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RESEARCH ARTICLE

Enhancing taxpayer registration with inter-institutional data sharing—evidence from Uganda

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Abstract

In many African countries, limited population data pose a challenge for tax administrations struggling with informal economies. This study examines Uganda's integration of national ID data into tax registration through "Instant TIN," an interface linking the Uganda Revenue Authority (URA) with the National Identification and Registration Agency (NIRA) and the Uganda Registration Service Bureau (URSB). This reform aims to streamline taxpayer registration and improve data quality. Using a mixed-methods approach—combining interviews with government officials and administrative data analysis—we identify three key findings. First, Instant TIN registrants differ significantly from those using the conventional process. They are more likely to be individuals, female, younger, and previously informal, highlighting the reform's role in bringing in marginalised taxpayers. Second, Instant TIN improves data quality. It reduces TIN duplications for individuals and enhances contact accuracy, decreasing invalid or missing email addresses by eight percentage points and invalid phone numbers by six. However, it worsens sector data quality, increasing missing or incorrect sector information by 12 percentage points. Third, while Instant TIN reduces duplication, manual data entry, and administrative burdens, challenges remain. Infrequent updates in external datasets and a lack of validation within the interface increase administrative costs and complicate taxpayer engagement. Additionally, mandatory in-person updates and invalid contact details add to compliance burdens. Overall, Uganda's experience highlights both the potential and limitations of integrating national ID data for tax administration, offering insights for other countries considering similar reforms.

Policy Significance Statement

Our study highlights key policy recommendations for enhancing tax registration and administration through improved data sharing and technological innovations. First, Uganda's Instant TIN system should strengthen its ability to validate taxpayer contact details and authenticate identities to prevent errors and fraudulent registrations. Second, shifting from point-to-point data sharing to integrated data systems across government agencies would improve registry accuracy and operational efficiency. Third, tax administrations should carefully assess the impact of mass registration campaigns, ensuring they have the capacity to support new taxpayers effectively. These insights extend beyond Uganda, as other revenue authorities, such as Ghana's, face similar challenges. Addressing data quality risks is crucial to maximising the benefits of digital registration initiatives while avoiding costly inefficiencies.

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1. Introduction

Governments in low-income countries (LICs) struggle to collect and use information about their population adequately. Tax administrations, in particular, are information-intensive, and the availability of taxpayer information is paramount for effective tax collection (Kleven et al., 2011, 2016; Pomeranz, 2015; Jensen, 2019; Naritomi, 2019). In many African countries, lack of systematic information on the tax base is a crucial challenge, as data are either unavailable or, if present, inaccurate (Mayega et al., 2021; Nyanga, 2021). Concurrently, African tax administrations operate in a context of high informality where accurate information on taxable entities is scarce (Besley and Persson, 2014). For this reason, one of their primary objectives is to register vast portions of the population for tax purposes, while the accuracy of data collected is often a secondary concern (Moore, 2022).

In this context, cross-agency data-sharing agreements and inter-institutional system integration, especially related to national ID schemes, can significantly strengthen African tax administrations (Santoro et al., 2022). Tapping into third-party ID data can help tax administrations in many ways. First, connecting every taxpayer to a unique, foundational national ID could improve revenue authorities' registration function, providing more accurate data about who taxpayers actually are. By leveraging ID data, tax administration could unambiguously identify each taxpayer. Similarly, access to business registries would improve tax administrations' ability to link businesses to their owners and employees, enabling a more straightforward assessment of tax liabilities. Second, cross-institutional integrated systems and a single point of registration across agencies could reduce taxpayers' compliance costs, sparing them the burden of visiting the tax office and other registration bureaus, interacting with several officials, and filing and submitting multiple paper forms. Relatedly, a more transparent and data-driven registration process, thanks to its more objective and simplified nature, may improve perceptions of tax reforms and broader citizens' attitudes towards the tax system, also by reducing the opportunity for collusion and corruption in taxpayer-official face-to-face interactions (Okunogbe and Santoro, 2022). In addition, updated data on taxpayers' contact details and business locations would allow tax administrations to reach them more easily for compliance and sensitisation purposes. Third, ID data and integrated systems could enhance the identification of potential evaders, who may plausibly exploit loopholes in the registration systems (such as multiple tax identifiers), thereby strengthening tax enforcement. Lastly, reliance on integrated systems could improve revenue administrations' management and efficiency. Better quality data would enable a shift towards a more data-centric approach, with a higher reliance on metrics and indicators (e.g., in performance targeting, measurement, and task restructuring). Moreover, the personnel freed up from in-person registration activities could be employed in more rewarding taxpayer service, an often-neglected area of tax administration where automation can be less helpful. All the above benefits depend on essential assumptions that are often unmet. First, the data necessary for tax purposes are available in other government agencies. This is often not the case, like for real estate ownership and land registration. Especially for wealthy individuals, useful information lies outside governments, and with commercial banks, many of which are resistant to sharing it with tax administrations backed by stringent regulations. Second, the data from third-party institutions, when available, are accurate and captured in a way that fits the needs of a tax administration. In contexts of limited coordination across institutions, government agencies often collect data to meet their needs, with little concern for what could be useful for tax purposes. Third, once the data are shared, tax administrations have adequate capacity and skills to analyse it and put it to its best use. This is often not the case, as resource-constrained revenue authorities often lack the capacity to systematically analyse the data they hold. Furthermore, tax administrations are adequately equipped with sophisticated storage and security systems to manage data safely and comply with data privacy regulations. Lastly, such data-driven reforms, as the one we study, occur in contexts where the bargaining relations between the State and citizens are already strained, and where taxpayers often hold poor views on the legitimacy and fairness of the tax system (Kjær et al., 2023).

The Uganda case study is emblematic in this sense. As part of a broader plan to integrate the Uganda Revenue Authority's (URA) systems with those of many other agencies, the URA has recently shifted its

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focus towards tapping into third-party data to identify taxpayers. In January 2022, the URA launched a data-sharing strategy aimed at integrating data from the national ID system managed by the National Identification and Registration Agency (NIRA) with its registry of individual taxpayers. A similar system integration, even if halted in 2023 by the URA to review its implementation, took place with the Uganda Registration Service Bureau (URSB) to obtain business information. From the taxpayer's perspective, such integration resulted in an online, much faster registration process called Instant TIN, where taxpayers input their national identification number (for individuals) or business registration number (for registered businesses) on the online registration platform. Instantly, data are automatically retrieved from the NIRA and URSB system, and a unique taxpayer identification number (TIN) is generated. This system integration strategy comes in a context where the URA's taxpayer registry presents gaps and inaccuracies (Mayega et al., 2021; Monitor, 2024), preventing the unambiguous *identification* of taxpayers, with important repercussions on the capacity to both *enforce* and *facilitate* compliance if taxpayers cannot be easily located and contacted (Okunogbe and Santoro, 2022). Hence, relying on third-party data at registration was believed to enhance the quality of the URA taxpayer registry significantly.

Given this background, Uganda would also be an interesting case study of how inter-institutional data sharing for registration purposes affects citizens' attitudes towards the tax system. Importantly, for a policy such as the one we study, aimed at capturing informal entities, Ugandans' support for taxing the informal sector is quite muted—about 58% disagree with the idea that the government should make sure that small traders and informal sector workers pay taxes on their enterprises (Makanga and Kewaza, 2025). As we explain in Session 2, Uganda's mass-registration campaign is not followed by equally effective taxpayer onboarding and education. The lack of clarity on tax obligations could deteriorate the impact of the registration drive—as three-fourths (76%) of Ugandans reported difficulty in knowing what taxes and fees they are supposed to pay to the government. Similarly, more than eight in 10 citizens (83%) reported difficulty in determining how the government uses tax revenues, and fewer than half (46%) thought tax revenues are usually spent in the service of citizens' well-being (Makanga and Kewaza, 2025). This could imply that increased attempts to tax the informal sector might deteriorate the public's perception of the tax system and cause significant resistance to registration.

As a last contextual note, Uganda is also an interesting setting to study, given the persisting challenges in ensuring data privacy and confidentiality rights. Data privacy is a central aspect of inter-institutional data sharing, especially when it comes to sensitive information on identity and tax. URA systems, like those of many tax administrations worldwide, have been targets of hacking and cyberattacks (Monitor, 2021a). Significant revenue losses occurred due to sophisticated hacking schemes into URA's customs data system in 2012 (Monitor, 2021b). Over 2017–2020, criminals siphoned off USH 255 billion via URA system intrusions, prompting calls for major IT infrastructure upgrades (NTV Uganda, 2024). The Central Bank, as well, has been a victim of offshore hackers (Business Insider Africa, 2024).

Against this background, our study addresses three interrelated questions: (i) How is the system integration between the URA and other public institutions' databases taking place, and what are the challenges in the process? (ii) When data sharing and registrations occur on the Instant TIN platform, does it improve data quality within the URA databases? (iii) Is the new data from third-party sources helpful in strengthening the capacity of URA to identify taxpayers, enforce and facilitate compliance, and improve overall administrative efficiency?

To address these questions, we follow a mixed-method approach combining qualitative and quantitative data analysis. First, in collaboration with the URA and other government institutions like NIRA, URSB, the Kampala City Council Authority (KCCA), and the National Information Technology Authority (NITA), we implemented 17 in-person, in-depth interviews with government officials to gain a comprehensive understanding of the integrations in place and gauge the different perspectives of the institutions involved. Second, we ran a more quantitative analysis of the URA administrative data. In particular, we explored registration patterns and key correlates with Instant TIN registration using the taxpayer registry. Also, we used this data to capture quality gaps and inaccuracies, trying to understand the role of the new registration solution in limiting them.

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The evidence we present is mixed. On the one hand, the impact of the Instant TIN technology on registrations has been remarkable. In 2022 alone, it accounted for 35 per cent of all registrations. Moreover, the technology's registration outcomes are closely linked to the Taxpayer Registry Expansion Programme (TREP), a URA mass-registration campaign. The Instant TIN is a crucial tool for TREP field officers to streamline registration when operating in a door-to-door or one-stop-shop modality. We find that 39 per cent of Instant TIN registrations are attributable to on-the-field TREP. Notably, the technology is predominantly utilised by previously informal businesses, particularly those that are young and, to a lesser extent, owned by women.

However, the picture looks more complex when considering the effects on data quality and URA functions. Duplication of identities is, by design, largely removed. Additionally, while using Instant TIN reduces inaccuracies in email addresses and phone numbers, it proves ineffective in enhancing the quality of company data. In-depth interviews suggest that these persisting data flaws pose challenges for the URA, including significant efforts by the registry maintenance team to rectify inaccuracies caused by using Instant TIN in TREP. Additionally, the poor quality of contact and location details undermines the URA's capacity to onboard new taxpayers and enforce tax laws, muting the benefits of a strengthened identification function.

This study is particularly relevant for various strands of research on tax administration in LICs. First, it directly contributes to the ongoing debate on the relevance of third-party data to improve tax collection. While evidence on third-party data in high- and middle-income countries is abundant (Fan et al., 2018; Mittal and Mahajan, 2017; OECD, 2017; Slemrod et al., 2017; Brockmeyer et al., 2019; Carrillo et al., 2017), very little is known about such potential in low-income contexts and even less so in Africa. On the one hand, promising evidence from Chile and Brazil suggests that tax administrations can effectively leverage third-party data to increase revenues (Pomeranz, 2015; Naritomi, 2019). Likewise, Brockmeyer et al. (2019) show that credible enforcement emails reporting information from third parties increased the tax payments among previously non-compliant firms in Costa Rica. Success stories also originate from Pakistan and China, thanks to VAT refund validation mechanisms that utilise third-party data (Fan et al., 2018; Waseem, 2022). Similar positive evidence comes from India (Mittal & Mahajan, 2017), where third-party reporting on transactions increased compliance of the top 1 per cent of firms. On the other hand, more mixed results come from Africa. In South Africa, Lediga et al. (2025) evaluated the synchronisation of the tax registry and the business registry. Similar to Uganda, the authority's strategy was to foster registration and produce a cleaner and more comprehensive taxpayer registry. Despite the synchronisation sizably increasing the tax net, revenues did not increase due to poor compliance of newly registered firms, a concern highly likely to apply in the Ugandan case. The same muted impacts on revenue are observed in Ghana, where the tax administration is transitioning from TIN to national ID numbers (Santoro et al., 2024).

