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The VAT in practice: Equity, enforcement and complexity

Giulia Mascagni, Roel Dom and Fabrizio Santoro

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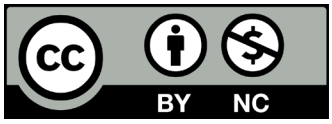

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Summary

The value added tax (VAT) is supposed to be a tax on consumption that achieves greater economic efficiency than alternative indirect taxes. It is also meant to facilitate enforcement through the 'self-enforcing mechanism' – based on opposed incentives for buyers and sellers, and because of the paper trail it creates. Being a rather sophisticated tax, however, the VAT is complex to administer and costly to comply with, especially in lower-income countries. This paper takes a closer look at how the VAT system functions in practice in Rwanda. Using a mixed-methods approach, which combines qualitative information from focus group discussions with the analysis of administrative and survey data, we document and explain a number of surprising inconsistencies in the filing behaviour of VAT-remitting firms, which lead to suboptimal usage of electronic billing machines, as well as failure to claim legitimate VAT credits. The consequence of these inconsistencies is twofold. It makes it difficult for the Rwanda Revenue Authority to exploit its VAT data to the fullest, and leads to firms, particularly smaller ones, bearing a higher VAT burden than larger ones. There are several explanations for these inconsistencies. They appear to lie in a combination of taxpayer confusion, fear of audit, and constraints in administrative capacity.

Keywords: value added tax; equity; enforcement; complexity; tax administration.

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Acronyms

EBM	Electronic billing machine
ETR	Effective tax rate
FGD	Focus group discussion
RRA	Rwanda Revenue Authority
RST	Retail sales tax
TIN	Taxpayer identification number
TOT	Turnover tax
VAT	Value added tax

1 Introduction

The introduction of the value added tax (VAT) represents one of the most significant innovations in tax policy and administration in developing countries, if not the most significant one (Moore et al. 2018). While at the beginning of the 1980s only about 30 countries had adopted the VAT, this number increased to almost 140 by 2009 – an increase mostly driven by low- and middle-income countries (IMF 2011). The VAT has become the single largest source of revenue in many countries, raising on average about a quarter of total tax collected (Ebrill et al. 2001; Keen 2012) – and almost 40 per cent in African countries (ATAF 2019). Despite having its critics (e.g. Emran and Stiglitz 2005), the theoretical case for introducing the VAT is widely supported by tax experts and academics. However, even the VAT's strongest supporters acknowledge that its practical implementation is often problematic (Keen 2007). This is particularly true in low-income countries, where administrative capacity is weaker and evasion more widespread than in higher-income ones (Bird and Gendron 2007). Despite its difficulties, we believe that the VAT is here to stay – and for good reasons. It is therefore important to understand these challenges more thoroughly, in the particular context of low-income countries.

This paper sheds light on how the VAT works in practice in a low-income country – Rwanda. By using a mixed methods approach, based on administrative data, focus group discussions (FGDs) and a nationally representative survey, we show three sets of results. First, we document widespread inconsistencies in administrative data on the VAT, both in taxpayers' own reports (between the VAT declaration and data recorded in electronic billing machines (EBMs), see section 4.2), and across trading partners (buyer and seller reports for the same transaction, see section 4.3). As we discuss in more detail below, this confirms that tax administrations in low-income countries do not have the capacity to fully use this data for enforcement. Second, we show that these inconsistencies reveal important distributional implications of the VAT: smaller firms face a higher tax burden and are less able to navigate the tax system to their benefit, thus leaving money on the table (see section 4.4). Third, the FGDs allow us to identify some possible explanations for these inconsistencies and their implications, based on taxpayer experiences. Taxpayer confusion, complexity and practical difficulties are particularly severe for smaller taxpayers, which explains some of the puzzling behaviour we observe in this group, as well as the implications for equity. Evidence from our survey supports these explanations, showing significantly weaker tax knowledge and business practices (e.g. recordkeeping) among small taxpayers, compared to larger ones.

Documenting such a widespread presence of inconsistencies is particularly relevant, because it illustrates how some of the intended benefits of the VAT do not materialise in a context where administrative capacity is weak. One of these benefits is the so-called self-enforcement mechanism, whereby the VAT is meant to discourage evasion by generating opposite incentives for sellers and buyers. As we describe in more detail in section 2, the former would tend to under-report sales, to pay less tax, while the latter would tend to report correctly or over-report, to reduce their tax burden through larger input claims. This mechanism only works if tax records from both parties can systematically be cross-checked by the revenue authority. But does that happen where there is weak administrative capacity?

The available evidence on the self-enforcement mechanism is still quite limited, but it suggests that, while it seems to work to some extent (Pomeranz 2015), it is unlikely to be fully effective in low-capacity environments where it is not backed up by effective verification (Carrillo et al. 2017; Steenbergen 2017). The widespread presence of inconsistencies in administrative data, which we document in section 4, suggests that tax administrations in low-income countries are unable to perform the systematic cross-checks that underpin

effective VAT enforcement. Importantly, widespread data inconsistencies are not specific to Rwanda, but are in line with recent evidence from other African countries, such as Uganda and Ethiopia (Almunia et al. 2017; Mascagni et al. 2018). The administrative complexity of this tax, coupled with weak institutional capacity, therefore emerges as a major obstacle in the practical functioning of the VAT in these contexts.

Interestingly, these inconsistencies often point to apparently puzzling taxpayer behaviour. For example, the incentives embedded in the VAT would lead buyers to report higher values than sellers. However, we only observe this behaviour in a small minority of cases, as reported in section 4.3. The opposite case, buyers under-reporting compared to sellers, is much more common. Many taxpayers effectively leave money on the table as they fail to claim for purchases that are correctly reported by their trading partners, and could therefore be used to offset their tax liability. A distributional analysis (section 4.4) reveals that missed refunds and under-claiming of input credits are particularly common among the smallest firms, which face a correspondingly higher effective VAT burden: an effective tax rate of 8.3 per cent in the first decile, compared to 5.4 per cent in the rest of the distribution. This raises important concerns over the VAT's equity on a dimension that is new to this debate – inequality across businesses – in addition to the better documented concerns over equity among consumers (Keen 2012; Muñoz and Cho 2004).[1]

Why would firms forego input claims that would benefit them? And, more generally, what explains the presence of widespread inconsistencies in taxpayer records? Our qualitative analysis offers a number of explanations, which are supported by the detailed taxpayer experiences emerging from FGDs (section 5) and the survey data presented in section 6. Importantly, these explanations co-exist and reinforce each other in the complex reality of taxpaying experiences.

The first explanation is related to taxpayer confusion, complexity in dealing with the tax administration, and practical difficulties related particularly to EBMs. These issues, which can broadly be labelled as compliance costs, are particularly severe for small taxpayers, as documented elsewhere in the literature (Ebrill et al. 2001; Coolidge 2012; Barbone et al. 2012; Bird and Gendron 2007; World Bank 2016; Harju et al. 2019; Gerard et al. 2018; Atnafu et al. 2019; Slemrod and Velayudhan 2020). In section 5.1 we document what they mean in the practice of small businesses, including difficulties in dealing with technology (EBMs) and claiming VAT refunds. The latter is in line with other studies showing that the VAT refund system is a particularly problematic feature of this tax (Harrison and Krelove 2005; Keen 2007). In section 6 we support this explanation with evidence of very low levels of tax knowledge and weak business practices among this group, consistently with recent literature on taxpayer knowledge and its role in explaining tax compliance (Aiko and Logan 2014; Isbell 2017; Mascagni et al. 2019a; Santoro et al. 2020). Second, fear of audit is often behind the failure to claim refunds among small taxpayers, coupled with a zealous tax administration that is particularly keen to check and audit cases of taxpayers claiming net VAT refunds (section 5.2.3). Third, evasion is certainly a factor, as our results point towards limited compliance both in terms of EBM usage and underreporting – though it might not be the main explanation for inconsistencies (see section 5.2.4). Finally, inconsistent administrative practices and delays in granting refunds might reinforce fears of aggressive audits and taxpayer confusion, potentially leading some taxpayers to adopt inefficient coping strategies, including under-reporting.

[1] The VAT has sometimes been criticised on equity grounds, as being regressive. However, these concerns can largely be addressed by appropriate exemptions for basic goods that are most consumed by the poor, thus making the VAT either neutral or even slightly progressive (Keen 2012; Muñoz and Cho 2004).

Our analysis contributes to the literature and debate on the VAT in low-income countries in two main ways. First, it documents in detail data inconsistencies, providing new and concrete evidence on how weak capacity prevents tax administrations in low-income countries from reaping the full benefits of the VAT. Second, we explore the distributional patterns of these inconsistencies to highlight important implications of the VAT on equity. These distributional patterns are confirmed in the administrative data, as well as in FGDs and our survey. By doing this, our analysis brings a new dimension to the debate on the VAT's equity: the way the VAT is applied in practice differs substantially across businesses, as smaller businesses end up bearing a greater burden than larger ones. This difference in the tax burden is largely due to smaller businesses foregoing input credits, which we attribute to compliance costs that are especially severe for the smallest firms. Finally, by adopting a mixed-methods approach, we are able to complement our quantitative results with concrete examples from taxpayer experiences, and illustrate what they imply in practice.

2 The value added tax

The VAT is an indirect tax on final consumption, typically levied at a rate between 15 and 20 per cent (Ebrill et al. 2001). Despite being a tax on consumption, it is collected at all stages of the production chain, as well as on sales to final consumers. The refund mechanism allows firms to claim back the VAT they paid on their inputs (input VAT), which is offset against the amount of the VAT they collect on their sales (output VAT). They remit the difference to the revenue administration. In some cases firms pay more VAT on the input they purchase than the VAT they collect on sales, in which case the firm can claim a refund from the revenue administration. This does not happen often, but is common for exporters (who do not charge the VAT on their sales but pay it on their inputs) and for new companies (which might face large initial input costs, and pay the VAT on these, while still having limited sales).[2] These refund claims can usually be offset against future or other tax liabilities, or can be paid by the revenue administration.

The VAT has several advantages compared to alternative sales taxes, such as retail sales taxes (RST) or turnover tax (TOT). It is more efficient than the TOT because it allows taxing final consumption and not production, thus reducing distortions on input choices and incentives to vertical integration. The VAT is less vulnerable to evasion than RST, because it is levied at multiple stages in the production chain rather than only at the retail stage, which is typically harder for the revenue administration to control (Ebrill et al. 2001; Keen and Lockwood 2010).[3] Most importantly, the VAT is meant to facilitate enforcement, both through the so-called self-enforcing mechanism, based on opposed incentives of buyers and sellers, and because of the paper trail it creates (Pomeranz 2015). The self-enforcing mechanism works by setting opposite incentives for sellers and buyers. While the former is expected to prefer underreporting a transaction's value, and thus pay less tax, the latter would rather over-report (or report correctly), because that allows for more input claims and thus a reduced net VAT liability. The paper trail is the record of transactions generated by trading partners along the value chain. It represents an important source of data for revenue authorities to cross-check a firm's declaration against those of its trading partners. Importantly, to successfully improve compliance, the self-enforcement mechanism and the cross-checks on the paper trail need to work in tandem.

