

# Firms as Tax Collectors<sup>\*</sup>

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Job Market Paper

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## Abstract

We study the implications of delegating tax collection duties to firms. We exploit a major reform to the withholding regime of the turnover tax in the City of Buenos Aires, where several large firms were appointed to act as collection agents (CAs) based on a predetermined revenue threshold. Combining rich firm-to-firm administrative data with quasi-experimental methods, we show that: (i) firms newly appointed as CAs do not change their reported business activity, (ii) firms with preexisting commercial ties to CAs increase their self-reported income, and (iii) the government collects more tax revenue. Analysis of a subsequent reform that reduced third-party tax collection shows that firms respond symmetrically by reducing their reported income. These results are in line with other papers' findings, suggesting that reforms to tax administration can have a considerable impact when it comes to raising revenue and building tax capacity. Our findings can provide guidance to other middle- and low-income countries on ways to determine who the right tax collector is as a function of the level of development.

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# 1 Introduction

Governments in developing countries struggle to raise revenue and build tax capacity. Increasing taxes and mitigating noncompliance are the most common policy measures considered by authorities. Yet achieving large-scale capacity often requires fundamental transformations of tax administrations.<sup>1</sup> The question of how taxes should be collected is usually at the forefront of tax authorities' debates. Among the possible methods, withholding systems—in which third parties collect and remit taxes owed by related parties—have historically played a central role in easing the burden of tax administration.

Tax withholding systems are ubiquitous. Part of the reason for the income tax's global success, for example, is that employers withhold at source from their employees (Besley and Persson, 2014). Similarly, the built-in withholding mechanism of the value added tax (VAT) has been shown to enhance compliance (Pomeranz, 2015; Waseem, 2020). Withholding of business income is particularly common in developing countries where governments lack the resources and capacity to accurately measure and tax firm activity (Slemrod, 2008; Slemrod and Velayudhan, 2018; Brockmeyer and Hernandez, 2019). In this case, financial institutions and large companies collect taxes owed by other firms in their commercial network. The use of this collection device for indirect taxes has surged over the last decade (Figure 1), but little is known about its implications.

This paper asks what the effects are of delegating tax collection duties to firms. To answer this, we analyze an unprecedented expansion of a withholding scheme to collect the turnover tax in the City of Buenos Aires, Argentina. Withholding entails changes to two main aspects of tax collection: who remits the tax and when it is paid. Under the standard filing procedure, firms are required to report their monthly sales and then apply the corresponding tax rate to determine the tax owed. Under the withholding scheme, some firms are appointed as collection agents (CAs) and collect part of the tax in advance from their commercial partners whenever there is a purchase or a sale. While in a first-best world the point of collection of the tax would be irrelevant, in the real world changes in the collection mechanism can matter for compliance (see Slemrod, 2008; Kopczuk, Marion, et al., 2016).

Our goal is to provide insight into the implications of withholding for both the collecting party and its linked taxpayers. For CAs, withholding is an administrative burden, as they now have to declare and remit taxes on behalf of others. It also implies closer

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<sup>1</sup>Such administrative reforms have proven highly effective according to recent research on Indonesia by Basri et al. (2019).

scrutiny from the tax authority which can penalize them if they fail to fulfill their role. Finally, withholding allows these firms to get a hold of additional funds that may be pocketed in the time between collection and remittance. For linked firms, withholding generates third-party information which may alter their enforcement perceptions. Also, the withheld amount may act as a lower bound on self-reported sales and tax owed. Last, withholding might shift firms' choice of trading partners to non-CAs in order to minimize their tax burden.

We bring new evidence to the discussion by exploiting a reform in 2016 that dramatically expanded the turnover tax withholding scheme. Under this reform, firms were appointed as CAs according to size: firms whose gross income (sales) in the preceding year was greater than AR\$60 million (the 97th percentile) were automatically appointed as CAs. Appointed firms then started to withhold the tax from their commercial partners. This implied an increase in the share of taxpayers' tax liability collected indirectly at source by CAs in lieu of direct payments to the tax authority. This setting allows us to estimate both the *direct effects* of expanding the withholding scheme on the firms tasked with collecting taxes and the *indirect effects* on those that now face an increase in the amount of taxes withheld at source. To our knowledge, this is the first paper that documents the full rollout of a policy of this kind; existing papers analyzing withholding of business income taxes omit the effects on the withholding agents, which bear the compliance costs.

Another novel feature of our paper concerns the data.<sup>2</sup> Our empirical analysis relies on two administrative sources processed by the tax administration: (1) monthly turnover tax declarations for nearly the entire universe of firms operating in the City of Buenos Aires; (2) transaction-level details of purchases and sales, provided by firms acting as CAs. These records allow us to trace out the commercial linkages between firms and build a business-to-business database, which is a key feature for our analysis. By combining the two data sources, we obtain a monthly panel of 250,000 firms and 1.6 million client-supplier pairs spanning 2015 to 2020. We combine these data with quasi-experimental methods that leverage the exogenous variation created by the reform to estimate direct and indirect effects.

Our empirical analysis begins by documenting the implementation of the program and the consequent expansion of the withholding net to provide some insights into how the policy actually worked in practice. We present nonparametric graphical evidence suggesting that newly appointed firms quickly took up their roles and started collecting the

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<sup>2</sup>We are the first researchers to convince the tax authorities to allow their databases to be used for academic research. Our hope is that this door will remain open for other people too.

tax from clients and suppliers very much like other preexisting CAs. We then proceed to analyze whether appointing firms as CAs affects their economic activity. We use a regression discontinuity design that exploits the discrete change in the probability of acting as a CA caused by the 2016 reform. While previous enrollments in the CA regime had been determined on a case by case basis, the November 2016 appointments were decided by applying the AR\$60 million cutoff rule to 2015 sales.<sup>3</sup> Taking these policy features into account, we estimate whether CAs change their behavior by comparing reported income for firms close to the cutoff. Our evidence shows no visible discontinuity in subsequent reported income in the years 2017, 2018, and 2019, suggesting that CAs' business activity was not affected by their new tax collecting role. We attribute this result to the fact that appointed firms were among the largest—and presumably most formal—firms in the economy, with highly streamlined tax-filing practices, such that collecting taxes from partners and remitting them to the government did not imply an increased burden or a change in enforcement perceptions.

Next, we analyze the response of taxpayers to withholding. We focus on firms that regularly trade with newly appointed CAs and, as a consequence of the reform, experience an increase in the amount of tax collected through withholding. We use a difference-in-differences methodology that relies on the fact that some firms were more exposed to the reform than others. Exposure is defined as the presence of new CAs in the network of commercial partners of a given firm. Firms in the control group are only linked to pre-existing CAs and do not experience any change in the way their tax is collected; firms in the treatment group are linked to newly appointed CAs, and thus some of their direct payments to the tax authority are withheld in advance after the reform goes into effect. The first-stage results show that both the number of linked CAs and the share of taxes withheld at source increase sharply among firms more exposed to new CAs, confirming that the reform only had bite for the treated group. Our second-stage results show that the reported sales of treated and nontreated firms were evolving in parallel trends before the reform, validating our strategy. Right after November 2016, however, treated firms exhibit an increase in reported sales relative to control firms. The difference-in-differences effect is, on average, 5.5 percentage points, and it increases over time, reaching about 9 percentage points by the end of 2019. We also show an increase in tax collected from treated firms after the reform that is similar in magnitude. One potential interpretation of these results is that withheld taxes act as a lower bound on self-reported income: if firms

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<sup>3</sup>We show that the rule was followed closely but with some exceptions: firms belonging to some specific industries were either left out or included in the collection scheme regardless of their 2015 sales. Nonetheless, the setting allows us to estimate a fuzzy RDD.

were underreporting their sales before the reform, having a larger part of the tax remitted by a CA may have forced them to increase the amount they must report.

In the last part of the analysis, we leverage a policy change in September 2018 in the opposite direction that affected a subgroup of firms linked to CAs. This allows us to shed light on whether firms respond symmetrically to changes in withholding by reporting lower sales when withholding decreases. To this end, we analyze a temporary reduction in tax withholding on financial transactions that targeted firms whose sales in 2017 were below AR\$10 million. While, for firms below the threshold, banks no longer withheld taxes on deposits received from other firms, firms above the threshold remained subject to bank withholding. Using a difference-in-discontinuity design, we show that firms below the cutoff experienced a reduction in the share of taxes withheld at source and responded by reducing their reported sales. That is, the same set of firms that report more sales when they become subject to withholding by CAs in 2016 exhibit a reduction in their reported sales when the bank withholding decreases in 2018. This result strikes us as remarkable and could suggest that a reduction in the coverage of third-party information (that is, banks providing information to the tax authority on the amount of money going in and out of businesses' bank accounts) gives firms more freedom to misreport their sales and thus to reduce their tax liability.

Taken together, our findings suggest that withholding by large firms can be an effective tax collection tool. Appointing firms to collect taxes does not seem to hurt their activity directly. And substituting direct tax payments with withholding at source increases reported sales of firms linked to newly appointed CAs, which, in turn, increases total tax revenue.

This paper builds on several strands of literature. First, it contributes to the literature on tax compliance and enforcement, which studies the drivers behind evasion and avoidance behavior (Allingham and Sandmo, 1972; Kleven, Knudsen, et al., 2011; Slemrod and Yitzhaki, 2002; Slemrod, 2019). In particular, we build on recent papers that emphasize two critical aspects of modern tax systems: how firms play a key role as fiscal intermediaries and how tax compliance critically depends on automatic features such as withholding (Kleven, Kreiner, et al., 2016; Slemrod, 2008).

Our paper is also closely related to two recent papers that study changes in the withholding system of Costa Rica (Brockmeyer and Hernandez, 2019) and Pakistan (Waseem, 2020). These papers provide compelling evidence on how the “remittance irrelevance” proposition—whereby the identity of the remitting party does not matter for tax collection purposes—is very unlikely to hold in a developing country. Brockmeyer and Her-

nandez (2019) analyze withholding by credit card companies in Costa Rica. They exploit variation in the coverage by third-party reporting and in the withholding rate to show that withholding increases sales tax revenue. The mechanisms behind this are default payment and increased enforcement perceptions. Meanwhile, Waseem (2020) studies the roll out of the VAT in Pakistan. Manufacturing firms, already in the tax net, increase their reported revenue when the tax is extended upstream to the energy sector and their inputs become subject to withholding. Waseem explains this behavior by arguing that the withheld amount acts as a lower bound on self-reported sales. Our setting is more general since withholding duties were assigned in a manner that was close to exogenous both for CAs and for linked firms, which became more exposed to third-party collection and remittance. Additionally, the reform we analyze was broader, as it was targeted at the whole economy, not a specific sector. These features allow us to determine more precisely in what cases might this tax collection mechanism be more effective.

Finally, we contribute to the literature on taxation and development that focuses on determining the optimal tax-administration intervention as a function of development (Keen and Slemrod, 2017; Best et al., 2015; Bergeron et al., 2021; Basri et al., 2019). As low- and middle-income countries develop, a reduction in the barriers to implementing more sophisticated tax collection systems fall and the first reform studied in this paper could become accessible. We believe that our tax collection setting and our findings can illuminate the path to improving tax collection systems.

The paper is organized as follows. Section 2 provides details on the tax and the reforms and provides some suggestive evidence of the reforms' macroeconomic implications. Section 3 discusses our data sources. Section 4 describes the conceptual framework we use to explain the empirical results. Section 5 documents the expansion of the withholding scheme and its direct effect on CAs while Sections 6 and 7 study the indirect effect on taxpayers. Section 8 concludes.

## 2 Context

The turnover tax (TT) is a subnational tax levied on firm revenue with no deductions for costs. It applies to all transactions taking place in the supply chain—that is, business-to-business and business-to-consumer transactions. This implies that it creates “cascading effects” in which final goods are taxed multiple times throughout production. Despite its distortive effects, the tax is simple to collect, which explains why it is used in all of the

twenty-four jurisdictions in Argentina.<sup>4</sup> In particular, for the City of Buenos Aires, the TT constitutes the main source of revenue, accounting for about 75% of total tax collected. Although firms must file their returns on a monthly basis, the city also uses a withholding scheme that relies on other firms to collect part of the tax in advance from their commercial partners; going forward, we refer to these two alternative collection mechanisms as “direct payment” and “withholding.” In 2021, 66% of TT revenue was remitted by withholding firms and the remaining 34% was collected through direct payments of taxpayers.

Withholding mechanisms differ depending on the identity of the collecting party, which can either be a commercial partner or a financial institution (bank or credit/debit card company). In 2021, the former contributed with approximately 30% of TT revenue while the latter collected about 25% of TT revenue (20% by banks and 5% by credit/debit card companies). Our main focus is on withholding by commercial partners. However, we also analyze a policy reform that temporarily eliminated the withholding by banks on a subset of firms.<sup>5</sup> We provide more details on how the tax collection mechanisms work in Section 4.<sup>6</sup>

Historically, tax collection in the City of Buenos Aires relied mostly on direct payments. Withholding by CAs was introduced in 1985; between 1985 and 2016 some large firms were appointed as CAs on a case by case basis. These firms withheld part of the taxes owed by their commercial partners whenever there was a purchase or sale.

In July 2016, a resolution was passed with the intention of expanding the set of firms acting as tax collectors.<sup>7</sup> It established a new appointment criterion based on sales: firms whose gross income in 2015 was at least AR\$60 million would be automatically enrolled as CAs. Appointed firms were notified in October and started their collection duties in November 2016. Firms appointed before this resolution passed remained in the tax collection scheme regardless of their revenue. From 2017 through 2020 there were no new appointments. For clarity, we summarize the timeline in the figure below.

The direct effect of the reform was a sharp increase in the number of CAs. Figure 3 plots the number of firms acting as CAs across time. Its pattern exactly matches the timeline described above. For the period prior to the resolution, there were small increases in

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<sup>4</sup>In fact, Hansen et al. (2021) shows that the tax is reemerging in the US, where nine states are currently using it. They attribute this to the following facts: (i) the large tax base (the TT taxes services, while retail sales taxes do not) can generate large revenues with low rates, (ii) retail sales taxes share its main drawback of taxing inputs, and (iii) its broad tax base limits firms’ tax evasion opportunities.

<sup>5</sup>Customs offices also withhold taxes, but this channel only contributes a small fraction of the total tax collected.

<sup>6</sup>For more details about the TT and the way it is collected, see Appendix A.

<sup>7</sup>Resolutions 364/AGIP/2016 and 421/AGIP/2016.



the number of active CAs; and in fact, between 1985 and 2001 there was only one CA, the tax administration itself. Between October 2016 and November 2016 the number of CAs more than doubled. Afterward, the number of active CAs gradually decreased as some firms exited.

The effects of the reform were considerable and immediate. Right after being appointed, CAs started to withhold the tax from their commercial partners. This increased the share of taxpayers' tax liability collected indirectly at source by CAs *in lieu* of direct payments. Appendix Figure D.3a shows that tax collected through withholding increased from 30% to 45% after the reform.

The reform had a noticeable impact on revenue as well. To show this effect, we compare tax revenue in the City of Buenos Aires with that in the Province of Buenos Aires. These are the largest jurisdictions in the country in terms of economic activity, and their economic performances track each other closely, making each one a natural benchmark for the other. Appendix Figure D.3c shows the percentage difference in tax revenue between the city and the province, taking the month prior to the reform as the baseline period. Prior to the reform, the city was performing worse than the province, yet we observe a trend break at the time of the reform, after which the outcome becomes more favorable for the city. The macro evidence thus shows that the reform had a large impact. Our goal in the remainder of the paper is to flesh out the microeconomic impacts.

### 3 Data

We combine two data sets derived from information collected by the Tax Administration Office in the City of Buenos Aires (AGIP). The first data source consists of monthly tax declarations for nearly the entire universe of firms operating in the city in the period 2015-20. These declarations are filed electronically through an account each taxpayer has with the tax administration. We observe all line items completed in a standard filing procedure (gross income; amount of tax withheld, distinguishing between sales and purchases; outstanding credits or debits) and a series of firm characteristics used to determine the

corresponding tax and withholding rates (firm type: small or large; sector: 995 six-digit codes; location: local or out of province).

To construct our second data set, we leverage a unique feature of our setting: firms acting as CAs are required to file a supplementary “invoice summary” that contains transaction-level details of purchases and sales within a given month. The line items included in this form are the total value of the transaction, the amount withheld, and whether the transaction was a purchase or a sale. We use these filings to trace commercial linkages between firms, allowing us to establish the relationships between CAs and their commercial partners. A limitation of this data source is that trade linkages are only observed when a firm becomes a CA—that is, when it starts filing the supplementary form that records transactions. This implies that for some firms we observe linkages since the beginning of our sample in 2015, while for firms linked to CAs appointed under the reform, we observe linkages only at or after November 2016. Figure 4 illustrates the process by which we construct our full data set and stresses the sequence in which the information is revealed. Combining the two sources of data, we obtain a panel of 250,000 firms and 1.6 million client-supplier pairs spanning 2015 to 2020.

Table 1 presents summary statistics for the period prior to the 2016 reform. Panel A describes the full sample, which contains over 190,000 thousand firms, roughly 5 percent of them are CAs. Overall, the firm-size distribution in terms of revenue is right-skewed. CAs are orders of magnitude larger than regular firms which corroborates the enrollment heuristics followed by the government of having large firms act as CAs, even before the 2016 reform. Panel B corresponds to the estimating sample used in Sections 6 and 7. When evaluating the response of taxpayers, we restrict the sample of firms to those that file taxes regularly (we drop firms that report positive sales in less than 50% of the periods).

