

Dodging the Tax Collector

Evidence on Firm Misreporting Behavior and Evasion Substitution*

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Abstract

Reducing tax evasion is a key priority for many governments, particularly in developing countries. A growing literature has argued that the use of third party information to verify taxpayer self-reports is critical for tax enforcement and the growth of state capacity. However, there may be limits to the effectiveness of third party information if taxpayers can substitute misreporting to less verifiable margins. We present a simple framework to demonstrate the conditions under which substitution will occur and provide strong empirical evidence for substitution behavior by exploiting a natural experiment in Ecuador. We find that when firms are notified by the tax authority about detected revenue discrepancies on previously filed corporate income tax returns, they increase reported revenues, matching the third party estimate when provided. Firms also increase reported costs by 96 cents for every dollar of revenue adjustment, resulting in minor increases in total tax collection.

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1 Introduction

The past two decades have seen a global revolution in information technology. Many believe that this transformation will dramatically improve outcomes in developing countries. As the World Bank recently noted, information and communication technologies have great promise to reduce poverty, increase productivity, boost economic growth, and improve accountability and governance (World Bank, 2012). Improving state fiscal capacity is one area in which information technology is hoped to have transformative potential. A key component of revenue collection is third party information: the ability of the tax authority to verify the reports of the taxpayer against other sources, such as an employer report of salary or the reports of a firms trading partners (ADD cites). With the advent of widespread computerization of tax records, such information verification has become easier than ever before. Indeed, countries around the world are investing heavily in information capacity as a mechanism to improve tax enforcement and build state capacity.

This paper examines the impact of such third party information based tax enforcement. In particular, we highlight a potential limit to the effectiveness of third party reporting: the ability of the taxpayer to make offsetting adjustments on less verifiable margins of the tax return. We demonstrate that such behavior can be expected under conditions common in many developing countries. We then provide strong empirical evidence of such substitution in the context of a natural experiment in Ecuador, in which the tax authority notified firms about discrepancies between their declared revenues and revenue reports from third party sources. Firms increase reported revenues in response to the notifications but offset almost the entire adjustment with increases in reported costs, resulting in only minor increases in total tax collection.

We begin with a simple conceptual framework to examine the effects of third party reporting on firm tax evasion. In this model, which builds on Kleven, Kreiner and Saez (2009), firms can reduce their tax liability by underreporting their profit amount, through decreasing reported revenues or increasing reported costs. However, we show that if the audit probability is a decreasing function of the reported profit rate, firms will have an incentive to appear small by under-reporting revenues and potentially also under-reporting costs. We also show that when third party reporting on revenues creates a floor on reported revenues, it can cause firms to offset some of the resulting higher tax liability by increasing reported costs. If enforcement capacity on non-third party reported margins is weak, as is the case in many developing countries, these substitution effects

can be large.

We analyze responses to third party reporting empirically in the context of the corporate income tax in Ecuador. In 2011 and 2012, the tax authority (Servicio de Rentas Internas, SRI) notified a sample of almost 8,000 firms about discrepancies between their self-reported revenue and information about their revenue from third party sources for previously filed corporate income tax returns from 2008-2010. Firms were asked to submit an amended tax return to address the discrepancy. These notifications represent the first time such third party information was used for tax enforcement in Ecuador in a systematic, large scale way.

There is clear evidence of large substitution effects. While the notifications generate an immediate strong increase in reported revenues, firms offset this increase by raising their reported costs by 96 cents for every dollar of revenue adjustment. The direct response to the information about the revenue discrepancy is strong. When firms are given a specific amount of third party reported revenue available to the tax authority, 35% of all firms that file an amendment match the indicated amount exactly. Firms that adjust revenues do so by 93 cents on average for every dollar of revenue discrepancy. This holds throughout the distribution of notified discrepancies, including when they are in the tens or hundreds of thousands of dollars. When firms are told that there is a discrepancy but are not provided with a specific amount, they adjust their reported revenue less, indicating that firms are misreporting both before and after the notifications.

Firms match the increase in reported revenue closely by an increase in reported costs, regardless of whether or not they were informed about the amount of third party information available to the government. If the message induces firms to increase their reported revenue more strongly, they also increase their reported costs more strongly, indicating that firms are deliberately targeting their cost adjustments to match their revenue adjustments. These effects also hold throughout the entire distribution of revenue adjustments. As a result of these offsetting cost adjustments, tax collection is an order of magnitude less than it would have been had firms only adjusted revenues.

We also examine misreporting in the universe of formal firms (about 60,000) prior to the intervention and consistent with our conceptual framework, we find evidence for both revenue and cost under-reporting. The latter may seem apriori surprising, since all else equal, reporting lower costs will lead to a higher tax liability. 24% of firm filings contain self-reported revenues that are smaller than third party reported revenues and there is

little bunching at the third party amount. These findings are consistent with the fact that there was almost no use of third party reporting prior to the notifications. However, 23% of all firm filings and 5% filings by firms with positive tax liability report costs that are below third party reported costs. Since third party reporting of costs is highly incomplete, these estimates provide lower bounds on cost under-reporting. As discussed below, such under-reporting has important implications for tax enforcement more broadly.

This paper contributes to the literature along several dimensions. First, the findings add to our understanding of the determinants of tax compliance. Making use of third party information is a key mechanism through which governments attempt to enforce taxes in practice. Previous work has shown that evasion is substantially lower on third party reported line items (XXXXKleven) and that third party reporting may substitute for traditional auditing in improving compliance (XXXPomeranz). Naritomi (2013) and Kumler et al. (2013) show that information generated from consumers and workers may play an important role in monitoring compliance by firms. However, to the best of our knowledge, this is the first study to examine the effects of introducing enforcement based on third party information directly.¹ Our results show that the efficacy of third party reporting may be limited by the ability of taxpayers to make offsetting adjustments on less verifiable margins of the tax return.

We do not see our results as contradicting the conventional view that third party reporting is an important component of modern tax collection. Rather, our results indicate that the effectiveness of third party reporting will depend on other aspects of the enforcement environment. When third party reporting is fairly complete and enforcement capacity on non-third party margins is strong, as is the case in many developed countries, third party reporting can indeed be a powerful tool for tax collection. However, when third party reporting is highly incomplete and enforcement capacity is weak, as is the case in many developing countries, there may be severe limits to its effectiveness. It is reasonable to believe that as countries develop both information and enforcement capacity, third party reporting will play an important role in tax collection. However, our results indicate that it is unlikely to provide an easy and immediate solution to the problem of

¹Klepper and Daniel (1989) use observational data to show that US firms that have a large share of non third party reported revenue have higher compliance on “inferior” evasion margins. However, they do not examine responses to third party reporting directly. Other studies have examined the effect of generalized deterrence of threat of audit messages (see e.g. Slemrod et al., 2001; Engstrom and Hesselius, 2007; Fellner et al., 2013 and Castro and Scartascini, 2013) or the effect of other related aspects of the tax system, such as the importance of the remitting party (Slemrod, 2008) and the role of withholding (Carrillo et al., 2012).

improving fiscal capacity in low income economies.