Second, this study contributes to the growing literature on formalisation, specifically registration for tax purposes. When it comes to Africa, recent studies have focused on government programmes aiming to include informal entities in the tax net and, at least potentially, increasing tax revenues (Gallien et al., 2021; Jouste et al., 2021; Moore, 2022; Lediga et al., 2025). Evidence from this strand of work challenges the idea that expanding the tax base to the informal sector, usually intended as micro and subsistence-level businesses, would generate substantial revenue gains (Benhassine et al., 2018; Moore, 2022) or profits (Bruhn and McKenzie, 2014; Ulyssea, 2020), and hints that it could eventually hamper the reliability of tax returns data, clogged with large numbers of nil submissions (Mascagni et al., 2022). Moreover, registration interventions can have critical unintended consequences, causing taxpayer confusion and affecting their perceptions of the tax system and compliance (Gallien et al., 2023). For Ugandans, the initiative under study can be seen as another vexating attempt to increase taxation without practical benefits in terms of better public services, as described above, to which to oppose resistance, as it happened with the public outcry against the social media tax (The East African, 2020) and the mobile money tax (Akol and Lees, 2021). As Moore (2022) argues, and as we corroborate in this study, political motivations and policy targets, rather than their practical promise, often tend to drive this "registration obsession." In cases where policy targets prevail over implementation, technology can become a

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potentially harmful tool. This study contributes to this strand of the literature by exploring the impact of system integration between government entities for registration purposes—an increasingly popular tax registration strategy in Africa.

Lastly, we directly connect with the rising evidence around technology in tax administration, as reviewed in Okunogbe and Santoro (2022). As the OECD argues, echoed by donors and international organisations, the digitalisation of tax administration could be "the most powerful tool for shifting light on the shadow economy" (OECD, 2017). However, it remains unclear how such IT-enabled registration drives improve taxpayers' perceptions, public service provision, and State-society bargaining (Kjær et al., 2023). While most of the literature looking at developing countries has focused on electronic fiscal devices (Ali et al., 2021; Mascagni et al., 2022; Hakizimana & Santoro, 2023) and electronic filing and payment of taxes (Okunogbe and Pouliquen, 2018), we focus on a novel technology boosting registration through the integration of the tax registry with national ID information. In this sense, we connect with recent work on IT-enabled solutions for registering taxpayers, particularly regarding property taxes (Okunogbe, 2021). We contribute to this literature by providing evidence on the benefits of data integration and technology for tax administration, highlighting their high context-dependence and susceptibility to challenges in the implementation process, design, take-up, and taxpayer behavioural response.

The policy relevance of this study is also evident, as it provides evidence to Ugandan and African policymakers on the benefits and challenges of cross-agency data sharing for tax administration. We acknowledge the ongoing challenges in integrating other institutional datasets with URA's registry and aim to extract valuable lessons from this case for future data-sharing initiatives. This evidence is urgent because several tax agencies are either exploring or implementing similar integration initiatives (Ethiopia, Malawi, Nigeria, Ghana). In the paper's conclusion, we also suggest practical policy recommendations for the URA.

In what follows, we describe the system integration and Instant TIN technology in Section 2 and present the research design in Section 3. Section 4 discusses our key results, and Section 5 concludes.

2. Context

2.1. The Ugandan context

Uganda, the context of this study, is a low-income country (LIC) in East Africa that shares the challenges of raising domestic revenue with other LICs (Besley and Persson, 2013). These are reflected in its tax-to-GDP ratio of 13.9 per cent in the 2022/2023 financial year (UNU-WIDER, 2023), below the government's medium-term revenue target of between 16 and 18 per cent of GDP (Ministry of Finance, Planning and Economic Development 2023). Such tax performance is significantly below that of high-income countries (33%), below the Sub-Saharan African average (17%), and that of low-income countries (15%), and generally low among East African peers (UNU-WIDER, 2023). Suboptimal revenue collection to fund development in Uganda is generally attributed to widespread evasion and informality. The informal sector in Uganda represented about 36 per cent of GDP on average from 2006 to 2020 (Elgin et al., 2021). Approximately 92 per cent of total employment is informal (Uganda Bureau of Statistics, 2021). However, despite its sheer size, the informal sector contributes less than 1% of tax revenues collected (Wamai, 2021). The failure to tax the informal sector results in foregone revenues worth about UGX1 trillion (U.S. $273 million) per year (Oxfam and SEATINI-Uganda, 2018). Only small shares of Uganda's economically active population and operational businesses, 6.8% and 7.1%, respectively, are registered for taxes, leaving large majorities of both people and firms outside the tax net. Uganda has one of the lowest taxpayer-to-labour-force ratios in East Africa (Oxfam and SEATINI-Uganda, 2018). To expand the tax net, the URA has invested heavily in formalisation strategies and the expansion of the tax base to foster compliance (Moore, 2022), and it is currently doing so by relying on third-party data.

Recent descriptive research indicates several gaps and inaccuracies in the URA data. For instance, concerning patterns that emerge when examining taxpayer identification numbers (TINs). At the time

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when this study was conducted, in Uganda, having a TIN was mandatory for any entity—individual or company—likely to engage in any tax-related transactions. This included that all individuals employed had to register for pay as you earn (PAYE) and hold a TIN. Moreover, a TIN was also required to claim certain types of state benefits, conduct land transfers, or obtain motor vehicle licenses (Uganda Revenue Authority, 2025). As of mid-2018, Mayega et al. (2019) show that about 30,000 individuals possess more than one TIN. Moreover, at the time, the employees' registration process did not validate the employee TIN submitted by the applicants, preventing the URA from unambiguously linking employees with employers (Mayega et al. 2019).

Between 2014 and 2018, 85 per cent of the tenants' TINs declared by landlords in rental income tax returns were either missing or incorrect, and information on tenants (33 per cent) and property addresses (77 per cent) was inaccurate. Likewise, half of the supplier TINs in withholding tax returns in 2020 are wrong, while most of the employees declared in the PAYE returns have incorrect identification details. The same inconsistencies plague income tax return data. Approximately one-third of the TINs of company directors are invalid (Mayega et al., 2021). The latter finding is alarming, given that company directors are also liable to remit individual income taxes, and the URA inevitably struggles to link individual directors to their companies (Santoro and Waiswa, 2022).

In addition, in the same diagnostic of the taxpayer registry, Mayega et al. (2019) find that as many as 44 per cent of all registered taxpayers have contact details identical to those of at least one other registered taxpayer—a share that translates into more than half a million taxpayers. This is likely because tax agents provided their details rather than taxpayers' when registering different clients. This practice might arise because of the requirement to provide an email address to register, which many taxpayers might not have, and because tax agents want control over their clients' filing process to demand more frequent payment (Mayega et al., 2019; Groening et al., 2024). Duplicates also refer to the national identification number (16,000) and passport number (6200) linked to taxpayers' accounts (Mayega et al., 2019).

With the intention of both improving the quality of data in its registry and expanding the registry, the URA has recently embarked on a broad governmental effort to promote inter-agency data sharing. It is now benefitting, with different degrees of consistency, from receiving data from the National Identification and Registration Authority (NIRA), the Uganda Registration Services Bureau (URSB), the Kampala Capital City Authority (KCCA), the National Social Security Fund (NSSF), the Uganda Bureau of Statistics (UBOS), among other governmental entities. The data-sharing practice between URA and NIRA is enabled by the two laws underpinning the establishment of NIRA in 2015: the Registration of Persons Act (2015) and the Data Protection and Privacy Act (2019). Both acts mandate NIRA to share data with government entities involved in revenue generation, most notably the URA. Given the Africa-wide trend of escalating cyberattacks, featuring greater sophistication, higher frequency, and broader financial and reputational impact, a solid regulatory background allowing secure data sharing was instrumental for the successful implementation of the policy.

NIRA and URSB, respectively, provide the revenue administration with information about individuals and businesses relying on an Application Programming Interface (API). The API allows the transmission of taxpayer data from NIRA and URSB to the URA. Currently, the application does not support other potentially valuable functions, such as real-time data exchange between institutions, the ability to update taxpayer information, or notification of updates in any of the registries. The data transfer occurs each time a new application on the Instant TIN portal triggers a request for information from URA to either NIRA or URSB, following a "pulling" mechanism. Despite future government plans to fully integrate systems between these institutions, the data are still shared unidirectionally from the NIRA and URSB to the URA.

2.2. Instant TIN

In line with the wave of digitisation efforts across African tax administrations, after the implementation of a robust Integrated Tax Administration System (ITAS) (Occhiali et al., 2022), in January 2022, the URA rolled out the "Instant TIN," an online registration system that relies on the transfer of data from NIRA and URSB. The Instant TIN allows individuals and businesses to register for income tax with the URA. Unlike

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the regular registration process, the Instant TIN provides the taxpayer with a TIN as soon as they register, which can be used immediately for most tax-related activities. Previously, taxpayers had to wait two working days to obtain a TIN.

Online individual registration through the Instant TIN begins with, and is conditional upon, submitting the national identity number (NIN) and date of birth. The system then retrieves taxpayer data from NIRA and automatically populates the name, date of birth, and place of birth. When registering a business, the taxpayer provides their business registration number (BRN), which triggers the push-out of business information from URSB to URA. Among this information are the business name, registration date, and entity type. The taxpayer must manually enter information such as the source of income and contact details. In theory, the Instant TIN benefits both the taxpayers and the tax administration. First, it automates income tax and VAT registrations of individuals and businesses, saving them time and money. Before the rollout of the Instant TIN, registering for income tax and VAT entailed completing an application form online, providing identity information and details about the business, and delivering the signed terms and conditions physically to the nearest URA office. Similarly, VAT registration required proof of business location, including a physical visit by a URA official to the taxpayer's premises. Once URA officers manually verify the information, taxpayers will receive a TIN within two working days. Therefore, the Instant TIN streamlined and accelerated the registration process for taxpayers. Second, the Instant TIN is widely recognised as a significant improvement to URA's internal processes (Interviewee URA14: "The instant TIN is the way to go because you save a lot of time with paperwork" [URA14, Kampala, December 2022]). It reduces the time and resources spent on registration tasks and avoids identity duplication in the taxpayer registry. While this feature of the Instant TIN is undoubtedly an improvement, the broader effects of the technology on other aspects of tax administration (e.g., data quality and broader administrative costs) are unclear. With this paper, we shed light on some of them.

Despite its innovative features, the Instant TIN system presents some important shortcomings. First, once registered with the Instant TIN, taxpayers can immediately perform certain activities, such as making presumptive income tax payments, importing and exporting goods, and transferring motor vehicle ownership. Actions such as completing the VAT registration and filing returns require the new taxpayer to visit the URA and provide additional information. Such steps are critical in the taxpayers' compliance journey, although they are not always undertaken, as discussed in Section 4.3. The Instant TIN design envisioned that each taxpayer registered with Instant TIN would be contacted by a URA operator by phone to amend inaccurate information and collect missing details, as well as onboard them. Financial constraints and inaccurate taxpayer contact records, however, prevent this from happening systematically (Interview URA16, Kampala, October 2022).

Second, the Instant TIN does not validate the information submitted by taxpayers. This applies to practically all fields, starting from the taxpayer's identity. While the system can check if the NIN or BRN exists, it cannot validate this information against who is making the application. This feature exposes the URA to the risk of allowing the tax registrations of income earners' family members, which reduces their tax liability. Moreover, the Instant TIN design does not allow the validation of applicants' contact details (email address and phone number), which are crucial for taxpayer compliance. In fact, not only are they needed by the tax administration to contact taxpayers and sensitise them about their obligations and communicate approaching deadlines, but their email address is also necessary to log in to the taxpayers' online account, where, among other activities, tax returns are filed. We will elaborate more on the implications of such system flaws in Sections 4.2 and 4.3. Instead, turning to the reasons for the design flaws of the Instant TIN, we can draw on our contextual knowledge and others' contributions to offer some reflections. We would say there are two concurring dynamics. First, as explained in our interviews, the fact that the Instant TIN was designed and implemented without an overarching and comprehensive design, adding features incrementally, meant that important aspects, such as information validation, were overlooked (URA12, Kampala, October 2022). Second, and relatedly, the URA was, and still is, under great pressure to expand the tax base with less focus on the quality of new entries. Third, the silos-like structure of government implies that the URA is not under strong pressure to maintain an accurate

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taxpayer registry, as its systems do not interact with those of other government agencies (Groening et al., 2024). These intertwined facts shaped the development and implementation of the Instant TIN system.

2.3. Taxpayer Register Expansion Project (TREP)

The implementation of the Instant TIN comes in the context of a major effort to encourage citizens and small businesses to register for tax purposes. An important pillar of this process is the Taxpayer Register Expansion Project (TREP), an initiative launched in 2013 by the Government of Uganda, in collaboration with the URA, URSB, KCCA, and the Ministry of Local Government. The URA-NIRA integration initiative originated from TREP's later stage, when third-party data became central to taxpayer registration (URSB, 2018). TREP has multiple objectives: registering businesses, educating them about the tax system, reducing compliance costs, and matching the information available to government agencies collecting revenue.