## 4 Conceptual Framework

In this section we focus on how tax collection works in practice and provide some insights on how changing the tax collection mechanism might affect firm behavior. Figure 2 summarizes the main features of the direct-payment and withholding mechanisms in a simplified setting with four agents: supplier, retailer, consumer, and tax administration. The supplier sells inputs to the retailer, which pays  $\$Y$  for the goods. In turn, the retailer takes the inputs and turns them into final goods, which are sold to the consumer, who pays  $\$X$  for them. As described earlier, all firms along the supply chain are liable for the tax. In our setting the supplier and the retailer respectively face tax rates  $\tau_S$  and  $\tau_R$  while

the withholding rate (a fraction of  $\tau$ ) is represented by  $\alpha \in (0, 1)$ .

Under the direct-payment mechanism, taxpayers self-report their sales at the time of payment. The supplier reports  $\$X$ , and the total tax liability for the period is  $\tau_S X$ . Similarly, the retailer reports  $\$Y$  such that its liability is  $\tau_R Y$ .

Under the withholding scheme, firms acting as CAs are in charge of withholding a part of the total tax liability from their commercial partners and remitting this amount to the tax administration. This task is performed in addition to their own duties as taxpayers to remit their own tax payments.

Withholding may be performed by either the seller or the buyer. When the seller acts as CA, it adds the withheld tax to the total sale amount. In our setting, this is represented by the supplier charging an extra amount for the sale to the retailer,  $X(1 + \alpha\tau_R)$ , which is then remitted to the tax administration (along with the seller's own taxes). When the retailer's tax is due, it will only pay the outstanding balance that remains after deducting the remitted amount from the total tax liability,  $\tau_R Y - \alpha\tau_R X$ . When the buyer acts as CA, it subtracts the withheld tax from the total purchase amount. In our setting, the retailer pays  $X(1 - \alpha\tau_S)$  to the supplier and remits it to the tax administration, where the funds become available to the supplier to deduct from its tax liability.

Withholding through CAs changes two main aspects of tax collection: *who* remits and *when* the tax is paid. Under the direct-payment mechanism, the tax is filed by the liable party on the due date. In contrast, under the withholding mechanism, the tax is paid by a third party in advance; the tax is withheld at source and remitted on a regular basis. These changes carry associated implications for both the collecting party and the taxpayer.

For CAs, appointment leads to closer scrutiny and increased penalties if they do not fulfill their role as CAs. Thus, the appointment itself might trigger changes in enforcement perceptions that lead to an increase in reported sales for firms that were previously underreporting (see Brockmeyer and Hernandez, 2019). Additionally, withholding is an administrative burden, as it requires CAs to keep a registry of transactions with trading partners and to file an additional form detailing such transactions. As pointed out by Slemrod (2008), this burden might be offset by the “cash-flow benefit” of withholding: CAs may hold onto the funds they withhold from the time of collection till the time of remittance, giving them the equivalent of an interest-free loan. However, the magnitude of these two contrasting forces is likely to be small in our setting for two reasons. First, the collection process is highly streamlined: when a firm is appointed CA, it is provided with a tax collection software that automatically incorporates withholding into its transactions.

Second, firms must transfer the withheld funds every month following a prespecified schedule that only allows for a small window of time between the remittance deadline and the tax-triggering event during which they could dispose of the funds.

For linked firms, there are three direct implications of switching to the withholding collection mechanism. Withholding enables each business-to-business transaction to be recorded in two places, generating third-party information. This may alter enforcement perceptions since the information could be used by the tax administration to detect non-complying firms. In addition, the withheld amount itself may act as a lower bound on self-reported sales and tax owed, as building up tax credit might raise a red flag. Finally, if withholding implies that a firm subject to it ends up facing a higher effective tax rate, the firm may decide to switch trading partners to non-CAs to minimize its tax burden.

We can derive testable predictions for the first two implications using the framework of firm tax evasion under third-party reporting developed in Carrillo et al. (2017), Brockmeyer and Hernandez (2019), and Waseem (2020). These papers primarily consider settings in which there is a VAT or sales tax, which allow for deduction of costs. Our setting is slightly less complex since the TT does not allow for any type of deduction. Consider a firm that is already subject to some amount of third-party withholding. If evasion costs are sufficiently low, it will underreport sales up to the point at which tax owed is completely offset by withheld funds. When a trading partner is appointed CA and additional transactions become subject to withholding, the firm can only avoid falling into negative liability territory by increasing reported sales. Therefore, we should expect to see an increase in reported sales for firms more exposed to withholding, as some of them will try to avoid raising a red flag. We should also expect to see an upward shift in the distribution of tax liability as firms try to bunch close to the lower bound set by withheld funds. Finally, as shown in Pomeranz (2015), we would expect the response of reported sales to be stronger in sectors in which informality is high or at the retail stage in which the cost of evasion is relatively low.

Regarding the third implication, Gadenne et al. (2020) show that supply chain distortions might occur, as firms that were previously underreporting face an increase in the tax burden when their current supplier becomes a CA. Firms that can choose among several alternative suppliers will face a lower input price if they switch to one that is not a CA. Thus, we would expect some trade links to break, or become less frequent, or show a decrease in trade volume.

## 5 Expansion of the Withholding Scheme

We begin the empirical analysis by documenting the expansion of the withholding scheme. Specifically, we describe the implementation of the appointment rule, the expansion of the withholding net, and the response of newly appointed CAs as they take on their new role.

We use a series of figures to provide nonparametric graphical evidence of whether the appointment rule worked in practice and how quickly the new CAs started withholding from linked firms; we find that take-up was high and firms responded quickly. Next, we analyze the response of appointed firms. Here, we use a regression discontinuity design (RD) that exploits the sharp change in the probability of acting as a CA based on 2015 gross income (before the reform) and we compare reported income for firms close to the cutoff to test whether CAs change their behavior. Our results suggests that CAs' business activity did not change. We interpret this as evidence that the policy did not cause a significant change in their business structure.

*Implementation of the appointment rule.* Figure 5 shows the 2015 gross income distribution for the whole sample of firms. The figure reveals an important fact about the type of firms that were targeted by the reform: they were among the largest in the economy. The cutoff roughly corresponds to the 97th percentile of the firm-size distribution. The bottom panel zooms in around the cutoff and shows there are no discontinuities around the AR\$60 million threshold, which confirms that firms were not able to manipulate the running variable used to determine appointment into the CA program. This is a promising fact that suggests that we can use firms around the limit to identify causal effect.

According to the appointment rule, firms above the AR\$60 million threshold should have been appointed to act as CA. Figure 6 provides evidence of how binding this rule was. On the x-axis we take the running variable and split it into equally spaced bins of size AR\$10 million; the y-axis is the probability of treatment (that is, of being appointed as a CA). Under perfect compliance, the probability of treatment should be 0 for firms below the threshold and 1 for firms above.

*Expansion of the withholding net.* Failure to comply with the duties assigned to CAs is heavily penalized. However, these regulations by themselves do not ensure that firms will take up their role as tax collectors. The next figures are intended to show that appointed firms rapidly took up their new duties. To do so, we compare their behavior with a group of preexisting CAs appointed in 2012. We use this group as a benchmark of what we would expect to be a "normal" behavior from firms that are already established in their roles as CAs. Figure 7a analyzes the extensive margin of collection duties: for each month

it shows the proportion of CAs in each group that are withholding from their commercial partners. It takes roughly a year for new CAs to fully take on their role. However, their starting point is very high: the first month after appointment, close to 70% of new CAs are withholding from other firms. Figure 7b, in turn, shows the intensive margin of collection duties: for each month it shows the average number of firms whose taxes are withheld in each group. New CAs on average withhold from fewer firms, which might be because they are smaller or younger than preexisting CAs. Taken together, these elements provide evidence that the policy worked in practice. The final step in our description of the expansion of the withholding scheme is to assess whether it had any direct effect on newly appointed CAs.

## 5.1 Response of Newly Appointed Collection Agents

The empirical exercise that we perform in this section is very simple: we test whether firms respond to enrollment as CAs by looking at their reported sales in the periods after the appointment event. To do so, we use a fuzzy RD framework focusing on firms whose sales in 2015 were close to the AR\$60 million threshold.

Recall that the reform to the withholding scheme established that firms whose sales in 2015 were at least AR\$60 million would be automatically enrolled as CAs. In Figure 6 we showed that, although assignment was not deterministic, there was a discrete increase in the probability of treatment at the threshold. In addition, Figure 5 showed that there were no discontinuities around the threshold, suggesting that firms were not able to manipulate the running variable used to determine appointment into the CA program. Moreover, the resolution that set the guidelines for the reform was enacted in July 2016, leaving no possibility for firms to adjust their 2015 sales. All these facts provide strong evidence that enrollment status was as good as randomly assigned to firms. In the absence of any changes, we should expect reported sales in the periods after the appointment event to evolve smoothly around the cutoff. Therefore, finding any jumps in the outcome of interest for firms close to the boundary would be suggestive evidence of a causal effect of the change in appointment status.

We identify the response of firms to enrollment as CAs by running regressions of the following form:

$$y_i = \alpha + \beta \cdot 1(R_i \geq c) + \gamma \cdot (R_i - c) + \varepsilon_i. \quad (1)$$

Here  $y_i$  denotes the outcome of interest for firm  $i$  for any given year,  $c = \text{AR\$}60\text{million}$  is the cutoff of interest, and  $R_i$  is the running variable, 2015 gross income. The coefficient

of interest capturing the effect of the discontinuity at  $c$  is  $\beta$ . In the first stage, we show that the probability of a firm above the threshold being appointed as a CA in November 2016 changes discretely around the cutoff. In the second stage, we analyze whether firms adjust their (log) reported sales in response to these changes.

Table 2 reports the results for the first stage and the 2SLS estimates from a fuzzy RD specification. Column 1 shows the first-stage change in the probability of a firm above the threshold being appointed as a CA in November 2016. This coefficient is analogous to the size of the jump in the probability of treatment shown in Figure 6. Columns 2 through 5 correspond to the effect on reported annual sales. These results are also displayed in Figure 8. Column 2 excludes the two treated months of 2016, November and December, and thus the results of this column can be interpreted as a placebo test, as the column only contains pre-reform sales. Importantly, none of these estimates are statistically significant, suggesting that CAs did not experience any effects on their business activity. We attribute this result to the fact that appointed firms were among the largest—and presumably most formal—firms in the economy, so tax collection duties did not saddle them with significant compliance costs to them, nor did they change their perception of tax enforcement.

The results shown in this section suggest that firms that became CAs did not change their behavior. In our view, this helps to reduce the concerns about potential confounding factors in the analysis that follows were we study the response of taxpayers when their business partners become CAs. If tax collection duties did not induce any large changes in the business structure of newly appointed CAs, then it is likely that there were no other fundamental changes in their interactions with trading partners.

## 6 How Do Firms Respond to an Increase in Withholding?

In this section we study the indirect implications of expanding the withholding scheme. In other words, we focus on the response of taxpayers to an increase in the amount of tax withheld from them. The ideal experiment to answer this question would be to randomly allocate CAs throughout the economy and compare the response of firms that are commercially linked to these CAs with the response of those that are not. While we cannot randomly assign tax collection duties to firms, we can leverage on the design of the reform and use the built-in variation in exposure to CAs to identify a causal effect of withholding on compliance. More specifically, we rely on the following quasi-experiment. The expansion of the withholding scheme entailed that some large firms were appointed as CAs. As shown above, this led to an exogenous and sharp increase in the number of CAs.

This had no immediate consequences for firms not directly targeted by the reform—that is, regular taxpayers. However, some taxpayers saw a larger increase in the number of CAs withholding from them as a byproduct of their commercial linkages. This increase was arguably exogenous to them, as it is unlikely that their choice of commercial partners was related to the size threshold used by the appointment rule.

The key econometric challenge that must be tackled to precisely estimate the effect of withholding on compliance is to distinguish it from other time-varying shocks that might have occurred around the time of the reform. To address this issue we implement a difference-in-differences (DD) design relying on taxpayers' differential exposure to newly-appointed CAs.

We use trade linkages to construct two distinct groups of firms: those that are connected to newly appointed CAs (our treatment group, T) and those that are not (our control group, C). Firms in T have commercial ties with CAs appointed in November 2016 and therefore experience an increase in the number of CAs in their network at the time of the reform. Firms in C only trade with preexisting CAs and do not experience a change in the number of CAs in their network of commercial partners. In an ideal setting the two groups would be constructed based on linkages observed in a baseline period. However, we face the challenge that we do not observe trade links until one of the firms becomes a CA. This implies that, for firms connected to new CAs, the first observed transaction is in November 2016 at earliest. To circumvent this issue, we assume that there is a six-month window of time in which firms do not drop their partners. Then, we classify into T any firm that transacts with a newly appointed CA between November 2016 and April 2017 and classify into C those that only transact with preexisting CAs during the same period.

By comparing T with C, we are comparing a group that experienced a change in the way taxes were collected—from direct payment to withholding—with a group that did not. Under the assumption that the two groups would have behaved similarly in the absence of the policy change, their comparison will reveal the causal effect of an increase in the share of tax collected through withholding on taxpayer behavior. Coefficient  $\beta$  in the following regression captures this effect:

$$y_{it} = \beta \cdot Treat_i \cdot Post_t + \theta_i + \gamma_t + \varepsilon_{it}. \quad (2)$$

Here  $y_{it}$  is the outcome for firm  $i$  in period  $t$ ,  $Treat_i$  is an indicator for firms in the treatment group,  $Post_t$  is an indicator for time periods after November 2016 (the reform date),  $\theta_i$  are firm fixed effects, and  $\gamma_t$  are time-period fixed effects. We focus on the following

outcomes. To gauge the first-stage results of the reform for taxpayers, we look at the number of CAs (extensive margin) and the share of tax withheld (intensive margin). The behavioral response is captured by gross income (sales), and we also look at tax liability. Although the data are provided at the monthly level, we aggregate them to the quarterly level in order to avoid some issues that are present in the most granular definition, such as the fact that some firms report zero sales in a given month and that large seasonal fluctuations in economic activity are related to the combination of the holiday season and the end of the fiscal year. In doing so, we define quarters relative to the reform; that is, the first quarter corresponds to the months of November 2016 through January 2017. We restrict the time frame of our regressions to all available quarters from the pre-period (starting November 2015) to the last quarter of 2019 (ending January 2020, before the COVID-19 pandemic began to take a toll on economic activity). Having defined the time variable in this way, we construct a balanced panel of firms that report positive sales in at least half of the periods in which they are present in the data.

We complement the DD estimates with the following event-study analyses:

$$y_{it} = \sum_{\tau=-q}^{-2} \delta_\tau \cdot D_{i\tau} + \sum_{\tau=0}^m \beta_\tau \cdot D_{i\tau} + \theta_i + \varepsilon_{it}. \quad (3)$$

Here  $D_{i\tau}$  is an event-study indicator for each quarter relative to the baseline period (November 2016–January 2017). The coefficients  $\delta_\tau$  and  $\beta_\tau$  estimate the effect on the outcome of interest for each period relative to the baseline ( $\tau = -1$ ), net of firm fixed effects. This specification provides compelling visual evidence of the validity of the identification assumption, as the coefficients  $\delta_\tau$  reveal pre-reform trends.

## 6.1 Empirical Results

*Event-study results.* We begin by providing evidence on the first stage of the reform: the increase in the number of commercial partners that are CAs and the related increase in the share of due taxes withheld at source. Figures 9 and 10 plot the event-study estimates for the first stage regressions. In the top panel of each figure, we run a separate regression for T and C and plot the coefficients for the time dummies plus the constant. The bottom panel displays the DD coefficients with the corresponding confidence interval assessing the relative difference between the two groups in each month.

Several features stand out in these plots. First, both cases evolve similarly before the reform. This provides initial evidence in favor of our identifying assumption: absent any

policy change, both groups evolved similarly. Second, there is a sharp increase for T at the time of the reform. This suggests that the policy had the intended effect of increasing exposure to CAs throughout their networks of partners and also suggests that the CAs fulfilled their role as tax collectors by withholding at source. Third, while the effect for the number of CAs is stable through time, the effect on the share of tax withheld decreases to about half of its initial magnitude as we move further away from the time of the event. A potential explanation is that although firms maintain their commercial partners once they become CAs, they may modify their sourcing decisions to reduce the amount of tax withheld by them.

In Figure 11 we show the analogous plots for the behavioral response to the reform. We plot the coefficients on reported income and compute its growth relative to  $t - 1$ , which allows us to rescale both groups relative to the baseline. The levels plot shows a similar pattern to the first-stage figures. Both groups track each other before the reform, and there is an increase for T right at the time of the reform. The DD plot allows a clearer appreciation of the immediate increase right at  $t = 0$  and the further increases over time. Overall, the estimates suggest that treated firms increased their reported gross income by 5 percentage points relative to the control group.

Finally, Figure 12 provides the estimation results for tax liability. The design of the TT entails that tax liability is calculated by applying the corresponding tax rate to the tax base; no deductions are contemplated in the tax structure. As tax liability is a function of the tax base, it would be surprising to find different results in this case. Reassuringly, tax liability displays the same pattern. Taken together, the results in Figure 11 and Figure 12 indicate that the tax administration saw an increase in total tax collected after the reform. This supports the macro evidence shown in Section 2.

*Difference-in-differences results.* Table 3 Panel A reports the results from estimating equation 2. We show the first-stage and reduced-form point estimates for the share of tax withheld, and we show the gross income growth relative to the baseline period. This exercise summarizes previous figures and shows that reported sales for treated firms increase by 5 percentage points relative to the control group after the reform is in place.

*Interpretation of the results.* A potential interpretation of this result is that withheld taxes act as a lower bound on self-reported income: if firms were underreporting their sales before the reform, having a larger part of the tax remitted by a CA may have forced them to increase the amount they must report.

