behaviour – without nil-filers



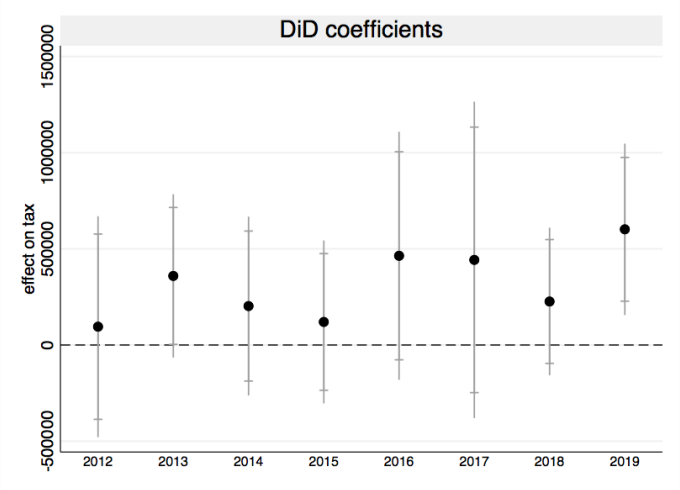
Notes: results based on RRA's administrative data, for the survey sample. Graphs show difference-in-difference coefficients (treat x year) from a fixed effects regression.

Figure A13 Shifts in compliance behaviour – without business income



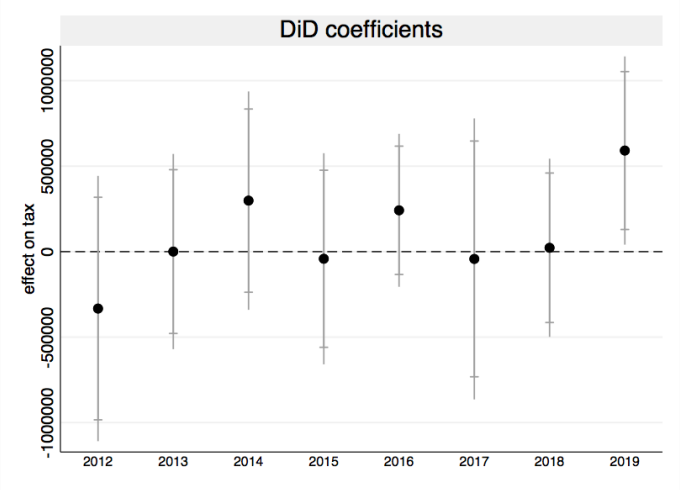
Notes: results based on RRA's administrative data, for the survey sample. Graphs show difference-in-difference coefficients (treat x year) from a fixed effects regression.

Figure A14 Shifts in compliance behaviour: cut-off date 14 March



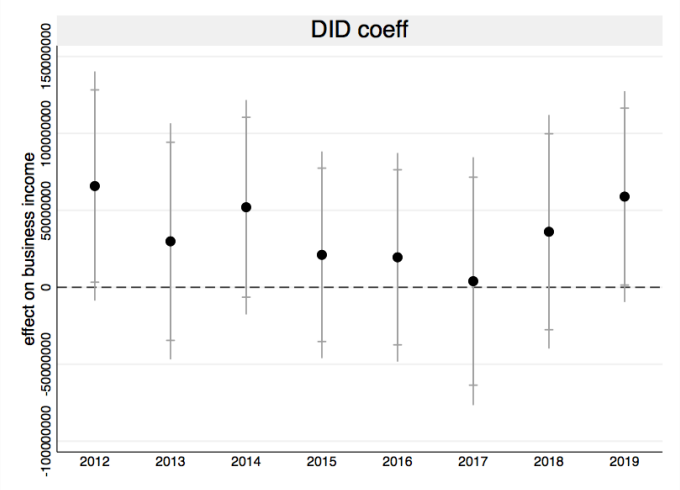
Notes: results based on RRA's administrative data, for the survey sample. Graphs show difference-in-difference coefficients (treat x year) from a fixed effects regression.