Various methods have been deployed to enhance taxpayers' registration. From TREP's launch in 2013 until 2015, one-stop shops and door-to-door visits were the only channels of taxpayer registration. One-stop shops are service centres including representatives from all the agencies involved, URA, URSB, KCCA, and local government. This aspect allows businesses to register with such institutions all at once, avoiding the monetary, time, and psychological cost of multiple procedures and duplication of information. Moreover, while registering, new taxpayers receive facilitation to comply with their obligations. Taxpayers attend one-stop shops voluntarily, possibly persuaded by the intense solicitation from the government, including public appeals from the URA's Commissioner General (Monitor 2021). At the set-up of one-stop shops, TREP officers also met with local councils and leaders to familiarise them with their activities. Door-to-door campaigns, instead, had a more "forceful" nature. In these instances, TREP officers would visit businesses and issue tax assessments. In case the business owner refused to register their business for tax and did not show a business licence, the officers would close their businesses and direct them to the nearest one-stop shop to get a business licence and register with the URA (Jouste et al., 2021). Therefore, it is realistic to say that registrations performed through door-to-door campaigns, and some at one-stop shops, are "forced registration." As discussed in Section 3, we are not able to identify from the data whether each registration was performed voluntarily by taxpayers at one-stop shops or forcefully. Starting in 2015, TREP included awareness campaigns like sensitisation workshops, radio advertisements, and newspaper scripts (Jouset et al 2021). It is likely thanks to the practical support provided at one stop-shops, to the ease of registration, and to the massive communication and engagement efforts from the government and the URA, that TREP has not been strongly opposed by the Ugandan informal sector. Anecdotal evidence from URA and media outputs suggests that the possibility of registering informal businesses without visiting multiple—often far—offices has facilitated many businesses' voluntary entry into the tax net (Bemanya, 2017).

On the other hand, forced registrations are likely to be resisted by taxpayers unwilling to comply with the tax law. One of the margins of taxpayers' resistance could be by providing wrong information to TREP officers, to prevent future engagement from the revenue authority. This would be possible due to the lack of information validating mechanisms in the Instant TIN system. Moreover, forcing taxpayers into registration might have repercussions on their perceptions of the URA and of the government more generally, deteriorating future compliance (Gallien et al., 2023). While the lack of granular data on perceptions of new entrants prevents us from delving into this very relevant aspect of forced registrations, an emerging body of literature looking at interactions between tax officials and taxpayers suggests that aggressive and intimidating approaches towards taxpayers erode their motivation to comply with taxes (Mascagni et al., 2025). Since the Instant TIN rollout, TREP has been leveraging such technology to expedite and ease the registration process in the field. Registration officers involved in door-to-door campaigns and based at one-stop shops use the instant TIN to register new taxpayers in case they have a NIN or a BRN. As discussed more in-depth in Section 4.1, evidence shows that many previously informal businesses registering with Instant TIN did so through TREP (44 per cent). TREP in-person registrations are carried out by external contractors. Anecdotal evidence suggests the registrations derived from this

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modality are at least partly inaccurate, given that officers are paid solely based on the quantity of registrations performed, with no incentive to collect accurate data and the potentially lower alignment of the contractors with the URA mission and standards (Mayega et al. 2019). Moreover, the technical features of the registration portal meant that, in the initial years of TREP, officers could circumvent the requirement to provide a valid phone number, the details provided to register businesses were not validated, and TIN-approving officers had the possibility to ignore the system's warning and approve the registration of a duplicate TIN—which they did 49% of the times (Mayega et al. 2019; Groening et al., 2024). Since the end of 2021, the URA has embarked on a new—automated and less costly—avenue to register large numbers of taxpayers as part of TREP. Specifically, URA heavily uses third-party data to spot and register business activities not yet in the tax net. To do so, URA combines datasets of different natures and sources, like those from the National Social Security Fund (NSSF) or the land registries. Table A1 in the Appendix reports the institutions providing data to the URA. Once an economic activity is identified, the URA registers new taxpayers by relying on third-party contact information, mainly phone numbers. If contact information allows, only after that does the URA inform taxpayers of their new registration via SMS. During this phase of TREP, hundreds of thousands of registrations have been performed. This type of registration falls out of the focus of this paper, which investigates the impact of integrating ID databases in the URA registration processes (the Instant TIN system); it is still relevant to provide a full picture of taxpayer registration channels in Uganda.

While in 2022 most registrations are of this kind, standard registrations from taxpayers voluntarily enrolling in the tax system have become a minority. Nevertheless, one-stop shops and door-to-door visits continue to this day. Figure 1 shows the trend of registrations over time by modality.

3. Data and methodology

3.1. Data sources

We make use of different data sources, both qualitative and quantitative. On the one hand, we refer to qualitative data to understand the context, describe the practices and challenges, and provide essential details to our arguments grounded in the local reality under study. On the other hand, we use administrative data to produce more quantitative results on the drivers of registrations and the potential impacts on data quality and

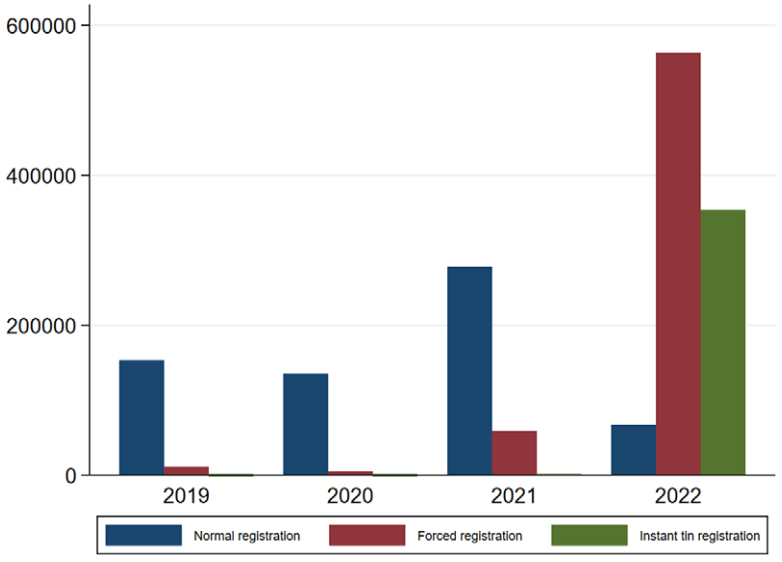


Figure 1. *Trend of registrations over time.*
Source: Authors' calculations on URA administrative data.

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accuracy. We collected qualitative data from 17 in-depth interviews with government officials. Interviews were conducted in person in Kampala in the second half of 2021 and 2022. Interviewees mainly included URA tax officials from different departments, such as domestic taxes, process management, IT, TREP unit, and the taxpayer registry cleaning team. Importantly, we also spoke to government officials outside URA, including at NIRA, URSB, KCCA, and NITA-U. Interviewing both parties of the data-sharing agreement was crucial to gaining a more comprehensive understanding of the integrations and gauging the actors' perspectives. Interviews lasted, on average, 1 hour. Table A2 in the Appendix summarises our data collection efforts.

Second, we have access to a wealth of administrative data from the URA. Relevantly, we use the whole taxpayer registry, including all registrations for tax purposes, as of December 6, 2022. The registry also contains information on whether the registration occurred through Instant TIN, the normal process, or forced registrations. For ease of analysis, we first restrict our sample of registrations to the years 2019–2022, as most of the registrations took place in this period, with a constant rise in registration numbers—in 4 years, a total of about one million taxpayers are registered. We restrict our sample to taxpayers who registered through the standard process or Instant TIN, excluding the automated forced registrations that constitute the latest TREP development. The vast majority of taxpayers in the dataset are individuals (92%), while the remaining are companies. While most of the patterns we produce refer to individual taxpayers, we also consider companies for the sake of completeness and to highlight potential differences in findings across the two categories.

Figure 2a below shows the pattern of registrations, clearly indicating the dramatic fall in standard registrations in 2022 when the new technology was launched, while Instant TIN registrations became the majority. About 350,000 taxpayers registered through the simplified channel, representing 8 per cent of registrations in 2022, and more than a third of total registrations in the last 4 years, excluding forced registrations. Considering all the registrations in 2022, the ones done through Instant TIN are 35 per cent. Among Instant TIN registrations, 39 per cent must be considered part of the on-the-field TREP mass registration effort. Instant TIN registrations had a higher trend in early 2022, as indicated in Figure 2a. Almost all Instant TIN registrations come from individuals (99%), as shown in Figure 2b. It is also true that the integration for companies started only in late 2022, before being halted in 2023, hence the lower numbers (Figure 2b). The analysis below will show results by disaggregating along this dimension. Apart from that, additional detailed information at the taxpayer level is available in the registry, from biographic details (name, gender, date, and place of birth) to contact information (phone number and email address), as well as tax-related features such as registration date, tax type, sector of activity, tax centre, and so forth We will use such information in the analytical framework described below. Importantly, and specifically to the interaction between TREP and instant TIN, the registry does not indicate whether the registration is performed forcefully by TREP officers in the field campaign activities or voluntarily by taxpayers seeking registration support at TREP one-stop shops.

3.2. Methodology

We deploy different methodological approaches based on the data we analyse. First, we applied thematic analysis to the qualitative data from the interviews. The coding of the interviews was done with a specific text analysis software (Nvivo). Given the semi-structured nature of our interviews, we used *open coding*, meaning that we did not have pre-set codes, but we developed and modified them during the coding process. The critical dimensions that emerged from the evidence relate to the nature of the data-sharing between institutions, the impact of the Instant TIN technology both on taxpayers' experience and the URA's functions and processes, and recommendations and perceptions. Table A3 in the Appendix summarises the dimensions or functions of the thematic analysis, as well as the number of sources/files with built-in, and the number of references associated with that dimension.

Second, we produce descriptive evidence on Instant TIN registration uptake and potential repercussions on data quality. We describe the selection into Instant TIN registration with a simple OLS framework, performed on the subpopulations of individual and incorporated taxpayers:

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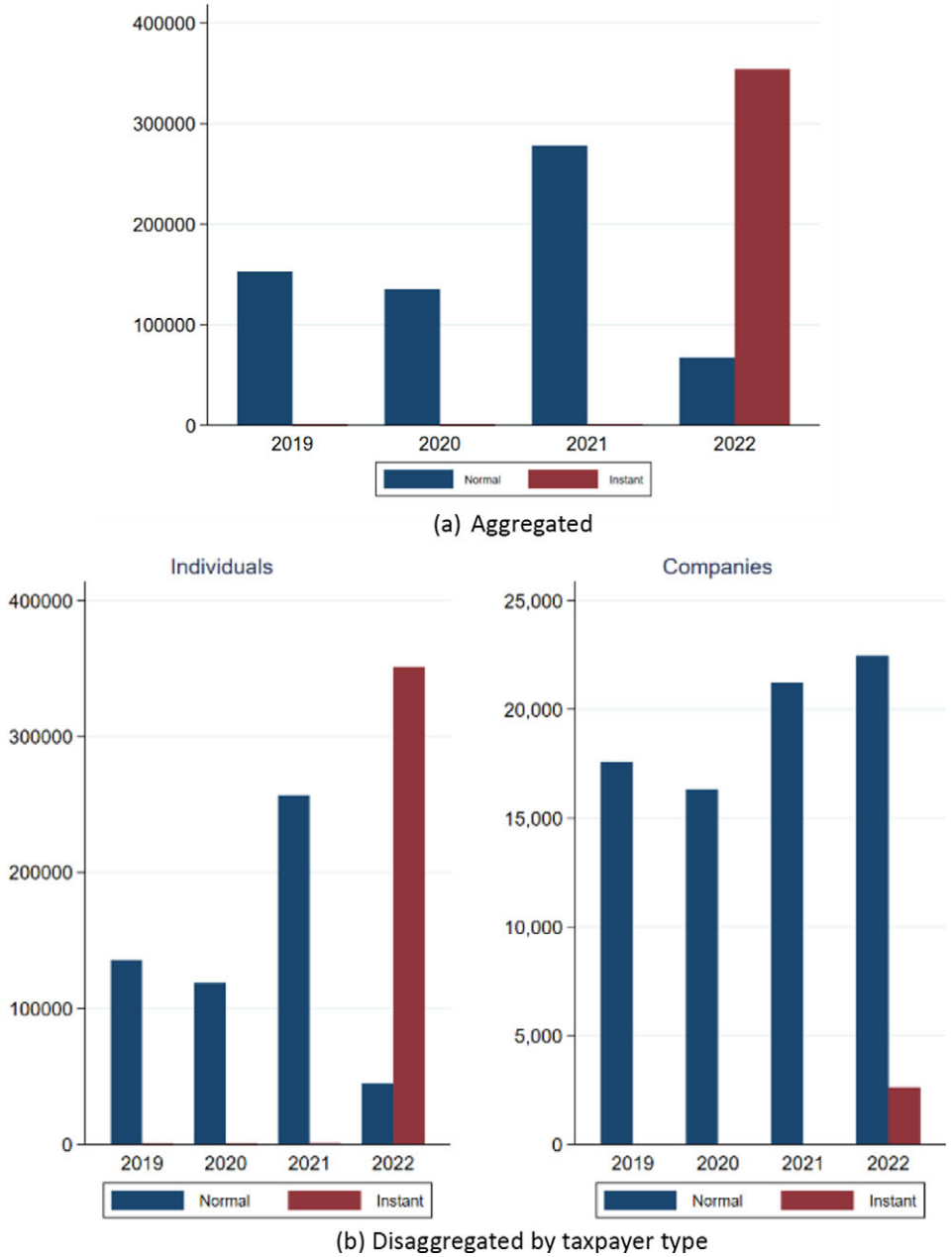


Figure 2. *Registration trends by year. (a) Aggregated (b) Disaggregated by taxpayer type. Source:* Authors' calculations on URA administrative data.

$$Y_i = f(\beta' Individ; \gamma' Business; \delta' Tax; v) \tag{1}$$

Y is the outcome of interest, that is, the Instant TIN registration. *Individ* is a vector of taxpayer-level information derived from the registry, including gender, age, and place of birth. By construction, such factors are available only for our estimation on individual taxpayers. *Business* refers instead to business-level information, namely the type of economic activity. Relatedly, we can identify whether the taxpayer

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was already registered as an official business with other government institutions, such as KCCA for individuals and URSB for companies, or whether they come from the informal sector, a dimension we explore more in-depth in the analysis. *Tax* indicates a set of variables referring to the tax profile of the taxpayer, namely the tax centre to which the taxpayer is assigned at registration, the registration date, and whether the taxpayer has been registered under the TREP programme.