## 7 How Do Firms Respond to a Decrease in Withholding?

We analyze another policy change that took place during the period of our study that—unlike the reform described so far—reduced exposure to withholding for a group of firms. The aim of our exercise in this section is twofold. First, it addresses potential endogeneity concerns that could arise regarding the previous analysis. Second, it provides an alternative identification channel for identifying the response of firms to withholding.

In September 2018 the city’s government decided to exempt firms whose sales in 2017 were below AR\$10 million from being subject to withholding by banks. This policy was part of a stimulus plan targeted at small and midsized enterprises during a national economic crisis. The policy measure was initially meant to last six months, although it was later extended for another six months. The policy (i) targeted a specific group of taxpayers relying on a predetermined size threshold, (ii) took place almost two years after the 2016 reform, and (iii) was the inverse of the reform analyzed thus far in the sense that in this case it reduced exposure to withholding.

Figure 13 plots the assignment rule for the policy. We take bins of firm sales in 2017 (the policy’s running variable) and calculate the average share of tax withheld by banks in each bin. The share was very similar on either side of the threshold for the periods prior to the policy change, and, exactly in September 2018, the share drops for firms below the threshold. The discontinuity is fuzzy because the tax administration denied the benefit to firms flagged as noncompliant (for example, firms that had failed an audit in the past or that maintained high levels of debt with the administration); these types of measures are more likely to be executed on larger firms.

Conditional on a firm’s sales in 2017, being granted an exemption from bank withholding is as good as randomly assigned for those that are close to the cutoff. Therefore, this setting allows us to address any potential endogeneity concerns that remained from the previous analysis.

Moving on to the identification of firms’ responses, this setting provides a way to test whether a reduction in the coverage of withholding leads to a fall in reported tax liability. Recall from Section 4 that noncompliant firms will try to underreport up to the point at which the self-reported sales offset any withheld funds. If the latter fall, then the firm will be able to underreport more. To estimate the effect of lowering withholding exposure on sales, we use a similar DD research design to the one summarized by equation 2. In this case, we leverage the discontinuity created by the assignment criterion and define treatment and control groups based on the location of firms on either side of the cutoff.

Firms in the treatment group are those whose sales in 2017 were between AR\$5 million and AR\$10 million. Firms in the control group are those whose sales in 2017 were between AR\$10 million and AR\$20 million.

Figure 14 shows the first-stage results for the share of taxes withheld by banks. Withholding by banks falls sharply right at the time of implementation for T relative to C. Figure 15 shows the response of sales. Firms whose withholding fell reduce their reported sales. We interpret these findings as follows: the policy led to a reduction in the coverage of third-party information for firms in T, whose banks were no longer collecting taxes from them and remitting the funds to the tax administration. This gave firms more freedom to misreport their sales, allowing them to reduce their tax liability.

## 8 Concluding Remarks

In this paper, we studied the effects of delegating tax collection duties to firms. We analyzed the expansion of the withholding scheme used to collect the TT in the City of Buenos Aires, Argentina, which entailed an increase in the share of taxpayers' tax liability collected indirectly at source by CAs in lieu of direct payments to the tax authority. The setting allowed us to estimate both the direct effects of expanding the withholding scheme on the firms that were tasked with collecting taxes and the indirect effects on those that now faced an increase in the amount of taxes being withheld at source. Our results show that relying on large firms to withhold taxes from their commercial partners is an effective tax collection tool for two reasons. First, appointing firms to collect taxes did not hurt their activity. Second, substituting direct payments for withholding at source increased reported sales, which, in turn, increased tax revenue. Taken together, our findings bolster the argument of recent research by Basri et al. (2019) showing that administrative reforms can be highly effective in raising revenue and building tax capacity.

We believe that our results could have important implications for the way countries determine how to collect taxes. At the initial stages of development, when informality is prevalent, countries might lack the administrative and enforcement capacity to use firms as tax collectors. As countries develop and improve their IT systems, however, substituting direct means of payment with indirect withholding schemes that rely on firms seems to be the right move. Our findings and the nature of the studied reforms can thus provide guidance to other middle- and low-income countries on ways to determine who the right tax collector is as a function of the level of development.

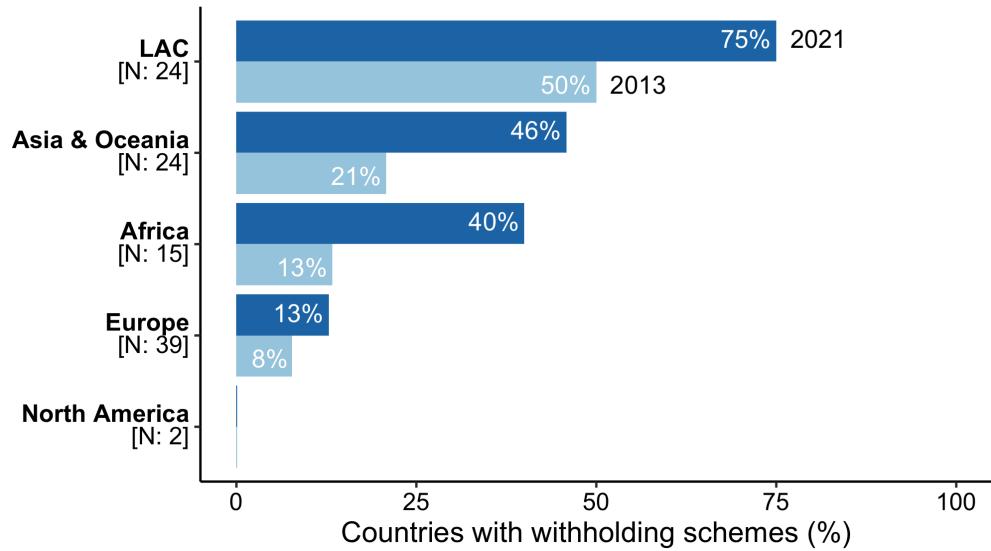
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# Figures

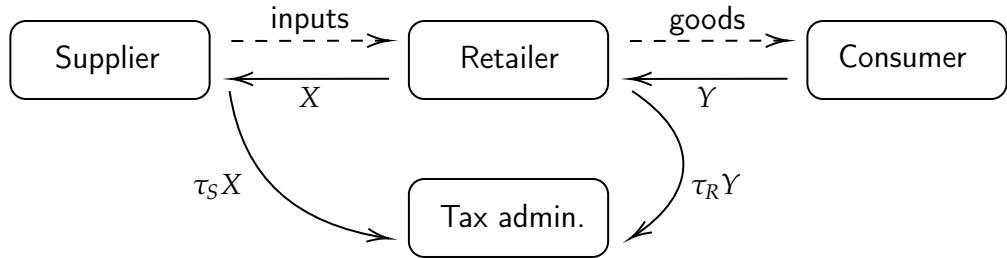
Figure 1: Withholding of indirect taxes by region



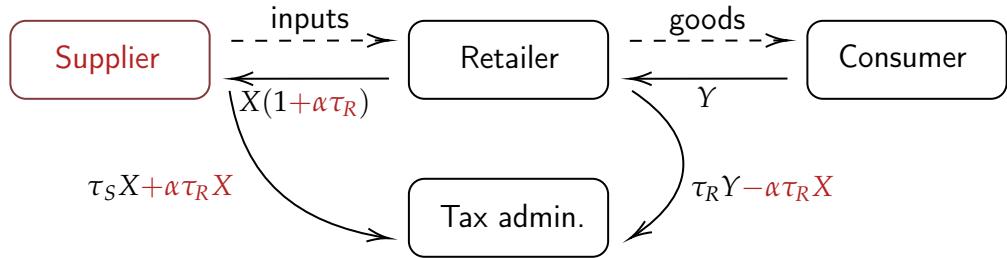
*Notes:* This figure shows the share of countries in each region with a withholding scheme for indirect taxes in 2013 (light blue bar) and 2021 (blue bar). We constructed the figure using text-analysis techniques applied to the Ernst & Young's "Worldwide VAT, GST and Sales Tax Guide.". For more details, see Appendix B.

Figure 2: Tax collection mechanisms

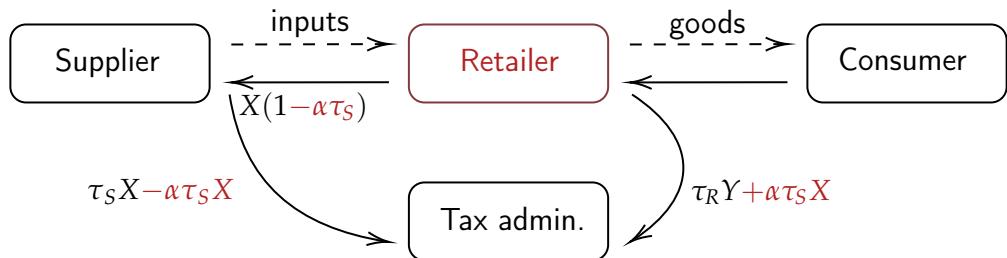
Direct payment



Withholding by seller (supplier)

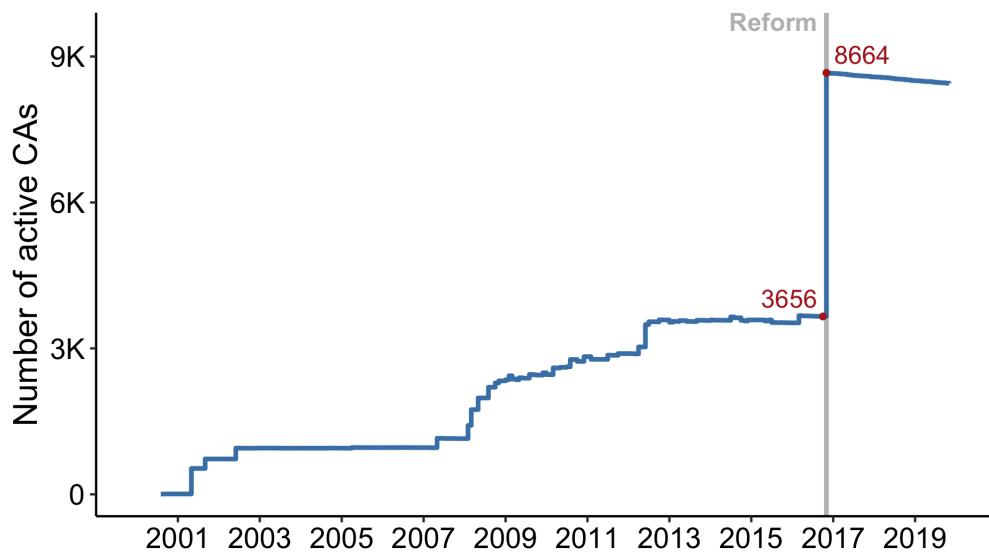


Withholding by buyer (retailer)



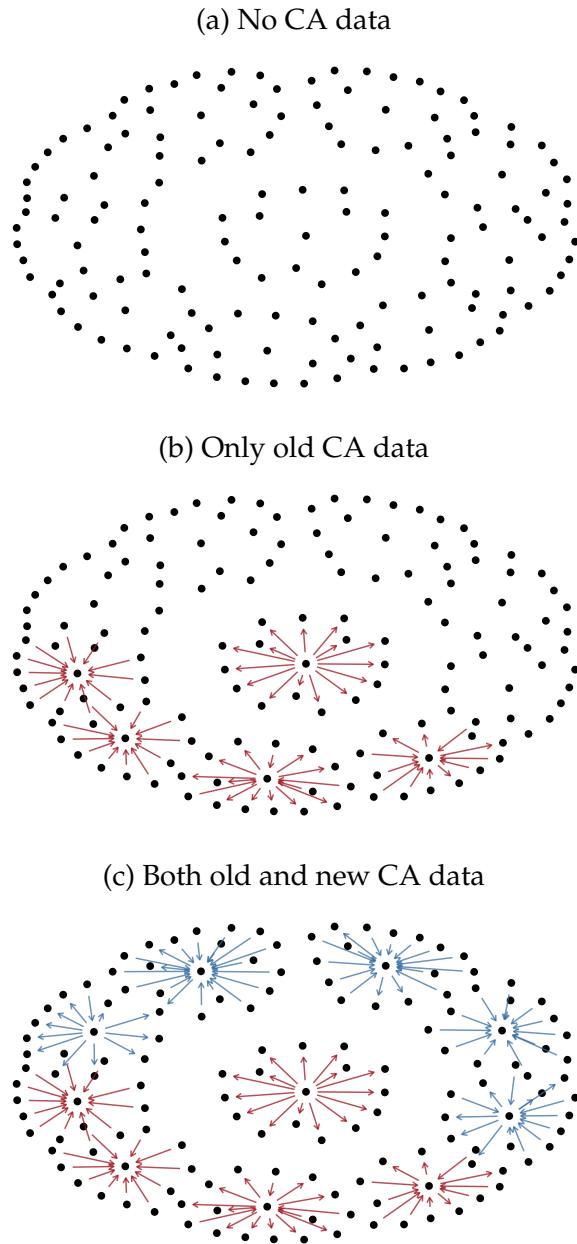
*Notes:* The figure summarizes the main features of the direct-payment and withholding tax collection mechanisms in a simplified setting with four agents. Highlighted in red are the agents that get appointed as collection agents under each scenario, as is the tax withheld by them.

Figure 3: Number of firms acting as collection agents



Notes: The figure shows the number of firms that are part of the collection agent (CA) register at any point in time. It was constructed using the monthly CA register published by the tax administration as public information. By comparing successive months, we obtain the actual entry or exit status for each firm, independent of whether it is recorded as active in our administrative tax records. See Figure D.2 for more details on how we scrapped the information. “Reform” corresponds to November 2016, the date at which the reform was enacted. Highlighted in red are the number of CAs in October 2016 and November 2016.

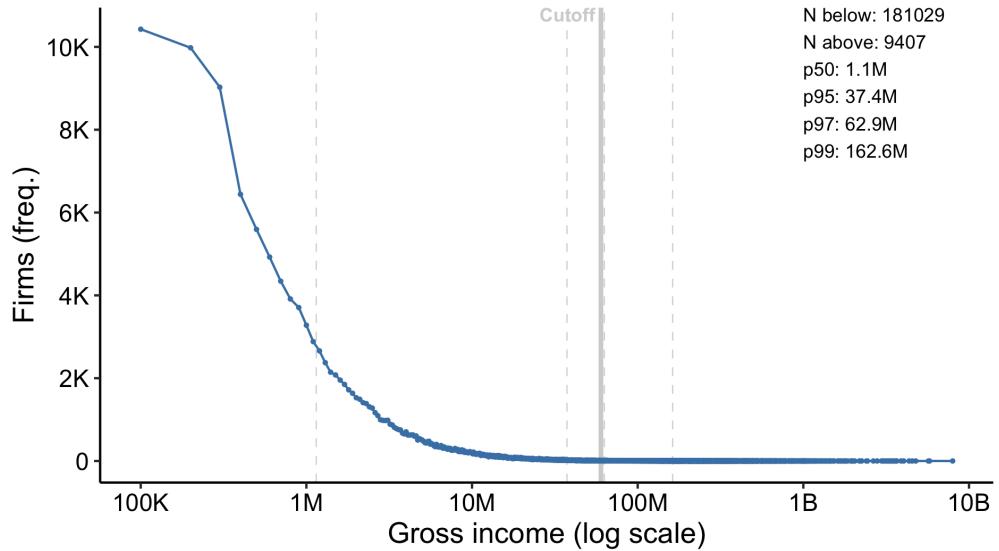
Figure 4: Networks



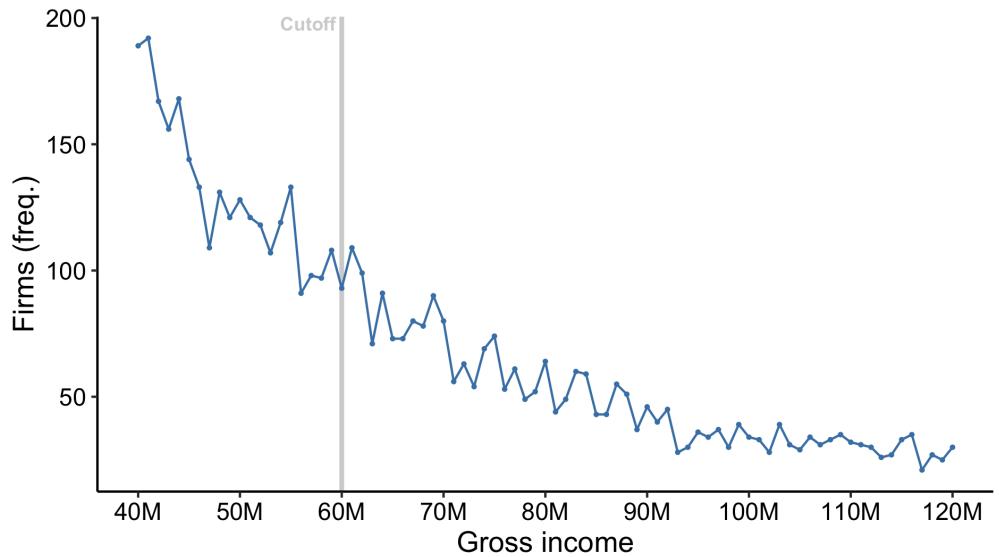
*Notes:* These figures illustrate the construction of the business-to-business linkages in our data set. Each node represents a real firm, and the connecting edges represent real linkages. The central nodes, from which the edges radiate, correspond to firms acting as collection agents (CAs) while the direction of the edges signifies whether the CA is a seller (outgoing) or a buyer (incoming) in the transaction. Notice that the same CA can simultaneously withhold sales and purchases and thus have arrows pointing in both directions.