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2 Exports are typically zero-rated for the VAT to follow the destination-based rule of taxing consumption goods. Other goods are typically exempted or zero-rated on equity grounds (e.g. basic food items, school uniforms or books). VAT exemptions differ from zero-rating because they do not allow beneficiaries to claim input VAT. As such, exemptions represent a potential threat to the correct functioning of the VAT (Ebrill et al. 2001).

3 Relatedly, an argument can be made that fully informal firms might still end up paying some VAT if they trade with VAT-registered partners anywhere along the chain (Keen 2008; de Paula and Scheinkman 2010).

The VAT is a rather sophisticated tax. Precisely for this reason, it is complex to administer (Slemrod and Velayudhan 2020). For example, while the large amount of information generated by the VAT is one of its key advantages, if the benefits for enforcement are to materialise it puts a burden on the tax administration to store and analyse it. Relatedly, the self-enforcing mechanism works if taxpayers believe the tax administration uses the paper trail for tax enforcement – and when that is backed up by some degree of traditional verification and audits (Carrillo et al. 2017). Similarly, the refund mechanism is open to the possibility of fraud (Waseem 2019; Alexeev and Chibuye 2016). It requires some capacity to verify firms' claims, especially in countries with low tax-to-GDP ratios that cannot afford to lose the revenue they have already collected. Some authors suggest that the VAT's complexity may spur innovation and modernisation in tax administration more broadly (Keen 2012; Ebrill et al. 2001). However, for this to happen, and for the VAT to work correctly, tax administrations should already have a relatively high administrative capacity, or should be able to increase it relatively quickly.

The VAT also imposes costs on the taxpayers who are registered for it. They need to keep a record of each transaction; aggregate such records periodically (monthly or quarterly) and send them to the tax administration; and make claims for inputs and back them up with appropriate records. All this represents an administrative burden for firms – or compliance cost. These requirements may put taxpayers off registering for the VAT altogether (Barbone et al. 2012; Harju et al. 2019; Slemrod and Velayudhan 2020). For this reason, VAT systems usually include a turnover threshold under which firms are not required to register for the VAT (Keen and Mintz 2004).[4] This creates its own inefficiencies: a recent study shows that firms select their trading partners based on VAT registration, thus creating segmentation in the value chain (Gadenne et al. 2019).

3 The VAT in Rwanda

Rwanda is a good setting for exploring how the VAT functions in practice in lower-income countries. It faces many of the challenges common to low- and middle-income countries, such as severe constraints in tax administration capacity and widespread evasion.[5] However, it has the relatively stable and efficient institutional setting that is a necessary condition for the VAT to work – though, as we will show, this is far from being a sufficient condition. The Rwanda Revenue Authority (RRA), the body in charge of administering and collecting tax in Rwanda since 1998, is in many ways a modern tax administration. It promotes voluntary compliance through outreach and education campaigns,[6] and relies on modern technology to support enforcement. Filing can be done online, through the e-tax system, or even via mobile phones, for micro taxpayers.

The VAT was adopted in Rwanda in 2012, and is in line with international standard practice. It is levied at a rate of 18 per cent, although the law also provides for zero-rating and exemptions for specific goods and services.[7] Smaller taxpayers need to submit quarterly declarations, while larger ones are required to declare every month. To avoid placing an

4 In many cases, small firms with annual turnover below the threshold are subject to an alternative simpler tax, similar to a turnover tax (TOT), to make sure they still contribute some indirect tax.

5 According to Schneider and Williams (2013), informality amounts to 40% of national income over the period 1999-2007, compared to 42% in East Africa.

6 A description and evaluation of RRA's taxpayer education programme can be found in Mascagni et al. (2019b).

7 The legislation that established the VAT is Law No 37/2012. This has been complemented by Law No 02/2015, which updated the list of zero rates and exempted goods, and introduced EBMs. Exemptions are granted for basic goods and services related to healthcare, education, telecommunications, agricultural products, and goods used as inputs to agriculture, among others. Investors also receive special exemptions and benefits.

excessive compliance burden on small taxpayers, only firms with annual turnover above FRw20 million (over US$20,000) are required to register.[8] That threshold is relatively low, and about half the average threshold applied elsewhere in Africa (ATAF 2019). There is no alternative indirect tax on goods and services for firms below the VAT threshold.[9]

As usual with the VAT, firms can claim back the VAT paid on their inputs by offsetting it against the VAT levied on their sales. Firms are required to claim the VAT they pay on their inputs in the relevant filing period. If necessary, they can delay this claim to the next filing period, as long as they do so within two years of the date of the original transaction. If the VAT paid on inputs exceeds the VAT charged on sales, firms are granted VAT credits. Credits under a certain threshold are rolled over to the next filing period to be offset against future VAT liabilities, while larger credits are refunded directly to the firm.[10] Strict timelines apply for these refunds. The RRA should refund the excess credit within 30 days of the end of the last tax period and after receipt of the required documentation. The law reserves the right for the RRA to conduct checks on the validity of refund claims. In those cases, the period to process the refund is extended to a maximum of three months. If a taxpayer has any outstanding tax payments, the VAT credits can be used to offset those arrears.

As in many other countries, the VAT is the main source of revenue in Rwanda and by far the most important of domestic taxes. According to RRA (2019), in 2017/2018 the VAT contributed 33 per cent of total domestic revenue, followed by employment income tax (23%), profit tax (19%), excise tax (12%), and import duty (8%). Nonetheless, Rwanda's VAT underperforms. The country's C-efficiency ratio, a widely-used indicator to evaluate the performance of VATs, is less than 30 per cent, compared to about 37 per cent for other countries in the region (USAID 2018).[11] Similarly, its refunds-to-VAT-revenue ratio is low: only 9 per cent, compared to an average of 15 per cent in comparable countries (ATAF 2019). This suggests the refund mechanism is not functioning properly, which we indeed document below.

Partly aiming to close this performance gap, a 2015 law introduced EBMs as a way to support enforcement and compliance. The use of an EBM, either a separate piece of hardware (EBM1) or the software equivalent (EBM2), became mandatory for most VAT-registered firms. Penalties were set for those who failed to adopt EBMs.[12] EBMs record all sales electronically, and release an official VAT invoice that can be used as proof for claims against input VAT payments. They transfer this data directly to the revenue authority through the mobile network. EBMs thus produce a huge amount of data at transaction level that could be transformative if fully exploited by the RRA for enforcement.

Along similar lines, and also to increase compliance, the RRA has recently adopted an input claim verification system where input credits can only be accepted once the seller has properly declared the relevant sale. Similar systems have been implemented in other countries, and they are a good example of how data produced by the VAT can be used for enforcement purposes (Slemrod and Velayudhan 2020).

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8 While registration is not compulsory below this threshold, firms can still voluntarily opt into the VAT system.

9 Small taxpayers are, however, required to pay personal income tax (PIT) or corporate income tax (CIT) according to simplified regimes that determine tax on the basis of turnover.

10 These thresholds are FRw200,000, FRw100,000 and FRw50,000 for large, medium and small firms respectively.

11 The C-efficiency ratio is substantially lower in low- and lower-middle income countries than in higher-income ones - 40% vs. 60%, as reported by Keen (2013).

12 Some firms are, however, exempted from using EBMs – e.g. petrol stations, telecommunication companies and financial institutions. Companies issuing less than three invoices a year are also exempted from using EBMs, which is meant to ease their compliance burden.

The legal and administrative framework described above puts Rwanda very much in line with international best practice. However, we will show the reality is more complex and puzzling than what this framework suggests.

4 Inconsistencies in administrative data and implications on equity

Much of the appeal and strength of the VAT lies in the paper trail it creates, which revenue administrations can exploit for enforcement purposes. But does this happen in practice, when low administrative capacity prevents tax officials from effectively using the relevant data? This section assesses the consistency of records generated in the VAT system using administrative transaction-level data. Rwanda's VAT system generates two flows of information – from the EBMs, which report transactions in real time to the RRA, and the VAT declarations firms regularly submit to the RRA.

In principle, the RRA can use EBM data to cross-check sales or purchases firms report in their VAT declarations. Similarly, firms' reports on the purchases they make can be used to cross-check the validity of the information reported by the seller, for the same transaction (as explained in more detail in section 2). Sellers should therefore be reluctant to unilaterally underreport their sales, unless they collude with buyers and agree to *both* report a lower value. Therefore, the data on firms' declarations should at least be consistent, if not truthful, to avoid raising suspicion and triggering inspection. That is the theory. The reality – as will be demonstrated – is different.

4.1 Administrative data

To check the consistency of the paper trail generated by the VAT, we start by mapping inconsistencies in Rwandan VAT data.[13] This dataset combines two sources of administrative transaction-level information made available by the RRA:

1. VAT declarations, which are the monthly or quarterly VAT filings of individual firms.[14] Along with the main declaration, taxpayers are required to submit two annexes, which include the details of each transaction they make – their local purchases and sales.[15] The annexes include the Taxpayer Identification Number (TIN) of trading partners for each transaction.
2. EBM data, which records details of firms' sales as registered by EBMs at the point of sale. Firms are required to enter all transactions into the EBM, including the value of the sale and VAT amount.[16] If the buyer has a TIN, they should enter it in the EBM so it can be included in the records and used as valid proof for an input claim.

[13] In sections 4.1, 4.2 and 4.3 we draw on the results of a previous working paper (Mascagni et al. 2019a), which provides more details on the data and analysis.

[14] About 40% of declarations are filed on a quarterly basis.

[15] The local purchases annex excludes imported purchases. The VAT on these can be claimed through a separate field in the VAT declaration. In principle taxpayers should report all transactions, even if they are exempt from the VAT (e.g. exports) – but this might not happen in practice. Imported purchases, and the relevant VAT payments, are reported separately.

[16] With some exemptions, as mentioned in section 3.

The declarations dataset includes 18,336 firms for the fiscal year running from July 2016 to June 2017.[17] However, EBM data was only available for 11,425 of those firms – providing a first indication of limited EBM usage. We aggregated all data to the quarterly level. As such, the unit of analysis is a firm-quarter or pair-quarter observation, where pairs are seller-buyer trading partners.[18] Two notes are due on this dataset, both of which are discussed in more detail in Mascagni et al. (2019a). First, there is a relatively large share of nil-filers in the dataset, defined as firms who declare zero in all relevant fields (sales, inputs and net VAT).[19] As discussed in more detail below, we retain them for our analysis. Second, we check for data consistency by comparing the total sales and inputs values as reported in VAT declarations and the annexes, for the same firm in each quarter. These amounts are fully consistent in over 98 per cent of cases, which gives us confidence in the quality of our declarations data.

4.2 Inconsistencies between declarations and EBMs

The flow of information from an individual firm to the RRA is composed of data coming from their EBM and data coming from their declarations. Are firms' declarations consistent with their EBM records? In this section we show that, in many cases, the answer is no.

Internal inconsistencies (those within taxpayers' own records) are obtained by comparing the value of the VAT on sales reported by a firm in its VAT declaration, to the VAT value transmitted by its EBM, over the same period. To avoid picking up mistakes in dates or minor timing differences we aggregate all transactions for each pair for each quarter of the financial/tax year.[20] We also exclude extremely large inconsistencies, which might be due to simple mistakes.[21] We consider transaction values to be consistent when the inconsistency is either zero or below FRw5,000 (about US$5.3).