As a second exercise, we set up another OLS framework, as described below, to understand the correlations between Instant TIN registration, now an explanatory factor, and data quality and accuracy:

$$Y_i = f(\alpha' Instant; \beta' Individ; \gamma' Business; \delta' Tax; v) \tag{2}$$

In this case, Y is a set of indicators for data quality, namely: (i) a dummy for multiple TINs, indicating if the same taxpayer holds more than one TIN, (ii) a dummy for invalid (including duplicate and missing) email address, (iii) a dummy for invalid (including duplicate and missing) phone number, (iv) a dummy for excessively large or small age (or outliers, measured as larger than twice the normalised difference between age and the overall mean), (v) a dummy for missing sector of activity. Outcomes (i), (iv), and (v) are available for individuals only and not for companies. With (i), we consider duplicate entities by looking at the taxpayer's name and the taxpayer's date of birth, which can be extracted only for individual taxpayers. For the same reason, the age variable in (iv) is given only for this taxpayer category. As concerns outcome (v), gaps in sector information occur only with individuals, while the sector is specified and present for all companies, regardless of their registration mode. Also, when computing gaps in sector information, we drop taxpayers registered for taxes on employment (PAYE), as such information is not collected for that tax type. Lastly, *Instant* is our key explanatory factor, taking a value of 1 for Instant TIN registration and 0 for standard registrations. The other variables are the same as in (1) and are used here as control variables to make the estimation more precise.

With equation 2, we first match Instant TIN and normal registrations with a Kernel-based propensity score matching (PSM) to strengthen our analysis and make the two groups more comparable. While we are not attempting to claim any causal effect of Instant TIN registrations on data quality, we are prudent in enhancing the similarity across normal and Instant TIN registrations. Self-selection into Instant TIN registration may introduce bias in our estimate—as taxpayers choosing Instant TIN registrations may be more or less prone to provide accurate data to the URA—which we try to address with PSM. At the same time, it is also true that taxpayers self-selecting into Instant TIN may do so for the ease and timeliness of the process and not for the in-built data requirements the registration comes with, the latter directly affecting data quality. Thanks to the Kernel PSM, we match every observation in the Instant TIN registration group with a weighted average of units from the normal registration group based on a propensity score from a logistic regression of the indicator variable for registering with Instant TIN as the outcome. After matching, we run regression 2 on our outcomes of interest following a doubly-robust estimator approach (Robins et al., 1994; Wooldridge, 2007; Kaiser, 2013). In sum, we combine PSM-derived weights and outcome regression with covariate controls, adjusting for the same covariates used to build the propensity score. This approach yields a "doubly robust" estimator—consistent if either the propensity model or the outcome regression is correctly specified (Słoczyński and Wooldridge, 2018). In both equations 1 and 2, heteroskedasticity-robust standard errors are used.

When it comes to assessing the quality of the matching, Figure A2 shows that PSM is successful in reducing imbalance in the different covariates after the match. Concerning the two main assumptions the PSM builds upon, *unconfoundedness* and *overlap* in log odds, while the former cannot be directly tested, it can be respected by including all the potential confounding variables available in our dataset. The latter requires that the propensity score distributions of Instant TIN and normal registrations sufficiently overlap, indicating a similar probability to be included in both groups, mimicking a standardised experiment. Figure A3 shows that this assumption is partially satisfied, and about 21 per cent of the taxpayers are dropped. For them, matching weights could not be built as taxpayers lie outside the common support. This means that the following estimates refer to 80 per cent of taxpayers in the registry, quite a high share which ensures generalisability to the overall taxpayer population.

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As a last note, our analysis does not look at impacts on taxpayer compliance behaviour and revenue collection but focuses on data quality and tax administration functions. The main reason is that most Instant TIN registrations took place in 2022 (Figure 2), and new registrations are required to file their tax returns only by the end of December 2023. We decided to give these taxpayers enough time to file and focus on other outcomes that matter for the internal functioning of the URA. Future research will instead focus on the impacts of Instant TIN registrations on compliance and revenue collection.

4. Results

4.1. Anatomy of Instant TIN registrations

As a first exercise, we map the correlates of Instant TIN registrations using taxpayer-level data. This analysis compares Instant TIN registrations from January to November 2022 to the normal registrations from 2019 to 2022. Results remain consistent if we consider normal registrations in the same period as instant TIN registrations, January to November 2022, or if we consider the same period 1 year earlier, in 2021. We opted for considering the whole period 2019–2022 to enhance the generalisability of our results.

First, we compare key taxpayer features between the two groups and test whether the mean differences are statistically significant, as shown in Table 1 below. All mean differences are statistically significant, primarily due to high statistical power from a large sample of about 1 million registrations. Some immediately interesting patterns emerge from the table. First, Instant TIN registrants are more likely to be born in Kampala and more likely to be assigned to tax centres outside of it. Second, due to their sheer size, individual taxpayers represent the totality of Instant TIN registration (99 per cent), also because of the higher feasibility this solution had for individuals compared to companies. Third, female and younger taxpayers are much more likely to register through Instant TIN than the normal process. Fourth, previously informal businesses are much more relevant in the subgroup of Instant TIN registrations

Table 1. *Mean differences by type of registration*

	Normal 2019–22		Instant 2022		
	Mean	Obs.	Mean	Obs.	Difference
Kampala tax centre	0.36	633,478	0.3	350,672	0.07***
Kampala born	0.08	633,478	0.13	354,600	−0.05***
Individual	0.88	633,478	0.99	354,600	−0.12***
Female	0.31	555,904	0.36	351,983	−0.05***
Income source: employment	0.55	555,904	0.48	351,983	0.07***
Income source: registered business	0.47	630,175	0.03	354,429	0.44***
Income source: assets	0.02	559,504	0.05	354,429	−0.03***
Income source: rental	0.02	557,599	0.03	354,429	−0.01***
Income source: informal business	0.04	633,478	0.42	354,600	−0.38***
<18	0	633,478	0	354,429	−0.00***
18–24	0.06	633,478	0.13	354,429	−0.08***
25–34	0.43	633,478	0.48	354,429	−0.05***
35–44	0.21	633,478	0.21	354,429	0.00***
45–54	0.09	633,478	0.09	354,429	0
55–64	0.05	633,478	0.04	354,429	0.00***
> = 65	0.17	633,478	0.04	354,429	0.13***
TREP reg.	0.01	633,478	0.39	350,672	−0.37***
N	988,078				

Source: Authors' calculations on URA administrative data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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(42 per cent) than in normal registrations (4 per cent), where, instead, officially registered businesses with other government institutions are the majority (47 per cent). Lastly, the on-the-field arm of TREP (one-stop shops and door-to-door visits) is responsible for about 40 per cent of Instant TIN registrations, in turn mostly individuals, while just a negligible portion of normal registrations was done through TREP (1.3%).

Putting all these features in a single framework, Figure 3 reports the coefficient plot from the linear OLS estimation in Equation 1, for both individuals (subgraph a) and companies (subgraph b). Again, the coefficients are highly statistically significant due to the large sample size. For individuals (Figure 3a), two key factors strongly correlate with the probability of registering with Instant TIN: being an informal business and registering through TREP. This is not surprising, as TREP officials, performing in-person registrations in door-to-door campaigns and at one-stop shops, mainly targeted informal individual businesses. Data show that as many as 44 per cent of previously informal businesses registering with Instant TIN did so through TREP, compared to 2 per cent among those registering with standard procedures. At the same time, being a formally registered business with other government institutions, an essential prerequisite for registering with URA, is negatively associated with Instant TIN registrations. Although marginal, gender plays a role, as being female is positively associated with the simplified registration procedure. The age distribution also shows a specific pattern, with older taxpayers being less prone to register with Instant TIN than younger ones. The magnitude of the positive correlation with Instant TIN is higher the younger the taxpayer is, compared to the excluded category, that is, the oldest taxpayers (>65).

For companies (Figure 3b), the availability of information is more limited, hence the regression considers a smaller set of features. Nevertheless, the primary correlate with Instant TIN registration is being previously informal, consistent with what is found for individual taxpayers. TREP is no longer a key factor, as a negligible minority of companies registered through the programme (0.03%).

Some considerations can be made based on the evidence above. First, the Instant TIN, simplified and much quicker, can attract different categories of taxpayers, like women or younger individuals, who might find it more suitable to register with this technology rather than going through the more burdensome standard process. Female and younger individuals could feel less comfortable navigating the complex bureaucratic spaces and be less knowledgeable about the tax system, as shown in the literature (Santoro et al., 2023). Female taxpayers might also appreciate the online procedure because of the possibility of registering without interacting with tax officials. In this sense, a simplified online system like the Instant TIN holds the potential to make the tax system more inclusive and accessible. Moreover, registering taxpayers at a younger age ideally fosters a culture of compliance to be followed throughout their lifetime.

Second, the role of on-the-field TREP campaigns in boosting Instant TIN registrations seems central. On the one side, this shows how intense tax registration programmes could exploit technology to reach their targets, ideally more easily and quickly. On the other hand, due to data limitations discussed in Section 3, the more practical question remains on the extent to which Instant TIN registrations associated with TREP were performed voluntarily or forcefully. We know that some registrations were not performed completely independently by taxpayers, especially after door-to-door visits (see Section 2). Third, the new technology seems pivotal in formalising previously informal entities. As displayed in Figure A5, previously informal businesses are abundant within Instant TIN registrations, while only about 3 per cent chose the normal route to register with URA. This could be due to the simplified process, which may be preferable for less sophisticated, less tax-savvy, and financially excluded businesses. At the same time, however, this finding depends on the TREP strategy, which, by policy intent, primarily targeted informal entities. Forty per cent of previously informal entities are registered through on-the-field TREP. Critically, the majority of informal taxpayers, 60 per cent, opted for the Instant TIN outside of TREP. This may hint again to a strong preference for this simplified digital solution from the informal category, in turn likely to intersect with the previously discussed female and younger groups.

More field research would be needed to fully understand the registration journey of taxpayers under TREP, and its impact on new entrants' perceptions of the tax system and compliance. Not only might forced registrations deteriorate perceptions and attitudes towards the tax system, but taxpayers voluntarily might also be less familiar with the requirements and complexities of the tax system.

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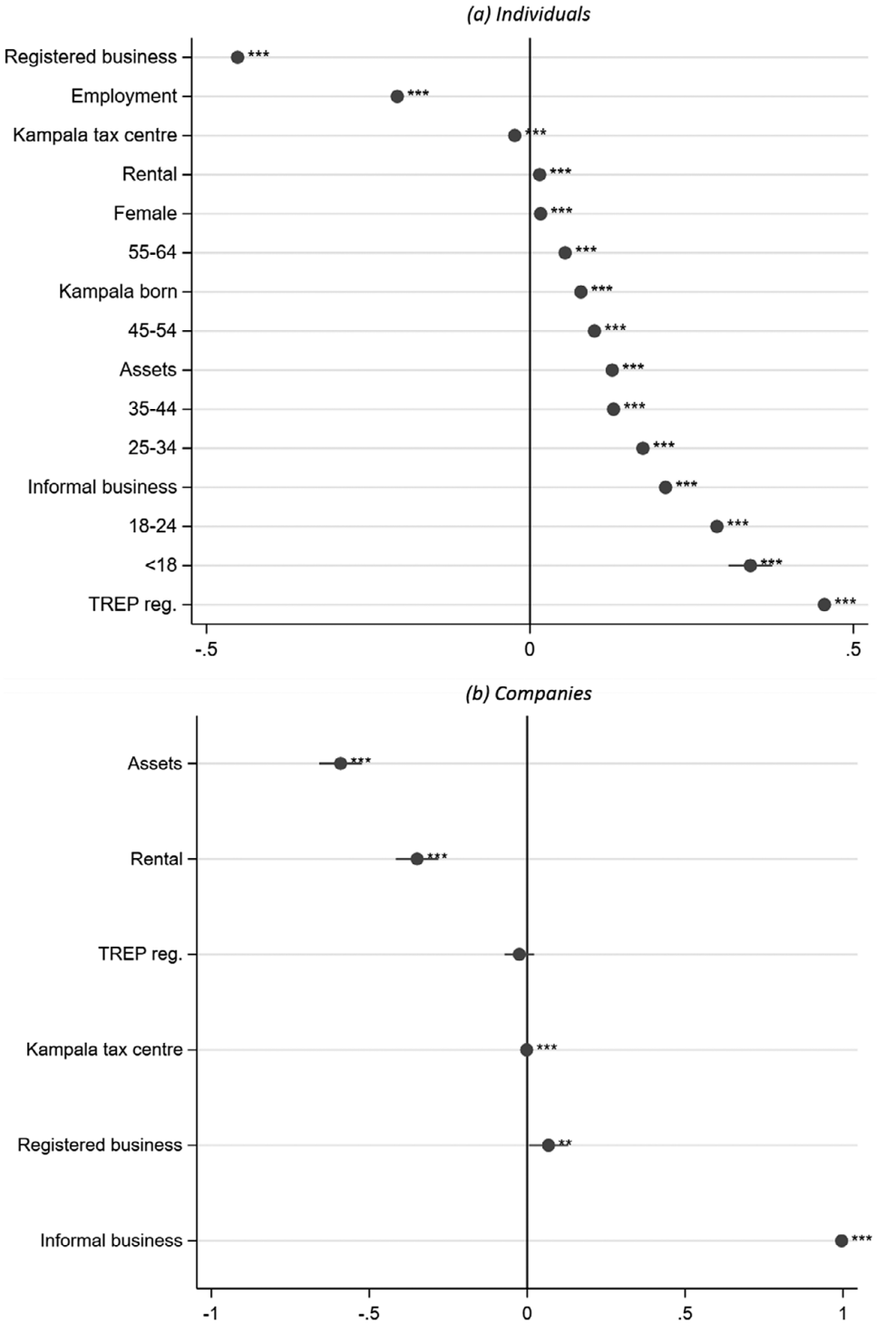