Figure A15 Shifts in compliance behaviour: cut-off date 21 March



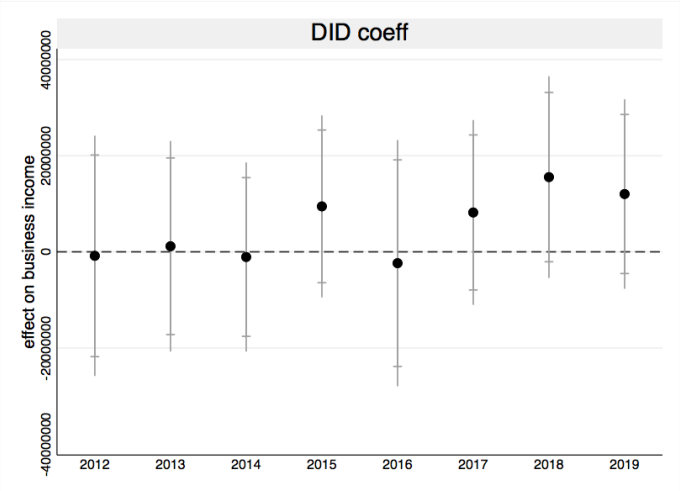
Notes: results based on RRA's administrative data, for the survey sample. Graphs show difference-in-difference coefficients (treat x year) from a fixed effects regression.

Figure A16: Shifts in compliance behaviour: business income



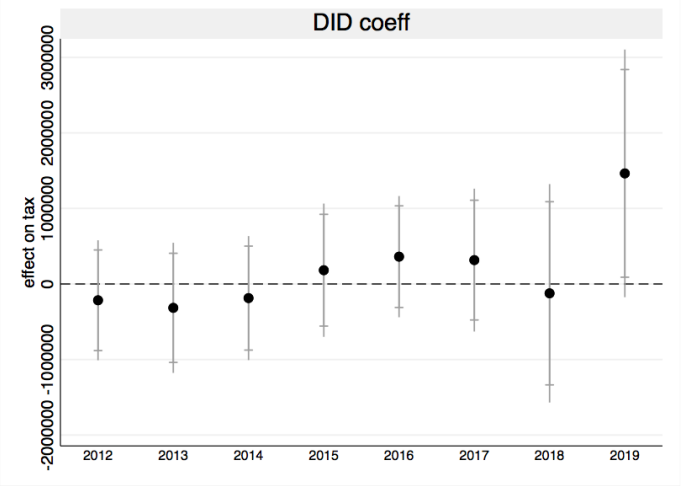
Notes: results based on RRA's administrative data, for the survey sample. Graphs show difference-in-difference coefficients (treat x year) from a fixed effects regression.

Figure A17 Shifts in compliance behaviour: operating expenses

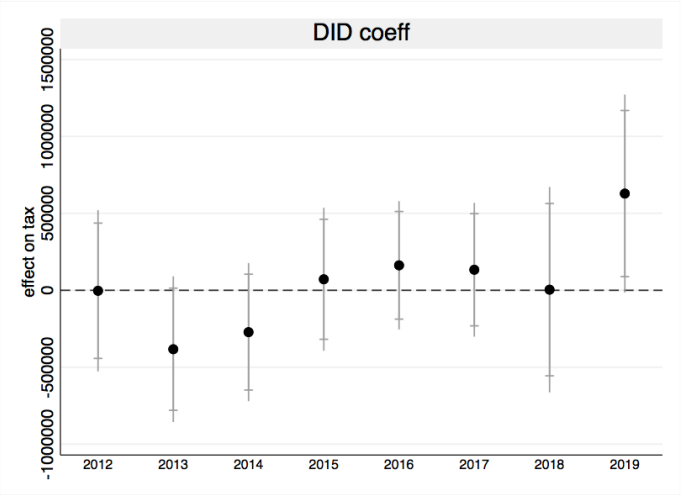


Notes: results based on RRA's administrative data, for the survey sample. Graphs show difference-in-difference coefficients (treat x year) from a fixed effects regression.