Since declarations and EBM data include the same information (e.g. value of sale, VAT applied) for the same transactions, we would expect there to be few, if any, inconsistencies. That is, if firms believe that the RRA systematically cross-checks their information and acts on it, firms will at least make sure that the information *they* report to the RRA is consistent. Figure 1 shows that, in practice, this is the case for just over half of all observations. For over 43 per cent of firm-quarter observations these numbers do not match.

In the majority of cases where an inconsistency exists (25% vs. 18.2%) taxpayers declare lower sales in their declarations than what is recorded by their EBM. In these cases, EBM-recorded sales are on average 40 per cent higher than what is reported in the relevant VAT declarations. By doing this, firms reduce their net VAT payments, as their tax liability is determined on the basis of declarations – not EBM data. This behaviour is perfectly in line with firms' desire to minimise their tax payments, and thus under-report their sales. What is puzzling is that they still record those un-reported sales in the EBM system, thus exposing themselves to the risk of inspections and sanctions. On the contrary, in a sizeable minority of

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17 The number of VAT firms refers to firms that make at least one declaration in the period. When comparing the number of VAT and EBM taxpayers, it is useful to keep in mind that: 1) taxpayers can voluntarily choose to use the EBM even if they are not obliged to do so - RRA has encouraged EBM adoption widely; 2) some taxpayers are exempt from using EBMs even if they are registered for the VAT (see section 3).

18 As explained in more detail in Mascagni et al. (2019a), we exclude observations where there is no valid buyer TIN. It is likely that such cases mostly reflect transactions at the retail level or exported products.

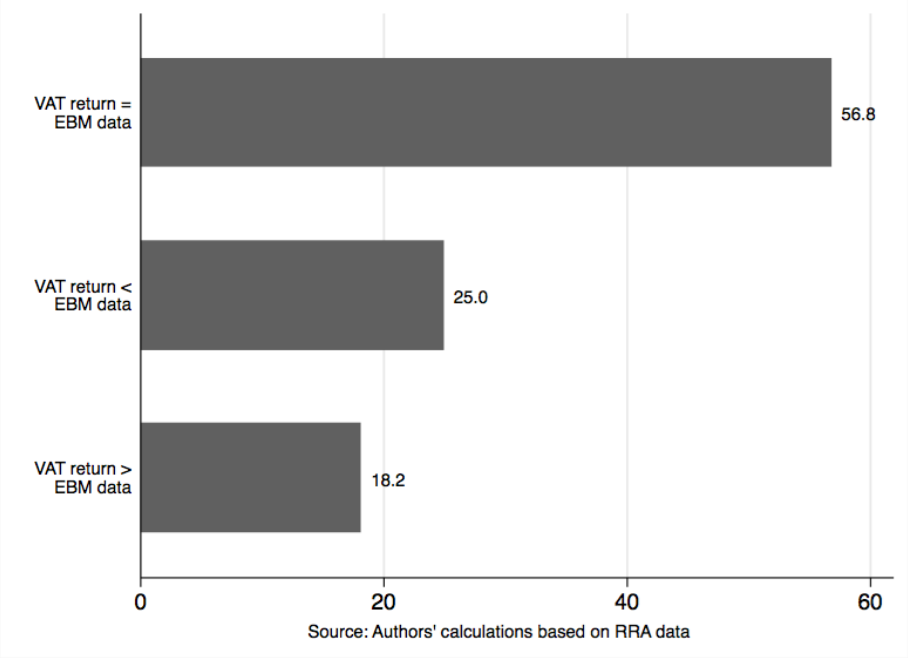
19 43% of taxpayer-quarter observations are nil-filers in at least one quarter and 35% are nil-filers across all quarters in which they file. These figures are largely in line with other evidence on nil-filers in low-income countries, including Almunia et al. (2017) in Uganda, Mascagni et al. (2018) in Ethiopia, Santoro and Mduli (2019) in Eswatini, and Mascagni et al. (2020) in Rwanda.

20 We also aggregate all transactions for each pair at the semester and year level. Results do not change significantly from those presented here and are available upon request.

21 Inconsistencies were trimmed at the 99th percentile.

cases (18%), firms report more in their tax declaration than the value recorded on their EBM. This is puzzling for the opposite reason: why would firms effectively pay more tax than what appears to be due based on EBM records? Interestingly, the incidence of each case of inconsistency is correlated with firm size: smaller firms are more likely to declare less than their EBM record (VAT declaration < EBM data), while larger firms are more likely to do the opposite (VAT declaration > EBM data). Appendix Figure A1.1 reports the extent of inconsistencies by total sales deciles. We explore possible explanations in section 5.

Figure 1 Internal inconsistencies



4.3 Inconsistencies between trading partners' reports

In section 2 we discussed how the self-enforcing mechanism only works in tandem with the tax administration's ability to cross-check the paper trail of records of trading partners along the value chain. Does that happen in practice? If it does, we should see consistent numbers in buyers' and sellers' reports for the same transactions. In this section we show this is far from being the norm.

External inconsistencies (between reports of buyers and sellers) are obtained by comparing the VAT value that buyers and sellers report for the same transactions in the same time period.[22] Based on transaction-level data from VAT declarations, we compare the total value of reported VAT in each quarter for a given pair of firms, where one is the seller and the other the buyer. We conduct the same data transformations as for the internal inconsistencies (see section 4.2). If a trading partner does not report a transaction at all or reports zero, the inconsistency is assumed to be equal to the full amount as reported by the other trading partner. In the case of external inconsistencies, however, we need to apply two further restrictions to make sure our analysis is meaningful. First, we exclude sales to final consumers. To do this, we only include transactions for which the buyer recorded a TIN number during the transaction – indicating that they are a firm and that they could claim the relevant input in their VAT declaration.[23] Second, we need to include only taxpayers who are

[22] We compare tax amounts as reported for the same transactions in the same period, by sellers and buyers.

[23] Input claims can only be done by registered businesses that can offset those purchases from their VAT liability. Final consumers cannot do so, and they are not part of the VAT paper trail.

registered for the VAT. This would naturally happen for firms that appear as sellers, as we observe their sales from a VAT declaration – implying they are registered. However, buyers could have a TIN even if they are not VAT-registered. This would be the case, for example, for firms that are under the VAT threshold, or organisations that are not required to register for the VAT.[24] Inconsistencies between those firms and sellers are 100 per cent by definition, because these buyers do not submit any input claim for the VAT. We therefore restrict our dataset to those taxpayers who submit a VAT declaration in at least one quarter during our data period.[25]

Figure 2 External inconsistencies

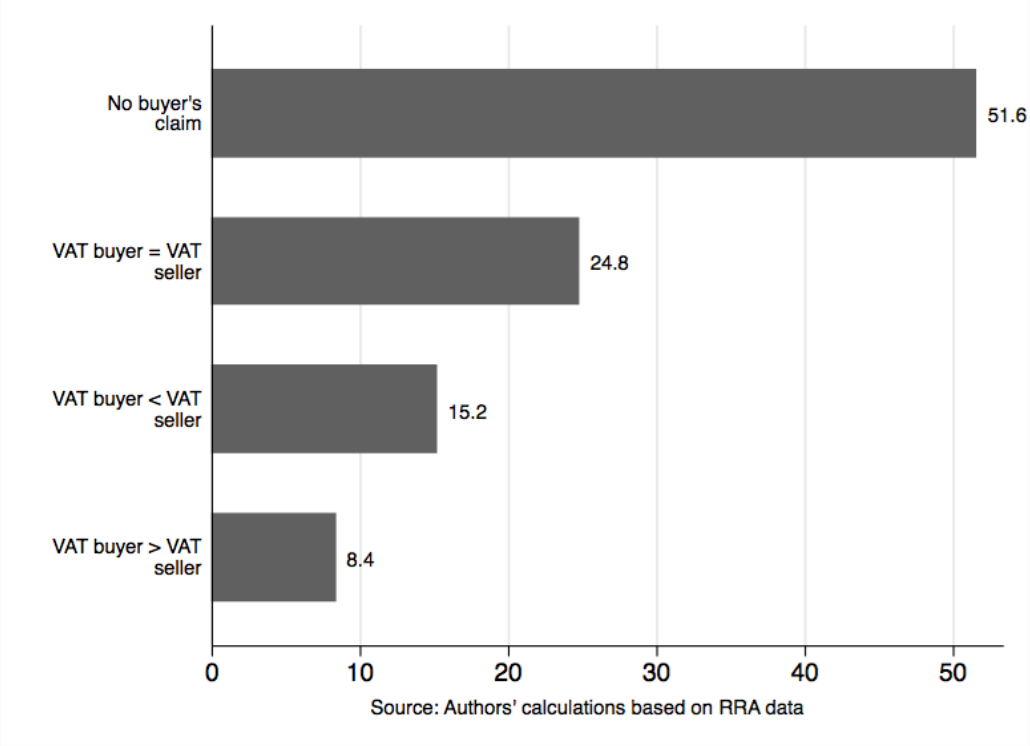


Figure 2 illustrates that external inconsistencies are widespread in Rwanda's VAT declarations data. Sellers and buyers report the same amounts in only 25 per cent of all pair-quarter observations. Inconsistencies are the norm: they are observed in 75 per cent of the pair-quarter observations. Not only are these inconsistencies widespread, they also go in an unexpected direction. Among inconsistent observations, by far the most common case is the one of buyers *under*-reporting and sellers *over*-reporting (67% of our pair-quarter observations).[26] In most of these cases, the buyer claims no input credit at all for the sales reported by the seller – while in the remainder it simply claims less than the full amount reported by the seller.

This behaviour does not seem to be due to exemptions –inconsistencies are still extensive in sectors that have low incidence of VAT exemptions.[27] Importantly, 87 per cent of buyers who are failing to claim have a VAT liability that could be offset by these missed input claims. The remaining 13 per cent are nil-filers, and would therefore need to claim a net refund rather

[24] Firms that are not registered for the VAT might still want to obtain a receipt that records their TIN, when making purchases, because they could use it as proof to back up expenses and deductions in their income tax declaration.

[25] Of the sub-set of firms that appear to be VAT-registered according to RRA's registry, 88% submit a VAT declaration in at least one quarter during our data period. The latter is the most relevant group for our analysis.

[26] The numbers are highly consistent (65% and 67%) whether we compare purchase annex with sales annex data or with EBM data. This result is also consistent with recent evidence from Uganda (Almunia et al. 2017).

[27] For more details see Mascagni et al. (2019a).

than being able to offset their VAT liability. Interestingly, failure to claim a VAT credit is much more common among smaller taxpayers than larger ones, as we show in Figure A1.2.

This result is puzzling. Why would firms fail to report purchases that would allow them to reduce their VAT payments? And why does this seem to happen particularly for small firms? We explore the implications of this result in the next sub-section, then in section 5 we provide some possible explanations.

Finally, it is worth noting that in Figure 2 we also observe the expected kind of inconsistency, showing firms underreporting their sales (and thus paying less VAT) and overreporting their purchases (and thus increasing their input claims). This happens in a small minority of observations, 8 per cent, and is consistent with tax evasion or fraud. This low number does not necessarily mean that VAT evasion does not exist in Rwanda. It may simply mean that taxpayers have ways to evade that would not necessarily show up in the data. One obvious case is collusive evasion, where sellers and buyers agree to keep a transaction completely under the VAT's radar, usually sharing the savings from the evaded tax.