Figure 3. *Correlates of Instant TIN registration, OLS framework. (a) Individuals. (b) Companies.*
Source: Authors' calculations on URA administrative data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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4.2. Impacts on data quality

Furthermore, we explore the data quality of Instant TIN registrations and their implications for the URA. Table 2 below reports the OLS coefficients on five different data quality outcomes, as explained in Section 3. All coefficients are highly statistically significant due to the large size of the groups we analyse, which enables precise estimations.

A first key finding is that Instant TIN registration helps reduce the multiplicity of TINs for individuals (col. 1). This is assured by design since an Instant TIN is generated upon the submission of a NIN—the latter being unique—and only one TIN can be generated for every NIN. While TIN multiplicity already was not a big issue in the standard registration procedures (around 1 per cent), such occurrence is reduced to zero when national identity numbers are used at registrations.

Regarding the validity of the contact details, column 2 indicates that Instant TIN registrations correlate with a significant reduction in the probability of seeing an invalid, missing, or duplicate email address. The reduction of 8 p.p. is also quite sizeable compared to the average (19 per cent) of invalid email addresses among normal registrations. Importantly, it is true that Instant TIN registrations present an overall higher share of invalid emails, as shown in Figure A6. However, this negative pattern is primarily due to on-the-field TREP registrations, where tax officials would input dummy email addresses to proceed with the registration form. Column 2 indicates that when TREP is accounted for as a control in the OLS framework, the negative effect of Instant TIN registrations on email validity dissipates, and a positive effect on email accuracy appears. This means that the negative effect of TREP is so strong on the outcome that, when included, it shows the actual positive effect of Instant TIN registration on email address quality.

There is, however, the possibility that the register cleaning unit at URA has the merits of the positive association of Instant TIN with the quality of email data. Our interviewees at the URA stressed that one of the main flaws of the Instant TIN system is that it does not validate email addresses or phone numbers. URA officials have stressed how this system feature causes challenges in contacting taxpayers to onboard them. Because of such and other flaws in data, the URA has mobilised internal resources to increase its capacity to clean the registry as the Instant TIN data come in.

That said, a similar positive effect on data quality is found on mobile numbers (col. 3), with a drastic decrease of 6 p.p. in invalid, missing, or duplicate numbers in Instant TIN registrations, or about a 36 per cent reduction compared to the control mean. Most invalid phone numbers in normal registrations are due to duplicates, now reduced to a negligible share (Figure A7). These results must be understood similarly to

Table 2. *Correlation between Instant registration and data quality*

	(1)	(2)	(3)	(4)	(5)
	Multiple TIN (Indiv. only)	Invalid email	Invalid phone number	Age outlier (Indiv. only)	Invalid sector (Indiv. only)
Instant TIN	−0.01***	−0.08***	−0.06***	−0.00***	0.12***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Controls	Yes	Yes	Yes	Yes	Yes
Mean among normally registered	0.011	0.193	0.162	0.066	0.070
R-sq.	0.000	0.853	0.271	0.798	0.658
N	691,373	693,970	693,970	691,332	250,815

Source: Authors' calculations on URA administrative data. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions are run on a sample of Instant TIN and normal registrations matched through propensity score matching, as described in Section 3. Column 1 refers to an indicator for duplicates in taxpayer identity, whereby taxpayers with the same name and date of birth hold different TINs. Column 2 uses an indicator for invalid email addresses, including missing and duplicate ones. The same applies to the outcome in column 3. Age outlier in column 4 is an indicator for age being larger than twice the standardised difference from the average population age. Column 5 uses an indicator for an invalid sector, including missing values. Columns 1, 4, and 5 refer to individuals only, while PAYE taxpayers are also excluded in column 5. More details on the estimation strategy in Section 3.

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the ones on email addresses. The Instant TIN does not allow phone number validation, leading to invalid entries either due to the hasty way TREP officials might perform registrations or to the—voluntary or involuntary—inaccuracy of data inputted by taxpayers. As we gathered from our interviews, such invalid information has been partly addressed with a registry cleaning exercise.

Furthermore, no significant effect is found on age outliers and the accuracy of age information (col. 4), despite Instant TIN registrations being significantly younger than normal ones (Figure A4). Lastly, some concerning evidence on the accuracy of sector information emerges from column 5, indicating that registering with Instant TIN increased the likelihood of invalid or missing sector records. The 12 p.p. increase represents almost twice the average of invalid sectors in normal registrations. This result is likely since providing sector information is not mandatory when registering as an individual taxpayer, while it is when registering as a company, hence the absence of gaps in such information for incorporated taxpayers (and the removal of companies from the regressions). The information about the sector of economic activity for companies is directly retrieved from URSB data, which is why the sector field is more accurate and never missing for this category of taxpayers. Despite this, our interviews with URSB officials highlighted how the reported business sector in URSB data might still not reflect the current business activity. In Uganda, there is no regulation mandating businesses to update their business sector with URSB, even if the nature of the business activity substantially changes.

Additional interesting evidence arises when disaggregating by individual and company registrations, referring to the separate NIRA and URSB data-sharing processes (see Section 2). Table 3 below indicates that most benefits in data quality come from individual Instant TIN registrations. On the contrary, companies registering with Instant TIN do not provide better quality email addresses and, even more concerningly, present a higher likelihood of having an invalid phone number. This might be because Instant TIN registrations for companies have been enabled later than those for individuals—as reflected in the low number of Instant TIN registrations of companies—and at the time of the analysis, the registry cleaning performed for individual new registrations had not occurred for business ones. As mentioned above, the URA has halted the Instant TIN for businesses as it undergoes some improvements.

As a last piece of evidence, results from Table 2 do not change if we restrict the comparison group to normal registrations in 2022, in parallel with Instant TIN registrations. Appendix Table A4 reports the OLS results using the matched sample. No change is found on multiple TINs, age, and invalid sector information. Results on contact details accuracy keep the same direction—with Instant TIN reducing inaccuracies—but, if anything, they get smaller in magnitude. Likewise, results do not change if we perform a naïve OLS regression without imposing any propensity score matching between Instant TIN

Table 3. *Correlation between Instant registration and data quality by taxpayer type*

	(1)	(2)	(3)	(4)
	Invalid email Indiv.	Invalid email company	Invalid phone number Indiv.	Invalid phone number company
Instant TIN	−0.09***	−0.00	−0.09***	0.31***
	(0.00)	(0.04)	(0.00)	(0.04)
Controls	Yes	Yes	Yes	Yes
Mean among normally registered	0.161	0.416	0.115	0.503
R-sq.	0.858	0.002	0.013	0.043
N	691,373	2597	691,373	2597

Source: Authors' calculations on URA administrative data. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions are run on a sample of Instant TIN and normal registrations matched through propensity score matching, as described in Section 3. Columns 1 and 2 refer to an indicator for invalid email addresses, including missing and duplicate ones. The same applies to the outcome in columns 3 and 4. More details on the estimation strategy in Section 3.

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and normal registrations. Appendix Table A5 indicates that the coefficient estimates keep the same direction and significance level. If anything, naïve estimates are larger in magnitude, most likely because the two groups are quite different. This implies that the smaller PSM-based coefficients are more conservative and realistic after removing extreme imbalances across groups through the matching algorithm.

4.3. Impact on tax administration's core functions

What does this evidence mean for the potential of the Instant TIN—enabled by inter-institutional data sharing—to improve the core functions of URA? Our findings clearly hint at important repercussions on how URA performs its duties, specifically with registration and identification, enforcement, and taxpayer assistance. We discuss both the immediate benefits and the persisting challenges with the support of qualitative evidence from in-depth interviews.

There is a widespread view among URA, NIRA, and URSB officials that the data exchange foundational to the Instant TIN platform is a strategic direction for progress. From the URA's point of view, the current point-to-point data sharing improved the identification and registration functions. As discussed in Section 2, the Instant TIN was both the main channel of voluntary registrations for income taxes and VAT and a powerful tool for TREP, helping the URA contractors reach very high registration targets. In both cases, the benefits of the Instant TIN come primarily in terms of avoidance of duplication, reduced error-prone manual input of data, and time and resources saved in the registration process (URA11).

The Instant TIN also seems to have significantly improved the facilitation function of the URA. The data show that the success of the Instant TIN as a registration tool is especially for taxpayers who are individuals, previously informal, younger, and female. URA officials say this is driven by reduced compliance costs for these less tax-savvy, less established businesses. At least in the first registration stage, the Instant TIN spares individuals from visiting the URA to go through the registration procedures, identification, validation of documents, manual filling of registration forms, and provision of biographic data and information on the economic activity (URA1 and URA14). Moreover, it has massively reduced the waiting time for a TIN, allowing businesses to start operating immediately.

Both the uses of the Instant TIN—the online *voluntary* registration and to support TREP—however, seem to have brought along with the benefits some challenges to the URA. The data collected from this technology are not always of good quality. As we could extrapolate from our interviews, there are at least three reasons for this. First, the data stored in the NIRA and URSB datasets are not updated as frequently as they should. Thus, when the URA uses information from these sources, it populates the registry with mistakes. Second, the Instant TIN portal does not validate the information inputted by the taxpayer (Section 2). Thus, if the taxpayers—deliberately or not—input the wrong data, the system accepts it. Third, TREP officers are external contractors under short-term employment, paid based on the number of registrations performed and independently of their quality. This suggests—and it seems to be confirmed by the administrative data—that the registrations performed during TREP were not of good quality. A critical trade-off arises between quick registration targets and collecting accurate taxpayer information, especially since the provision of poor information at the point of registration is a deliberate act of resistance by taxpayers opposing attempts to tax them (The East African, 2020; Akol and Lees, 2021), especially when they see little benefits in terms of public services and bargaining power (Kjær et al., 2023) (URA16). This trade-off has been recently documented and explains the prevalence of nil filing in Africa, again due to the urgency of increasing registration numbers without much focus on the quality of tax returns information submitted by new entrants (Moore, 2022; Groening et al., 2024).

The poor quality of the data inputted through the Instant TIN has repercussions for URA's administrative costs and revenue mobilisation potential. Regarding the former, they consist both of the additional resources spent in the registry maintenance, which has increased since registration is done through the Instant TIN, and of the costs of contacting each taxpayer after registration via SMS or phone call to invite

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them to update their details in person at the URA offices. Indeed, as explained by a URA official, "*The registry update and cleaning function is done every year. The challenge is the numbers, because the speed of new registrations means that for each taxpayer whose information you update, you register many with inaccurate information. This links to the registration drive*" (URA16). In addition, *"Cleaning URA's register is also going to be a critical challenge, not least because information is captured differently in each participating registry. The only way to solve this is to get taxpayers to come back and update their information*" (URA11).

Costs in terms of revenue mobilisation potential manifest for two reasons. First, because storing wrong taxpayer information in the registry does not allow the revenue authority to onboard these taxpayers, educate them, and eventually enforce the tax law on them. For example, if the business address or contact information is invalid, the URA cannot reach the taxpayer and offer education programmes and other support initiatives. Similarly, if taxpayers provide invalid sector information or the system retrieves an outdated sector code from URSB, the URA would not be able to know the correct information unless taxpayers come to provide it—again, a very rare circumstance given the widespread resistance to taxes (The East African, 2020; Akol and Lees, 2021). Second, once registered with the URA on the Instant TIN platform, taxpayers must visit the URA to update their contact and location information. This step is mandatory for compliance with VAT. According to our interlocutors at the URA, roughly 50 per cent of Instant TIN-registered taxpayers come to amend their information and start their compliance journey. Since many taxpayers have used Instant TIN for VAT purposes, these gaps in following up on the registration process may imply significant compliance issues for a crucial tax in the country.