Figure 5

(a) Pre-reform gross income distribution

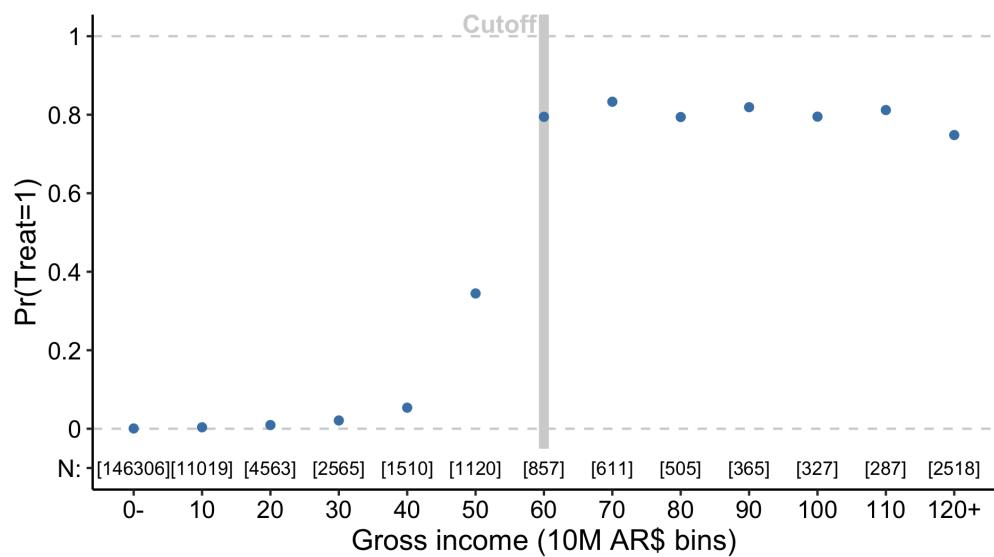


(b) Zooming in around appointment-rule cutoff



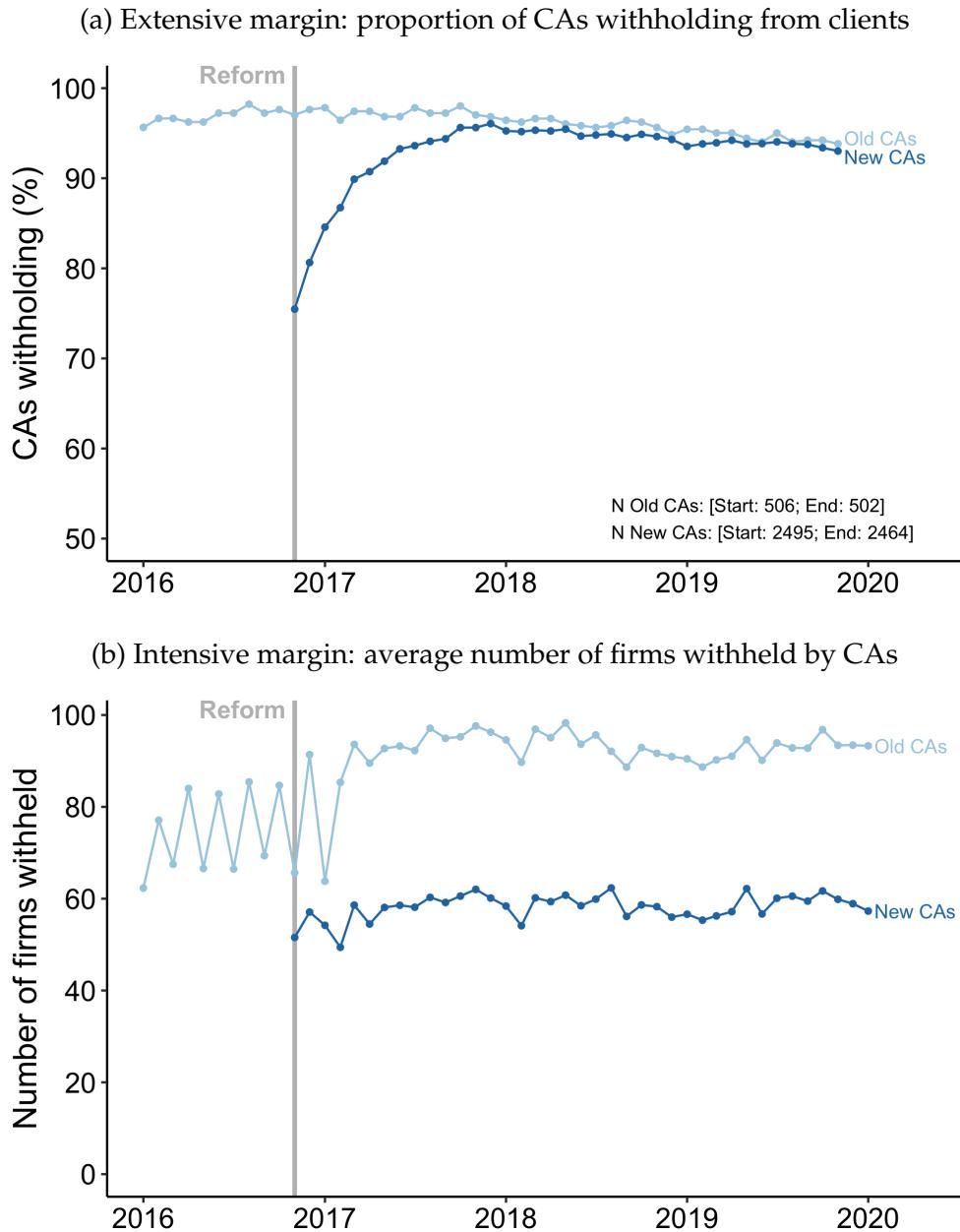
Notes: Gross income bins of size AR\$100,000 and AR\$1 million (~US\$8,000 and ~US\$80,000), respectively; “Cutoff” indicates the location of income threshold; dashed lines indicate p50, p95, p97, and p99; each plot shows the relevant part of support.

Figure 6: Probability of appointment as collection agent



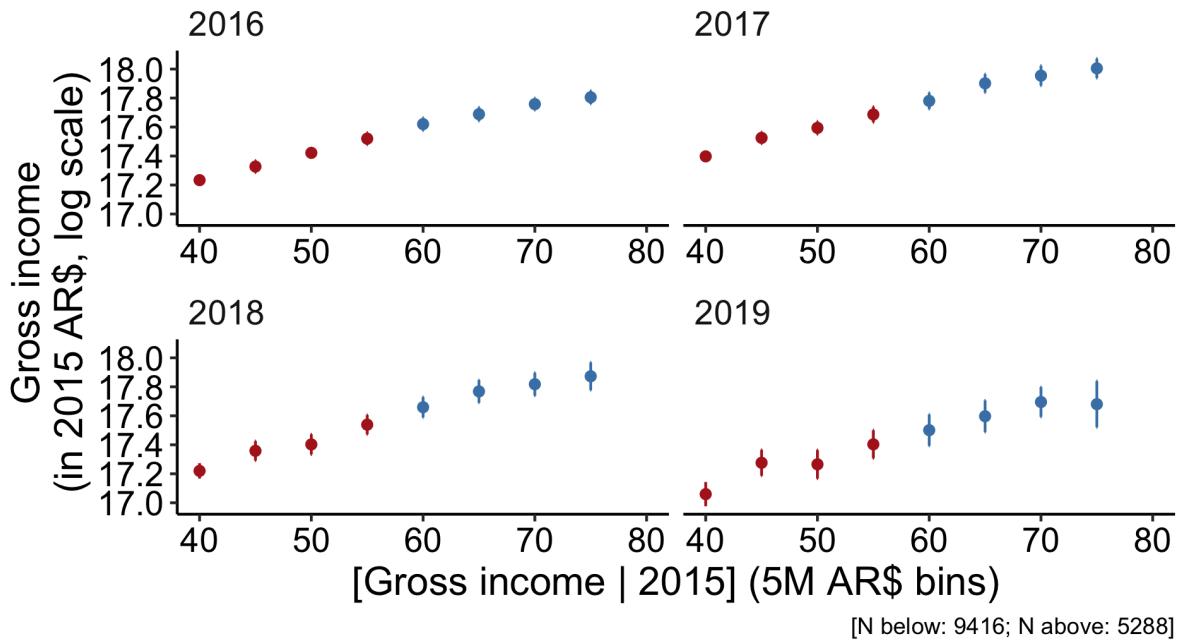
*Notes:* The figure shows the probability of appointment as collection agent by gross income bin. The reform enacted in November 2016 stated that firms whose gross income in 2015 was greater than AR\$60 million would be automatically appointed. “Cutoff” indicates the location of this threshold. The numbers in brackets indicate the total number of firms in each bin.

Figure 7: Withholding by collection agents: extensive and intensive margins



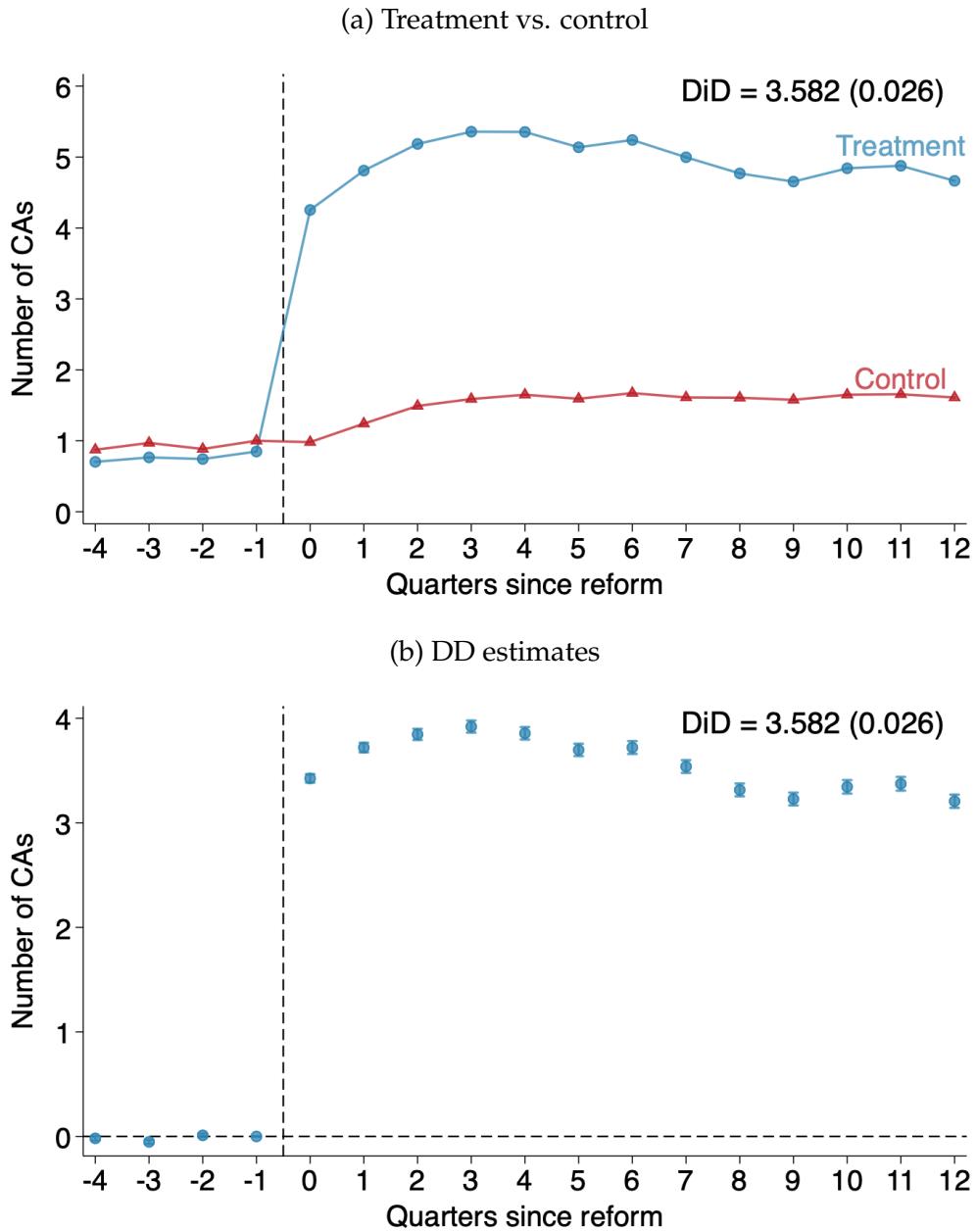
*Notes:* We compare the behavior of new collection agents (CAs), appointed in November 2016, with that of old CAs, appointed in 2012. The figure in panel (a) plots the proportion of new CAs that are withholding from commercial partners. Panel (b) shows the average number of firms that get withheld from.

Figure 8: Gross income of newly appointed collection agents vs. non-eligible firms



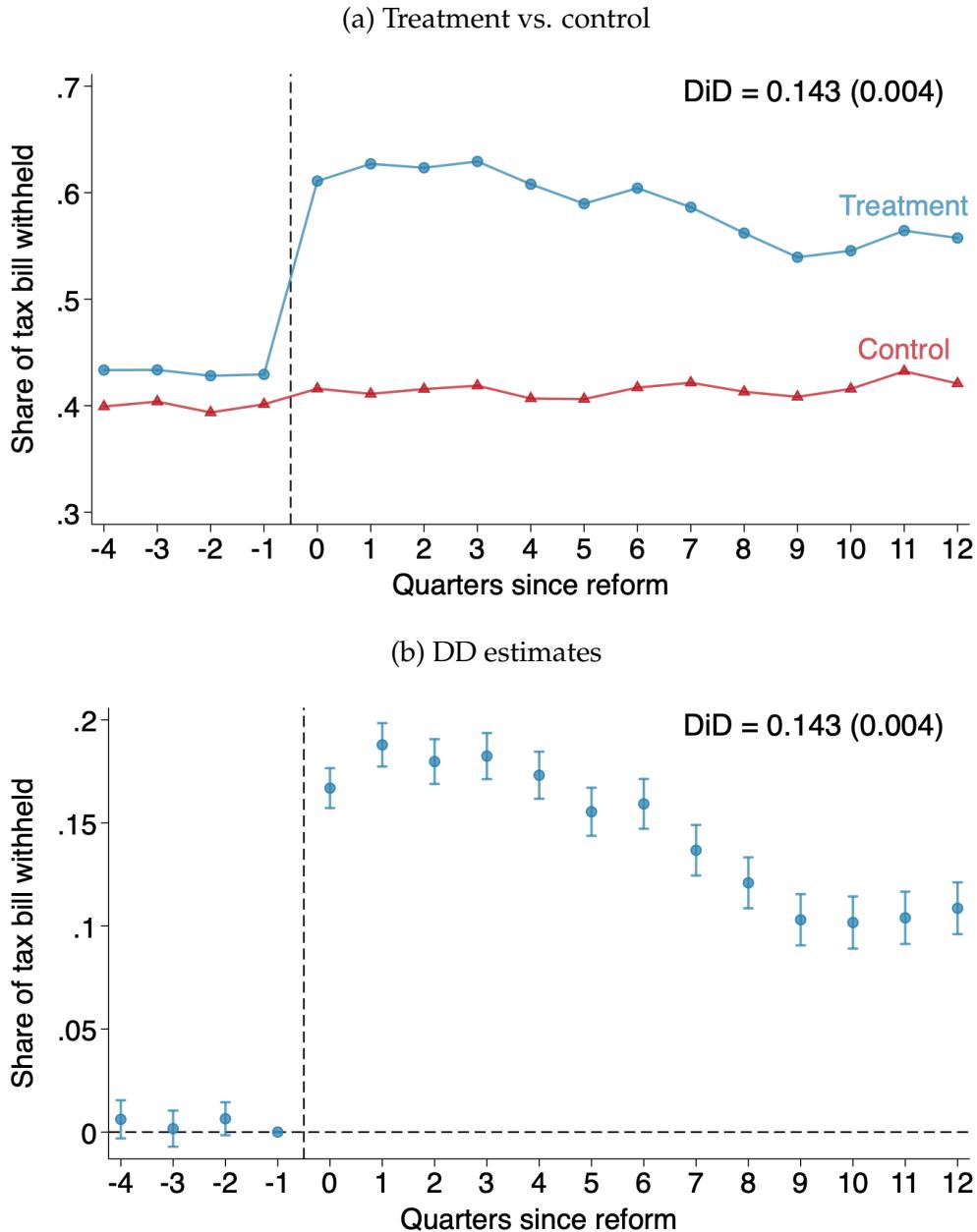
*Notes:* These figures plot log annual gross income in 2015 pesos for eight equally spaced bins (width AR\$5 million) of the running variable: annual gross income in 2015. With some exceptions, the rule we exploit appointed firms above AR\$60 million as collection agents (CAs). The blue dots represent firms eligible to become CAs. The red dots correspond to non-eligible firms. The top left panel corresponds to 2016 and excludes the two treated months, November and December. Hence, it can be interpreted as a placebo test because it only reflects pre-reform sales. The top right panel and bottom panels show annual sales from 2017 through 2019. The sample is a balanced panel of firms. We exclude outliers (growth rate below percentile 1 or above percentile 99) from our calculations.