4.4 Implications for the VAT's equity

The debate around the VAT's equity has typically focused around its incidence on consumers. Our results on external inconsistencies (section 4.3), however, highlight another dimension along which to evaluate the VAT's equity: missed input claims might affect small firms disproportionately, and thus increase their effective tax burden. In this section, we check whether that happens by calculating two statistics: effective tax rates (ETRs) and input-to-sales ratio. We calculate ETRs as the ratio of a firm's net VAT liability (VAT collected on sales – VAT paid on purchases) to its VAT sales.[28] Because firms offset the VAT they collect on their sales by the VAT they pay on their inputs, this ratio should be well below the statutory VAT rate of 18 per cent. ETRs are an indication of the effective tax burden on firms. The input ratio is calculated as the total claims for purchased inputs made by a firm, divided by total VAT sales. It is an indication of how much firms are able to make use of input claims to offset their VAT liability. We compute these two statistics for all firms in the administrative dataset. We then analyse them across the sales distribution, to check for any differences between smaller and larger firms.

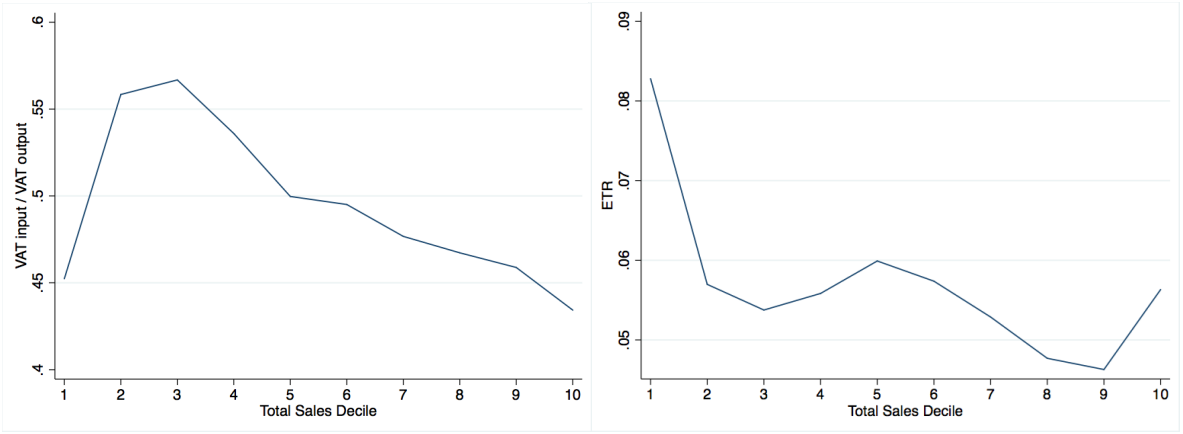
The results are quite striking. Figure 3.1 shows that firms in the first decile of the sales distribution have a lower input ratio than relatively larger firms – 45 per cent, compared with an average of 50 per cent in the rest of the distribution.[29] This is particularly due to a large portion of firms in the first decile (42%) that make no input claim at all – compared to 21 per cent in the rest of the distribution. Once we exclude firms with zero input claims, the differences in the input ratio across the distribution are much less striking, as displayed in Figure A1.3. This suggests that underreporting is particularly due to small firms foregoing all input claims, rather than claiming selectively. This is in line with the results in section 4.3, showing that making no input claim is more common than making an input claim that is lower than the seller's reported amount. After the sharp increase between the first and second decile, the input ratio then decreases with sales, which is consistent with economies of scale (e.g. firms paying lower prices for larger quantities of input).

[28] We use VAT liability net of reverse charge, which is a special case in which buyers withhold the VAT on a purchase and remit it directly to RRA. Since this happens mostly for large firms, who are withholding agents, we would see an artificially higher ETR for large firms if we included this reverse charge. Still, our key results are qualitatively unaffected by this choice.

[29] We calculated deciles based on the distribution of sales of firms in the VAT dataset, excluding nil-filers.

Correspondingly, Figure 3.2 shows that ETRs display the opposite pattern. Firms in the first decile face much higher ETRs than firms in higher deciles. The smallest firms face an ETR of 8.3 per cent, compared with an average of 5.4 per cent in the rest of the distribution.[30] This graph illustrates an important implication of the underclaiming of inputs by buyers: the effective burden of the VAT falls more heavily on the smallest firms. Figure A1.4 reports ETRs after we remove firms with zero input claims. In this case, the ETR varies less by size and shows a slightly progressive pattern. This evidence confirms the finding that firms that fail to report any claim, who are more likely to be in the lowest deciles, inevitably face a much higher VAT burden.[31]

Figure 3.1 Ratio of input over output VAT **Figure 3.2 Effective VAT rates**



We further test these differences in ETR across the sales distribution in a multivariate framework, where we can take into account other firm characteristics. The relation of interest is the one between the ETR (transformed to take values from 0 to 100 to improve the readability of coefficients) and sales (in log), as a measure of size. Exploiting the panel dimension of our data, Appendix Table A2.1 reports fixed effects estimates (FE) and the between estimates (BE) of the relation between size and ETR once we control for a number of firm characteristics such as sector, location and other firm fixed effects. Both in comparisons within firms over time (FE) and across firms (BE), the ETR decreases with firm size. This association is statistically significant and economically large: a 1 per cent increase in size is associated with a 0.66 (FE) to 0.68 (BE) percentage points decrease in the ETR. These results confirm the descriptive result of figure 3.2 and suggest that it is not due to other firm characteristics.

In contrast to debates on the incidence of the VAT among consumers (Alavuotunki et al. 2019, Bird and Gendron 2007; Cnossen 2019), our analysis shows that the VAT might be inequitable in a very different way. Because small firms fail to claim all their input, they end up paying more VAT instead of offsetting it. In the next section we explore some of the reasons behind this behaviour.

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30 A t-test on the difference of mean EVRs between decile 1 and deciles 2-10 shows a highly statistically significant result, with a p-value of 0.000.

31 As an additional result, we measure the ETR as the ratio of a firm's net VAT liability to its total sales. This ratio indicates whether firms are benefitting from reduced rates and exemptions across the distribution. Results are reported in Appendix Figure A1.5. The graph shows how firms in decile 4 and higher have a lower effective VAT rate than the one showed in Figure 3.2, with the ETRs diverging the most for firms in the top two deciles. This evidence suggests that larger firms are able to reduce their effective rate by means of reduced rates and exemptions.

Besides equity, our results may be symptomatic of deeper problems in the VAT system, due to systematic deviations of its practical functioning compared to the theory described in section 2. If firms do not claim their input VAT, then the VAT chain and the paper trail break down. As discussed in section 2, the VAT is intended to be a tax on consumption, to be paid by final consumers. It 'untaxes' firms in the middle of the production chain by allowing them to subtract the VAT they pay on their inputs from the VAT they collect on their outputs. When firms do not report all their purchases, they forgo the opportunity to reclaim the VAT they paid on their inputs. Thus, the VAT chain is broken. The firm that does not claim its input VAT, in effect, ends up paying the VAT that has already accumulated in the value chain. The consequences can be far-reaching. Absorbing part of the VAT would push up the production costs of firms. This in turn could lower profits, increase prices or distort input choices – precisely what the introduction of the VAT was meant to address.

5 Shedding light on inconsistencies: taxpayer experiences

Our analysis of inconsistencies in administrative data revealed a few puzzling facts. First, firms' own reports to the RRA are often inconsistent (section 4.2). We found several cases where data recorded via EBMs did not correspond to VAT declarations for the same taxpayer and in the same time period. Why would firms report inconsistent records, thus exposing themselves to the risk of being investigated, and potentially sanctioned? Second, inconsistencies between buyers' and sellers' reports for the same transactions in the same time period are the norm. These inconsistencies are mostly the result of missing input claims. In section 4.3 we have shown that these firms would have VAT liabilities to offset, if they were to make those missed claims. Why would firms forego input claims that would benefit them, in terms of reduced tax payments? In section 4.4 we started shedding some light on this question by showing that missed input claims are a problem particularly for smaller firms, rather than larger ones. In this section, we investigate it in more detail. To do so, we conducted focus group discussions (FGDs) with VAT-registered firms in Rwanda. Although they are not intended to establish causality, FGDs provide useful insights on the practical functioning of the VAT from the taxpayer perspective, which in turn helps us to explain some of the inconsistencies in the data.

5.1 Focus group discussions

We ran six FGDs with VAT-registered firms in Rwanda between March and July 2019.[32] Firms were sampled from the RRA's VAT database – the same source of administrative data we used in the previous section. We restricted the sample to those firms that recently (in the last quarter under study, Q2 of 2017 – see section 4.1) displayed both an internal and an external inconsistency – to make sure we would capture participants with direct experience of the behaviour we are looking to investigate. To facilitate logistics, we only included firms with valid contact details and located in Kigali. The resulting sampling frame consisted of 500 firms. From this group, we then randomly selected 28 small and 28 large firms, defined based on annual turnover.[33] In total 26 firms sent representatives, mostly business owners,

[32] The FGDs took place on the premises of a private research company in Kigali. Each FGD was led by one ICTD researcher, with assistance from the Rwandan research company. Each session lasted for about two hours and was conducted in a combination of English, French and Kinyarwanda. The audio recordings of the FGDs and accompanying notes were analysed ex-post using a coding framework organised around a list of key thematic areas. Bits of text were categorised systematically into each area to identify common patterns and themes across the six focus groups.

[33] Small (large) firms belong to the bottom (top) decile of the annual turnover distribution, with an average turnover of US$0 (US$1 million).

but also, in a few instances (3), tax accountants and secretaries. The first three FGDs were conducted with representatives from large firms (13 in total), while the last three FGDs included representatives from smaller firms (13 in total).

The discussions were guided by a pre-designed protocol that included three sections. Part 1 focused on the VAT system as a whole, with the aim of capturing participants' general impressions about what works and what does not. Parts 2 and 3 focused specifically on the puzzling behaviour we wanted to investigate in more depth. Participants were provided with a hypothetical case, taken from those that we found to be particularly common or puzzling in our inconsistencies analysis of section 4. They were then asked to explain it based on their experience. More specifically, Part 2 used a scenario in which a firm's sales as reported by its EBM were larger than what had been declared in the VAT return. Part 3 focused on the case of a hypothetical taxpayer who did not make a claim for any of the VAT credits they had built up.

We took particular care to make sure the discussion was truthful and open, especially since the issues under discussion are potentially sensitive – such as evasion or discontent with the RRA. To do so, we avoided asking direct questions and focused on hypothetical cases, so that taxpayers did not have to explicitly discuss their own behaviour or beliefs. We made sure that no official from the RRA participated in the discussions, as their presence would have inhibited participants and likely resulted in bias. Participants were told that the FGDs were meant to improve the RRA's services, but were also reassured that their participation would be kept confidential and no individual details would be shared with the RRA.

5.2 Explanations from taxpayer experiences

As discussed in the previous section, the discussion was organised with separate parts relating to internal and external inconsistencies, respectively Parts 2 and 3 of our FGD protocol. However, many of the explanations provided under both parts are useful to explain inconsistencies more generally than the specific example we used, and have broader implications on the VAT. In this section we therefore group them by theme, rather than by parts of our FGD protocol, as they speak to broader issues about the VAT. However, the themes and examples we describe below are normally coexisting, overlapping, and often reinforce each other. For each explanation, we highlight the context in which taxpayers brought it to the discussion.