Figure A18 Shifts in compliance behaviour: CIT vs. PIT

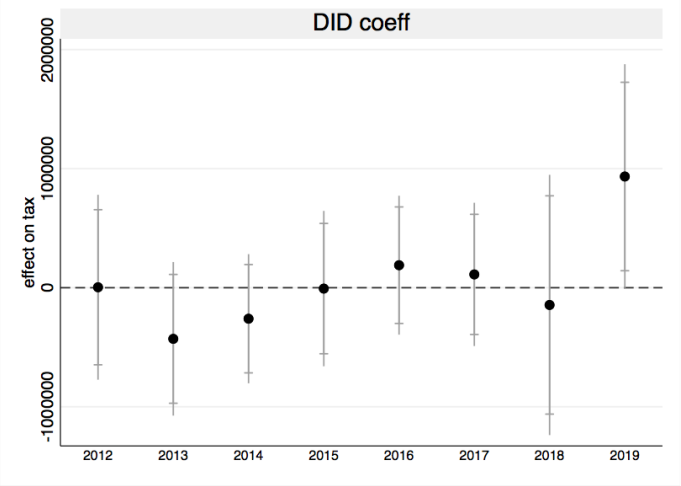


(a) CIT payers

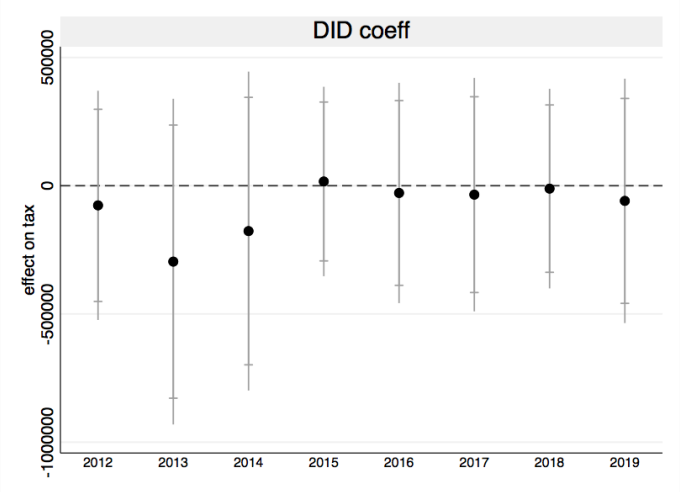


(b) PIT payers

Figure A19 Shifts in compliance behaviour: by location

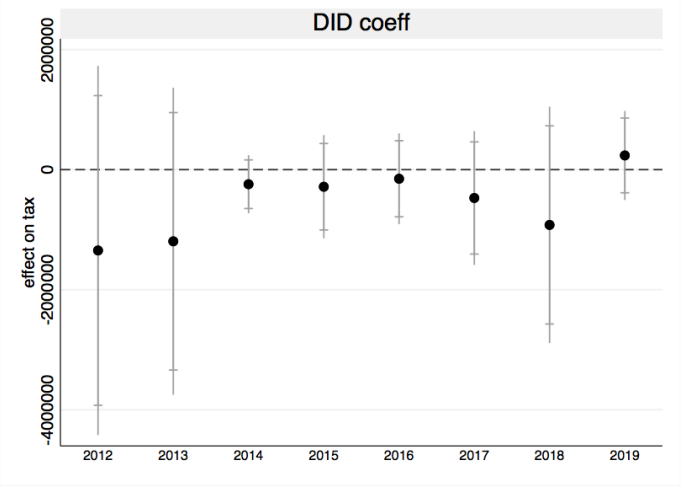


(a) Kigali