Second, our results speak to the literature on multitasking. In the classic multitasking problem (Holmstrom and Milgrom, 1991), increasing incentives or monitoring on one margin may cause agents to substitute adverse behavior to other margins. A natural application of this framework is in the context of crime, but empirical evidence of substitution of illegal activity in response to monitoring is scarce (Yang, 2008; Benson et al., 1992). Our results indicate that such displacement is indeed important in the tax context, and that evaluations of an enforcement policy should measure its global impact on all margins combined, rather than on the enforced margin alone.

Third, we are able to shed light on the micro-economics of corporate income tax misreporting, based on detailed line-item level information from administrative firm panel data. In particular, we are able to examine the specific forms of firm misreporting directly by comparing firms own reports to the reports of third parties. A key novel finding is that some firms under-report their true costs. This type of behavior is consistent with our conceptual framework but would not be predicted under most alternative models of firm evasion, and it has important policy implications. For example, if firms have incentives to under-report costs, the self-enforcement mechanism of the VAT may be undermined,² In addition, if firms do not have incentives to fully declare costs, this can encourage informality in other markets. Firms may under-report labor income deductions for employees, leading to increased labor informality. In addition, formal firms may have less reluctance to trade with informal supplier firms that cannot provide valid receipts to deduct input costs, thereby reducing a disincentive to informality.

Finally, our paper contributes to a growing literature on public finance in developing economies (Besley and Persson). In particular, our findings are complementary with an emerging set of studies that demonstrate that optimal tax enforcement and tax policy may differ across developed and developing countries as a result of differences in information and enforcement environments (Gordon and Li; Best et al.).

The remainder of the paper proceeds as follows. Section 2 provides a brief conceptual framework for examining the effects of third party reporting on firm tax evasion. Section 3

²See e.g. Gordon and Nielsen (1997); Fedeli and Forte (1999); Kopczuk and Slemrod (2006); De Paula and Scheinkman (2010); Keen and Lockwood (2010); and Pomeranz (2013) for further discussion of evasion in the VAT supply chain. Our finding of cost under-reporting is also consistent with Kopczuk (2012), who shows that the introduction of a flat tax in Poland lead to increases in both declared revenues and declared costs.

describes the Ecuadorian tax system and outlines our empirical predictions. Section 4 discusses the data and methods. Section 5 presents the results and Section 6 concludes.

2 Conceptual Framework

2.1 Third Party Reporting in the Allingham-Sandmo Framework

In this section, we develop an illustrative model of the effects of third party reporting on firm tax evasion that reconciles the empirical patterns we observe in the data.³ We begin with a brief review of the standard Allingham and Sandmo (1972) framework, which is an application of the Becker (1968) model of crime to the case of tax evasion, and Kleven, Kreiner and Saez (2009) (henceforth KKS), who embed third party reporting into this framework.

In the Allingham-Sandmo model, taxpayers have true income W and choose their level of reported income, \widehat{W} . They pay tax on their declared income at rate τ . Evasion is detected with probability p , in which case they must pay the owed tax as well as a penalty (at rate θ) on the evaded tax (Yitzhaki, 1974). Taxpayers then maximize expected utility, with the first order condition of the following maximization problem implicitly defining \widehat{W}^* .

$$EU = (1 - p)U(W - \tau\widehat{W}) + pU(W - \tau W - \theta\tau(W - \widehat{W}))$$

A limitation of the Allingham-Sandmo model is that it is difficult to reconcile low observed audit rates and penalties with the generally low levels of tax evasion on many forms of income. KKS (2009) address this concern by allowing W to be comprised of two components: W_T , which is third party reported and W_S , which is self-reported. Taxpayers choose the reported values of these income components: \widehat{W}_T and \widehat{W}_S . The detection probability on third party reported income is 1, so taxpayers will set $\widehat{W}_T = W_T$. However, in this baseline framework, taxpayers can fully offset increases in \widehat{W}_T with decreases to \widehat{W}_S , potentially declaring large negative values for \widehat{W}_S . Since taxpayers optimize over total \widehat{W} , \widehat{W}^* remains unchanged and third party reporting will end up being irrelevant

³We discuss potential alternative explanations in Section 5.

to tax collection. KKS introduce additional constraints, for example on the detection probability function or on the level or sign of \widehat{W}_S , to break this irrelevance result.

2.2 The Case of Firms

We now build on this framework to model the effect of third party reporting on tax evasion in the firm context. Firms have revenues and costs and pay a flat tax on declared profits, defined as reported revenues minus reported costs. Both revenues and costs are potentially comprised of third party and self reported components. We will assume throughout that true profit $\pi \geq 0$ and self-reported profit $\widehat{\pi} \geq 0$. We therefore have:

$$\begin{aligned} R &= R_T + R_S = \text{revenues}, \widehat{R} = \text{reported revenues} \\ C &= C_T + C_S = \text{costs}, \widehat{C} = \text{reported costs} \\ \pi &= R - C = \text{profits}, \widehat{\pi} = \widehat{R} - \widehat{C} = \text{reported profits} \\ Tax &= \tau \widehat{\pi} \end{aligned}$$

Note that there is an important inherent asymmetry in the effect of third party reporting between revenues and costs. Firms evade taxes by under-reporting revenues and over-reporting costs. If third party reporting is partial, it provides a *lower* bound on true values. If firms declare $\widehat{R} < R_T$, it is clear that they are under-reporting revenues. However, if firms declare $\widehat{C} > C_T$, this could be due to over-reporting of costs or due to legitimate costs that were not third party reported. We return to the implications of this asymmetry below.

2.3 Behavioral Responses to Third Party Reporting

2.3.1 General Case

We now examine a generalized version of the KKS (2009) framework applied to firms. The detection probability is a function of both firms' own reports and third party reports. The penalty conditional on detecting misreporting is a function of the tax rate, firm reports, and true revenues and costs.⁴

⁴We model firms as risk averse, which is a realistic assumption for many developing countries, where a large share of firms are sole proprietorships or owned by a single family and corresponds more generally to

Firms solve the following maximization problem:

$$EU = (1 - p(\widehat{R}, \widehat{C}, R_T, C_T))U(\pi - \tau\widehat{\pi}) + p(\widehat{R}, \widehat{C}, R_T, C_T)U(\pi - \tau\pi - \theta(\tau, \widehat{R}, \widehat{C}, R, C))$$

We take R_T and C_T as given for the firm. This assumption is appropriate to our empirical context, in which firms have no opportunity to take actions to change existing third party reports at the time the notifications are sent.⁵

If revenues and costs enter the detection probability function and the penalty function only in terms of reported profits, $(\widehat{R} - \widehat{C})$, without any restrictions, firms can again fully offset all effects of R_T by changes to \widehat{R}_S . An increase in R_T will cause firms to increase \widehat{R} , but they can simultaneously increase \widehat{C} , returning to their original optimal level of reported profits with no effect on the detection probability or penalty. In this case, third party reporting of revenue will have no effect on tax collection.