Figure 9: Number of collection agents



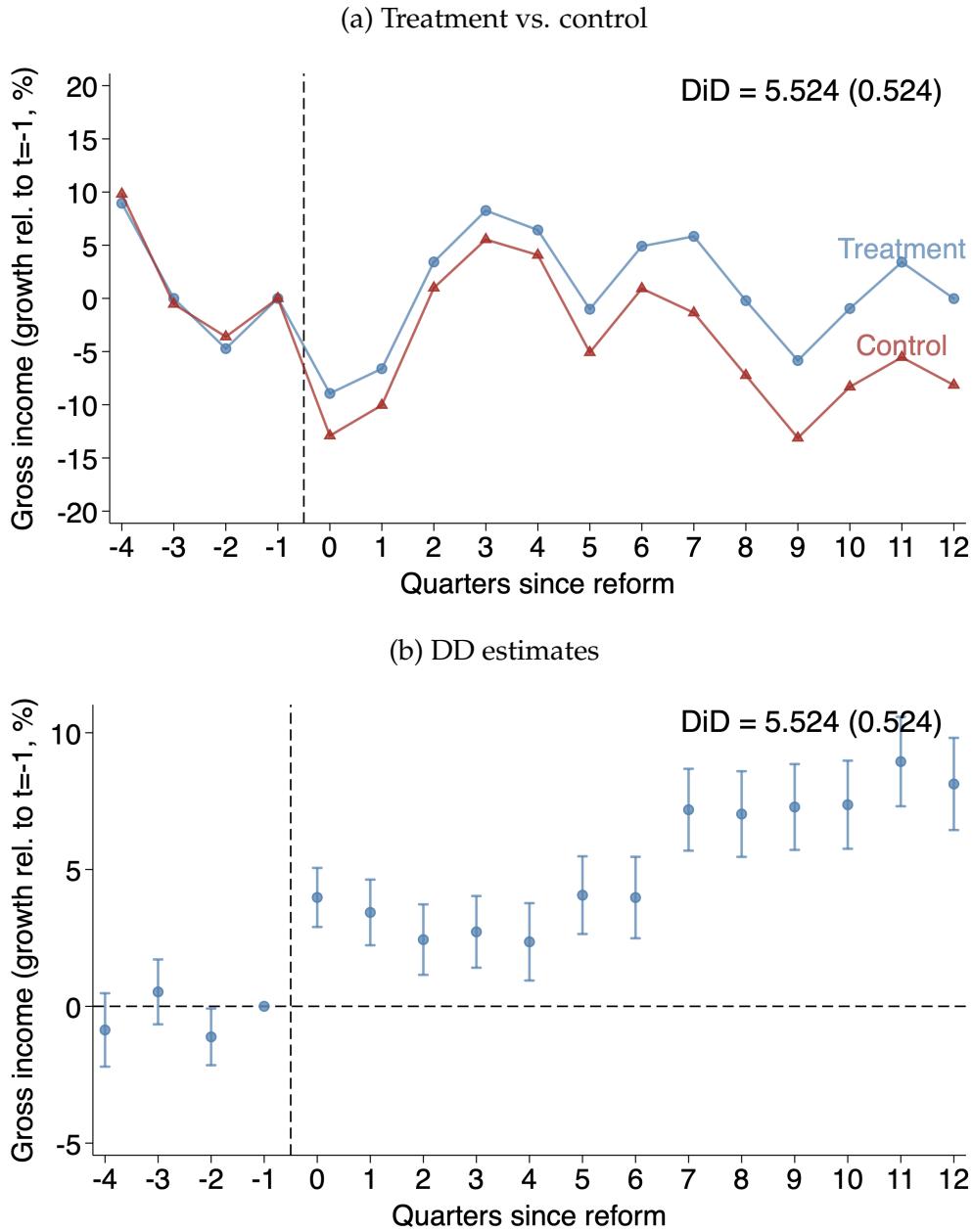
Notes: Panel (a) corresponds to the regression of the outcome of interest on the full set of firm and month fixed effects, dropping the dummy for the baseline period. The figure plots the coefficients on the constant and the time dummies of these regressions, run separately for the two groups of firms. Each coefficient represents the average within-firm number of collection agents (CAs) relative to the baseline month. Panel (b) is the differences-in-differences (DD) analog of the Panel (a). All regression specifications contain a balanced panel of firms that filed taxes in at least six months every year.

Figure 10: Tax withheld



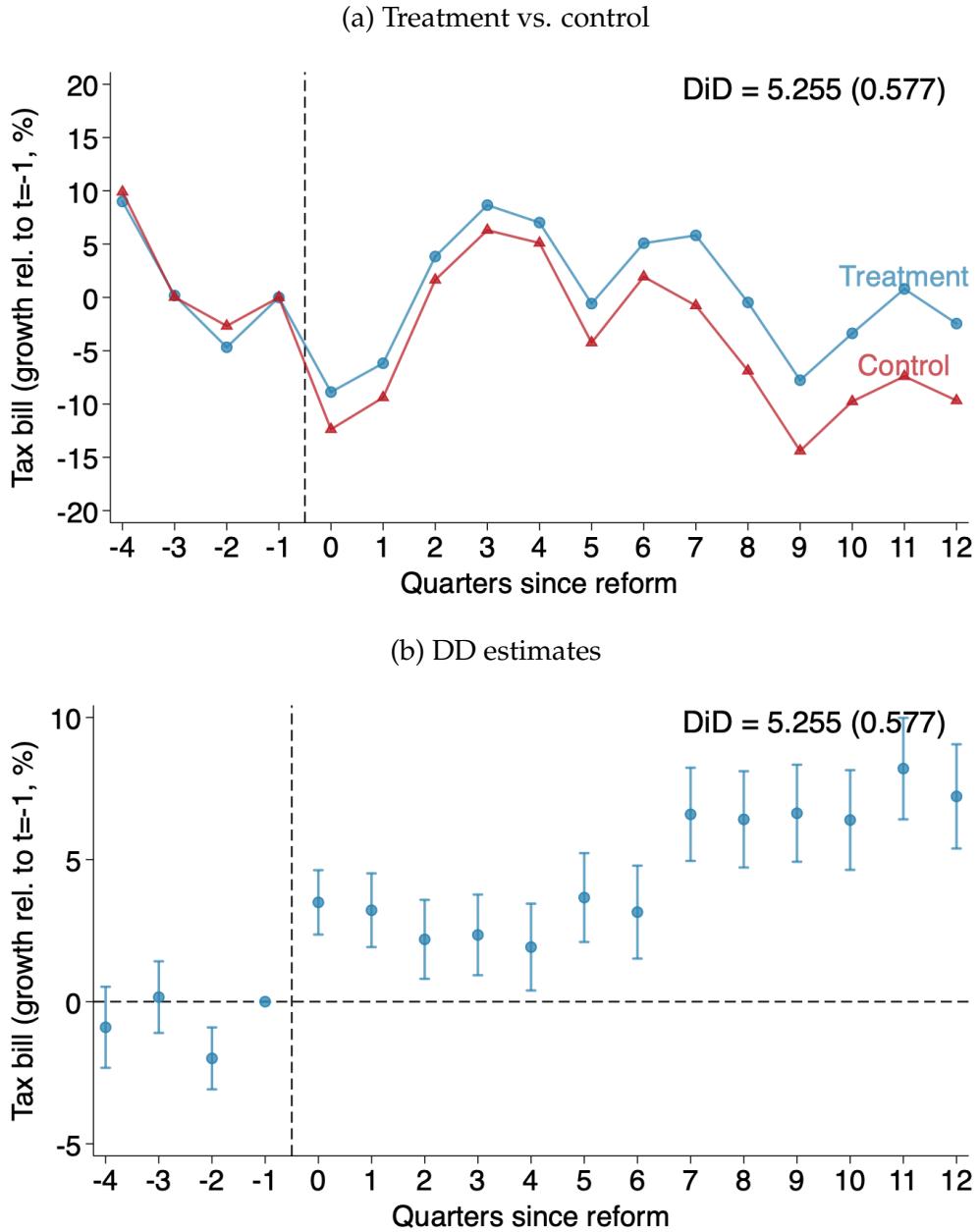
Notes: Panel (a) corresponds to the regression of the outcome of interest on the full set of firm and month fixed effects, dropping the dummy for the baseline period. The figure plots the coefficients on the constant and the time dummies of these regressions, run separately for the two groups of firms. Each coefficient represents the average within-firm change in tax withheld as a share of total tax liability relative to the baseline month. Panel (b) is the differences-in-differences (DD) analog of Panel (a). All regression specifications contain a balanced panel of firms that filed taxes in at least six months every year. Outcomes are winsorized at percentiles 5 and 95.

Figure 11: Gross income growth



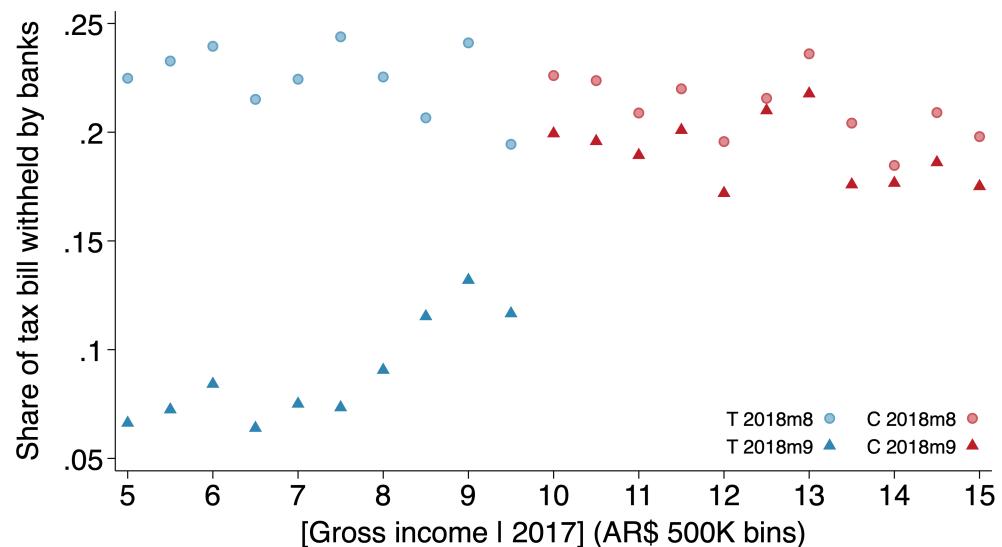
Notes: Panel (a) corresponds to the regression of the outcome of interest on the full set of firm and month fixed effects, dropping the dummy for the baseline period. The figure plots the coefficients on the constant and the time dummies of these regressions, run separately for the two groups of firms. Each coefficient represents the average within-firm gross income growth relative to the baseline month for the corresponding group of firms. Panel (b) is the differences-in-differences (DD) analog of Panel (a). All regression specifications contain a balanced panel of firms that filed taxes in at least six months every year.

Figure 12: Tax liability growth



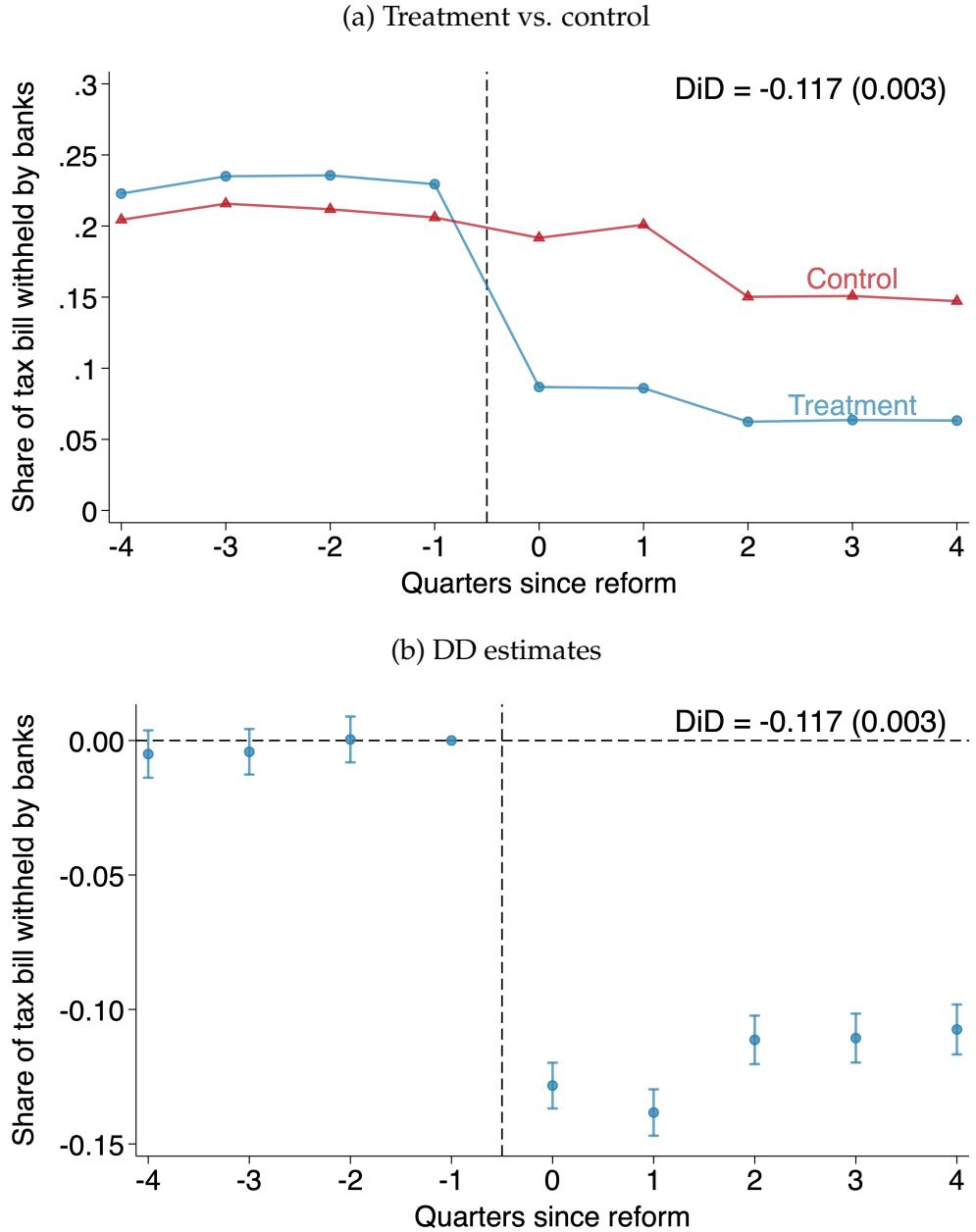
Notes: Panel (a) corresponds to the regression of the outcome of interest on the full set of firm and month fixed effects, dropping the dummy for the baseline period. The figure plots the coefficients on the constant and the time dummies of these regressions, run separately for the two groups of firms. Each coefficient represents the average within-firm tax liability growth relative to the baseline month for the corresponding group of firms. Panel (b) is the differences-in-differences (DD) analog of Panel (a). All regression specifications contain a balanced panel of firms that filed taxes in at least six months every year.

Figure 13: Tax withheld by banks



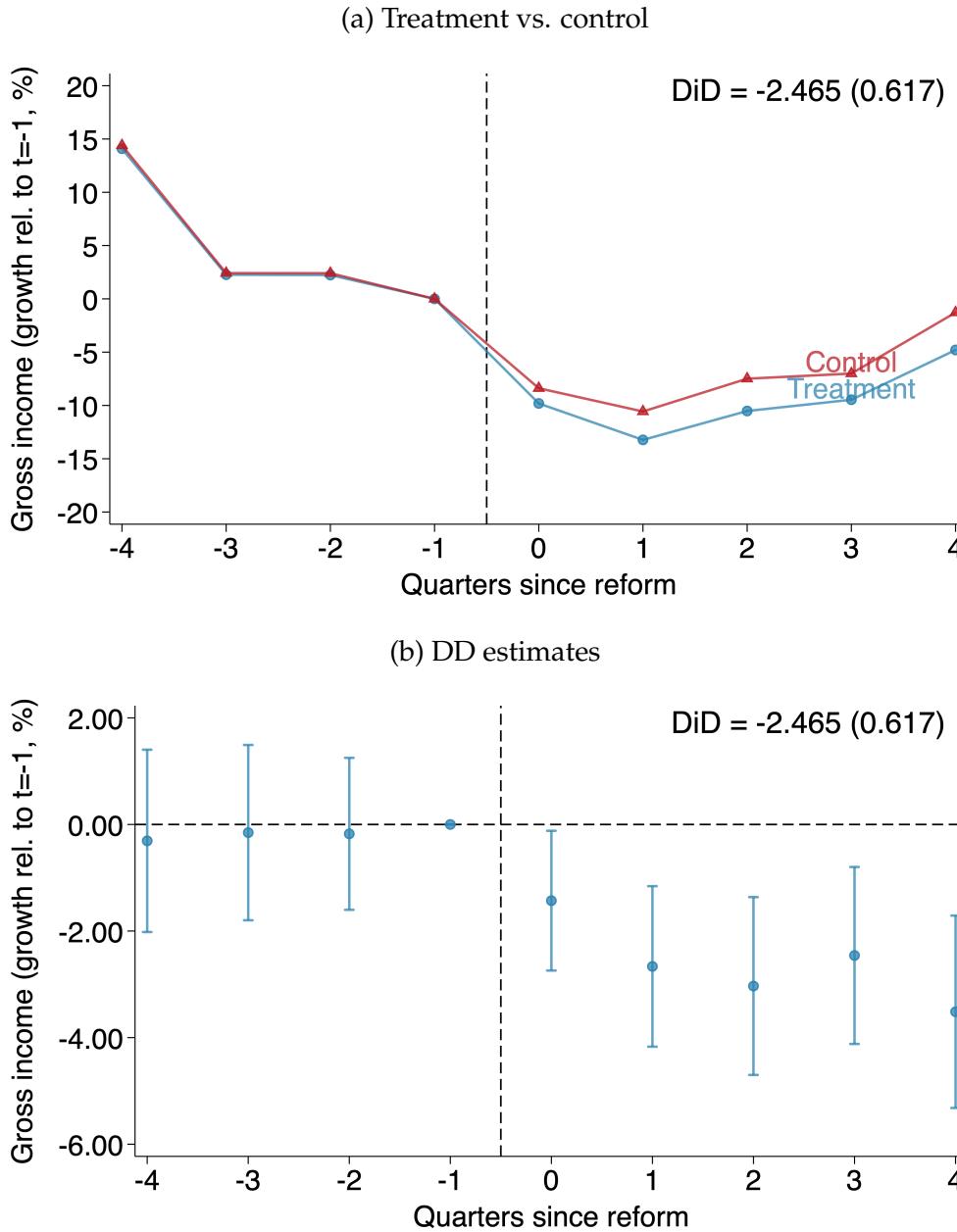
*Notes:* In September 2018 withholding by banks was waived for firms whose sales in 2017 were below AR\$10 million. This figure takes bins of firm sales in 2017 (the policy's running variable) and calculates the average share of tax withheld by banks in each bin. Bins below the threshold are colored in blue; bins above the threshold are colored in red. The circles correspond to August 2018, the month before the policy change, and the triangles correspond to September 2018, when the policy change took effect.