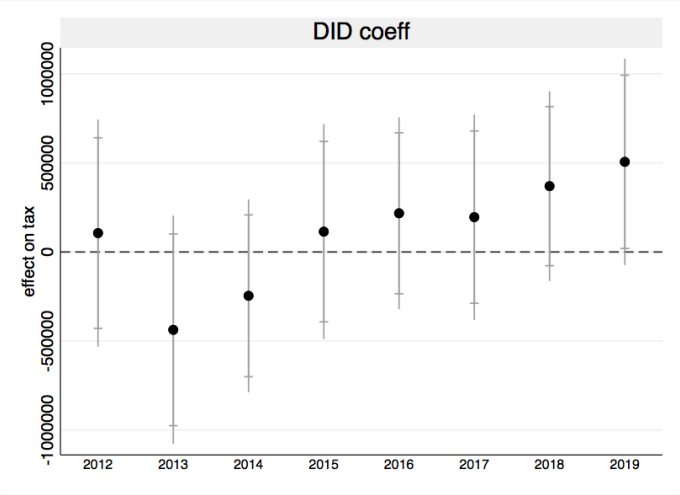


(b) Provinces

Figure A20 Shifts in compliance behaviour: by gender

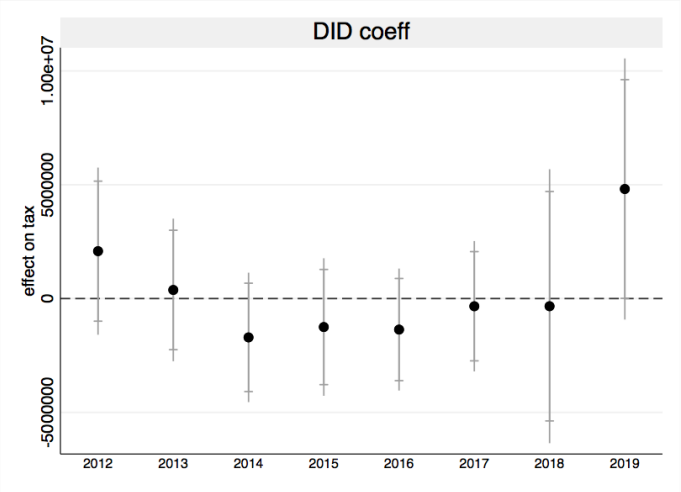


(a) Female

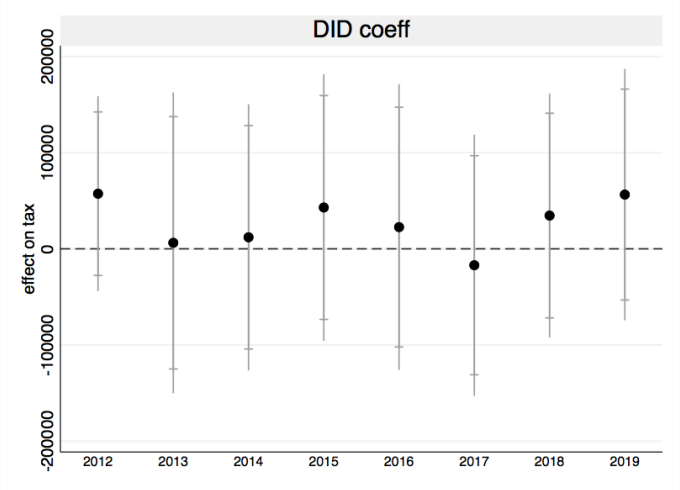


(b) Male

Figure A21 Shifts in compliance behaviour: by size (deciles of sales)