Note that, due to the asymmetry reason discussed above, having third party information on costs does not prevent this full offset. Since third party reporting creates a floor on reported costs (not a ceiling), firms can increase their reported costs without the tax authority being able to determine whether or not these costs are legitimate. As shown below, this full offset effect will break down if the audit or penalty functions take this asymmetry into account and treat revenues and costs differently. Nevertheless, the mechanism will continue to hold that firms may respond to third party information by adjusting their reporting on margins on which third party information is less binding.

This indicates an important link between third party reporting and traditional auditing, since the effectiveness of third party reporting will ultimately be determined by the tax authority's ability to enforce non third party reported margins.

2.3.2 Specifying the Detection Probability

We now consider a specific case of the detection probability function. We begin with a baseline case in which the tax authority has no third party information about the firm

a context in which firms dislike volatility on profits. This also allows ease of comparison to the standard Allingham-Sandmo framework.

⁵In equilibrium, firms may attempt to limit the information available to the tax authority. For example, they may engage in cash rather than credit card transactions. We discuss this possibility later in the paper. Here, we consider the optimization problem of an individual firm. Please see Pomeranz (2013) for further discussion of cross-firm spillovers in enforcement.

but can observe whether firms' self-reports seem "internally consistent." The detection probability is therefore a function of firms' self-reported variables \widehat{R} and \widehat{C} .

Specifically, we now assume that the tax authority has some basic information about the true distribution of profit rates. If a firm reports \$100 in profits on \$1,000 in revenue, that is more plausible than if the firm reports \$100 in profits on \$1,000,000 in revenue. Correspondingly, we assume that the audit probability is $p(\frac{\widehat{\pi} + \varepsilon}{\widehat{R}})$ where $p' < 0$ and ε is a small number greater than zero.⁶

This specification of the audit rule is plausible for our empirical context. In a number of field interviews we conducted, tax authority staff indicated that the reported profit rate is one of the key characteristics they consider when determining whether to audit, and numerous firm owners and tax accountants stated that they pay close attention to the reported profit rate.

As in Allingham-Sandmo, the penalty is a linear function of the evaded tax. The firm optimization problem is now:

$$EU = (1 - p(\frac{\widehat{\pi} + \varepsilon}{\widehat{R}}))U(\pi - \tau\widehat{\pi}) + p(\frac{\widehat{\pi} + \varepsilon}{\widehat{R}})U(\pi - \tau\pi - \theta\tau(\pi - \widehat{\pi}))$$

Proposition 1. *Since $p' < 0$, firms will choose the lowest level of declared revenue consistent with their declared profits. Specifically, as $\varepsilon \rightarrow 0$, $\widehat{R}^* = \widehat{\pi}^*$. This then implies that $\widehat{C}^* = 0$.*

Proof. Conditional on $\widehat{\pi}$, the firm prefers to minimize p . $\widehat{R} \geq \widehat{\pi}$ and $p' < 0$ therefore imply $\widehat{R} = \widehat{\pi}$ and $p = p(1)$. Define $\widehat{\pi}^{**} = \widehat{\pi}^*(p(1))$. Now note that the firm can change \widehat{R} while keeping $\widehat{\pi}$ fixed (by adjusting \widehat{C}), and this does not affect expected utility at a given p . This defines $\widehat{R}^{**} = \widehat{\pi}^{**}$. The optimal choice of \widehat{C} is then zero. ■

Intuitively, the firm will maximize its reported profit rate $\frac{\widehat{\pi}}{\widehat{R}}$ in order to minimize its audit probability and chooses the optimal *level* of reported profits $\widehat{\pi}$ given this audit rate. Firms can get to their desired level of profits by adjusting either reported revenues or reported costs, but under-reporting revenues gives the added benefit of reducing the audit rate. They will therefore not even report their legitimate costs. This result arises

⁶The addition of ε differentiates among corner cases where $\widehat{\pi} = 0$, so that declaring zero profits on a large amount of revenue is more likely to trigger an audit than declaring zero profits on a small amount of revenue.

from the assumption that the tax authority has no information about true revenues and costs (which we relax below) as well as the assumption of a monotonic p function.⁷

The Effect of Third Party Reporting We now introduce third party information on revenues. Following KKS (2009), we model third party reported revenue (R_T) as having a detection probability of 1.

Proposition 2. *Define \widehat{R}^* as the optimal firm choice in the absence of third party reporting. If $R_T \leq \widehat{R}^*$, third party reporting will have no effect. If $R_T > \widehat{R}^*$, then $\widehat{R}^{*'} = R_T$.*

Proof. Since $p = 1$ if $\widehat{R} < R_T$, $\widehat{R}' \geq R_T$. Suppose that the firm chooses $\widehat{R}' > R_T$ implying an optimal level of reported profits, $\widehat{\pi}^{*'}$, and reported costs, $\widehat{C}^{*'}$. The firm can now reduce \widehat{R}' and increase \widehat{C}' by some $\delta > 0$. This results in the same level of reported profits but a lower audit probability and therefore higher expected utility. Thus, $\widehat{R}^{*'} = R_T$ ■

We can now examine the response of $\widehat{\pi}$ to R_T . Define $Y_N \equiv \pi - \tau\widehat{\pi}$ (after tax profits in the non-audited state) and $Y_A \equiv \pi - \tau\pi - \theta\tau(\pi - \widehat{\pi})$ (after tax profits in the audited state). Taking the first order condition with respect to $\widehat{\pi}$, we have:

$$p\left(\frac{\widehat{\pi} + \varepsilon}{R_T}\right)U'(Y_A)\theta\tau - (1 - p\left(\frac{\widehat{\pi} + \varepsilon}{R_T}\right))U'(Y_N)\tau - \frac{1}{R_T}p'\left(\frac{\widehat{\pi} + \varepsilon}{R_T}\right)(U(Y_N) - U(Y_A))$$

The first and second terms capture the “standard” Allingham-Sandmo trade-off: higher evasion results in higher utility in the non-audited state but lower utility in the audited state. The third term captures the fact that firm reports change the detection probability. As $p' \rightarrow 0$, the extent of offsets increases ($\frac{\partial \widehat{\pi}}{\partial R_T} \rightarrow 0$). Intuitively, the less responsive the detection probability function is with respect to the reported profit *rate*, the less the reported profits *level* is affected by the third-party reporting. This can be the case if audit capacity is weak, the variability in true profit rates is high, or knowledge about true profit rates is low.

Cost Under-Reporting One of the implications of our framework is that firms may under-report true costs: in the case above, $\widehat{C}^{*''} = R_T - \widehat{\pi}^{*'}$, but $\widehat{C}^{*''} \leq C$. Firms will adjust

⁷This assumption could be modified so that a reported profit rate that is “too high” also appears suspicious. Since our main focus is on the effects of third party reporting, which creates a *lower* bound on reported revenues, we retain the assumption of a monotonic p function for simplicity.

their reported costs in response to an increase in third party reporting of revenues, but the new level of reported costs may be larger or smaller than their true costs. Intuitively, the audit rule creates incentives for firms to appear smaller on paper than they are. We present direct empirical evidence in Section 5 that some firms do indeed under-report costs.