Figure 14: Tax withheld by banks



Notes: Panel (a) corresponds to the regression of the outcome of interest on the full set of firm and month fixed effects, dropping the dummy for the baseline period. The figure plots the coefficients on the constant and the time dummies of these regressions, run separately for the two groups of firms. Each coefficient represents the average within-firm change in tax withheld as a share of total tax liability relative to the baseline month. Panel (b) is the differences-in-differences (DD) analog of Panel (a). All regression specifications contain a balanced panel of firms that filed taxes in at least six months every year. Outcomes are winsorized at percentiles 5 and 95.

Figure 15: Gross income growth



Notes: Panel (a) corresponds to the regression of the outcome of interest on the full set of firm and month fixed effects, dropping the dummy for the baseline period. The figure plots the coefficients on the constant and the time dummies of these regressions, run separately for the two groups of firms. Each coefficient represents the average within-firm gross income growth relative to the baseline month for the corresponding group of firms. Panel (b) is the differences-in-differences (DD) analog of Panel (a). All regression specifications contain a balanced panel of firms that filed taxes in at least six months every year.

## Tables

Table 1: Summary statistics

	No. firms	Gross revenue				Tax liability			
		p5	p50	mean	p95	p5	p50	mean	p95
<b>Panel A: Full sample</b>									
Firms	183,503	0	42	249	1,052	0	1	6	28
Collection agents	9,366	3	2,757	19,209	39,947	0	85	942	1,451
<b>Panel B: Estimating sample</b>									
Firms	80,208	7	123	415	1,664	0	3	11	45

*Notes:* This table reports summary statistics calculated in the period January–October 2016, before the expansion of the withholding regime. Gross revenue and tax liability are expressed in thousands of 2016 Argentinian pesos. Panel A corresponds to the full sample. Panel B is the estimating sample used for the taxpayer responses in Sections 6 and 7.

Table 2: Regression discontinuity estimations

	First stage	Reported sales			
		2016 (1)	2017 (2)	2018 (3)	2019 (4)
RD estimate	0.323*** (0.054)	0.845 (0.588)	0.555 (0.621)	0.839 (0.571)	0.554 (0.559)
Number of firms	4,098	3,235	3,195	3,151	3,102

*Notes:* This table reports the first-stage and the 2SLS estimates from a fuzzy regression discontinuity (RD) specification. The running variable is annual gross income in 2015. The reform to the withholding system enacted in November 2016 stated that firms whose gross income in 2015 was greater than AR\$60 million (with some exceptions) would be automatically appointed as collection agents (CAs). Column 1 shows the first-stage change in the probability of a firm above the threshold being appointed as a CA in November 2016. This first stage is graphically shown in Figure 6. Columns 2 through 5 correspond to the logarithm of reported annual sales. Column 2 excludes the two treated months of 2016, November and December. The results of this column can be interpreted as the result of a placebo test, as they only reflect pre-reform sales. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels. The regression is estimated for the range [40, 60) to the left of the cutoff, and [60, 80) to the right of the cutoff using a linear approximation and a triangular kernel. RD estimates are computed with the `rdrobust` routine from Calonico et al., 2017.

Table 3: Difference-in-differences estimations

	<b>First stage</b> (1)	<b>Reported sales</b> (2)	<b>Tax revenue</b> (3)
<b>Panel A: Increase in withholding</b>			
<i>Treat · Post</i>	0.143*** (0.004)	5.524*** (0.524)	5.255*** (0.577)
Observations	1,221,000	1,221,000	1,221,000
Number of firms	75,710	75,710	75,710
$\bar{y}_{t-1}$	11.623	965.219	33.437
<b>Panel B: Decrease in withholding</b>			
<i>Treat · Post</i>	-0.108*** (0.003)	-2.798*** (0.701)	-4.285*** (0.776)
Observations	142,913	142,913	142,913
Number of firms	16,006	16,006	16,006
$\bar{y}_{t-1}$	7.236	1156.487	33.105

*Notes:* This table reports the first-stage change in withholding and the reduced-form estimates from a difference-in-differences specification. Column 1 shows the first-stage results. For Panel A, this corresponds to the share of taxes withheld by CAs, while for Panel B it corresponds to the share of taxes withheld by banks. Columns 2 and 3 correspond to the gross income and the tax revenue growth relative to the baseline period (third quarter of 2016 and third quarter of 2018, respectively). The last row of each panel shows the average value of the variable reported in columns at baseline. Standard errors clustered at the firm level are reported in parentheses. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels.

# Appendices

## A Turnover Tax: Further Details

The Turnover Tax (TT)—also known as gross receipts tax—is an indirect provincial tax imposed in each of the twenty-four jurisdictions in Argentina (twenty-three provinces and the City of Buenos Aires). It is levied on the gross sale of goods or services with no possibilities for deducting costs. It therefore applies to all the transactions taking place in the supply chain—that is, business-to-business and business-to-consumer transactions. This type of tax is simple to collect but creates “cascading effects” whereby final goods are taxed multiple times throughout production.<sup>1</sup> The TT represents the main source of own revenue in all the jurisdictions (about 75% of total tax receipts in the City of Buenos Aires).<sup>2</sup> Each jurisdiction has its own subnational tax laws and TT regulations regarding the tax base, tax rates, apportionment rules, collection schemes, exemptions, and promotional regimes applicable to each activity.

*Tax rates.* The tax rates typically vary from 3.5% to 5% for the sale of goods and services depending on the taxpayer activity, annual turnover from the previous year, and place where the transaction takes place (inside versus outside the province). For example, in 2016, retailers with 2015 revenue less than forty-nine million pesos faced a 3% tax rate on total sales. This rate increased to 4% if their 2015 revenue was greater than forty-nine million pesos (that is, it operates as a notch rather than a kink). Importantly, firms selling out of province might be taxed at higher tax rates (as if there were internal customs). This type of firm is informally called a “foreign jurisdiction” firm. When filing taxes, multi-activity firms must discriminate their tax base by the types of activity they carry out and apply the corresponding tax rate in each case. For example, a large footwear manufacturer that also sells shoes to final consumers could be taxed at 1% for its manufacturing sales and 4% for its retail sales.

*Local versus multiprovince firms.* Taxpayers are classified as *local* when they only sell goods or services within the jurisdiction (for example, a corner shop) or *multiprovince* when they operate both inside and outside the jurisdiction (for example, a manufacturer from another province selling goods in the City of Buenos Aires). These firms are part of

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<sup>1</sup>In environments with limited enforcement capacity this type of tax provides limited opportunities for firms to engage in tax evasion relative to profit-based taxes like the VAT and corporate income tax (Best et al., 2015).

<sup>2</sup>The other taxes levied at the provincial level are the stamp tax, property tax, car tax, and other minor duties.

the so-called Multilateral Agreement.

*Apportionment formula.* For firms operating in multiple provinces, there exists an apportionment system to distribute the tax base across places. The formula is based on a sales factor and an expenditure factor determined at year  $t-1$  (unified coefficient). In particular, 50% of total sales are distributed according to the ratio of a taxpayer's sales in the taxing province to its overall sales; and the other 50% are distributed according to the ratio of a taxpayer's expenditures in the taxing province to its overall expenditure.

*How the TT is collected.* The TT can be paid directly by taxpayers (standard method) or collected indirectly by third parties (withholding method). In the standard method, taxpayers log on to the tax administration's website at the end of the month, self-report the gross revenue accrued in each activity over that month; the system applies the corresponding tax rate and generates a payment coupon. Under the withholding method, the tax administration can designate firms, banks, or credit and debit card companies to operate as collection agents (CAs). In the case of firms as CAs, every time a taxpayer purchases inputs from a CA or sells goods or services to a CA, part of the invoice amount is withheld by the CA and remitted to the tax authority. In the case of banks, every time a payment is deposited in the bank account, the bank withholds part of it and remits the funds to the tax authority. In the case of card companies as CAs, every time a transaction is made with a debit or credit card, the card company withholds part of it. In all these cases, taxpayers still have to file taxes at the end of each month but the withheld amount constitutes a credit in favor of the taxpayer who can discount it from the tax liability before making any payments.

*Withholding and reverse withholding.* Withholding can operate both downstream and upstream. Upstream withholding is similar to that used for the collection of personal income tax in the US. In this case the payer in the transaction (retaining agent) withholds a fraction of the total amount of the sale and remits it to the tax administration in concept of future tax payments from the payee. In the downstream case, the supplier (perceiving agent) withholds from the payer by adding the withheld tax to the total sale and remits it to the tax administration in concept of future tax payments from the payer. The remitted funds are accumulated in the withheld taxpayer's account and can be used to deduct from future outstanding tax liabilities. Importantly, in all these cases, the CA must report very detailed information to the tax authority: the firms it traded with, the tax identifier, the total amount of the transaction, and the withheld amount. This information is automatically available for taxpayers when they file their monthly tax returns using the official processing software. If a CA fails to report a transaction, then taxpayers can report

it themselves so that they can claim the advance payment back. When that happens, CAs can face severe penalties. Hence, CAs have strong incentives to perform their collection duties accurately.

*Overwithholding.* In practice, the sum of withheld amounts could be smaller or greater than the tax liability. On the one hand, not all transactions are subject to withholding and, generally, the withholding rate is lower than the statutory tax rate. This implies that taxpayers are usually able to compensate a fraction of the tax liability with the advance payments withheld at source. On the other hand, it could happen that the monthly withheld amount exceeds the monthly liability, thus generating a credit balance in favor of the taxpayer that can be rolled over for future tax payments. These funds cannot easily be withdrawn and are essentially an interest-free loan from taxpayers to the tax authority. The main reason why this could happen is that credit card companies and banks also act as CAs. So, a given transaction between two trading partners might be subject to withholding multiple times (for example, by a supplier, by a credit card company, and finally when the money is deposited in a bank account).

*TT collection over time.* Until the early 2000s, the tax was basically collected via direct monthly payments. From that point on, the tax administration started appointing firms to act as CAs on an ad hoc basis—usually targeting the biggest firms in the economy. As the tax authority developed its IT system, the appointment of firms became more widespread and eventually expanded their net in a discrete way as was shown in Figure 3. That is precisely the main reform we exploit in our analysis.

*Who becomes a CA?* The 2016 reform we analyzed replaced the ad hoc way of appointing CAs with a simple revenue-based rule: firms whose 2015 revenue was greater than sixty million pesos were automatically enrolled as CAs (Resolution 364/AGIP/2016). These firms could act as both *perceiving agent*, when selling goods or services, and *retaining agent*, when purchasing goods or services.

When a firm is enrolled as a CA, it must start using a separate tax collection software that incorporates withholding into its sales. This software has an updated register of all firms that are liable to be withheld and also determines the rate that should be applied. The withholding rate is applied to the amount before taxes. Firms must transfer the withheld funds every fifteen days along with an annex containing the details of every transaction: tax identifier of the withheld party, total transaction amount, and amount perceived or retained. Anecdotally, given that appointed firms are large and formal, they do not find it very complicated to adapt to this new system.

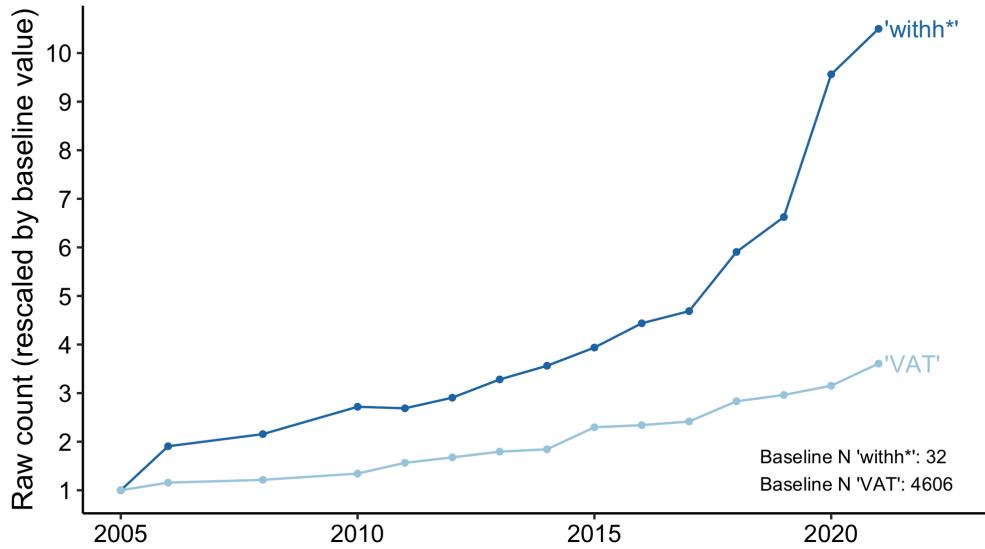
*Federal taxes.* Firms are also subject to federal taxes. Depending on the firms' revenue, they have to file a monthly VAT return or be part of a simplified regime. The VAT base is total value added, which implies that firms can deduct purchases from their total revenue. On the other hand, firms in the simplified regime pay a fixed amount depending on the threshold determined by gross income, the same variable used to determine the tax rate and tax liability of the TT.

## B Text Analysis Using Ernst & Young's Guide for Indirect Taxes

We explain in more detail the process followed to construct the database used in Figure 1. We started by downloading Ernst & Young's "Worldwide VAT, GST and Sales Tax Guide". We split each of these guides into country chapters where possible (2013 onward). Then, we created a text-analysis program to scrape information from each chapter. For each country in the guide and every year available, the program searched for terms related to "tax withholding." In particular, we searched for strings containing the term "withh\*" (that is, "withholding," "withheld," "withhold," "withholdings," "withholder," etc.). The program created an binary indicator equal to 1 if a country's chapter contained any of these terms. As a benchmark, we repeated the text-analysis exercise by searching for terms related to the VAT, since this is also a widespread tax instrument.

Figure B.1 below shows the raw counts (scaled by the 2005 value) of the total number of matches per guide (that is, the sum across countries). The dark blue line corresponds to terms related to withholding and the light blue line to VAT. We observe a sharp increase in the number of matches over time. Moreover, the trend accelerates from 2018 onward. This suggests that withholding regimes are becoming more widespread. Moreover, from Figure 1, we can see that this is particularly pronounced in low- and middle-income countries, which usually have lower tax capacity. The results of our paper are encouraging and suggest that this might be a good development of tax systems.

Figure B.1: Number of matches per document:  
“withh\*” vs. “VAT” (used as benchmark)



*Notes:* This figure summarizes the results from our text-analysis exercise. It plots the time series of the number of times that our program detects terms related to withholding (dark blue) or VAT (light blue). Each series is rescaled by the level in 2005. Source: Own elaboration based on [Ernst & Young](#). Our R code is available upon request.

## C Documenting the Reforms with Raw Data

**What do the withholding reforms look like in the raw administrative data?** In this section we document the variation used in the paper in more detail and without imposing any sample restrictions. That is, we simply open the databases as they were shared with us and in a couple of lines of code we compute summary statistics and time series that capture the nature of the identifying variation. The goal of this exercise is twofold. First, it adds *transparency* to the paper and the research process. Second, it is a way of showing the *aggregate relevance* of the analyzed reforms. That is, we consider *all* the firms in the data instead of only those better suited for our empirical strategies (for example, those linked to new versus old CAs, those above and below the relevant cutoffs). Reassuringly, even without imposing any sample restrictions, we document sharp changes in several withholding measures right at the time of the reforms. The facts that we document also help alleviate concerns about the quality of the data and the speed of implementation or

take-up of the reforms.

We provide graphical evidence to shed light on the variation used in the paper. Recall that we exploit two reforms: an increase in withholding for firms linked to newly appointed CAs (November 2016) and a decrease in withholding from banks (September 2018). There is a third reform in January 2020 that further expanded the net of withholding agents by updating the parameters from the first reform (Resolution 296/19 AGIP). We decided to ignore this third reform in the main analysis of the paper due to its closeness to the COVID-19 pandemic. Nevertheless, for completeness we document its variation. In the next set of figures we denote these three reforms with vertical red lines.