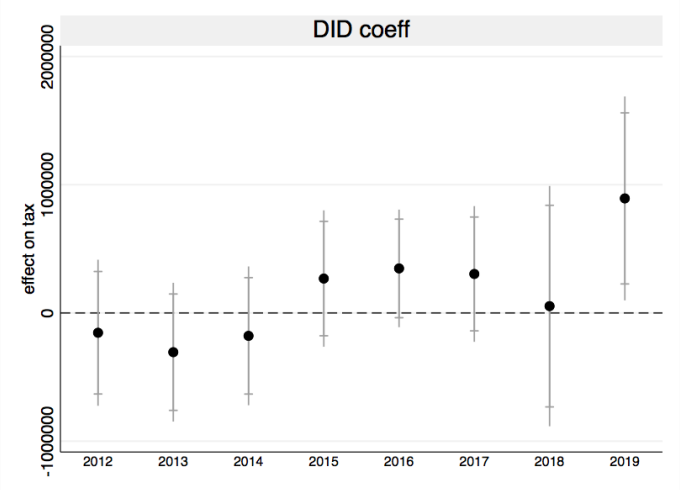


(a) Top decile

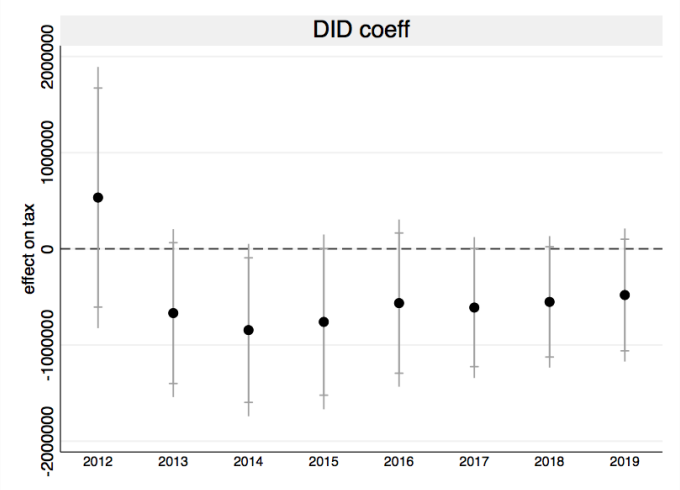


(b) 1-9 deciles

Figure A22 Shifts in compliance behaviour: by compliance category



(a) Actives at baseline



(b) Nil-filers at baseline

References

Arndt, C., Davies, R., Gabriel, S., Harris, L., Makrelov, K., Modise, B., Robinson, S., Simbanegavi, W., van Seventer, D. and Anderson, L. (2020) *Impact of Covid-19 on the South African Economy: An Initial Analysis*, Working Paper 111, SA-TIED

Bachas, P., Brockmeyer, A. and Semelet, C. (2020) *The Impact of COVID-19 on Formal Firms: Micro Tax Data Simulations across Countries*, Policy Research Working Papers 9437, World Bank Group

Baekgaard, M., Christensen, J., Madsen, J.K. and Mikkelsen, K.S. (2020) 'Rallying Around the Flag in Times of COVID-19: Societal Lockdown and Trust in Democratic Institutions', *Journal of Behavioural Public Administration* 3.2

Barasa, E., Kazungu, J., Nguhiu, P. and Ravishankar, N. (2021) 'Examining the Level and Inequality in Health Insurance Coverage in 36 Sub-Saharan African Countries', *BMJ Global Health* 6 e004712

Bishi, H., Grossman, S. and Startz, M. (2020) *How COVID-19 has Affected Lagos Traders: Findings from High Frequency Phone Surveys*, Policy Brief, NGA-20075, August 2020, International Growth Centre

Caselli, F., Grigoli, F., Lian, W. and Sandri, D. (2020) *Protecting Lives and Livelihoods with Early and Tight Lockdowns*, IMF Working Paper 234, International Monetary Fund

Crisman, B. (2020) 'Disease, Disaster, and Disengagement: Ebola and Political Participation in Sierra Leone', *Studies in Comparative International Development* 55: 328–353

D'Arcy, M. (2011) *Why Do Citizens Assent to Pay Tax? Legitimacy, Taxation and the African State*, Working Paper 126, Afrobarometer

Djiofack, C.Z., Dudu, H. and Zeufack, A.G. (2020) 'Assessing COVID-19's Economic Impact in Sub-Saharan Africa: Insights from a CGE Model', in S. Djankov and U. Panizza (eds.) *COVID-19 in Developing Economies*, Centre for Economic Policy Research: 53–68

Egger, E.-M., Jones, S., Justino, P., Manhique, I. and Santos, R. (2020) *Africa's Lockdown Dilemma: High Poverty and Low Trust*, Working Paper 2020/76, UNU-WIDER