This has important implications. First, it provides a microfoundation for the idea that firms may understate overall economic activity to “fly under the radar” of tax or other regulatory authorities (Almunia and Lopez-Rodriguez, 2013; Schneider et al., 2010). Second, this type of behavior may undermine the self-enforcement mechanism in the VAT. This mechanism operates through client firms asking their suppliers for receipts in order to be able to deduct input costs. If firms do not declare all their costs, this incentive to request receipts is diminished.⁸

2.3.3 Limits to Enforcement

Note that the detection probability p is the probability that the firm is caught *and* punished. We have so far assumed that p equals 1 if firms self-reported revenues are lower than third party reports. However, if there are limits to enforcement, p would still rise discontinuously at R_T but be limited below 1. This could occur if the tax authority faces constraints on its ability to enforce tax collection, even conditional on observing misreporting (Carrillo et al., 2011).

In this case, firms may optimally choose reported revenues that are below third party revenues, effectively taking the risk that the tax authority will either not observe the discrepancy or not enforce its elimination. Nevertheless, if p rises discontinuously at R_T , firms will never choose reported revenues just below this level, instead bunching at R_T .

⁸Somewhat counterintuitively, cost under-reporting also suggests that the tax authority could in fact benefit from higher reporting of costs. In particular, if a firm is reporting $\widehat{C} < C_T$, forcing it to declare higher costs can result in higher optimal reported profits for the firm, for some parameter values.

3 Background and Empirical Predictions

3.1 Firm Taxation and Third Party Information in Ecuador

3.1.1 Rates and Reporting Requirements

We now turn to our empirical setting: the corporate income tax in Ecuador. Ecuador's per capita GDP in 2011 was approximately 5,000 USD.⁹ Tax revenues are around 12% of GDP, with indirect taxes comprising about half and corporate income tax making up the majority of the remainder. Oil-related royalties are also an important component of public revenues.

All incorporated firms in Ecuador are required to file an annual profit tax return (Form F101). Pre-tax profits are defined as the difference between total revenues and total costs. Firms must distribute 15% of pre-tax profits among their employees and are then taxed at a flat rate of 25% on the remainder. The 25% rate is independent of firm size and was constant for over 20 years up to and including the years that were affected by the intervention in this study.¹⁰ There are no tax refunds for losses, but losses can be carried forward, with some limitations, for 5 years with a maximum deduction against 25% of profits. The Ecuadorian fiscal year corresponds to the calendar year and firms file the annual corporate tax return the following April.

All firms are also required to file a monthly value added tax return (Form F104). In order to deduct input costs, this form must include a purchase annex listing the amount purchased from each supplier along with the supplier's tax ID.¹¹ A similar annex for sales to client firms must be submitted by firms with annual sales above 200,000 USD as well as by Large Taxpaying Units, public sector firms, financial institutions, credit card companies, and firms requesting withholding refunds.

⁹Ecuador dollarized its economy in 2000. All financial figures in this paper are expressed in USD.

¹⁰Corporate tax rates were reduced to 24%, 23% and 22% in fiscal years 2011, 2012 and 2013, respectively. The tax rate is lower for profits that are reinvested; however, this aspect of the tax code is not relevant for the interventions examined here. There are certain special provisions that apply to oil companies and public sector companies. These firms are included in our full sample analysis but were not subject to the policy interventions.

¹¹In addition to VAT withholding, firms withhold a percentage of their payments to suppliers, which they transfer to the tax authority. This withholding can be used by suppliers as a credit against their corporate tax liability.

3.1.2 Third Party Information and Cross Checks

The Ecuadorian tax authority (SRI) can check firms' self reports against several sources. For example, it can use data from the purchase annexes to compare a firms self-reported sales to the sum of all purchases reported *from* that firm by other firms. The SRI supplements this information with credit card sales from credit card companies, exports and imports recorded by the Ecuadorian Customs, and returns to financial investments recorded by financial institutions. Since third party reporting is incomplete, the resulting estimates of firm revenues will generally provide a lower bound on true revenues.¹²

The ability of the SRI to utilize this third party information is relatively recent. Digitized purchase and sales annex data have only been collected since 2007 and discrepancies were initially computed only in special cases, such as in the process of auditing a large company. SRI began conducting large scale cross checks of taxpayers in 2011, computing revenue discrepancies for previously filed corporate income tax returns. The notifications we now describe represent the first time the SRI used third party information for tax enforcement in any large scale, systematic way.

3.2 Policy Intervention

Our results are based on a series of natural policy experiments, in which the SRI notified selected firms about detected discrepancies between third party reported information and firms' self-reported revenues on previous corporate income tax returns. Notified firms were asked to file an amended return to address the detected discrepancy. While the specific firm selection methodology is confidential to the SRI, key factors included the magnitude of discrepancies and potential tax adjustment. We discuss firm selection in the context of our empirical strategy in Section 4.2 below.

We examine three rounds of notifications corresponding to tax returns from 2008, 2009, and 2010. We refer to these as the 2008, 2009, and 2010 rounds respectively. The notifications corresponding to the 2008 returns were sent in August-September 2011; the notifications corresponding to the 2009 and 2010 returns were sent in March-April 2012. Note that in all cases, notifications were sent for previously filed tax returns after all real

¹²It is possible that there are errors or misreports on the annexes of firms transacting partners, but given the incompleteness of third party information, the resulting estimates of R_T will still be underestimates of true revenues in most cases.

transactions for the relevant tax period had been completed. Therefore, any changes we observe in response to the notifications are reporting rather than real economic responses.

For the 2008 round, 3,136 firms were selected for notification. For the full original notification (in Spanish) see Appendix 6. The relevant portion of the message is translated below:

“Dear Mr/Mrs [XXX], General Manager of Firm [XXX],

After reviewing the databases which it possesses, the Tax Administration has identified revenue amounts that are attributable to the firm that you represent, which are larger than the amount reported on its 2008 corporate income tax return. [...] The Tax Administration requests that you submit an amended return for the year 2008 via internet within 10 business days.”

2,221 firms were selected for the 2009 round and 2,636 firms for the 2010 round. In these rounds, the notifications also included the Tax Authority’s calculation of the firm revenue based on third party sources. The relevant portion of the message is translated below:

“Dear Mr/Mrs [XXX], General Manager of Firm [XXX],

After reviewing the databases which it possesses, the Tax Administration has identified revenue amounts that are attributable to the firm that you represent, which are larger than the amount reported on its 20XX corporate income tax return, as shown in the following table:

Fiscal Year	Line Item of the Corporate Income Tax	Value Calculated by the Tax Administration	Value Declared by the Taxpayer
20XX	699. Total Revenue	\$255,300	\$190,500

[...] The Tax Administration urges you to submit an amended return for the year 20XX via internet.”

Notifications were sent by email to the address on record, which typically belongs to the general manager or accountant of the firm. We observe firms’ initial filings as well as any subsequent amendments made to their returns.