Figure C.1 shows descriptive evidence of the relationship between total tax withholdings and tax liability for the period September 2015 to December 2020. This graph includes the zeros and thus captures both extensive- and intensive-margin changes in withholding. Panel (a) plots the ratio of total tax withholdings to tax liability. The numerator includes withholding from three sources: (i) commercial partners and card companies, (ii) banks, and (iii) the customs office. We report the *median* of the ratio to get a better sense of the distribution of firms and to prevent some large outliers from spoiling the figure. Relatedly, Panel (b) plots the fraction of firms whose monthly withholdings exceed the tax liability.<sup>3</sup> Both panels exhibit discrete jumps right at the time of the reforms. The share of tax withholdings to tax liability increases by about 20 p.p. in November 2016, decreases by more than 20 p.p. in September 2018, and increases again by about 20 p.p. in January 2020. Likewise, the share of overwithheld firms increases from 23% to 30% in November 2016, decreases to 24% in September 2018, and increases again to 31% in January 2020.

The patterns from Figure C.1 mask substantial heterogeneity. We next decompose these patterns into the extensive and the intensive margin. This is reported in Figures C.2 and C.3, respectively. In addition to this, we unpack total withholding into its sources: (i) withholding by firms (for example, when trading with CAs or credit card companies) and (ii) withholding by banks (for example, when receiving deposits or making transfers).<sup>4</sup> We also break the former into (i.a) withholding performed in the *sale of goods or services* and (i.b) reverse withholding made in the *purchase of inputs*. As explained below, we conclude that (i) the increase in withholding in Figure C.1 after the *first* reform

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<sup>3</sup>In practice, firms can be overwithheld when (i) they are not registered in the withholding register of a province and the commercial partner thus must apply a withholding rate that can be twice as large as the tax rate, or (ii) a lag occurs between the sales of a good or service and the month in which the bank or credit card company reports the withholding. For instance, it is common for firms to have substantial sales in a month but the money credited in the bank account in the following month, generating a time mismatch between the tax liability and the withheld amount.

<sup>4</sup>We omit withholdings by the customs office because it represents a tiny share of the total.

is mostly explained by a combined extensive- and intensive-margin increase of reverse withholding in the purchase of inputs, and (ii) the sharp decrease in withholding after the *second* reform is entirely driven by an extensive-margin decrease in bank withholding.

Figure C.2 documents the extensive margin of withholding. We plot the share of firms whose taxes are withheld at source by type of withholding. Panel (a) suggests that although withholding is prevalent (blue dots), there is substantial variation across withholding types. Before the initial reform, about 60% of the firms were subject to withholding by firms (brown dots) and 50% by banks (green dots). Importantly, right after the first reform, the brown dots increase from 60% to 70% but the green dots do not change. This is reassuring, as the first reform only increased the number of firms operating as withholding agents—not banks. In contrast, after the second reform, which exempted a subgroup of firms from bank withholding, the green dots exhibit a sharp large decrease from 48% to 21% but the brown dots remain stable at 70%. When we further break down the withholding by firms (brown dots) in Panel (b), we observe a similar extensive-margin pattern for the withholding of sales (light blue) and purchases (light red) in the first reform.

Last, Figure C.3 documents the intensive margin of withholding over time. In this case, we plot the share of tax withholdings to tax liability for firms with positive withholding in each month separately. To capture responses at the upper end of the distribution, we compute the *average* rather than *median* and we exclude the largest outliers. Panel (a) focuses on the withholding by firms and Panel (b) on the withholding by banks. The top panel suggests that most of the response to the initial reform—the one that expanded the number of CAs—comes from withholding in purchases (light red dots) rather than in sales (light blue dots). Intuitively, when firms *purchase* intermediate inputs from upstream CAs, the invoice is *increased* by the amount of the withholding (it appears as an extra line in the receipt). When firms *sell* goods or services to downstream CAs, the invoice is *reduced* by the amount of the withholding (the seller receives a separate proof of payment for the withholding portion). With these two possibilities in mind, the figure might imply that the November 2016 reform likely appointed very large *upstream* CAs that were selling to downstream firms. This would explain the sharp increase of the light red dots and the relatively smooth pattern of the light blue dots. Finally, Panel (b) shows a smooth, flat evolution in the share of bank withholdings to tax liability. This is reassuring, as the September 2018 reform exempted a subgroup of firms *entirely* from bank withholdings. As a result, in this case we would expect to only observe changes in the extensive margin, which is confirmed by the green markers in Figures C.2a and C.3b.

Taken together, our facts suggest that the reforms we exploit in this paper operated

as they ought to. The analysis also suggests that the reforms were substantially large, modified the way the turnover tax is collected and, ultimately, provide sharp identifying variation to study the implications of withholding from firms in a credible way.

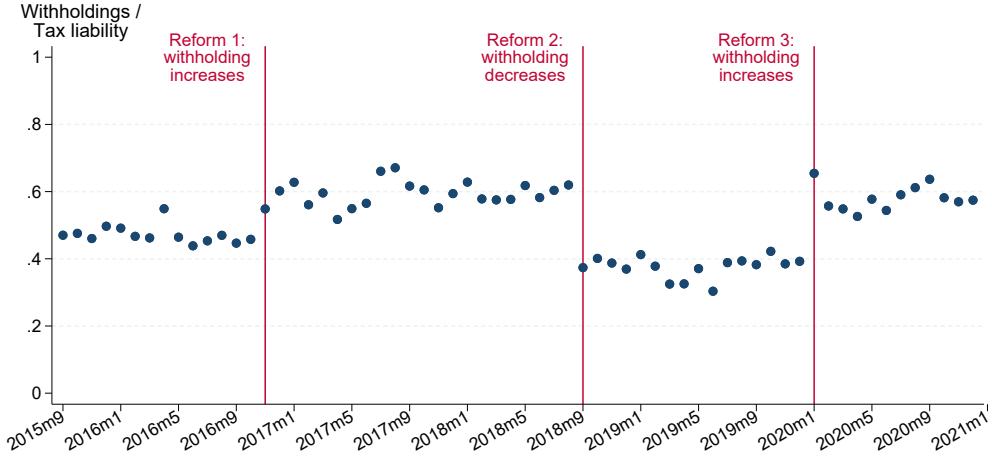
Table A1: Statistics of withholding at baseline (September 2016)

	Withheld firms		Withholdings / tax Liability				
	N Firms	share	p5	p50	p75	p95	mean
<b>Total withholding</b>	132,897	0.806	0.029	0.434	0.969	2.643	0.770
<i>By type of withholding:</i>							
Sales to CAs	132,897	0.351	0	0	0.188	1.094	0.256
Purchases from CAs	132,897	0.514	0	0.002	0.116	0.923	0.214
Bank deposits	132,897	0.473	0	0	0.280	1.373	0.279

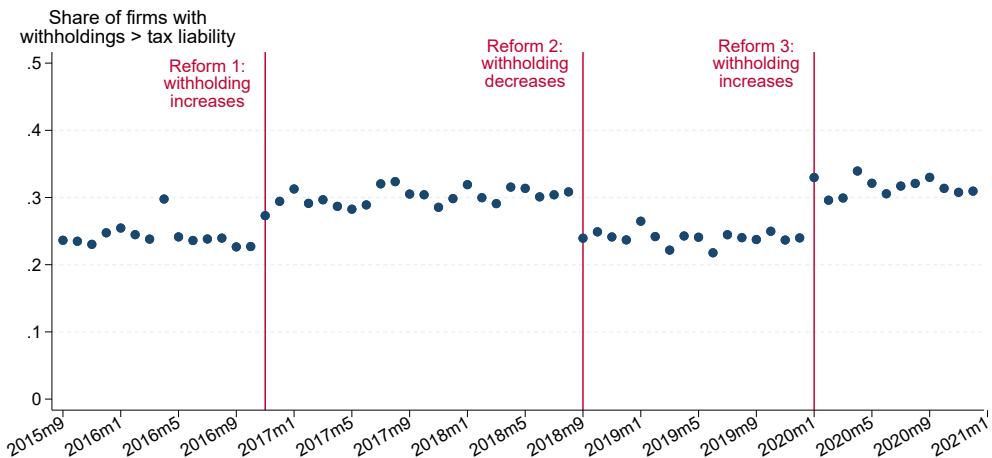
*Notes:* This table reports summary statistics of withholding calculated in September 2016, right before the expansion of the withholding regime. The first row shows statistics for total withholding. The last three rows break total withholdings down by type: those generated when selling to collection agents (CAs), those generated when purchasing intermediate goods from CAs, and those generated when receiving payments in a bank account. The first column shows the number of firms in the data. The second column reports the share of these firms that have positive withholdings. The last five columns show different moments of the share of tax withholdings to tax liability. Importantly, this ratio includes the zeros and thus captures both extensive and intensive margins.

Figure C.1: Tax withholdings versus tax liability

(a) Share of tax withholdings to tax liability



(b) Share of firms overwithheld



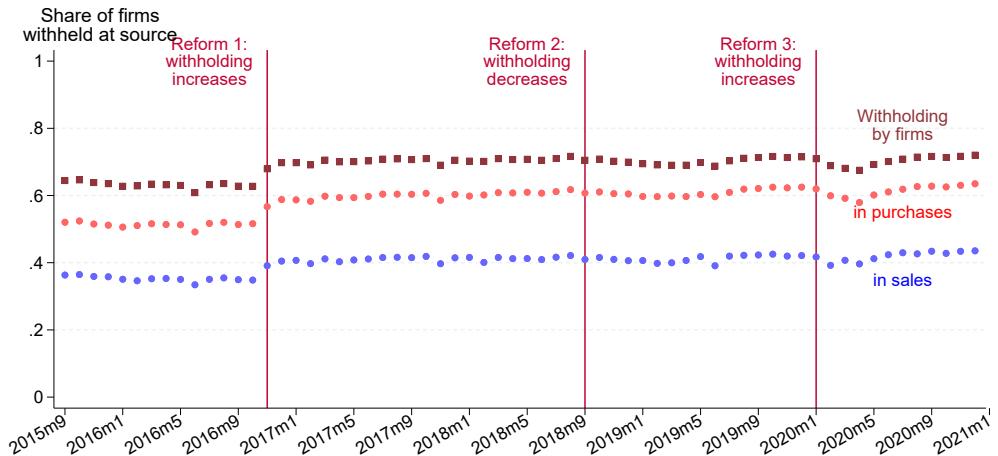
*Notes:* This figure shows descriptive evidence of the relationship between total tax withholdings and tax liability for the period September 2015 to December 2020. Panel (a) plots the ratio of total tax withholdings to tax liability. The numerator includes withholding from three sources: (i) commercial partners and card companies, (ii) banks, and (iii) the customs office. We report the *median* of the ratio to get a better sense of the distribution of firms and to avoid the influence of large outliers. Panel (b) plots the fraction of firms whose monthly withholdings exceed the tax liability. See the text for further details.

Figure C.2: Tax withholdings: extensive margin

(a) Share of withheld firms per month



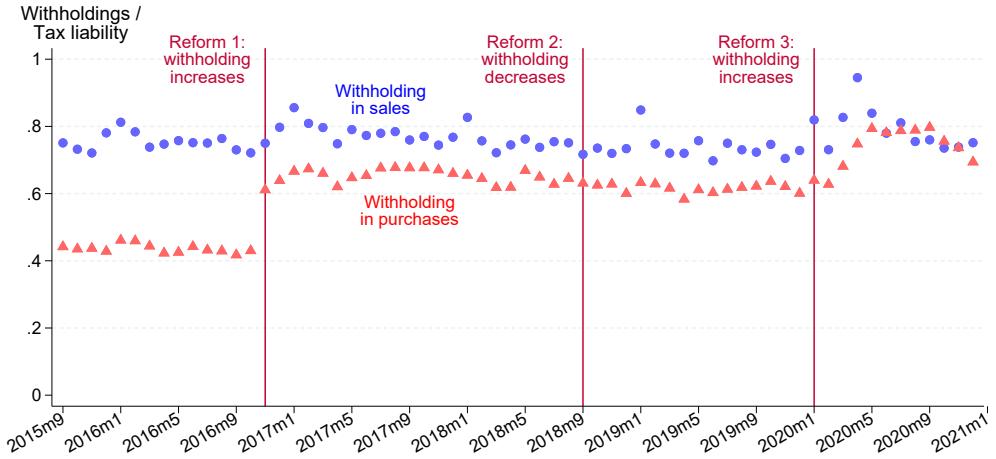
(b) Withholding in sales and purchases



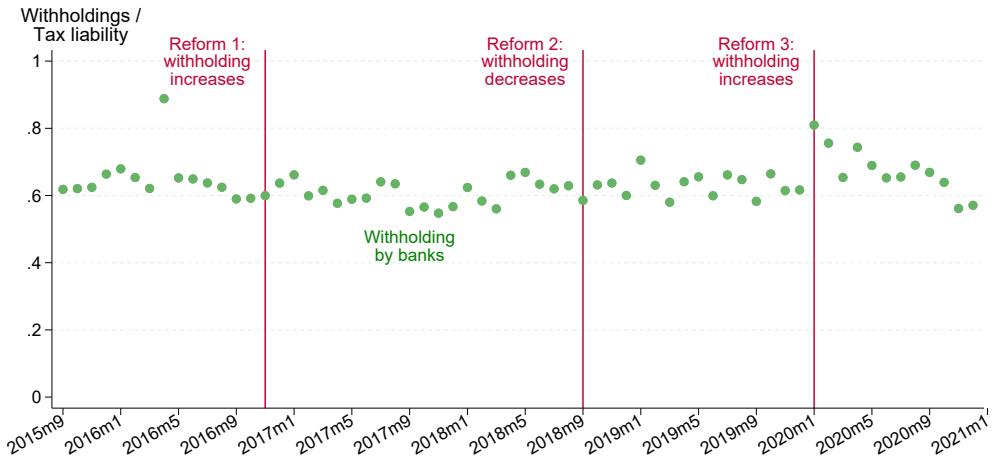
*Notes:* This figure documents the extensive margin of withholding over time. It plots the share of firms withheld at source by type of withholding. The blue dots in the top panel correspond to firms with any withholding (that is, by collection agents, banks, or customs). The brown dots show withholding by collection agents. The green dots show withholding by banks. The bottom panel further breaks the withholding by firms (brown dots) from Panel (a) into withholding of sales (light blue) and withholding of purchases (light red). See the text for further details.

Figure C.3: Tax withholdings: intensive margin

(a) Withholding by commercial partners and credit card companies



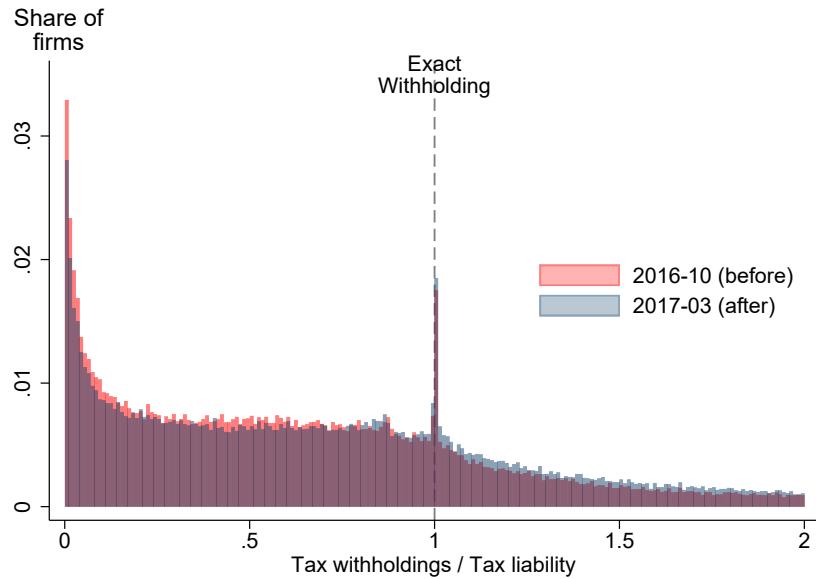
(b) Withholding from banks



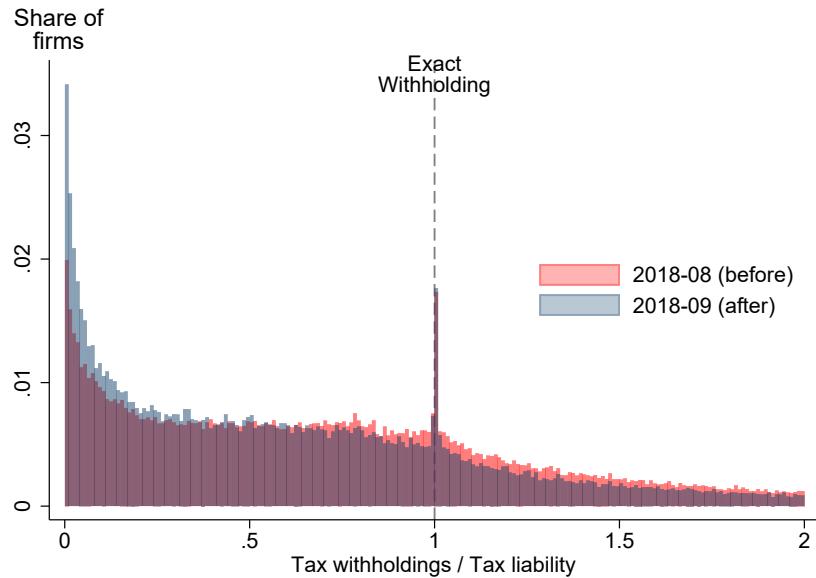
*Notes:* This figure documents the intensive margin of withholding over time. Panel (a) shows withholdings by firms and Panel (b) withholdings by banks. Each panel plots the share of tax withholdings to tax liability for firms with positive withholding in each month separately. To capture responses at the upper end of the distribution, we compute the *average* rather than *median* and we exclude the largest outliers. See the text for further details.