5. Conclusion and policy recommendations

This study is a preliminary assessment of the Instant TIN, a taxpayer registration system launched in January 2022 in Uganda, which relies on data sharing from other government agencies, NIRA, and URSB, to automate the applicant's identification and *instantaneously* generate a TIN. Registration through the Instant TIN is available to individuals and businesses and has been deployed with the promise of facilitating taxpayer registration and boosting the tax administration's functions. Data quality was also thought to benefit in a context like Uganda, historically characterised by gaps and inaccuracies in tax administration data (Section 2).

We present a mixed picture of the findings using administrative data from the URA and several in-depth interviews (Section 3). On the one hand, the Instant TIN dramatically increased registration numbers, amounting to 85 per cent of all registrations in 2022 alone—when excluding forced registrations—practically replacing normal registrations. We also show that the new technology is strongly connected to the TREP programme as a critical tool that field officers use to simplify their activities and reach registration targets. Unsurprisingly, previously informal businesses seem to use Instant TIN technology more, representing a large portion of the total, even if we do not know whether they voluntarily opted for it or have been forcefully registered by TREP officers as a result of door-to-door visits. Being young and, albeit only marginally, female also correlates with using the technology.

On the other hand, a more complex picture emerges exploring the impacts on data quality and URA functions. Analysis of administrative data indicates that the Instant TIN reduces inaccuracies in email addresses and phone numbers, yet it worsens the quality of business sector information. The new tool is also ineffective in improving data quality for companies. Furthermore, evidence from in-depth interviews hints at the costs of such flaws for the URA. These concerns mostly the massive data cleaning effort of the registry maintenance team to correct the data inaccuracies brought in using Instant TIN to support TREP and the potential revenue losses due to the impossibility of making use of the information—mostly contact and location details—to onboard taxpayers or enforce compliance.

Based on the evidence above, we make some policy recommendations. These can be useful in informing future data-sharing initiatives, where other institutional datasets could eventually be integrated with the URA's registry.

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First, the Instant TIN's capacity to validate third-party information could be significantly improved. First, the Instant TIN portal should be able to validate the taxpayer's email address and phone number. For example, the contact details provided during registration could be validated through a one-time passcode (OTP). This would guarantee the validity of contact details in the taxpayer registry. Such improvement would imply more effective facilitation and enforcement functions at the URA, making it possible to reach the totality of new taxpayers to offer support or enforce the tax law. Better quality data in the registry would also spare the revenue authority from employing sizeable resources to nudge taxpayers to update their information and clean the taxpayer registry from invalid taxpayers' records. Second, the URA should authenticate the identity of the person registering through the Instant TIN to prevent people from registering kin for tax purposes to decrease their tax liabilities. While the problem could be partly solved if NIRA incentivised people to update their information and notify the death of family members (URA12), deploying a facial or biometric recognition technology at registration would also improve the URA's identification function (NIRA11).

The above point relates to our second policy recommendation. The URA would benefit from shifting from the current point-to-point data-sharing practice with NIRA and URSB to an integrated data system. Thanks to such a shift, the URA could operate with more up-to-date information. The current system does not notify the URA (nor NIRA and URSB) when citizens update their information with other agencies. In theory, pairing a one-touch-point registration with real-time information updates could reduce registries' vulnerability to error-prone manual input or voluntary input of different information (URA16). Other benefits of such integration would be savings in registration costs for the involved institutions and for taxpayers, who would be spared from visiting multiple offices (URSB11).

Apart from benefitting the RRA registration function, the data integration would improve the URA monitoring and enforcement functions, as outlined in the URA11 interview:

> "Previously, businesses could operate informally and effectively out of reach of the URA. With the URSB integration, URA has real-time access to BRN data and therefore knows immediately when a business is registered, which means it can follow up directly with the business owners or indirectly with the local licensing authority to determine the entity's tax obligations. If businesses know URA has access to this data, they are more likely to comply with their tax obligations."

Third, more thought should be devoted to the policy targets and intents around registration and formalisation. Relatedly, more consideration should be given to how to measure the success of technological innovations and which performance metrics to look at. The increasing attention to tax registration in Uganda is in line with unprecedented mass registration campaigns visible in other African countries (Moore, 2022). Our evidence indicates that technologies like the Instant TIN can help dramatically increase registration numbers. However, some concerns remain on how the functions of the tax administration can benefit from the great registration efforts, of which the Instant TIN—and technological innovations in general—have become a prominent tool. It is particularly unclear whether the URA has the capacity in personnel and resources to adequately assist and monitor exponentially increasing numbers of new taxpayers every year, especially when their records are of poor quality. Evidence from other contexts shows that mass-registration drives do not always bring the expected benefits in terms of revenue, and that the complications in managing registries bloated with inactive taxpayers could be important (Mascagni et al., 2022; Moore, 2022; Lediga et al., 2025). A solution could be to consider whether prioritisation should be given to entities already in the tax net, with higher potential value, to maximise their revenue potential and improve compliance behaviour, which often is, at best, suboptimal Gallien et al., 2023). An example is given by the URA's remarkable efforts in targeting HNWIs. Such high-value entities have been successfully identified and registered, but their tax compliance remains difficult to improve due to a mix of political and technical challenges (Santoro and Waiswa, 2022).

Lastly and relatedly, the tax administration should partake in a policy shift where the ultimate goal is to strengthen State-citizen relations, improve accountability, and legitimacy. It is not clear how such an initiative, for the way in which ID data have been leveraged, aims at boosting perceived bargaining power

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and fairness in citizens, who have been used to resisting taxes. A cultural shift from siloed targets and institution-specific incentives to a broader, whole-of-government and long-term vision should be pursued, with the sole incentive of fulfilling State-society contracts through better data.

Our policy recommendations are relevant beyond the Ugandan context. As mentioned, the URA is joining a broader trend of revenue authorities using third-party and identification data, more specifically, to register new taxpayers. For example, a similar study in Ghana reveals how the Ghana Revenue Authority (GRA) is expanding its income taxpayer registry by migrating data from the National Identification Authority (NIA), with the risk of bloating the registry with inaccurate—thus unusable—information. Santoro et al. (2024) indeed find very limited impact on revenue gains, mostly driven by already-enrolled taxpayers who migrated from TIN to National ID, while new entrants contribute very little. Interestingly, the same positive evidence we document in this study on ID-based registrations dramatically increasing new entrants' numbers, as well as on administrative data quality, is reflected in the evaluation of the policy in Ghana. A very similar parallel emerges from South Africa as well (Lediga et al., 2025). We argue that, despite the very different political context and democratic history between Ghana, South Africa, and Uganda, and the different degrees of IT-preparedness, the potential of ID-based registrations for revenue generation is similarly muted. The administrative and capacity constraints also seem to be the same across the two countries, as well as the strenuous popular resistance towards more vexing taxes. As explained above, if the risks of obtaining flawed data are not minimised, as well as of lacking capacity and staff to onboard the new entrants, the costs of mass registration campaigns could be significant to the revenue authorities, and the tax administration functions might not benefit from the process.

Further research is needed on this subject. Three critical limitations of this study imply that the evidence we produce is still preliminary and descriptive. As a first limitation, this study can only partially isolate the impact of data sharing on the quality of data, given the registry-cleaning process that the URA continuously performs internally. The results of this paper are still valuable since we gathered that data-cleaning activities are performed mainly for the information obtained through TREP registration. Further investigation would be necessary to shed light on the exact functioning of such internal processes. A closer look at the impacts of bureaucrats' experiences and opinions could also be interesting, as tax officials, just like taxpayers, are directly involved in digital reforms (Okunogbe and Santoro, 2023).

Second, this research primarily revolves around the internal functioning of the tax administration, exploring implications for data quality and the core URA functions. Very little can be gauged about which taxpayer profiles opt for Instant TIN registrations, how taxpayers directly experience the new process, and how such a process ultimately affects their perceptions. As stated above, especially for informal businesses, it is unclear if their use of the Instant TIN is driven by a voluntary choice to register or imposed by TREP officers. These two different experiences can have divergent impacts on future compliance. As of now, anecdotal evidence suggests that taxpayers positively appreciate the simplified and quickened registration process, but more detailed and nationally representative survey data would be helpful in fully understanding taxpayers' experience. For instance, it is unclear how taxpayers perceive the requirement to visit the URA for income tax or VAT registration after the instant TIN registration. Given the mixed evidence on taxpayers' visits to URA after registration (Section 4.3), we speculate that this represents an extra burden for them. We welcome more research looking at how data-driven tax registration solutions can ultimately improve State-citizens relations.

Third and related, this study is not suited to measure impacts on taxpayers' compliance behaviour, which we leave to future research. A very preliminary inspection of administrative data indicates a positive pattern of payment behaviour, which follows a different timeline and is often disconnected from filing behaviour (Santoro and Waiswa, 2022). As shown in Figure A8a, the probability of paying any tax in 2022 is slightly higher for Instant TIN registrations than for normal ones—salbeit it is broadly remarkably low in general. However, amounts paid by Instant TIN registrations seem significantly smaller (Figure A8b). The latter fact is probably due to the higher incidence of presumptive taxpayers among Instant TIN registrations (16 per cent) than among normal ones (10 per cent). By design, presumptive taxpayers are smaller and pay fixed amounts per year. This also reinforces the above

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evidence on previously informal businesses driving most informal entities' Instant TIN registrations. Such informal businesses are arguably smaller, hence remitting a lower tax. In sum, considering tax registration as a process rather than a stand-alone action, future research should explore how a given registration experience reverberates into repeated tax compliance decisions throughout the taxpayer's life.

Data availability statement. The administrative tax data that support the findings of this study have been accessed confidentially from the Uganda Revenue Authority, with whom the ICTD signed an MoU. Restrictions apply to the availability of these data, which were used under licence for this study. Data could be available from the Uganda Revenue Authority in an anonymised fashion.

Author contribution. Conceptualization-Equal: C.S., F.S., M.A., R.W.; Data curation-Equal: C.S., F.S., M.A.; Formal analysis-Equal: F.S.; Funding acquisition-Equal: F.S.; Investigation-Equal: C.S., F.S., M.A., R.W., J.N.M.; Methodology-Equal: C.S., F.S.; Project administration-Equal: C.S., F.S., R.W., J.N.M.; Resources-Equal: C.S., F.S.; Software-Equal: C.S., F.S.; Supervision-Equal: C.S., F.S.; Validation-Equal: F.S.; Writing – original draft-Equal: C.S., F.S.; Writing – Review & Editing-Equal: C.S., F.S., M.A., R.W., J.N.M.

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Appendix

Table A1. *Datasets used in the last phase of the Taxyper Registration Expansion Project (TREP)*

1. Architects registration data
1. Hotel Sector
2. Integrated Financial Management Information & System (IFMIS)
3. Integrated Revenue Administration System (IRAS)
4. Kampala City Council Authority (KCCA) Directors' data
5. Kampala City Council Authority (KCCA) Property Details
6. Kampala City Council Authority (KCCA) Trade License data
7. Kampala City Council Authority (KCCA) TREP registration data (two datasets)
8. Landlord data
9. Landlord in Kasese
10. Local Government of Arua City
11. Local Governments
12. Local Governments Trading Licence Registry
13. Ministry of Education
14. National Water
15. National Social Security Fund (NSSF)
16. Pharmacists registration data
17. Private Sector Schools
18. Property Location
19. Uganda Bureau of Statistics (UBOS)
20. **Umeme Limited** (largest energy distributor)

Note. The table reports the names of the registries that URA is using to carry out the last phase of TREP, not the name of the institutions that provided them.