Fjeldstad, O.-H., Schulz-Herzenberg, C. and Sjursen, I.H. (2012) *People's Views of Taxation in Africa: A Review of Research on Determinants of Tax Compliance*, ICTD Working Paper 8, Brighton: Institute of Development Studies

Gangl, K., Kirchler, E., Lorenz, C. and Torgler, B. (2017) 'Wealthy Tax Non-Filers in a Developing Nation: The Roles of Taxpayer Knowledge, Perceived Corruption and Service Orientation', in B. Peters, H. Gribnau and J. Badisco (eds.), *Building Trust in Taxation*, Intersentia: 354–374

Gaspar, V., Jaramillo, L. and Wingender, P. (2016) *Tax Capacity and Growth: Is there a Tipping Point?* Working Paper 234, International Monetary Fund

Goldberg, P.K. and Reed, T. (2020) *The Effects of the Coronavirus Pandemic in Emerging Markets and Developing Economies: An Optimistic Preliminary Account*, Brookings Papers on Economic Activity Summer 2020 Special Edition, Brookings

Goodfellow, T. (2017) 'Taxing Property in a Neo-developmental State: The Politics of Urban Land Value Capture in Rwanda and Ethiopia', *African Affairs* 116.465: 549–572

Imai, K. (2011) 'Multivariate Regression Analysis for the Item Count Technique', *Journal of the American Statistical Association* 106.494: 407–416

Isbell, T. (2017) *Tax Compliance: Africans Affirm Civic Duty But Lack Trust in Tax Department*, Policy Paper 43, Afrobarometer

Johansson, B., Hopmann, D.N. and Shehata, A. (2021) 'When the Rally-around-the-Flag Effect Disappears, or: When the COVID-19 Pandemic Becomes "Normalized"', *Journal of Elections, Public Opinion and Parties* 31: 321–334

Kangave, J., Nakato, S., Waiswa, R., Nalukwago, M. and Zzimbe, P.L. (2018) *What Can We Learn from the Uganda Revenue Authority's Approach to Taxing High Net Worth Individuals?* ICTD Working Paper 72, Brighton: Institute of Development Studies

Kritzinger, S., Foucault, M., Lachat, R., Partheymuller, J., Plescia, C. and S. Brouard (2021) 'Rally Round the Flag: The COVID-19 Crisis and Trust in the National Government', *West European Politics* 44.5–6:1021–1231

Lees, A., Mascagni, G. and Santoro, F. (2020) Simulating the Impact of COVID-19 on Formal Firms in Rwanda, MTI Practice Notes 9J, World Bank

Lust, E. and Rakner, L. (2018) 'The Other Side of Taxation: Extraction and Social Institutions in the Developing World', *Annual Review of Political Science* 21.1: 277– 294

Luttmer, E. and Singhal, M. (2014) 'Tax Morale', *Journal of Economic Perspectives* 28.4: 149–68

Mahmud, M. and Riley, E. (2020) 'Household Response to an Extreme Shock: Evidence on the Immediate Impact of the Covid-19 Lockdown on Economic Outcomes and Well-being in Rural Uganda', *World Development* 140, 105318

Mascagni, G. and Lees, A. (2021) *Using Administrative Data to Assess the Impact of the Pandemic in Low-income Countries: An Application with VAT Data in Rwanda*, African Tax Administration Paper 22, Brighton: Institute of Development Studies

Mascagni, G., Santoro, F. and Mukama, D. (2019) *Teach to Comply? Evidence from a Taxpayer Education Programme in Rwanda*, ICTD Working Paper 91, Brighton: Institute of Development Studies

Mascagni, G., Santoro, F., Mukama, D., Karangwa, J. and Hakizimana, N. (2020) *Active Ghosts: Nil-filing in Rwanda*, ICTD Working Paper 106, Brighton: Institute of Development Studies

McCulloch, N., Moerenhout, T. and Yang, J. (2021) 'Building a Social Contract: Understanding Tax Morale in Nigeria', Journal of Development Studies 57.2: 226–243

Moore, M. (2020) *What is Wrong with African Tax Administration?* ICTD Working Paper 111, Brighton: Institute of Development Studies