3.3 Empirical Predictions

We next outline empirical predictions in the context of our conceptual framework. Our data allow us to examine revenue and cost misreporting in the full universe of firms, and responses to third party reporting notifications in the policy intervention. Recall that the key effect of third party reporting is to create a threshold for reported revenues, below which there is a discontinuous increase in the probability that misreporting is detected and penalized. Prior to the notifications, third party information was not used for enforcement purposes, except for selected audit cases. The detection probability function faced by firms was thus equivalent to one in which the tax authority had no third party reports about firms ($R_T = 0$). Therefore, the policy notifications effectively introduces R_T for notified firms.

In the cross-section of firms prior to the intervention, the absence of enforcement based on R_T should result in reported revenues both below the third party level and above with little to no bunching at R_T . The framework also predicts that some firms may under-report costs, setting $\hat{C} < C$. While we do not observe real costs C , we can perform a stricter test for cost under-reporting by examining whether firms report $\hat{C} < C_T$. C_T is likely to be substantially smaller than C , since only a small share of firms are required to file sales annexes. This test will therefore provide a lower bound on the extent of cost under-reporting.¹³

All firms in the policy intervention have $\hat{R} < R_T$ by definition, since the SRI sent notifications only to firms that under-reported revenues relative to available third party information. Our context best corresponds to the “limits to enforcement” case in Section 2.3.3. Firms could only have been legally prosecuted for failure to submit an amended return if a written notification had been delivered to them in person by a member of the SRI staff. This is very expensive, and the email option for notifications was chosen due to resource constraints. If there are limits to enforcement, some firms may simply choose not to file an amendment.

Among firms that do file an amendment, we should see bunching of reported revenues at R_T when R_T is disclosed, i.e. in the 2009 and 2010 rounds. In the 2008 round, where R_T was not reported to firms, revenue adjustments will depend on firm beliefs about the amount of third party information to which the government has access. So firms’ amended

¹³It is possible that supplier firms misreport sales, on which the third party cost variable is based. However, since the incentive is for firms to under-report revenues, this will typically result in a *lower* C_T .

reported revenues may be above or below the actual R_T . In all rounds, we expect to see firms offsetting the increase in reported revenue with an increase in reported costs. The magnitude of this effect will depend on the gradient of the audit probability with respect to the reported profit rate: large offsets would imply a relatively flat gradient, i.e. an enforcement probability that is not very responsive to suspiciously low profit rates.

Finally, we can provide some suggestive results on firms' behavior in filings for subsequent years. Notifications of detected discrepancies must be *ex post* to the original filing by definition and reflect the way in which governments use third party information for enforcement in practice. However, as taxpayers update their beliefs about the consequences of filing a return with a discrepancy, this will determine their *ex ante* behavior for the following year. In particular, we might expect firms, which have been notified in the policy intervention during 2011, to report both higher revenues and costs on their returns for the following year. We provide suggestive evidence of such responses by examining firm reports on their returns for 2011 (due in March 2012). In general, we note that this experiment sheds light on the short-run responses to third party reporting, holding other aspects of the enforcement environment constant. As we discuss in the concluding section, there may be additional long-run equilibrium effects of third party reporting as tax authorities improve their overall enforcement capacity.

4 Data and Empirical Strategy

4.1 Data

We combine several sources of administrative data. Information about self-reported revenues and costs on all original and amended tax returns is compiled from the corporate income tax form F101. We observe values for all line items as well as the submission date for each amended version of the return. Firms can submit amendments to the F101 without presenting any additional documentation.

Revenue and cost discrepancies are calculated using third party data. Specifically, third party reported revenue is the sum of exports, bank interest, and the maximum of the sum of purchases from the firm reported by client firms and the sum of purchases from the firm made using credit cards. Third party reported costs are the sum of firms' imports and sales reported by their suppliers. Purchases and sales reported by supplier

and client firms are calculated by the SRI using data from the F104 annexes described in Section 3.

The third party revenue measure was hand checked by SRI staff for the sample of notified firms, resulting in some adjustments. These adjusted measures of R_T were provided to firms in the 2009 and 2010 rounds and were calculated (but not provided to firms) in the 2008 round. We use the adjusted third party measure for evaluating responses to the policy experiments and the unadjusted measure for cross-sectional results. In practice, the adjusted and unadjusted measures are highly correlated, and the policy experiment results are robust to excluding firms for which adjustments were made.

We define the universe of economically active firms as those that filed an F101 in a given year and which had some non-zero revenues or non-zero costs, based on self-reported or third party reported information. In 2008, we do not have third party reported information for firms outside the notification sample and therefore restrict the sample to firms with non-zero costs or revenues based on self-reported information for this year.¹⁴

Table 1 shows summary statistics for the full sample for fiscal years 2008-2010 (pooled). The sample includes 87,076 firms and almost 200,000 firm-year observations. The mean declared annual revenue is \$1.58 million with a median of \$42,200. Declared costs have a mean of \$1.48 million and a median of \$41,600. Correspondingly, there is a large range in tax liabilities. The mean is \$23,000; however, the median is zero, and the standard deviation is over \$600,000.¹⁵ Firms' self-reported revenues and costs are higher than third party reports on average. Note that since third party information is incomplete, this does not necessarily mean that firms are over-reporting these values. As we discuss in detail below, a substantial share of firms report *lower* revenues or costs than the third party reports.

Table 2 Panel A shows summary statistics for the firms that were selected for notification in each round of the policy intervention (henceforth referred to as the "notification sample"). All numbers reflect the last pre-notification filing for the corresponding tax year. In this sample, self-reported revenues are lower than third party reported revenues for all firms, since this is how they have been selected for notification. Revenue discrepan-

¹⁴23% of firms in the 2009-10 sample had zero costs and revenues based on self-reports but positive values based on third party reports.

¹⁵The fact that the median firm reports zero tax liability is not unique to Ecuador. In the US, between 1998 and 2005 an average of 65% of firms reported no tax liability (U.S. Government Accountability Office, 2008). This figure reflects US held corporations that filed the 1120 or 1120A tax form between 1998 and 2005.

cies are large, both in absolute terms and as a share of baseline self-reported revenue. On average, self-reports are lower than third party reports by \$307,000, \$176,000 and \$197,000 in 2008, 2009 and 2010 respectively.¹⁶ To analyze the relative size of the discrepancy, we look at the distribution of $(R_T - \widehat{R})/(\widehat{R} + 1)$, and find that the median is 0.63 (not shown in Table). There were 3,136 firms selected for the 2008 round, 2,221 for the 2009 round, and 2,636 for the 2010 round. Some firms were notified in more than one round. Our results are robust to restricting the samples to firms that were only notified once and all results are clustered at the firm level. Not all firms selected for notification actually received them: approximately 7% of messages bounced due to invalid email addresses, and it is likely that additional notifications were not received or read by the intended recipients. We can therefore think of the notification sample as an “intent-to-treat” sample.