5.2.1 Compliance costs and taxpayer confusion

Issues related to compliance costs and taxpayer confusion were by far the most common element emerging from FGDs. The literature has already highlighted that compliance costs might be one of the main challenges of the VAT (World Bank 2016; Atnafu et al. 2019; Harju et al. 2019). In this section we support that general claim, with specific examples from taxpayers' own experience with the VAT that emerged in relation to both EBMs (internal inconsistencies) and the refund system (external inconsistencies).

Practical difficulties in operating EBMs among smaller firms. Generally, small firms see value in the use of EBMs and agree that they help them to meet their compliance obligations.[34] However, they experience significant problems in operating the EBMs – more so than larger firms. Representatives from small firms were more likely to complain about

[34] e.g. several participants reported that EBMs improve the quality of their record-keeping as they, for instance, can provide transaction lists. Reference is made to the FGD with small taxpayers on 4 July 2019 - P3 from FGD5 said : 'EBM also helps you to know how your stock is and the profit you have encountered in that period'.

technical problems – for example, issues with topping up SIM cards,[35] and with the necessary equipment (computers, connection, etc.) required to keep up with the new EBM version (EBM2).[36] They were also more likely to mention difficulty in resolving mistakes, which we discuss in more detail below. Smaller firms recognised their limited knowledge and stressed the need for the RRA to organise more taxpayer education initiatives to educate firms on the use of EBMs.[37] It should be noted, however, that the RRA already organises several training sessions – showing a need for either more sessions or better outreach.[38] The technical problems emerging from our FGDs might also explain external inconsistencies: when a seller has a technical problem with an EBM, the buyer might not feel confident about making a claim for that purchase as they might not have the proper receipt to back it up.[39]

Mistakes in EBM records. One of the most common issues raised by taxpayers in relation to EBM value being higher than declaration values (see section 4.2) is simple mistakes in EBM records: adding one zero too many or too few to the sale amount, inputting the same transaction twice, or including the TIN number instead of the amount.[40] These problems with using the machine can also explain why EBM sales are often larger than sales from VAT declarations for small firms (see section 4.2). These are very practical mistakes that might appear to have little meaning for the bigger picture of how the VAT functions in practice, compared to the theory. But the details of the interaction between taxpayers and the tax administration in dealing with these mistakes reveal broader issues with the VAT's administration.

Firms usually discover such mistakes, if at all, when reconciling the books towards the end of the filing period. If a businessperson or accountant then wants to correct that mistake, they need to contact the RRA, if their firm is the seller. If the firm is the buyer, then they need to contact the seller, who should then contact the RRA. These correction requests take time, sometimes days, and can only be made in the RRA's headquarters in Kigali. The cost of correcting mistakes is thus high, especially for firms located outside the capital. Given that these mistakes are usually discovered close to a filing deadline, and given the high penalties for late filing, many firms prefer not to correct the EBM records. The selling firm may simply declare the correct value in the sales annex of the VAT declaration. Some buyers choose not to report the purchase and forgo the VAT input credit, since the erroneous EBM record might not be considered as a valid proof to back up those claims. As such, these mistakes also represent a possible explanation for the missed input claims documented in sections 4.3 and 4.4, as emerged in multiple FGDs.[41] Importantly, the widespread incidence of mistakes is

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35 P1 from FGD6: 'EBM1 was a little bit tricky because of the airtime - for example, sometimes you buy airtime but after a while you may forget the exact time when you bought so you keep using the machine and boom the airtime just finishes while maybe doing a receipt for a client, which is bad'.

36 P2 from FGD6 reported: 'EBM2 is expensive to use, you have to buy a computer, a printer, internet and also pay someone who knows how to use the computer and the software system'. P3 from FGD5 said: 'EBM2 is also good but it requires a lot of things like a computer, internet, printer and also it requires to have the knowledge of how to use a computer which is not likely for everyone to know how to'. P6 from FGD6 mentioned: 'The EBM2 is also very good and clear but the problem is that not all companies can afford to buy a computer and a printer'.

37 FGD with small taxpayers held on 2 July 2019 (P4 from FGD4).

38 Mascagni et al. (2019b) provide evidence on the limited outreach and take-up of taxpayer education programmes organised by the RRA.

39 Note, however, that in the case of technical problems the law allows for paper receipts, temporarily.

40 Example from FGD with small taxpayers held on 2 July 2019: P2 from FG4 said 'P2: I think the problem is about the typing mistakes. You print a receipt of FRw20000 instead of FRw2000 so that 0 that you added by mistake can cause you problems'. Another example is about inexperienced operators who may repeat a transaction when the EBM loses connectivity or fails to print a proper receipt. Yet, these transactions are still registered and sent to the RRA as soon as connectivity is restored, thus creating duplicates.

41 Multiple FGDs (FGD 2,3,4,5,6) supported this argument: (i) FGD with large taxpayers held on 6 March 2019 (P1 from FGD1: 'when you are making your declarations before the deadline, and you find one with a mistake you can cancel the other one and make a new invoice. But for this one you have to go back to your customer'); (ii) FGD with large taxpayers held on 5 March 2019 (P2 from FGD2: 'I think one of the issues could be that the receipts fade off so if you can't see the number you will definitely keep the purchase because it has happened to me, I tried to figure out numbers tried putting in many numbers, but it didn't work so I just left it'.); (iii) FGD with small taxpayers held on 2 July 2019 (P3

known by RRA officials, who usually only correct very large ones – many others remain in the system.

In the broader context of practical difficulties with operating EBMs, the example of mistakes illustrates particularly well the complexity that taxpayers face with tasks that could be relatively simple in principle. On the tax administration's side, capacity is simply too limited to allow for systematic correction of mistakes – even the ones that taxpayers themselves highlight. This makes the use of EBM data for enforcement less straightforward than it might be otherwise, since officials cannot be sufficiently confident that the data accurately reflects firms' activity.

5.2.2 Complexity and uncertainty in administrative practices

The practical functioning of tax administration often presents several complexities and uncertainties. While the theoretical functioning of the VAT and the relevant laws might be clear on paper, the way they are implemented is often less straightforward – especially from the perspective of taxpayers. In this context, contradictory messages and confusing practices often emerge in interactions between taxpayers and tax officials. This complexity in administrative practices further reinforces the problems linked to high compliance costs, described in the previous section. Our FGDs provide two examples of how administrative practices diverge from the more straightforward way in which the VAT system should work on paper. Both examples concern input claims, and they emerged particularly from the discussion related to Part 3 of our protocol (see section 5.1).

Permitted time to make input claims. As mentioned in section 3, Rwandan law allows taxpayers to delay their input claims after the relevant period when the purchase occurred in certain circumstances. However, FGD participants, especially those from small firms, expressed confusion over the time within which they are allowed to report purchases and claim back the VAT they paid on these purchases. According to FGD participants, interpretation of these provisions by the RRA varies depending on which department they interact with. When firms file their VAT declaration these delayed claims generally do not cause issues, which suggests that they do not get rejected through automatic checks or ad hoc inspections by tax officials. However, if a declaration is flagged for audit, claims with similar delays are perceived to be very likely to get rejected. As one participant noted: 'a receipt from January, even if it is February, is allowed by the system, but when the auditor comes he will reject this receipt and take it out'.[42] To avoid this, some firms do not report older purchases if they forgot to report them during the previous filing period – this is another explanation for the issue of missed claims highlighted in sections 4.3 and 4.4.

Delays in VAT refunds. The complexity and uncertainty of the input claim system is further exacerbated by low levels of trust in proper functioning of the refund system – cases where input claims are larger than the VAT on sales and thus require a refund (see section 2). Many have experienced delays and even failure to process legitimate refunds, with one participant saying that 'it takes a lot of time, almost a year, [and] is not convenient for businesses'.[43] Firms appear to prefer a predictable cash flow to waiting for an uncertain

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from FGD2: 'there must be some error and he typed the wrong numbers and he hasn't recognised so that he goes back and cancels so even when the time to declare and pay he doesn't remember that there is somewhere he made a mistake'); (iv) FGD with small taxpayers held on 4 July 2019 (P2 from FGD5: 'I think it is the bad usage of the machines, maybe due to the lack of knowledge of how to use it or that he may make mistakes and fail to correct them'; (v) FGD with small taxpayers held on 5 July 2019 (P5 from FGD6: 'it happens for example they are times when you are going to make a receipt of 2 million and you type 20 million instead and you come to know it when you are going to declare seeing it in the back office of the machine and you can't even remember the client nor can you find him').

42 FGD with large taxpayers held on 6 March 2019 (P2 from FGD3).

43 FGD with large/small taxpayers held on 5 July 2019 (P2 from FGD6: 'if a tax payer asks for a refund, it should at least be 1 or 2 days but it takes a lot of time, almost a year. It is not convenient for businesses').

refund of the money that they are owed. This experience is confirmed in available data on refunds from the World Bank's Doing Business database. While the law provides for a 30-day limit to process refunds, or a maximum of 3 months when additional checks are needed, in practice the average time to obtain a VAT refund in Rwanda is 39 weeks – about 10 months (World Bank 2019). Rwanda – like many other low-income countries – consistently scores very weakly on the 'adequacy of refund processing' in a recent TADAT assessment (TADAT 2019).

5.2.3 Beliefs on enforcement and fear of audit

Credibility of enforcement. In section 4 we showed that firms often report inconsistent information to the RRA – in fact this is almost the norm. Whether this behaviour is due to mistakes or evasion, these widespread inconsistencies are only possible if the RRA does not raise any objections to them and firms do not believe that the RRA has the ability to cross-check administrative data. We know that the RRA does not cross-check data systematically, but rather performs targeted checks based on risk profiles. We are also not aware of any active initiative to pursue these inconsistencies systematically, perhaps partly due to the data limitations highlighted in section 5.2.1. But do taxpayers still believe that the RRA *can* check that data and use it for enforcement? If they do not, then inconsistent records are much less puzzling – they would believe that their inconsistent records will not lead to any investigation or sanction. We explored this question particularly in relation to the example of firms reporting lower values in their VAT declaration than the amount recorded in their EBM (part 2 of our protocol). The FGDs did not lend much support to the hypothesis that firms do not believe the RRA to have the necessary enforcement capacity. On the contrary, they generally see RRA enforcement as rather effective and aggressive, as we discuss in more detail in the next section.[44] Therefore, it seems that weak administrative capacity does not translate into beliefs about enforcement – at least our FGDs do not support that hypothesis.

Fear of audits on net refunds. The belief in RRA's capacity is reflected in widespread fear of audit in relation to net refunds. As discussed in section 3, this occurs when the value of the VAT input claim is larger than the value of the VAT collected on sales. Firms in our FGDs confirmed that they try to avoid being in a net credit position, as they believe this will trigger an audit. According to the law, such net refunds are possible: if firms have accumulated more input VAT than output VAT, they can carry over that credit or request a refund from the RRA. However, because there are many examples of VAT refund fraud, some of which we document in section 5.2.4, tax administrations are usually very careful when it comes to approving VAT refunds. This is consistent with the severe delays we documented in the previous section. Yet, VAT refunds are key to the proper and efficient functioning of the VAT system. The conversations with firms suggest that the RRA may be overly restrictive, or as one participant put it: '[claiming a VAT refund] is like inviting the RRA to come for an audit'.[45] To avoid these audits, a firm may choose to not report purchases if doing so would put the firm in a net refund position.