Figure C.4: Distribution of tax withholding to tax liability

(a) Before and after the increase in withholding by collection agents



(b) Before and after the decrease in withholding by banks



*Notes:* This figure shows the distribution of the ratio of total tax withholdings to tax liability. We use two hundred bins of 0.01 width. Panel (a) shows the density right before (pink) and after (blue) the increase in withholding by collection agents. Panel (b) shows the density right before (pink) and after (blue) the decrease in withholding by banks. In Panel (a) the density shifts to the right and in panel (b) it shifts to the left. Both panels exhibit bunching at the point at which withholding exactly matches the tax owed.

## D Additional Figures and Tables

Figure D.1: Relevance of the reform

ámbito.com

## Modificaciones en régimen de retenciones en CABA

EDICIÓN IMPRESA 11 Octubre 2016

Los agentes de retención en el régimen de recaudación reformulado serán designados de oficio cuando superen ciertas cifras de ingresos del año calendario anterior sin advertirse un mecanismo de reclamo.



Por Jorge A. Carmona y Héctor A. Duguine

El régimen recaudatorio vigente en la actualidad se haya dispuesto por Resolución N° 939/AGIP 2013, con las modificaciones introducidas por la Resolución N° 364/AGIP 2016 y la Resolución N° 421/AGIP 2016. Las modificaciones introducidas, crean un típico régimen general de recaudación de retenciones y percepciones basado en gestión de alícuotas por Padrón de Contribuyentes, intentando emular el vigente en la provincia de Buenos Aires administrado por ARBA con retenciones y percepciones cruzadas, perdiendo los Agentes de Recaudación el beneficio de no ser retenidos y percibidos. Hasta la modificación efectuada por la Resolución N° 364/AGIP 2016, en la CABA los agentes de recaudación eran en todos los casos designados taxativamente por el Fisco, a partir de ahora coexistirá ese régimen con el de padrones de alícuotas para el régimen general de retenciones y percepciones. Además de los nominados, deberán actuar en ese carácter los sujetos que desarrollen actividades en la Ciudad Autónoma de Buenos Aires queobtenido en el año calendario inmediato anterior ingresos por un montoa los \$60.000.000. A diferencia de la provincia de Buenos Aires en donde el potencial agente debe inscribirse, en la CABA será designado de oficio cuando supere esa cifra. No advertimos un mecanismo exprés de reclamo.

Con ese objeto deberánlos ingresos gravados, exentos y no gravados correspondientes a todasjurisdicciones, netos de impuestos. Se considera que desarrollan actividades en laAutónoma de Buenos Aires aquellos sujetos que posean en esta jurisdicciónagencias, representaciones, oficinas, locales y todo otro tipo de explotación, edificio, obra, depósito o similar y quienes se valgan paraejercicio de su actividad en territorio de la Ciudad Autónoma de Buenos Aires, de losde comisionistas, corredores, consignatarios o martilleros. Existen una serie de sujetos excluidos de actuar como agentes de recaudación.

*Notes:* This figure shows an article from the *Ambito* newspaper that discusses the major expansion of the withholding scheme analyzed in this paper. The title is "Changes in the Withholding Regime in CABA (City of Buenos Aires)," and the text below reads "Withholding agents in the reformulated collection regime will be appointed ex officio when they exceed an income threshold from the previous calendar year and have no right to appeal the appointment." Related newspapers also published articles with FAQs clarifying the details of the reform. For example, see [iProfessional](#). Source: [Ambito.com](#).

Figure D.2: Example of the register of withholding agents published monthly by the tax administration

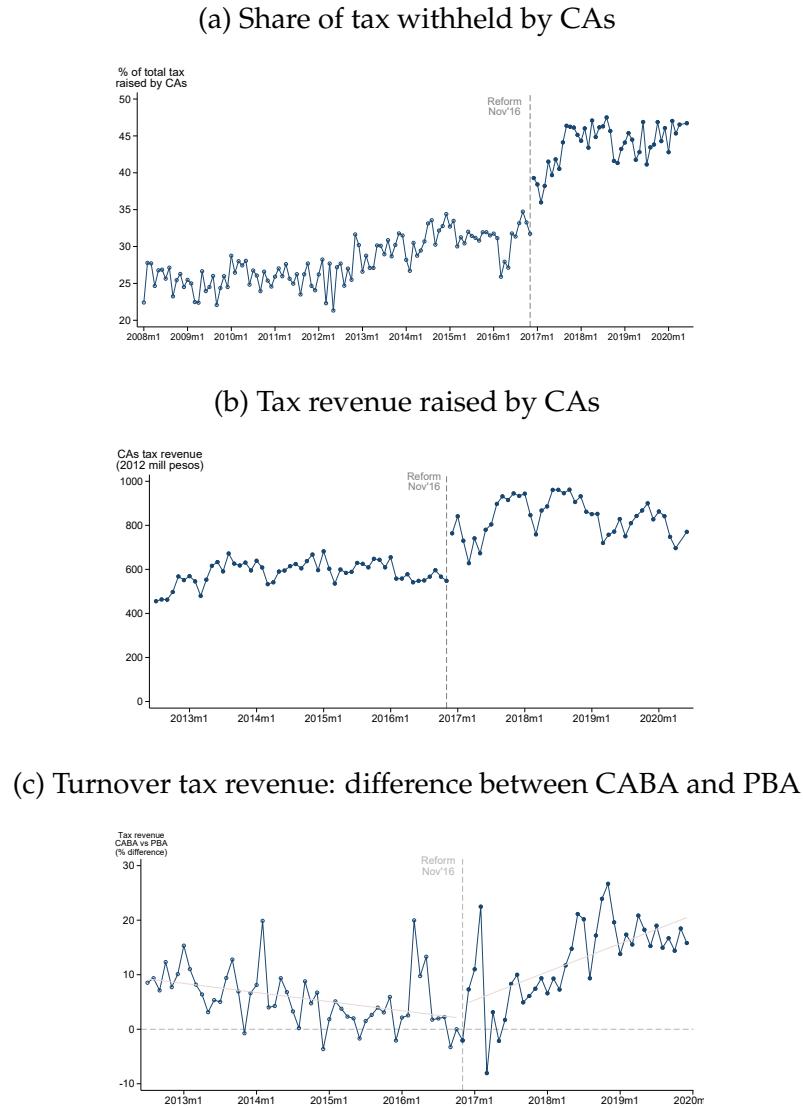


NOMINA AGENTES DE RECAUDACION  
MAYO 2017

ORDEN	AG	DV	CUIT	RAZON SOCIAL	NORMA	VIGENCIA
1248	15404	0	30711230188	CABLETECH ARGENTINA SA	RES. 364-AGIP-2016	01/11/2016
1248	8410	9	30573652094	CABLEVISION SA	RES. 1080-MHGC-07	02/05/2007
1250	9454	2	30500596892	CABOSCH S.A.	RES. 607-AGIP-2009	01/10/2009
1251	15875	0	33504113049	CABOT ARGENTINA SAIC	RES. 364-AGIP-2016	01/11/2016
1252	1543	7	3057746742	CABRALES SOCIEDAD ANONIMA	Res. 1465-SHF/01	01/09/2001
1253	9506	6	30708969245	CACHAY S.A.	RES. 50-AGIP-2010	01/03/2010
1254	11537	0	30507400228	CACHI YACO SA	RES. 364-AGIP-2016	01/11/2016
1255	13811	0	30700584131	CACHO SUSPENSION S.A.	RES. 364-AGIP-2016	01/11/2016
1256	15356	0	30710983107	CAOCIC SPORTS VISION SRL	RES. 364-AGIP-2016	01/11/2016
1257	9519	5	30540103544	CADENACI SA	RES. 50-AGIP-2010	01/03/2010
1258	9760	8	30578899002	CAFE OYAMBRE SRL	RES. 371-AGIP-2010	01/08/2010
1258	9761	1	30707732055	CAFE ROCAMORA S.R.L.	RES. 371-AGIP-2010	01/08/2010
1260	1507	9	30501077131	CAFE'S LA VIRGINA S.A	Res. 430-SHF/01	01/05/2001
1261	1544	0	30523456144	CAFES MUÑO SRL	RES. 371-AGIP-2010	01/08/2010
1262	9479	7	30504312212	CAGNOLI S.A.	RES. 675-AGIP-2009	01/12/2009
1263	14471	0	30708284250	CAIF COMPAÑIA ARGENTINA DE INVESTIGACIONES FARMACEUTICAS S.A.	RES. 364-AGIP-2016	01/11/2016
1264	15870	0	33500730639	CAIMAR	RES. 364-AGIP-2016	01/11/2016
1265	3749	6	30663206621	CAJA DE SEGUROS SA	Res. 430-SHF/01	01/05/2001
1266	4749	2	30554475910	CAJA DE VALORES S.A.	Res. 1465-SHF/01	01/09/2001
1267	3563	6	30701951251	CAJA NOTARIAL COMPLEMENTARIA DE SEGURIDAD SOCIAL	Res. 1465-SHF/01	01/09/2001
1268	12739	0	30644296675	CALDENES SA	RES. 364-AGIP-2016	01/11/2016
1269	11340	0	30500309678	CALEDONIA ARGENTINA COMPAÑIA DE SEGUROS S.A.	RES. 364-AGIP-2016	01/11/2016
1270	13303	0	30683338121	CALENDER SA	RES. 364-AGIP-2016	01/11/2016
1271	9271	3	30556460526	CALEREA BUENOS AIRES S.A.	RES. 568-AGIP-2008	01/02/2009
1272	9280	8	30709076902	CALEREA CONGRESO SH D E JUAN M SELVA MARiano F SELVA Y JUAN I SELVA	RES. 568-AGIP-2008	01/02/2009
1273	14607	0	30708555386	CALEREA DE SAENZ P.E.A. S.A.	RES. 364-AGIP-2016	01/11/2016
1274	14152	0	30707587845	CALEREA EL OMBU S.A.	RES. 364-AGIP-2016	01/11/2016
1275	16050	0	33683663269	CALEREA SAN JUSTO SA	RES. 364-AGIP-2016	01/11/2016
1276	12253	0	30596774640	CALFOR S.R.L.	RES. 364-AGIP-2016	01/11/2016
1277	10998	4	30710371527	CALFRAC WELL SERVICES (ARGENTINA) SA	RES. 363-AGIP-2014	01/07/2014
1278	15949	0	33596683679	CALICO S.A.	RES. 364-AGIP-2016	01/11/2016
1279	14658	0	30709687568	CALMED SA	RES. 364-AGIP-2016	01/11/2016
1280	16136	0	33707526449	CALOREX S.A.	RES. 364-AGIP-2016	01/11/2016
1281	9089	6	30706046093	CALZADO LOPEZ TABO SRL	RES. 313-AGIP-2008	01/10/2008
1282	11908	0	30551587300	CALZADOS FERU S.A.	RES. 364-AGIP-2016	01/11/2016
1283	9091	5	30690631721	CALZARTE SRL	RES. 313-AGIP-2008	01/10/2008
1284	12150	0	3058357657	CALZETTA NEUMATICOS SOCIEDAD ANONIMA	RES. 364-AGIP-2016	01/11/2016
1285	10800	4	33690586916	CALZIFICIO ALDAMA SA	RES. 592-AGIP-2012	01/10/2012
1286	9641	8	30700955008	CAMARA DE EMPRESAS DE CONTROL Y ADM. DE INFRAACCIONES DE TRANS DE LA REP. ARG. ASOCIACION CIVIL	RES. 144-AGIP-2010	01/05/2010
1287	10323	5	30643748823	CAMARAS Y LUCES SA	RES. 259-AGIP-2012	01/06/2012
1288	15308	0	30710776063	CAMARIQAS SA	RES. 364-AGIP-2016	01/11/2016
1289	12621	0	30632820732	CAMASA SA	RES. 364-AGIP-2016	01/11/2016
1290	11392	0	30501948981	CAMBRE INDUSTRIAL COMERCIAL Y FINANCIERA SA	RES. 364-AGIP-2016	01/11/2016

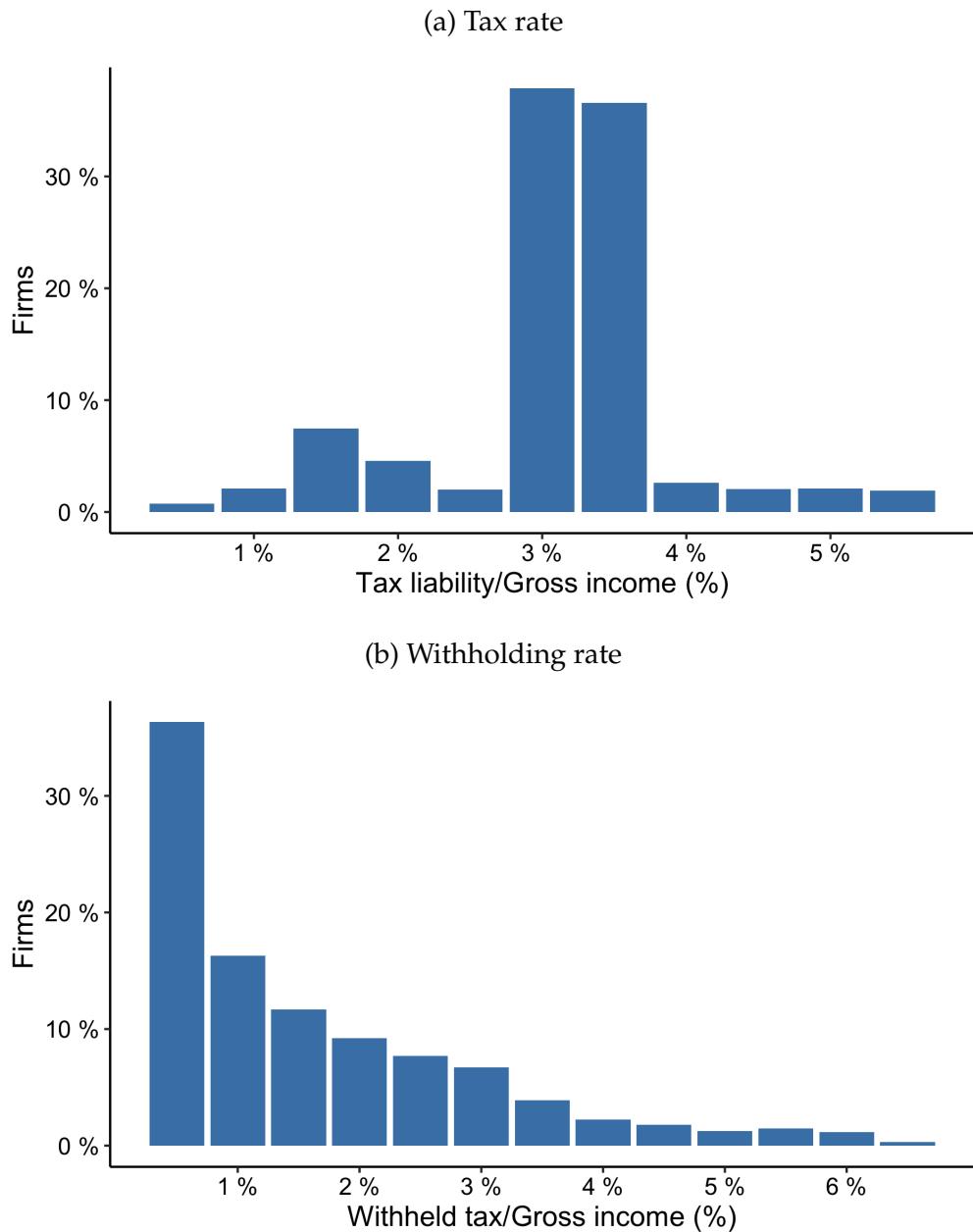
*Notes:* This figure shows a page from the register of withholding agents published monthly by the tax administration. The full list, in particular, includes all the active withholding agents as of May 2017. This information is publicly available on the [AGIP website](#). Each row corresponds to a different firm. The fourth column shows the tax identifier, the fifth column shows the name of the company, the sixth column shows the resolution that appoints the firm to act as collection agent, and the last column shows the starting date. Not surprisingly, the majority of the dates correspond to November 1, 2016, the date at which the major reform we analyze was implemented. We downloaded all these monthly registers, digitized them, and constructed a database that we merged with our main administrative data. We also used this database to construct Figure 3. It is interesting to observe the mix of firms appointed to act as collection agents. In this list one can see coffee producers, pharmaceutical firms, insurance companies, footwear manufacturers, and construction-materials wholesalers, among others.

Figure D.3: Macro evidence that documents the expansion of withholding



*Notes:* This figure shows macro facts that document the implementation of the reform in the City of Buenos Aires (CABA). Panel (a) shows the share of total turnover tax revenue raised via withholding by collection agents (CAs). Panel (b) shows the levels of revenue raised by CAs in real terms. Both (a) and (b) display a sharp increase right at the time the net of withholding agents was expanded (denoted with a vertical line). The series keeps increasing during 2017, suggesting some sluggish adjustment of newly appointed firms. Panel (c) shows the percentage difference in tax revenue between CABA and the Province of Buenos Aires (PBA) relative to October 2016, the month before the reform we analyze in the paper. This is analogous to running a difference-in-differences regression between these two jurisdictions and, therefore, captures the aggregate causal effect of appointing firms as tax collectors (that is, it captures both direct and indirect effects). The graph includes a separate linear fit before and after the reform. It shows that CABA, relative to PBA, was on a downward tax revenue trend, which is reverted right after CABA expanded its network of collection firms. By 2019, CABA's tax revenue was 20% compared to PBA and relative to October 2016. Source: Own elaboration based on aggregate data from "Dirección General de Estadística y Censos (Ministerio de Hacienda y Finanzas GCBA)." 54

Figure D.4: Tax and withholding rates



*Notes:* The figures show the “effective rates.” Average annual rates by taxpayer calculated for the baseline period, 2016.