Panel B of Table 2 presents summary statistics for firms that submitted an amended return after receiving the notification (henceforth referred to as the “amending sample”). We count a firm as amending if it filed an amendment within three months after the notification.¹⁷ The share of amending firms in the notification sample was 19% in the 2008 round, 11% in the 2009 round, and 16% in the 2010 round. Note that these figures understate true response rates since, as discussed above, not all firms in the notification sample actually received the notification. The observation that a substantial share of firms choose not to amend is consistent with the case of limits to enforcement discussed above. Amending firms are somewhat smaller in terms of overall self-reported economic activity than the full notification sample, but median revenue discrepancies are quite similar.

Given the magnitude of revenue discrepancies, notifications had the potential for large effects on total tax collection. For example, if all firms in the 2009 and 2010 rounds had amended their returns to match the indicated third party reported amount, aggregate pre-tax revenue would have increased by approximately \$391 and \$522 million for the 2009 and 2010 fiscal years, respectively. If other line items were held constant, this would imply a total increase in tax collection of approximately \$194 million.¹⁸ Among just the

¹⁶Conversations with SRI staff confirm that summary statistics for the 2008 round differ from the 2009 and 2010 rounds because the selection criteria for receiving a notification were changed somewhat for the later years; summary statistics for the full sample are very similar across the three years.

¹⁷In 2009 and 2010, we observe the firm-specific notification date. In 2008, as we discuss below in Section 4.2, we impute the exact notification start date. We assume that the 2008 notifications were made over a one month period following the start date, as in 2009 and 2010, and therefore consider amendments filed within a four month window of the start date in 2008 to be as consistent as possible with the later rounds. In practice, over half the firms that amended their return responded in less than one month and our results are robust to choice of the post-notification window.

¹⁸This is calculated as the tax rate (25%) multiplied by 85% of the additional declared revenue, since

amending firms, implied increases in total tax collection would have been \$116 million. As we show below, actual tax revenue increases were substantially smaller, because firms offset their revenue adjustments with adjustments to reported costs.

4.2 Empirical Strategy

We are able to estimate the causal effects of the notifications without an explicit control group by comparing firms' post-notification and pre-notification returns. The underlying identifying assumption is that in the absence of the notification, firms would not have amended their returns. In this case, firms' own pre-notification reported values provide a valid counterfactual for post-notification reports.

Indeed, the probability that firms spontaneously revise their returns for previous years after such a long period absent a notification is very low. Figure 1 plots amendment rates for the notification sample (right hand column) and for the rest of the full sample (left hand column). The start of the notification period is indicated by zero on the x-axis. Amendment rates are very close to zero for both samples prior to the notifications. There is a stark increase in the amendment rate for the notified sample following the start date, but no such increase in the non-notified sample. Moreover, as we show below, the types of adjustments made by non-notified firms that happen to revise their returns are entirely different from the amendments by notified firms. Correspondingly, the comparison between the pre-notification and post-notification returns provides a causal estimate of the discrepancy notification on firms' reporting behavior.

In the 2008 round, we know that notifications were sent in August and September of 2011 but do not observe the firm-specific notification dates. We can impute the start date based on the timing of the spike in the amendment rate for the notification sample as compared with the 2009 and 2010 rounds. Based on this discontinuity, we impute the start date for the 2008 round as August 11, 2011. In the subsequent analysis, we use the firm-specific notification dates for the 2009 and 2010 rounds and August 11, 2011 as the notification date for the 2008 round. The pre-notification reports are defined by the last observed F101 filing or amendment prior to these dates. The post-notification reports are defined by the first observed amendment (if any) after the notification during the post-notification windows defined in the preceding section.

15% of profits have to be distributed to workers.

The sample of firms selected for notifications is of course not representative for the population of all firms in Ecuador. However, this population it is of particular interest in the context of tax enforcement, since firms with large discrepancies are the ones with the greatest potential for improved tax collection. Therefore, third party based enforcement strategies typically target exactly this type of firm.

5 Results

5.1 Evidence from the Full Sample of Firms

Before we will turn to the impacts of the discrepancy notifications in Section 5.2, we examine the pattern of revenue and cost discrepancies in the full sample of firms, prior to the intervention. We focus on 2009 and 2010, the two years for which we have data on third party reported revenues and costs for all firms.

5.1.1 Revenue Discrepancies

Figure 2, Panel A plots the difference between the log of self-reported revenue and the log of third party reported revenue for firms with non-zero third party reported revenue. We add 1 in all log specifications to deal with zero reports.

As seen above, self-reported revenues are on average larger than third party reported revenues. This is very plausible since third party reporting is partial, and not all of firms sales will appear in another firms purchase annex. Firms that report revenues higher than third party reported revenues may or may not be under-reporting their true revenues. At the same time, we also see filings with revenue under-reporting: 24% of filings report revenues that are below third party revenues. The fact that self-reported revenue is smaller than (incomplete) third party reported revenue suggests that these firms are evading by under-reporting their revenue. We observe a small degree of approximate bunching around R_T . However, this bunching is not sharp: only 3.8% of filings have self-reported revenues that exactly match the third party estimate, and these are cases where R_T is relatively small on average. As we will show, responses to the notifications result in much stronger bunching.

5.1.2 Cost Discrepancies

Figure 2, Panel B plots analogous differences of self-reported and third party reported costs for firms with non-zero third party reported costs. Again, we observe that firms have on average higher self-reported costs than third party reported costs. This can result both from the fact that third party reports are incomplete, and from the fact that some firms may be over-reporting their costs in order to reduce their tax liability. There is essentially no bunching at C_T .¹⁹ However, one of the predictions of our model is that firms may under-report true costs, counter to the intuition that firms should wish to over-report costs in order to reduce tax liability. We can look at this issue by analyzing whether firms report costs below the third party reported costs ($\hat{C} < C_T$). This will provide a lower bound on the extent of true cost under-reporting ($\hat{C} < C$) because third party reporting for costs even more incomplete than third party reporting for revenue, as discussed in Section 3.1.1. We find that indeed, 23% of returns report costs that are lower than third party reported costs. However, firms that declare zero tax liability may have limited incentives to declare all costs (even though some degree of loss carryover is allowed). Focusing on firms that are not affected by this concern, we find that firms under-report costs even when declaring positive tax liability: 9% of returns that under-report costs have positive tax liability and 5% of all filings that have positive tax liability exhibit cost under-reporting.

The finding that a substantial share of firms under-report costs has broader implications for the effectiveness of the VAT. One of the main attractive features of the VAT is that it has self-enforcing properties as a result of the conflicting incentives between buyers and sellers. Specifically, although sellers have incentives to under-report the value of the transaction, buyers will want the transaction to be reported fully in order to maximize their cost deductions. However, if buyers have incentives to under-report true costs, opportunities for evasion and collusion in the VAT can arise and production chains outside the VAT system can emerge (Keen and Smith, 2006).

¹⁹If we examine the full sample, including filings for which we do not have third party information, we see somewhat stronger bunching at both R_T and C_T (Figure A1). This additional bunching reflects cases in which both the self-report and the third party report are zero.

5.2 Response to Notifications

The following section analyzes the responses to the discrepancy notifications. We first examine how firms adjust their reported revenues in response to the notifications and then consider effects on reported costs and overall tax liabilities.