Table A2. *In-depth interviews*

	Institution	Department	Date
1	URA	Business Intelligence	June 2, 2021
2	NIRA	Management	November 17, 2021
3	KCCA	IT	September 28, 2022
4	URSB	Business Processes	October 3, 2022
5	URSB	Planning	October 3, 2022
6	URA	Business Intelligence	October 3, 2022
7	URA	Enterprise Architecture	October 4, 2022
8	URA	Service Management	October 4, 2022
9	URA	IT	October 5, 2022
10	URA	Business Analysis, Domestic Tax	October 5, 2022
11	URA	Warehouse of data	October 5, 2022
12	URA	TREP officers supervision	October 5, 2022
13	URA	Register Cleaning, TREP	December 5, 2022
14	URA	Service Management, TREP	December 7, 2022
15	KCCA	Compliance and Risk Management	December 8, 2022
16	URSB	Business Processes	December 12, 2022
17	NITA-U	UG Hub team	January 30, 2023

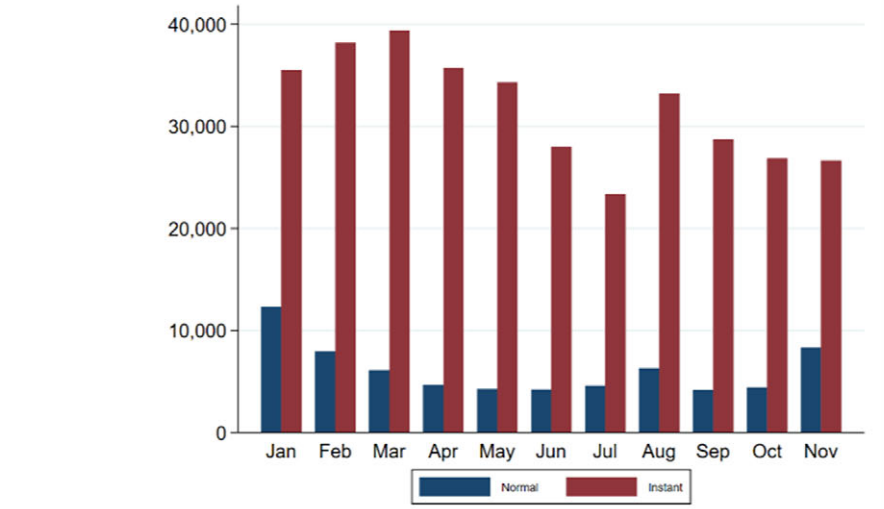
Roles of interviewees: executive directors, managers, supervisors, officers.

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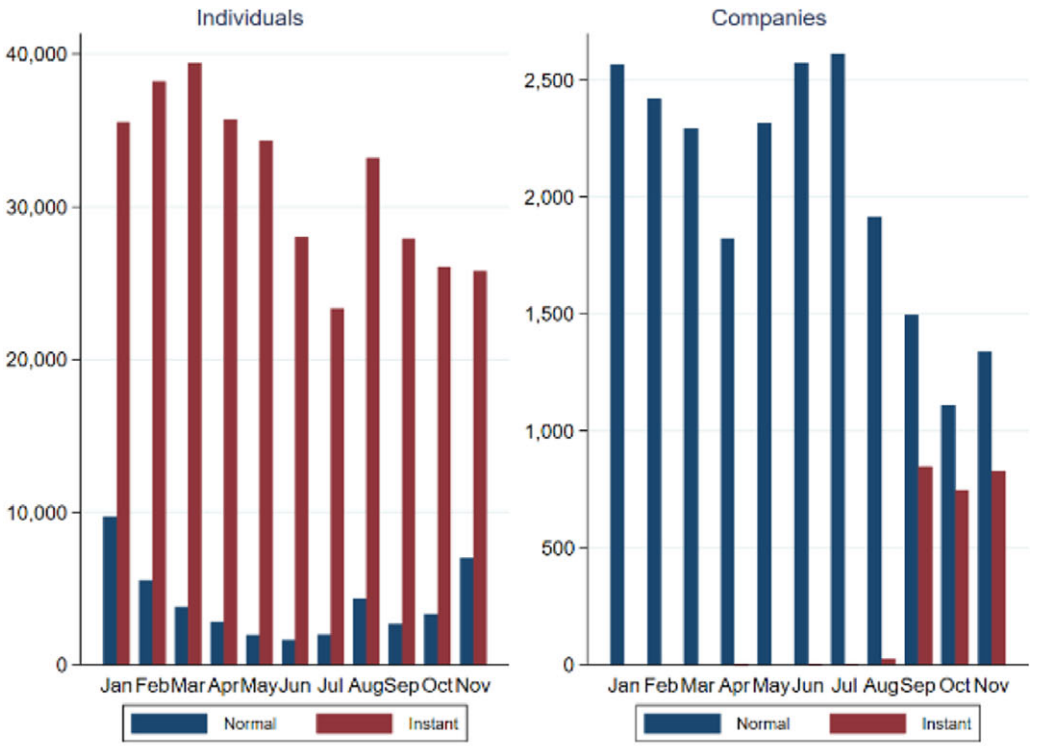
Table A3. *Codebook of thematic analysis*

Codes	Description	Files	References
Dimensions	Functions of URA enhanced by the integration (identification, facilitation, enforcement, monitoring)	2	3
Impact data	Impact of Instant TIN on data quality	2	3
■ Email	Impact of Instant TIN on email address section of registry	4	5
■ Location	Issues with the data about location	2	3
■ Phone	Impact of Instant TIN on the quality of phone number information	1	1
■ Processes and strategy	What impact the new technology and integration have on internal processes	1	2
■ Sector	Info on the sector coming from Instant TIN registration	2	2
■ TIN Duplication	Impact of Instant TIN on TIN duplication	4	5
Integration	Ways of integrating datasets across institutions	0	0
■ KCCA-URA	integration between KCCA and URA data	4	10
■ KCCA-URSB-NIRA	integration between KCCA, URSB, and URA data	5	7
■ NIRA-URA	integration between NIRA and URA data	4	9
■ URA-NITAU	integration between NITAU and URA data	1	3
■ URA-URSB	Integration and data sharing between URSB and URA	5	8
Instant TIN - companies and individuals	Any information on the difference in uptake of Instant TIN or standard registration across different categories of taxpayers (companies or individuals).	3	3
Instant TIN - formalisation	Role of Instant TIN in improving formalisation	1	1
Instant TIN—info	General and relevant information about the Instant TIN	4	6
Perspectives on implementation	Perspectives of other agencies on URA and integration with them, etc.		
■ Benefits	Benefits of integration from different agencies' perspectives	6	8
■ Challenges	Challenges of the implementation of integration from each agency's perspective	8	15
Policy recommendations	Challenges and corresponding Policy recommendations	7	14
TREP role	Role of TREP in uptake of Instant TIN—what function did it have	6	9
Utility IT	Utility of Instant TIN to Taxpayers	10	15

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(a) Aggregated



(b) Disaggregated by taxpayer type

Figure A1. *Registration trends by month.*
Source: Authors' calculations on URA administrative data.

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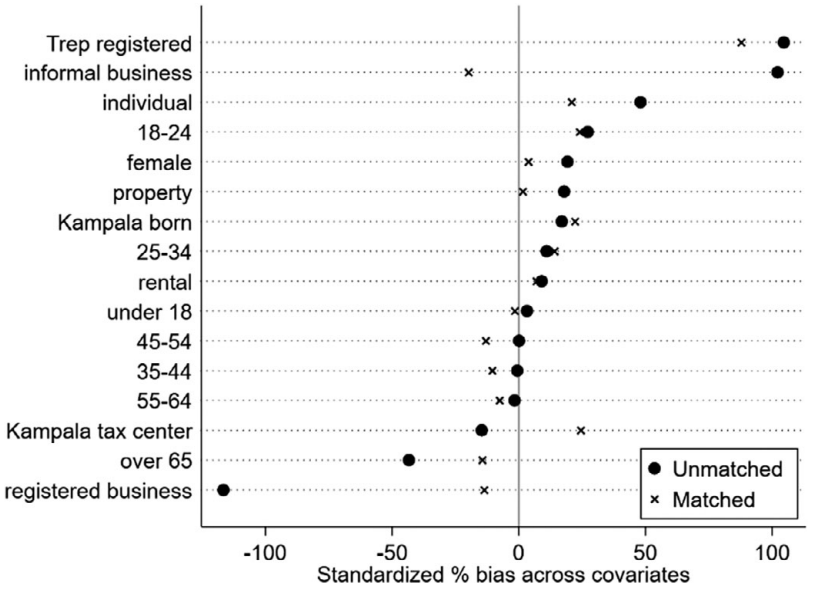


Figure A2. *Matching balance.*
Source: Authors' calculations on URA administrative data.

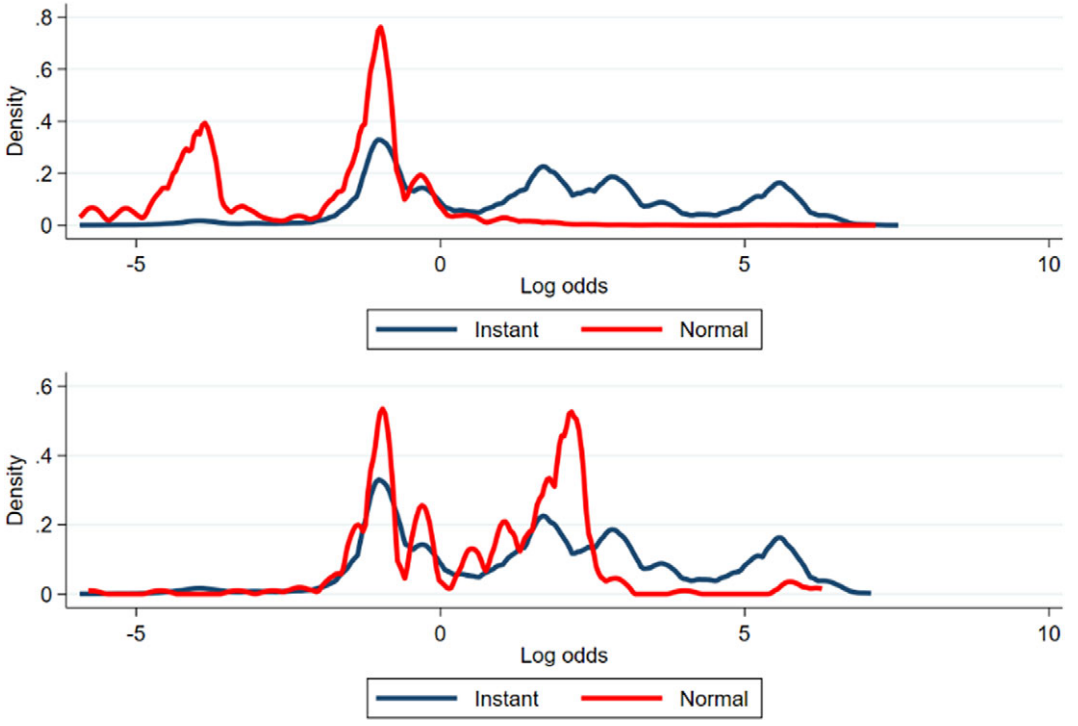


Figure A3. *Distribution of matching log odds.*
Source: Authors' calculations on URA administrative data.

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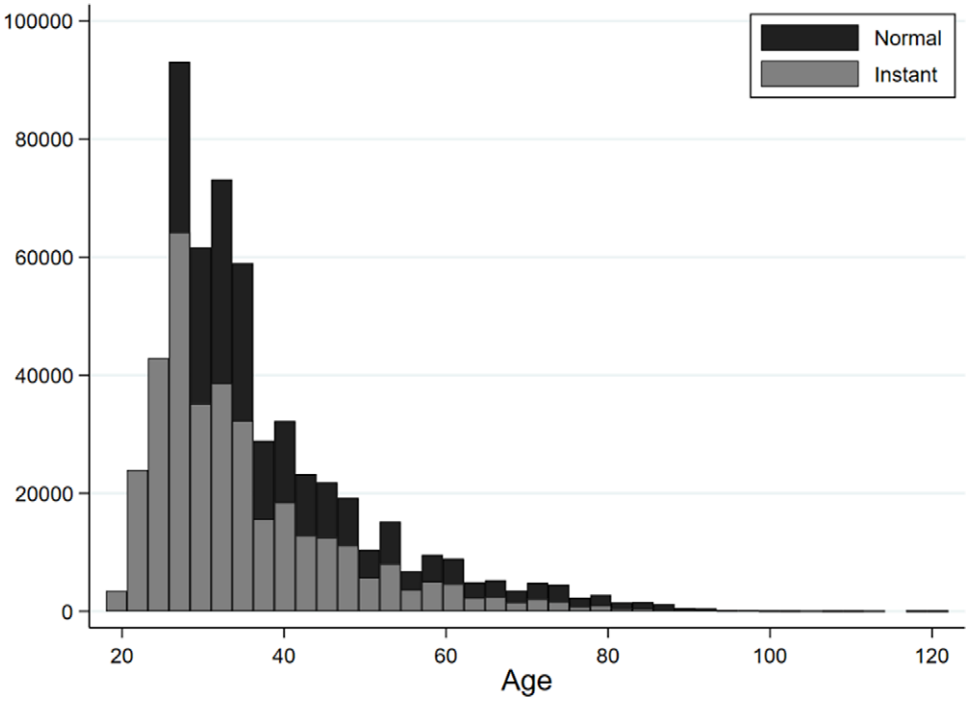


Figure A4. *Distribution of age by type of registration.*
Source: Authors' calculations on URA administrative data.