The fear of inspections by the RRA featured especially in discussions with smaller taxpayers. They perceive these inspections to be very aggressive and costly.[46] One participant noted

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[44] FGD with small taxpayers held on 4 July 2019 (P3 from FG5: 'But it is a difficult process because first of all if you claim back your money the RRA starts to control your movements, makes audits and sometimes instead of getting your money back you lose some'). Also, FGD with small taxpayers held on 2 July 2019 (P1 from FGD4: 'what many people fear about claiming their money, is because it is like inviting RRA to come for an audit'), and FGD with small taxpayers held on 5 July 2019 (P2 from FGD6: 'so when you go to RRA to ask for the money, they make things very complicated').

[45] FGD with small taxpayers held on 2 July 2019 (P1 from FGD4: 'what many people fear about claiming their money, is because it is like inviting RRA to come for an audit so even if some have refunds to make they prefer to keep it quiet'.)

[46] FGD with small taxpayers held on 2 July 2019 (P5 from FGD4: 'We don't reclaim a refund. You can claim 100,000 for example, Auditors can say that you have to pay 10 million so there's no need of claiming a 100,000 If you're going to

that ‘if you claim back your money, the RRA starts to control your movements, makes audits, and sometimes instead of getting your money back you lose some’.[47] There is a perception that the RRA is reluctant to issue refunds and will go to great lengths to find mistakes or evidence of evasion to stop a refund. In an environment characterised by low capacity and high informality, it is often easy for the RRA to find this evidence. It is therefore quite plausible that taxpayers, especially smaller taxpayers, refrain from reporting some of their purchases if that would put them in a refund position.

Fear about aggressive audits is somewhat justified. The RRA performs an audit for every VAT refund above certain thresholds, which vary according to firm size. These thresholds are publicly available from the RRA website, and we report them in Appendix Table A2.2. In practice, this means that the vast majority of VAT refund claims trigger an audit. According to the 2020 Doing Business Report, 50 per cent to 74 per cent of VAT refund claims are exposed to an audit in Rwanda (World Bank 2019). This practice, which is also common in other countries, is likely to be behind the low refund-to-VAT-revenue ratio in Rwanda (see section 3), as well as delays in processing such claims.

Interestingly, the experience of larger firms is quite different in this respect. Participants from larger firms, which have more resources and capacity, remarked that instead of foregoing their input claims, they strategically hold back from reporting their purchases in months where these would push them into a net refund position. Instead, they hold on to them to lower or offset their VAT liability in a future filing period.[48] If the VAT they paid on their purchases is higher than what they collected on their sales, larger firms, instead of submitting all receipts and claiming the VAT refund, will submit only a part of those receipts in order to lower their input VAT and avoid a refund position. They submit the remaining receipts in future filing periods.[49] This is indeed allowed by the law, but there is uncertainty as to whether it is allowed in the administrative practice, as we documented in section 5.2.3. Importantly, strategically delaying input claims requires some ability in record-keeping and managing books of accounts that many small taxpayers simply don’t have (see section 6).

5.2.4 Tax evasion

Part of the explanation we observe is certainly related to evasion – though it is not obvious this is the main explanation.

Market for VAT receipts. While taxpayers fear audits, as documented in the previous section, this does not prevent them from finding creative ways around tax minimisation. One example is fraud on VAT receipts. In section 4.2 we show that larger firms are more likely than smaller ones to declare lower sales in their VAT declarations compared to their EBM records. This could be a consequence of evasion and EBM-related fraud, but not the intuitive

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end up playing 10 million’. P1 from FGD4: ‘if it is a small amount and you are not ready for an audit then you won’t be claiming anything at all’).

47 FGD with small taxpayers held on 4 July 2019 (P3 from FGD5).

48 FGD with large taxpayers held on 5 March 2019 (P5 from FGD3): ‘If you file the receipts correctly the RRA should see that you need a refund, so why do they come to audit you?’ They then went on to mention that their business records are not always properly organised. The participant then complained that ‘one day they come and ask you to use the EBM, if they come to audit, they won’t tolerate [that] your files weren’t in order. That’s why we prefer avoiding the audit and keep the receipts for the following month’.

49 FGD with large taxpayers held on 3 March 2019 (P1 from FGD1: ‘Look I have purchased 10 servers then there is an amount of say 5 million, but I didn’t make any sales this month, but I know next month I will make sales, so if I claim 5 million to RRA it may take 5 months or so. But if I delay a bit then in the next month, I can make a declaration of that invoice and then I claim directly’; P4 from FGD1: ‘Instead of claiming the VAT because of refund delay they prefer to claim the VAT which they are ready to pay directly. And keeping invoices that you can use directly next time’.). FGD with large taxpayers held on 5 March 2019 (P5 from FGD3: ‘We’re not saying that we refuse to claim it, but we just don’t want to destabilise our business by claiming refund this month when we use the balance for the following month. What would be ideal is to regularise our stock, if I sell a bottle of juice the rest in the stock will be also sold at some point so it doesn’t make sense to hurry when in the end the money will still be paid to RRA’).

kind. According to one participant there exists something like a market for VAT receipts.[50] In this market there is a demand from firm A for fake VAT receipts, which allows firm A to increase its input VAT and thus reduce the VAT it has to remit to the RRA. These fake receipts are typically supplied by a clerk in a larger firm B, like a hotel or grocery store, where it is difficult for management to impose strict control over the issuance of EBM receipts – a classic principal-agent problem. For a fee, the clerk of firm B issues an EBM receipt to firm A. Firm A pockets the difference between the amount on the receipt and what it pays the clerk. However, according to its EBM data firm B registered a transition. When firm B's accountant reconciles the books at the end of the period, the value of the EBM transactions will be higher than the real activities of the company, which they declare in the firm's VAT return. For the reasons described earlier, the firm may not want to correct the EBM records.

Under-reporting. Finally, it is important to note that all the issues highlighted here are still compatible with widespread VAT evasion. While we observe buyers' under-claiming, our administrative data does not allow us to observe whether taxpayers declare all the relevant sales accurately. It is quite likely that some firms under-report their VAT sales and make limited use of EBMs, as documented elsewhere (Fjeldstad et al. 2020). Substantial under-reporting of sales could be consistent with widespread under-claiming of inputs. Systematic reports of large input credits, against much lower sales, could look suspicious.[51] Firms may therefore prefer to appear small on both the sales side (by under-reporting) and the input side (by foregoing input claims). In the context of evasion on the sales side, the issue of missed refunds might perhaps seem less worrying. However, our results remaining concerning for two reasons. First, the VAT burden remains uneven across the firm size distribution, which raises new questions on equity. Second, underreporting on the sales and input sides means that the VAT chain is broken and might inevitably bear on intermediate stages – instead of being the tax on consumption it is intended to be.

6 Supporting evidence from a taxpayer survey

The results reported so far have shown widespread inconsistencies in administrative data, with important implications on equity, and provided some explanations based on taxpayer experience. In this section we use a nationally representative survey from 2020 to test and support some of the explanations emerging from FGDs. We are particularly interested in investigating further some differences we highlighted between large and small taxpayers – for example, on compliance costs or EBM usage.

6.1 Rwanda National Taxpayer Survey

The Rwanda National Taxpayer Survey was conducted in early 2020 by the International Centre for Tax and Development (ICTD), in partnership with the Rwanda Revenue Authority.[52] The survey collected data on 1,059 small and medium firms that are listed in the RRA's taxpayer registry, which recently reported through their tax declaration to have some

[50] FGD with large taxpayers held on 6 March 2019 (P5 from FGD3: 'At the end of the month you go to the RRA back office and you count, for example, that EBM shows you that you have to pay 3 million and so you think about that you go to sound out shops 'Can you give me a receipt and I give you something'. So the owner of that shop when they come and see that they have sold goods for 2 million. But those receipts that have been bought do not count')

[51] There are, however, some cases where input claims larger than sales are indeed perfectly legitimate. e.g. this is the case for exporters (who do not levy the VAT on their sales), and new businesses (that might have large input costs and still limited sales).

[52] The survey was conducted as part of a background study to support the RRA's new Compliance Improvement Plan.

business income to the RRA.[53] Crucially, this implies that we can connect the survey and administrative data through unique identifiers. Firms were randomly sampled from the RRA's taxpayer registry to make sure the survey is nationally representative.[54] The questionnaire includes the following modules: (i) demographics, (ii) business characteristics, (iii) risk aversion, (iv) knowledge about the tax system, (v) satisfaction with public services, (vi) interactions with the RRA, (vii) overall tax burden and compliance costs, and (viii) attitudes and perceptions about tax compliance. Although it was not a requirement for selection into the survey, 329 firms in the sample are registered for the VAT. Our main results are based on this sub-sample, but they are also confirmed when we look at the full survey sample (see Appendix Table A2.4).

Because our interest is particularly on the distributional patterns for small and large firms we observed in the administrative data, we map the survey data onto the deciles obtained from the administrative dataset. We can do that thanks to unique identifiers that allow us to link these two sources of data at the taxpayer level. More specifically, we take the decile cut-offs from administrative data (based on the sales distribution) and apply them to total sales, as reported in tax declarations, for survey participants.[55] By doing this, we obtain ten categories in the survey sample, which are broadly comparable with the income ranges of the deciles from the administrative data. In what follows we call these administrative deciles. Naturally, our survey data is more representative of the bottom administrative deciles than the top ones, as it focused particularly on small and medium taxpayers. However, we have some observations across the whole distribution.[56] To support our results on the distributional implications of the VAT, we compare a set of key variables between the first administrative decile and all other deciles. For robustness, we also compare the first decile with the next four ones, finding highly consistent results (see Table A2.5).

6.2 Supporting evidence on distributional implications

Using this survey, we are particularly interested in further testing our results that small taxpayers bear a relatively higher burden (ETR) and claim relatively less (input ratio) largely because they face high compliance costs, as emerged in our FGDs. In addition, and relatedly, we look to check if EBMs are particularly problematic for small taxpayers, compared to larger ones.

We investigate the issue of compliance costs and taxpayers' ability to navigate a complex tax system by looking at a set of variables linked to two objective indicators: taxpayer knowledge and actual business practices. The former is captured thanks to a unique mini-quiz composed of eight questions on basic aspects of tax system. In addition to an indicator capturing how many questions of the quiz each taxpayer got right, we also use a question on the VAT rate separately, as it is particularly relevant to our analysis. Business practices are captured thanks to three variables in particular: whether a firm keeps books of accounts, whether it has a dedicated tax accountant, and whether it has a business bank account. We consider these measures objective because they capture objective facts about the taxpayer, rather than perceptions. More subjective measures are, for example, questions on whether

[53] We used the taxpayer registry and declarations data - the latter to figure out taxpayers' filing status (non-filer, nil-filer, and active taxpayer). In this paper we only use data on active taxpayers, those who declare some income to the revenue authority, and exclude non-filers and nil-filers. The full sample, including the latter, would be about 2,000 taxpayers. More details on nil-filers in Rwanda can be found in Mascagni et al. (2020).

[54] Other inclusion criteria included: (i) possessing a valid and unique TIN and (ii) having correct contact information. Stratified random sampling was used, with size and CIT/PIT dummies as the strata.

[55] This is a somewhat imperfect measure, because we use total sales from income tax declarations rather than total sales from VAT declarations, which are the basis for the administrative deciles used in section 5.3.1. However, by doing this we are able to map all the survey sample on the administrative deciles.