5.2.1 Revenue Adjustments

Recall that the conceptual framework predicts that we should observe strong bunching at the third party reported revenue amount R_T if firms are informed about the amount of R_T . This should be the case for the 2009 and 2010 rounds, where firms were provided a specific value of the R_T . We indeed find strong bunching in response to the notification. Figure 3 shows the difference between the log of post-amendment self-reported revenue and the log of third party reported revenue among amending firms. In contrast to the pre-treatment results on the entire cross-section of firms shown in Section 5.1.1, we see very large bunching around zero, indicating that firms are adjusting their revenues to match the provided estimate of R_T . 39% of firms in the 2009 round and 35% of firms in the 2010 round match exactly, setting $\hat{R}' = R_T$. These findings imply that firms receive and understand the notification messages, and try to avoid further prosecution by adjusting their reported revenue to the minimum required to comply with the information that tax authority possesses. Figure 4 shows these revenue responses in more detail, plotting the change in declared revenue (revenue adjustment) against the pre-treatment revenue discrepancy. Panel A shows results for all amending firms. Approximately 15% of amending firms filed an amendment but did not change reported revenues or any other major variables. These firms are essentially analogous to non-amending firms. We therefore define the sample of adjusting firms as firms which made any positive adjustment to revenue following the notifications, shown in Panel B.

The left hand side of Figure 4 present the results for the 2009 and 2010 rounds. Firms tend to locate closely along the 45 degree line, matching the third party estimate. This shows that the observed bunching around zero in Figure 3 is not limited to small firms: even firms with very large revenue discrepancies matched the third party amount in their amended returns.²⁰

²⁰The displayed data points are restricted to the range zero to one million, but the fitted line and confidence interval reflect the unrestricted sample.

Next, we can test whether the bunching is a direct result of the information provided in the notifications, by comparing these findings to the the 2008 round. For 2008, firms were only told that their reported revenues were below third party reported amounts but were not given an actual value of R_T . Indeed, we observe much less bunching, and only 6% of firms match R_T exactly. This exact matching in the 2008 round could reflect some firms seeking out and obtaining additional information about their revenue discrepancies from the SRI, or firms having knowledge about what information the SRI could plausibly obtain based on third party records.

We can see the revenue responses for the 2008 round in more detail I the right-most graphs in Figure 4. Firms with larger revenue discrepancies make larger revenue adjustments on average, but there is much higher variance than in the 2009 and 2010 rounds. In addition, the fitted line in Panel B lies clearly below the 45 degree line, indicating that firms in the 2008 round tend to adjust revenues by less than the true estimated revenue discrepancies.

Comparing the 2008 results with the 2009 and 2010 rounds yields several implications. First, the notifications did effectively change R_T : the observed responses indicate that it is not the case that firms knew R_T even prior to the notifications and the notifications changed only the magnitude of the discontinuity in the p function at R_T . If this were true, we would not see differences in responses between 2008 and the other rounds. Second, the fact that firms make smaller adjustments when not provided the specific amount of R_T suggests that they are underestimating the ability of the tax authority to collect third party information. Finally, the 2008 results provide strong evidence of misreporting both before and after the notifications. If the notifications simply prompted firms to review their books and correct all honest errors, we would expect similar revenue adjustments across all three rounds.

Another point that speaks against an interpretation in which firms simply forgot to report all of their revenues on their initial returns is the following: 28% of firms in the notification sample and 38% of the adjusting sample had reported zero revenues on their initial returns. This is quite frequent because in Ecuador, as in many countries, there are strong incentives for registered firms to continue to file annual returns even if they truly had no economic activity in a given year.²¹ Therefore, the filing of a return with zero reports does not raise a red flag for the tax authority in and of itself. Since it is unlikely

²¹Inactive firms face stiff fines if they fail to submit tax returns until the firm is legally closed, a process which is costly and can take several years.

for firms to “forget” that they had any economic activity, lazy reporting alone cannot explain the observed patterns of adjustment.

Figures 3 and 4 above display revenue discrepancies and adjustments in absolute terms without making adjustments for firm size. Figure A2 in the Appendix shows results that adjust for firm size by scaling both axes by baseline reported revenue. If anything, observed matching is stronger. To the extent that there is incompleteness or noise in the SRI’s measure of R_T , these results indicate that firms match the estimate provided to them.

Table 3 presents the results in regression form along with robustness tests. Panel A shows the response in reported revenue in the pooled 2009 and 2010 rounds. Standard errors are clustered by firm, and all results are statistically significant at the 1% level. The baseline regression coefficient corresponds to the fitted line in Figure 4, Panel B. This coefficient is 0.927, indicating that adjusting firms increase their reported revenues by 93 cents for every dollar of indicated third party revenue. Our main specification focuses on the sample of amending firms as discussed in Section 4.1. We also calculated the results for the full notification sample. These results are mechanically attenuated, since firms that do not file an amendment will by definition have no change to their reported revenues and costs. However, even among the notification sample, the estimates are still highly statistically significant.

We now confirm these figures through a number of robustness checks. When we restrict the sample to firms notified in only one round, the coefficient is 1.016. Also, as was already visible in Figure 4, the effects are not driven by firms responding to large revenue discrepancies: the coefficients stay very similar when we restrict the sample to firms with revenue discrepancies below \$1,000,000 or below \$250,000, confirming that the observed effects hold throughout the distribution. A very small number of firms make negative revenue adjustments; including these firms has a negligible effect on the estimated coefficients (0.926).

Our baseline specification uses the last F101 filing prior to the notifications as our baseline measure of reported revenue. In some cases, the measure of baseline revenue provided to firms on the letters from SRI differs slightly. Using the letter measure in our calculation of revenue adjustments again makes no significant difference to the results (0.932). Finally, as discussed above, the measure of R_T provided to firms is derived from the third party reported data, but was hand checked by SRI staff and adjusted in

some cases. Our results are robust to excluding cases where such adjustments were made (1.111).

5.2.2 Cost Adjustments

We now come to the analysis of our key result that firms make substantial offsetting adjustments to their change in reported revenues by changing their reported costs. Figure 5 plots the change in reported costs against the change in reported revenue for adjusting firms. In all three rounds, firms locate almost exactly along the 45 degree line. This means that firms offset their increase in reported income with an almost identical increase in reported costs. This behavior holds along the entire distribution of changes in reported revenue, even when these revenue adjustments are very large, as high as \$1,000,000.

Whether or not firms were informed about the amount of R_T available to the government, their offsetting change in reported costs still matches their change in reported revenues very closely. The rightmost panel in Figure 5 shows that for cost adjustments, there is no difference for the 2008 round. This indicates that firms are targeting their optimized level of reported cost to the change in reported revenue induced by the notification message. If the message induces firms to increase their reported revenue more strongly, they also increase their reported costs more strongly. These results are also robust to scaling by baseline reported revenues (see Figure A3 in the Appendix).