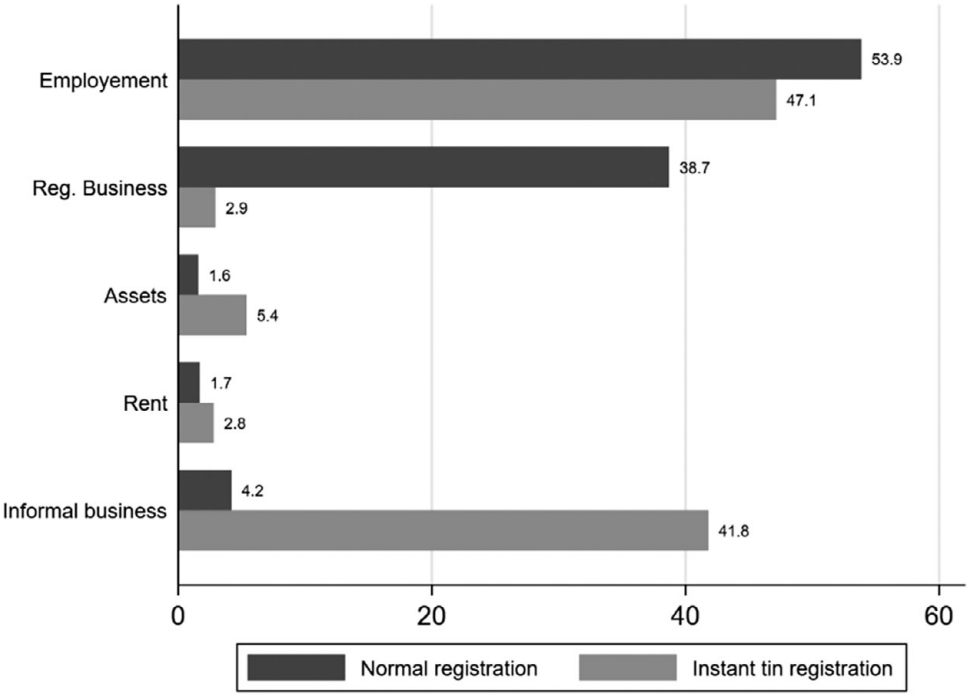


Figure A5. *Distribution of income sources by type of registration.*
Source: Authors' calculations on URA administrative data.

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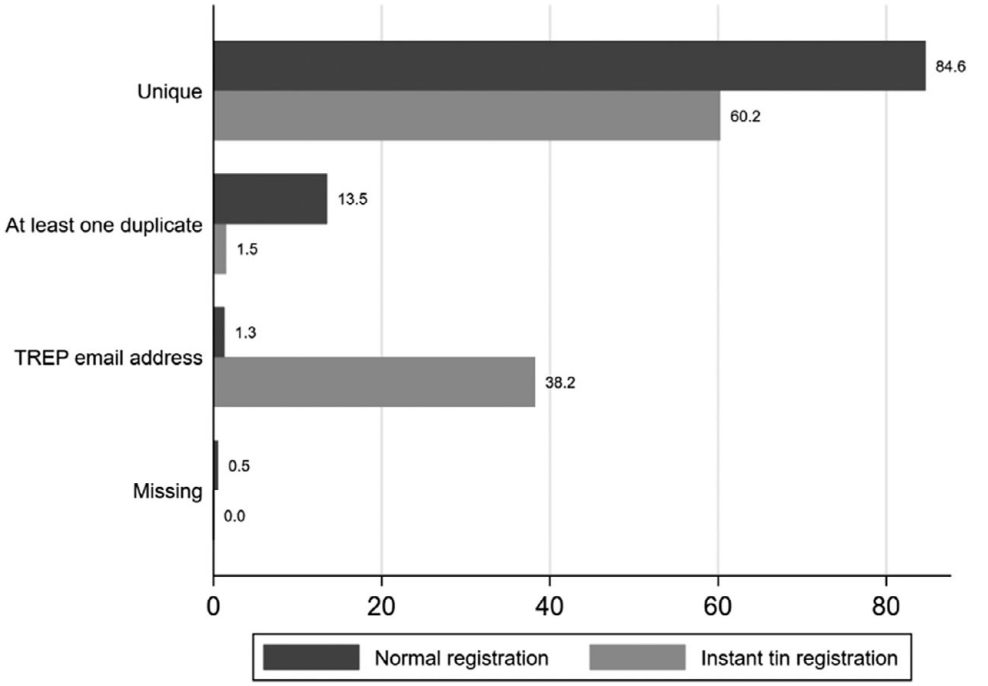


Figure A6. *Rate of email validity by type of registration.*
Source: Authors' calculations on URA administrative data.

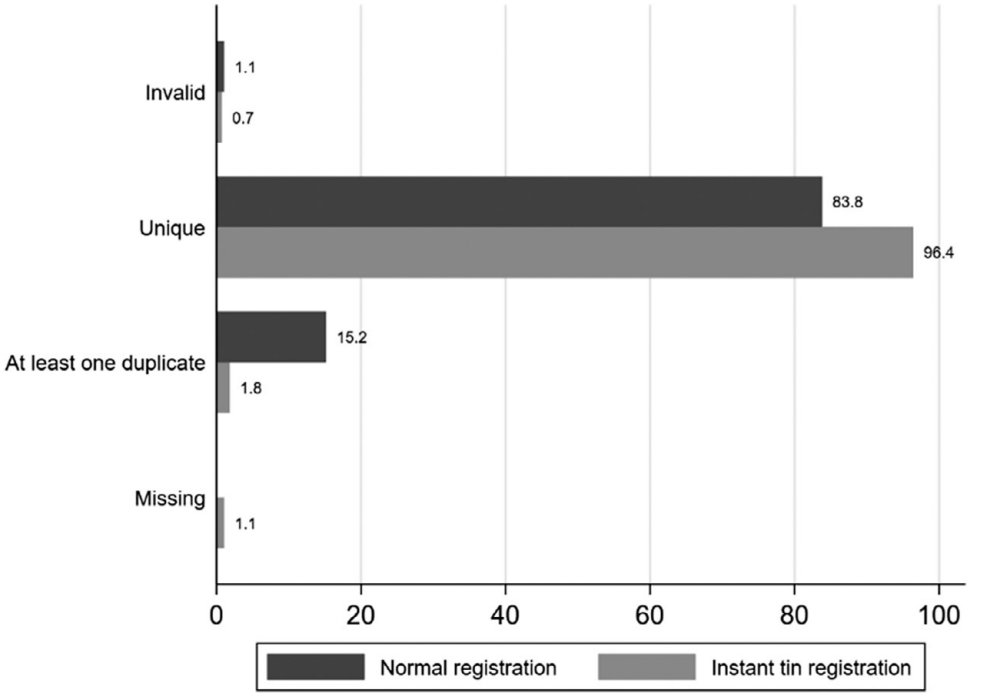


Figure A7. *Rate of phone number validity by type of registration.*
Source: Authors' calculations on URA administrative data.

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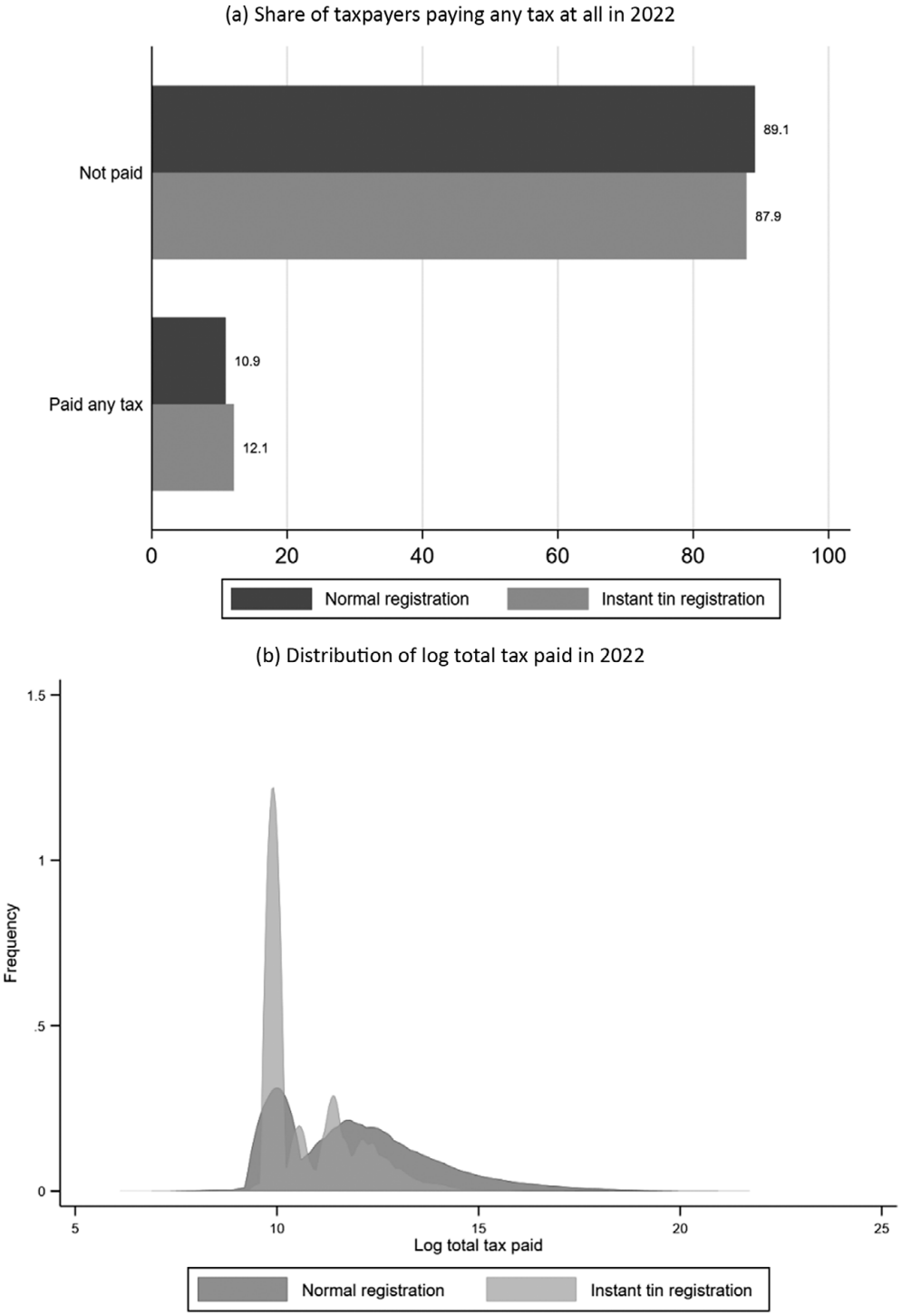


Figure A8. *Payment behaviour by registration type. (a) Share of taxpayers paying any tax at all in 2022. (b) Distribution of log total tax paid in 2022.*

Source: Authors' calculations on URA administrative data. In Figure A8a, paying any tax at all indicates whether the taxpayer made at least one tax payment in 2022 for any tax head among the 10 tax heads available in the data. In Figure A8b, the log total tax paid is the log transformation of the total tax paid in 2022, which in turn is built as the sum of all payments made in 2022 for all 10 tax heads available in the data.

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Table A4. *Correlation between Instant registration and data quality, 2022 registrations only*

	(1)	(2)	(3)	(4)	(5)
	Multiple TIN (Indiv. only)	Invalid email	Invalid phone number	Age outlier (Indiv. only)	Invalid sector (Indiv. only)
Instant TIN	−0.01***	−0.03***	−0.02**	−0.00	0.13***
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Controls	Yes	Yes	Yes	Yes	Yes
Mean among normally registered	0.011	0.379	0.271	0.069	0.063
R-sq.	0.000	0.853	0.272	0.799	0.659
N	375,526	378,010	378,010	375,524	194,802

Note. Authors' calculations on URA administrative data. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions are run on a sample of Instant TIN and normal registrations matched through propensity score matching, as described in Section 3. Column 1 refers to an indicator for duplicates in taxpayer identity, whereby taxpayers with the same name and date of birth hold different TINs. Column 2 uses an indicator for invalid email addresses, including missing and duplicate ones. The same applies to the outcome in column 3. Age outlier in column 4 is an indicator for age being larger than twice the standardised difference from the average population age. Column 5 uses an indicator for an invalid sector, including missing values. Columns 1, 4, and 5 refer to individuals only, while PAYE taxpayers are also excluded in column 5. More details on the estimation strategy are in Section 3.

Table A5. *Correlation between instant registration and data quality, without PSM*

	(1)	(2)	(3)	(4)	(5)
	Multiple TIN (Indiv. only)	Invalid email	Invalid phone number	Age outlier (Indiv. only)	Invalid sector (Indiv. only)
Instant TIN	−0.01***	−0.09***	−0.10***	−0.00***	0.40***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Controls	Yes	Yes	Yes	Yes	Yes
Mean among normally registered	0.011	0.193	0.162	0.066	0.070
R-sq.	0.005	0.491	0.200	0.821	0.927
N	907,887	988,078	988,078	907,787	514,810

Note. Authors' calculations on URA administrative data. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Such naïve regressions are performed without PSM. Column 1 refers to an indicator for duplicates in taxpayer identity, whereby taxpayers with the same name and date of birth hold different TINs. Column 2 uses an indicator for invalid email addresses, including missing and duplicate ones. The same applies to the outcome in column 3. Age outlier in column 4 is an indicator for age being larger than twice the standardised difference from the average population age. Column 5 uses an indicator for an invalid sector, including missing values. Columns 1, 4, and 5 refer to individuals only, while PAYE taxpayers are also excluded in column 5. More details on the estimation strategy are in Section 3.

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