[56] The first administrative decile includes 558 surveyed taxpayers (i.e. 53% of the survey sample), the second 181 (17%), the third 66 (6%); the next 7 administrative deciles each contain about 3.5% of the sample.

the taxpayer believes the VAT is easy to comply with. We consider this a more subjective measure because a taxpayer might well perceive that the VAT is easy to comply with, but at the same time ignore provisions of the VAT system that they are failing to take up – most importantly input claims.[57] All variables used in this section are described in Appendix Table A2.3.

Table 1 reports the average of those variables in the first administrative decile (small firms in what follows), the rest of the distribution (larger firms), and the difference between the two – with an indication of statistical significance. Both knowledge and administrative practices are much weaker among smallest firms than for the rest. Small taxpayers are 25 percentage points less likely than larger ones to know what the standard VAT rate is. Relatedly, 68 per cent of the smallest firms keep books of account, while this figure is 77 per cent for the rest – however, this difference is not statistically significant.[58] Related to the specific issue of refunds, the FGD result discussed in section 5.2 is confirmed here: only 13 per cent of the smallest taxpayers ever asked for a refund, while for larger ones this figure is 29 per cent. These differences are statistically significant.

Table 1 Comparison of key survey variables between small and larger firms (N=329)

	(1)	(2)	(3)	(4)
	Mean All deciles	**Mean Decile 1**	**Mean Deciles 2-10**	**Difference (2) – (3)**
Knowledge index (0-8)	4.19	3.54	4.37	0.82***
Knowledge of VAT rate (%)	0.72	0.53	0.77	0.25***
Record-keeping (%)	0.75	0.68	0.77	0.08
Has a tax accountant (%)	0.57	0.28	0.65	0.36***
Has a business bank account (%)	0.69	0.48	0.74	0.26***
EBM usage (%)	0.48	0.28	0.54	0.25***
Claimed refund (%)	0.26	0.13	0.29	0.16***

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ as resulting from t-tests on the difference in mean of decile 1 and deciles 2-10. Results based on Rwanda National Taxpayer Survey (2020). Description of the variables is provided in Appendix Table A2.3.

These results hold in a multivariate framework. We run descriptive regressions explaining the key survey variables with a dummy for small taxpayers (those in the first administrative decile) and include a number of controls, such as gender, age and location, as well as tax perceptions.[59] The results are included in Appendix Table A.3.1. In line with the descriptive findings from Table 1, the dummy for small firms is significant in the regressions with taxpayer knowledge (col. 1-2), business practices except bookkeeping (col. 3-4-5), EBM usage (col. 6) and claiming a refund (col. 7).

Consistently with the results on weak knowledge and with the practical difficulties with EBMs documented in section 5.2.1, Table 1 shows that there are large and statistically significant differences in EBM usage between smaller and larger firms: only 28 per cent of the former use them, against 54 per cent of the latter. This might also help to explain why, in section 4.2, we find that smaller firms are more likely to declare more than recorded through their EBMs. Our FGDs highlighted how small firms in particular face practical difficulties with EBM.

[57] For completeness, we also tried to look for differences in these more subjective measures of compliance costs, both for all taxes generally and for the VAT in particular. There is no statistically significant difference in responses between smaller and larger taxpayers.

[58] The difference in bookkeeping practice is highly significant when we consider the whole sample of surveyed taxpayers (N=1,059) in Appendix Table A2.4.

[59] The full list of controls is: gender, age, location, sector, and number of employees. In addition, we also include perceptions – e.g. likelihood of audit, trust in RRA, perceived corruption, and perceived fairness of the tax system.

This is consistent with the fact that so few actually use them, which Table 1 confirms. However, some of these firms that fail to use EBMs might actually report at least some of the sale in the declaration. Thus, failure to use EBMs does not necessarily imply evasion – at least not in all cases. As a last consideration, survey data show two-thirds of taxpayers using EBMs believe that the tool made it very much easier to comply, mirroring the positive feedback from FGDs (section 5.2.1). In contrast with this rather positive assessment, it is also true that a number of issues are reported: (i) the system is slow, mentioned 35 per cent of the times; (ii) it is difficult to amend mistakes done on the machine (26%); (iii) the machine is difficult to operate (18%).

7 Conclusions and policy recommendations

This paper reports three sets of results. First, we document widespread inconsistencies in taxpayer records relating to the VAT in Rwanda. This suggests that some of the expected benefits of the VAT, such as the self-enforcement mechanism, are not fully realised in practice. Second, we show that these inconsistencies reveal important concerns over the VAT's equity: smaller firms face a higher tax burden and leave money on the table, by missing input claims. This is a new element in the debate on the VAT's equity, showing how this tax affects smaller firms differently to larger ones. In a functioning VAT system, VAT payments are, at least partly, offset by input claims. When this mechanism malfunctions because firms fail to reclaim the VAT paid on inputs, the VAT essentially becomes a tax on production, rather than the tax on consumption it is intended to be. Third, we show that the explanation for these inconsistencies and distributional implications lie particularly in taxpayer confusion, complexity and compliance costs – coupled with weak capacity on the part of the tax administration.

Our results have three main implications in terms of policy. First, our results speak to the debate on the effectiveness of the VAT in low-income countries, which is still far from being settled. While most researchers and practitioners agree that the efficiency of the VAT is often lower in lower-income countries, the reasons for its underperformance are less clear. Our paper contributes to this debate by documenting some practical problems in how the VAT functions in a lower-income country. This evidence does not amount to a case against the VAT. It does, however, raise some serious questions about its equity and efficiency.

Second, our results on inconsistencies point to severe gaps in the way data is currently used for enforcement. Importantly, these are not unique to Rwanda, as other studies have documented similar inconsistencies in other African countries such as Uganda and Ethiopia (Almunia et al. 2017; Mascagni et al. 2018). While cross-checks like the ones presented in section 4 are not performed systematically on all taxpayers, the RRA's risk division regularly cross-checks data for cases that meet certain criteria. Similarly, RRA has recently introduced an input validation system that automatically checks input claims to prevent fraud. While this is a step in the right direction for making better use of the data, our results show that the RRA should be equally concerned about whether taxpayers are able to make genuine claims. Although addressing under-claiming does not imply any revenue gain, it is important from an equity perspective – as well as to build trust in the RRA more generally.

Third, there are a few practical policy recommendations that might be considered in light of our results. For example, the revenue authority might consider automatic input claims for small firms below a certain threshold, to ensure they offset their liability by at least a minimum percentage. The difficulties documented here, particularly for firms in the first decile, also indicate the need to potentially revise the threshold for VAT registration upwards.

Our results also point to a strong case for facilitation: small taxpayers, in particular, would benefit from initiatives and measures aimed to increase their knowledge of and confidence in the VAT system, including the use of EBMs and how to correct mistakes.