Olken, B.A. and Singhal, M. (2011) 'Informal Taxation', *American Economic Journal: Applied Economics* 3:1–28

Paler, L., Prichard, W., Sanchez de la Sierra, R. and Samii, C. (2017) *Survey on Total Tax Burden in the DRC*, Technical Report, Department for International Development, Brighton: Institute of Development Studies

Prichard, W., Custers, A., Dom, R., Davenport, S. and Roscitt, M. (2019) *Innovations in Tax Compliance – Conceptual Framework*, Policy Research Working Paper 9032, World Bank Group

Prud'homme, R. (1992) 'Informal Local Taxation in Developing Countries', *Environment and Planning C: Government and Policy* 10.1: 1–17

Ranchhod, V. and Daniels, R.C. (2020) *Labour Market Dynamics in South Africa in the Time of COVID-19: Evidence from Waves 1 and 2 of the NIDS-CRAM Survey*, Working Paper, Southern African Labour and Development Research Unit

Ray, D. and Subramanian, S. (2020) *India's Lockdown: An Interim Report*, Working Paper 27282, National Bureau of Economic Research

Rwanda Revenue Authority (2020) *Annual Activity Report 2019/20*, Technical Report, Rwanda Revenue Authority

Rwanda Revenue Authority (2017) *Compilation of Fiscal Laws and Regulations in Use in Rwanda*, Rwanda Revenue Authority

Santoro, F. and Mdluli, W. (2019) *Nil-filing in Eswatini: Should the Revenue Administration Be Concerned?* African Tax Administration Paper 6, Brighton: Institute of Development Studies

Santoro, F., Groening, E., Mdluli, W. and Shongwe, M. (2020) *To File or Not to File? Another Dimension of Non-compliance: The Eswatini Taxpayer Survey*, ICTD Working Paper 110, Brighton: Institute of Development Studies

Schraff, D. (2020) 'Political Trust During the Covid-19 Pandemic: Rally Around the Flag or Lockdown Effects?' *European Journal of Political Research*

Teachout, M. and Zipfel, C. (2020*) The Economic Impact of COVID-19 Lockdowns in Sub-Saharan Africa*, Policy Brief, International Growth Centre

van den Boogaard, V. and Santoro, F. (2021) *Explaining Informal Taxation and Revenue Generation: Evidence from South-central Somalia*, ICTD Working Paper 118, Brighton: Institute of Development Studies

van den Boogaard, V., Prichard, W. and Jibao, S. (2019) 'Informal Taxation in Sierra Leone: Magnitudes, Perceptions and Implications', *African Affairs* 118.471: 259–284

van den Boogaard, V., Prichard, W. and Jibao, S. (2018) *Norms, Networks, Power, and Control: Understanding Informal Payments and Brokerage in Cross-border Trade in Sierra Leone*, ICTD Working Paper 74, Brighton: Institute of Development Studies

Walker, P.G.T., Whittaker, C., Watson, O.J., Baguelin, M., Winskill, P., Hamlet, A., Djafaara, B.A., Cucunubá, Z., Mesa, D.O., Green, W., Thompson, H., Nayagam, S., Ainslie, K.E.C., Bhatia, S., Bhatt, S., Boonyasiri, A., Boyd, O., Brazeau, N.F., Cattarino, L., Cuomo-Dannenburg, G., Dighe, A., Donnelly, C.A., Dorigatti, I., van Elsland, S.L., FitzJohn, R., Fu, H., Gaythorpe, K.A.M., Geidelberg, L., Grassly, N., Haw, D., Hayes, S., Hinsley, W., Imai, N., Jorgensen, D., Knock, E., Laydon, D., Mishra, S., Nedjati-Gilani, G., Okell, L.C., Unwin, H.J., Verity, R., Vollmer, M., Walters, C.E., Wang, H., Wang, Y., Xi, X., Lalloo, D.G., Ferguson, N.M. and Ghani, A.C. (2020) 'The Impact of COVID19 and Strategies for Mitigation and Suppression in Low- and Middle-income Countries', *Science* 369: 413–422