Appendices

Appendix 1 Figures

Figure A1.1 Internal inconsistencies by total sales deciles

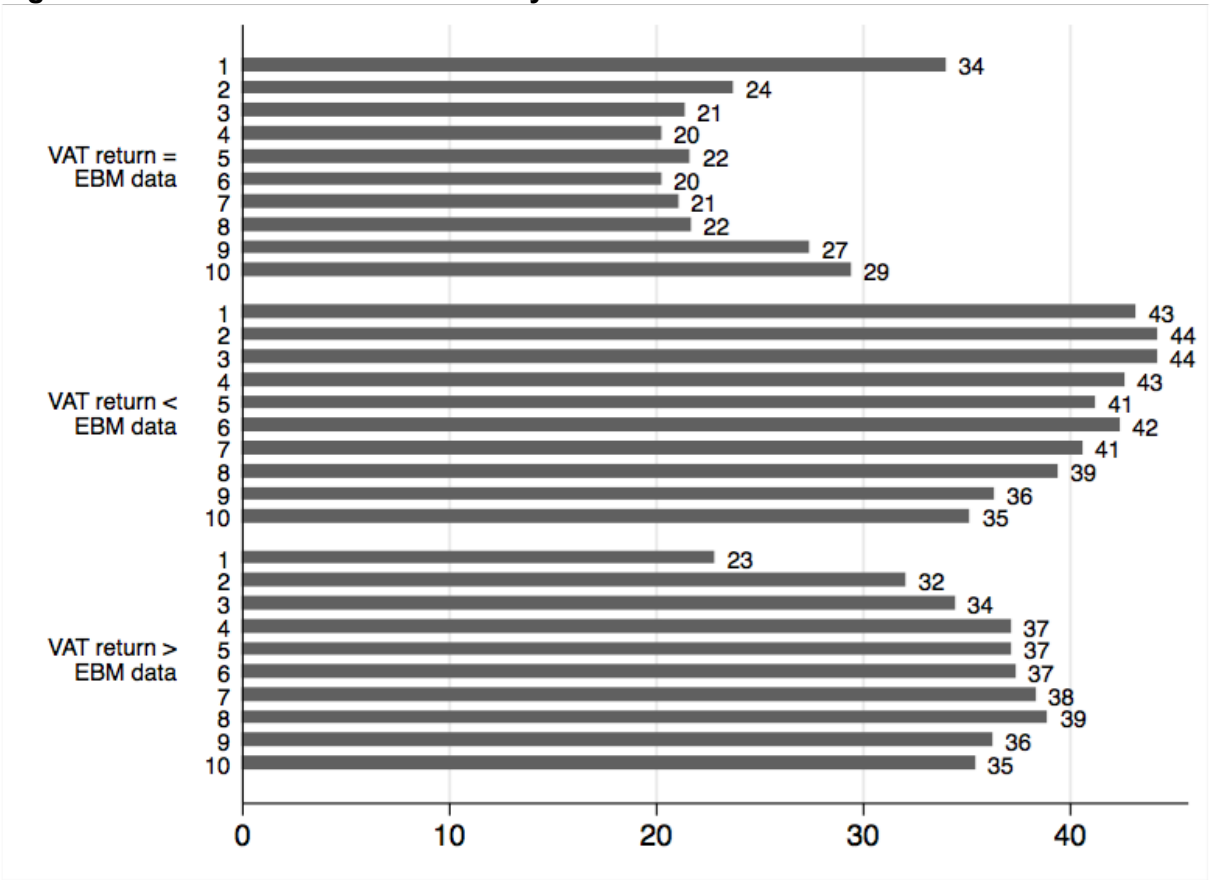


Figure A1.2 External inconsistencies by total sales deciles

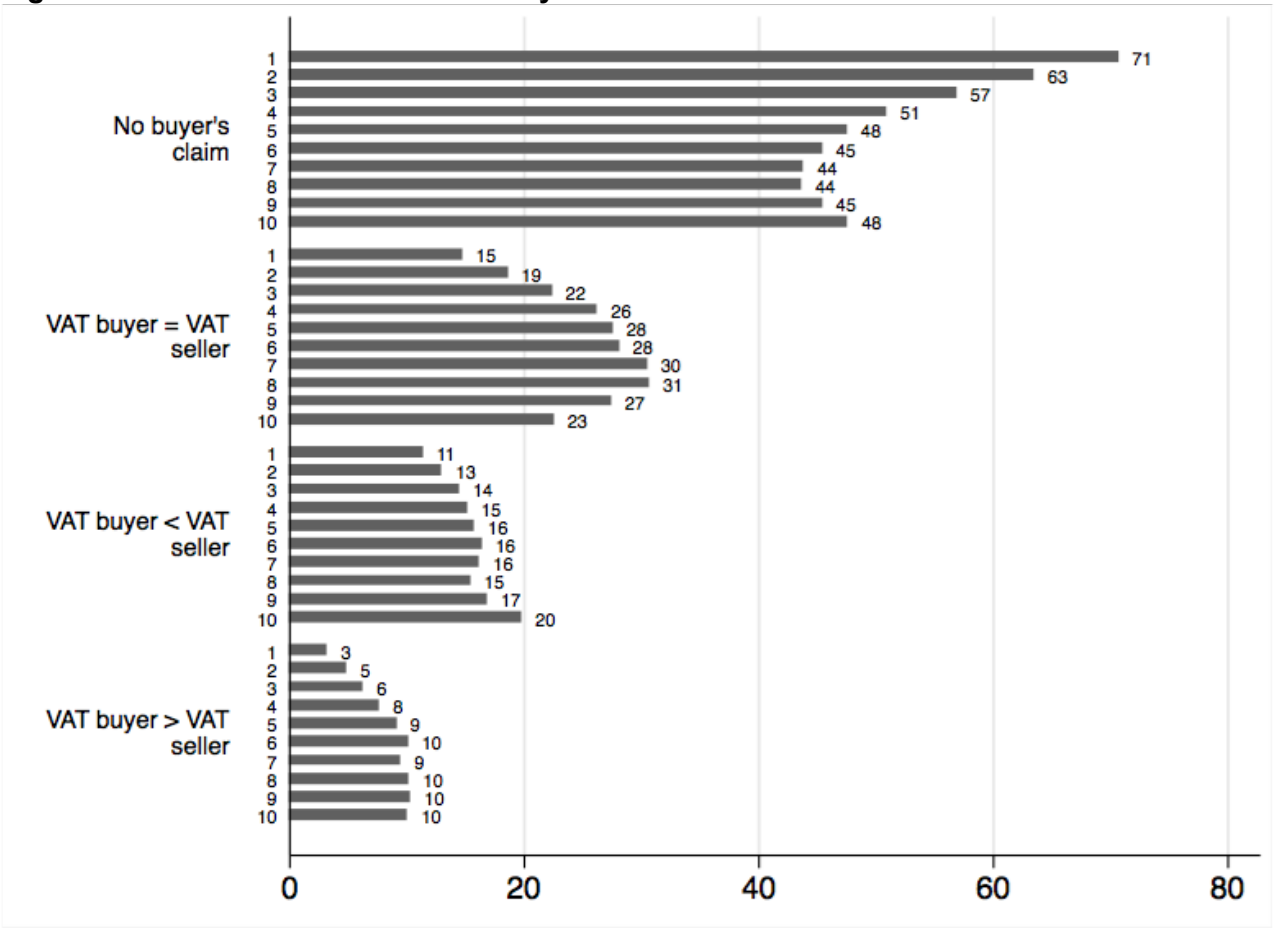


Figure A1.3 Ratio of input over output VAT – without zero-claimers

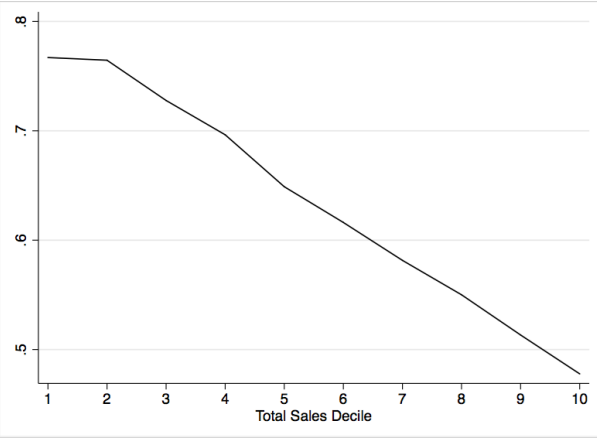


Figure A1.4 Effective VAT rates – without zero-claimers

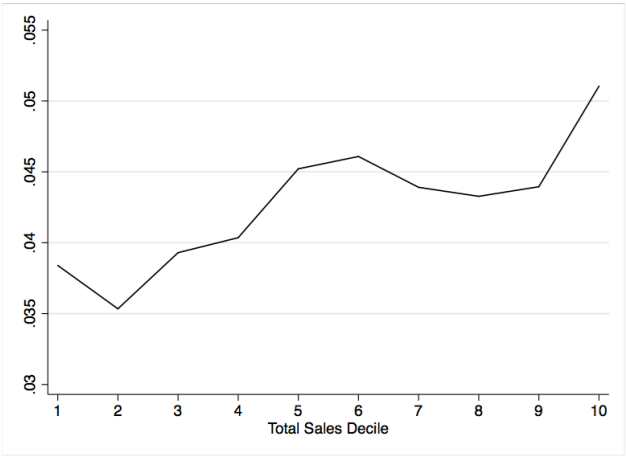
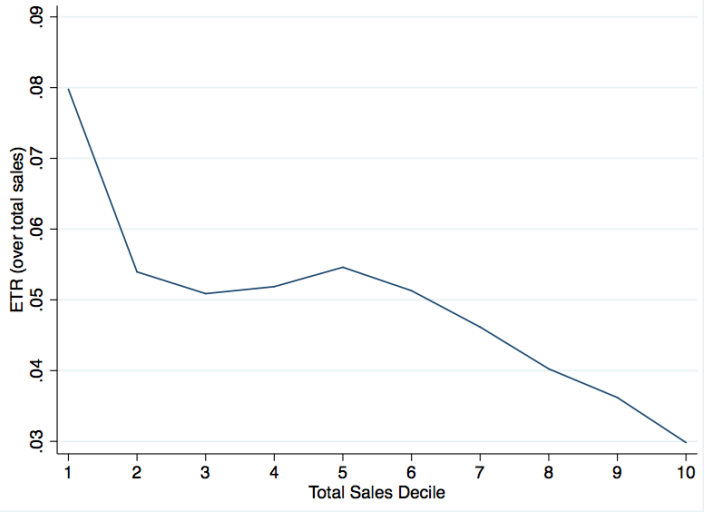


Figure A1.5 Effective VAT rates measured as the ratio of net VAT over total sales



Appendix 2 Tables

Table A2.1 Correlates of ETR – regression results

	(1)	(2)	(3)	(4)
	FE	FE	BE	BE
Size	-0.66***	-0.66***	-0.63***	-0.68***
	(0.05)	(0.05)	(0.03)	(0.03)
Export		-1.48**		4.03***
		(0.68)		(0.71)
Energy			-2.51***	-2.10***
			(0.50)	(0.50)
General commerce			-4.03***	-3.78***
			(0.20)	(0.20)
Hotels and bars			-2.99***	-2.67***
			(0.36)	(0.36)
Construction			-2.17***	-1.84***
			(0.30)	(0.30)
Transport			-0.52	-0.29
			(0.45)	(0.45)
Public				3.15***
				(0.59)
Young				-0.32**
				(0.14)
Old				1.71***
				(0.22)
District dummies	Yes	Yes	Yes	Yes
Mean of Y	5.385	5.385	5.385	5.385
R-sq.	0.021	0.022	0.134	0.148
Observations	30773	30773	30773	30773

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Columns 1 and 2 report the fixed effect estimates while columns 3 and 4 display the between firm estimates. The dependent variable is the ETR transformed to take values from 0 to 100 to improve the readability of coefficients. The independent variable Size is the log of the firm's total sales in a given quarter. Export is an indicator variable for whether the firm reports positive exports in a given quarter. Public is an indicator variable for whether the firm is a public company. Young is an indicator variable for firms younger than 5 years while Old indicates firms older than 10 years. District dummies are included across all regressions.

Table A2.2 Audit thresholds for refunds in Rwanda

Taxpayer type	Automatic refund threshold (FRw)	Automatic audit thresholds (FRw)
Small taxpayers	50,000 to 500,000	50,000 to 500,000 more than three consecutive times; or greater than 500,000
Medium taxpayers	200,000 to 1,000,000	200,000 to 1,000,000 more than three consecutive times; or greater than 1,000,000
Large taxpayers	200,000 to 2,000,000	200,000 to 2,000,000 more than three consecutive times; or greater than 2,000,000

Source: RRA (2019) VAT Refund: www.rra.gov.rw/index.php?id=184&L=0.

Table A2.3 Description of key survey variables

Variable	Question	Range	N
Knowledge index	Average of 8 tax-related questions	0-8	1,059
Knowledge of VAT rate	What is the standard tax rate for the VAT?	0-1	1,059
Record-keeping	Do you keep any records of your business transactions?	0-1	1,059
Has a tax accountant	Who manages your tax affairs?	0-1	1,059
Has a bank account	Do you have a bank account for your business?	0-1	1,059
EBM usage	Do you use EBM?	0-1	1,059
Claimed refund	Have you ever claimed refunds for VAT inputs?	0-1	321

Table A2.4 Comparison of key survey variables between small and larger firms (N=1,059)

	(1)	(2)	(3)	(4)
	Mean All deciles	Mean Decile 1	Mean Deciles 2-10	Difference (2) – (3)
Knowledge index (0-8)	3.90	3.70	4.19	0.49***
Knowledge of VAT rate (%)	0.45	0.31	0.60	0.29***
Record-keeping (%)	0.55	0.44	0.67	0.22***
Has a tax accountant (%)	0.25	0.09	0.42	0.33***
Has a business bank account (%)	0.36	0.21	0.54	0.33***
EBM usage (%)	0.16	0.04	0.31	0.27***
Claimed refund (%)	0.26	0.13	0.29	0.16***

Note: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$ as resulting from t-tests on the difference in mean of decile 1 and deciles 2-10. Results based on Rwanda National Taxpayer Survey (2020). Description of the variables is provided in Appendix Table A2.3).

Table A2.5 Comparison of key survey variables between small and larger firms (N=186)

	(1)	(2)	(3)	(4)
	Mean All deciles	**Mean Decile 1**	**Mean Deciles 2-5**	**Difference (2) – (3)**
Knowledge index (0-8)	3.92	3.54	4.15	0.61**
Knowledge of VAT rate (%)	0.64	0.53	0.71	0.18***
Record-keeping (%)	0.68	0.67	0.68	-0.01
Has a tax accountant (%)	0.43	0.29	0.51	0.22***
Has a business bank account (%)	0.59	0.49	0.66	0.17***
EBM usage (%)	0.39	0.28	0.45	0.16***
Claimed refund (%)	0.20	0.13	0.24	0.10***

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ as resulting from t-tests on the difference in mean of decile 1 and deciles 2-5. Results based on Rwanda National Taxpayer Survey (2020). Description of the variables is provided in Appendix Table A2.3.

Appendix 3 Multivariate framework

Table A3.1 Survey indicators and smallest taxpayers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Knowledge Index	**Know VAT rate**	**Bookkeeping**	**Tax accountant**	**Bank account**	**EBM use**	**Ever claimed**
Smallest TPs	-0.72***	-0.18***	0.01	-0.29***	-0.18**	-0.17**	-0.17***
	(0.26)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)	(0.05)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-sq.	0.115	0.124	0.081	0.178	0.138	0.095	0.075
Observations	329	329	329	329	329	329	321

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Smallest TPs indicate those taxpayers in the smallest decile of the turnover distribution. The outcome variables in columns 1 to 7 are described in Appendix Table A2.3.

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