Table 3 Panel B presents these results in regressions analysis for the pooled 2008-2010 rounds. The baseline regression coefficient corresponds to the fitted line in Figure 5. This coefficient is 0.962, indicating that adjusting firms increase their reported costs by 96 cents on average for every dollar of revenue adjustment. This result of large offsetting increases in declared costs holds through all the robustness checks also conducted in Panel A (described at the end of Section 5.2.1). Looking at the specific numbers, we find that over 15% of firms match their cost adjustments to their revenue adjustments within \$100, with about half of these matching exactly. Almost 30% of firms match within \$1,000. Recall that the median discrepancy in the notification sample is \$50,000.

A natural question is why the tax authority would not immediately pursue these firms. While we do not have information on actions taken against specific firms, conversations with SRI staff indicate that they are indeed planning (and may have already started) follow-up control efforts. However, such efforts run exactly into the problems which third party cross-checks are aimed at mitigating. They would require in-person audits,

which are time consuming and very costly. The main purpose of third party reporting is that, *unlike* audits, it is meant to provide a simple, low-cost mechanism to enforce tax collection. The reason why firms substitute their reporting towards higher declared costs is likely exactly the fact that cross-checking such costs requires in person audits, rather than simply cross-checks.

We now examine the patterns of cost adjustment in greater detail. As we have seen above, some firms may have under-reported their costs in their original tax filing. Some of the cost adjustment could therefore reflect firms bringing some of these costs on the books. Recall that when third party reporting of costs is partial, without an audit the tax authority cannot distinguish between newly reported true costs and made up costs. This central challenge faced by the tax authority is in fact what allows firms flexibility in choosing their cost adjustments and puts limits on the power of third party reporting of revenue. One aspect of such behavior that we can observe how many firms in the notification sample report lower costs than the third party reported costs $\widehat{C} < C_T$ (similar to the analysis on the cross-section of all firms in Section 5.1.2). The share of firms for which this is the case is higher in the notification sample than across all firms. Prior to the notifications, 50% of firms in the adjuster sample report $\widehat{C} < C_T$, indicating that there is scope for a significant number of firms to increase their reporting of real costs.

To the extent that some additional costs are legitimate, part of the observed response could reflect firms bringing entire transactions (revenues together with their associated costs) on the books. As discussed above, over 15% of adjusting firms match their cost adjustments to their revenue adjustments within \$100, which would only be consistent with bringing zero profit transactions on the books. In addition, if firms were bringing entire transactions on the books, we would expect to see a positive correlation between firms' reported profit rates prior to the notifications and the reported profit rate on the amended portion of the return. We find no such correlation: among all adjusting firms, the correlation coefficient between the pre-notification profit rate and profit rate on the amendment is -0.01. Among adjusters with positive pre-notification reported profits, the correlation is actually negative. This indicates strongly that firms are in fact choosing a new optimal level of reported costs based on their new level of reported revenue.

Additional evidence on the form of cost reporting comes from the specific line items along which firms adjust costs. Ecuadorian firms are required to distinguish between production and administrative costs on the corporate income tax form. Production costs

include all intermediate inputs while administrative costs contain all other expenses. In the event of an audit, the provision and value of many administrative costs, such as legal or consulting services, are more difficult to verify than physical inputs to production, particularly if there is collusion between firms. While we do see increases in reported production costs,[DISCUSS and add stats here] Finally, the most frequent cost adjustment is on "Other Administrative Costs," a line item that is particularly hard to verify because it may contain miscellaneous purchases including transactions with the informal sector.²² Taken together, these results indicate that firms are systematically shifting their distributions of reported costs towards line items that are difficult for the tax authority to verify relative to their pre-notification returns.

5.2.3 Effects on Tax Revenue

Given the results above, it is not surprising that overall effects on tax collection are modest. Figure 6 plots a histogram of changes in the log of tax liability for adjusting firms. We see a large spike around zero, consistent with firms having offset much of their revenue adjustments with corresponding cost adjustments.

Table 4 presents regressions of revenue adjustments, cost adjustments, and resulting changes in tax liability for the amending sample (Panel A) and the overall notification sample in Panel B . The coefficient on 'post' indicates the difference in declared amounts before and after the notifications. If a firm made no amendment in the relevant post-notification window, its post-notification values are the same as its pre-notification values. Standard errors are clustered at the firm level, and all results are significant at the 1% level.

Panel A shows that amending firms on average increased their reported revenue by \$86,000 and their costs by \$80,000, resulting in an average change in tax liability of \$1,900. This increase in tax liability is more than an order of magnitude smaller than it would have been had firms adjusted only revenues. We see similar patterns in the full notification sample (Panel B). These effects are mechanically attenuated by the amendment rate, since non-amender firms had zero adjustments by definition. However, even in this sample, the observed effects are significant at the 1% level. Our estimates imply that the total incremental tax collection attributable to the notifications was approximately \$2 million.

²²50 percent of adjusting firms report zero "Other Administrative Costs" before the amendment, while only 25 percent report zero after the amendment.

Finally, we return to our initial identifying assumption, which is that the pre-post difference in firms reports can be taken as a causal effect of the notifications. Table 5 shows a placebo test in which we simulate treatment effects for non-notified firms, assuming that these firms had been notified on the first day of the notification period in each year. Panel A shows the results including all non-notified firms, Panel B for non-notified firms that happened to make an amendment during the relevant period. There are no significant changes in revenues, costs, or tax liabilities, and the point estimates for revenue and cost adjustments are of opposite sign. The assumption that in the absence of the government notice, the notification sample would have not adjusted its reported costs and revenues in the way we found above therefore seems highly plausible.

In sum, our results provide strong evidence indicating the limits of third party reporting. While the notifications did cause firms to adjust their reported revenues to match third party reported amounts, firms offset much of this adjustment by increases in reported costs. These results cannot be driven by real economic responses, since all decisions for the relevant tax returns were made well prior to the notifications. The pattern of responses provides strong evidence of misreporting by firms, both before and after the notifications.

These findings indicate that the effectiveness of third party reporting depends on other features of the enforcement environment, which may be weak in developing countries. Formally, the large cost offsets we observe reflect a low gradient of the expected audit probability with respect to the reported profit rate. In practice, this may reflect low capabilities of the tax administration such as low detection capacity or low enforcement capacity conditional on detection, which can result from limited governmental resources, corruption, weak legal environments, or many other challenges prevalent in developing countries

5.3 Subsequent Tax Filings

The above analysis of the amendments examines how firms respond to *ex post* notifications of detected discrepancies. As taxpayers update their beliefs about the information available to the tax authority, they can be expected to also adjust their *ex ante* behavior for subsequent tax years. Most individuals in the United States, for example, report their W2 income accurately because they know that discrepancies will be detected and prosecuted with near certainty. In the Ecuadorian case, we might expect notified firms to

try to avoid revenue discrepancies in subsequent years, by reporting higher revenues, but also higher costs to offset the resulting tax liability increase.

An empirical challenge is finding an appropriate counterfactual for notified firms' subsequent filings. One potential way to construct a control group would be to use propensity score matching. However, this is not suitable in this context for the following reason. An important variable to match on would be the size of revenue discrepancy $\widehat{R} - R_T$. However, in cases where firms with large revenue discrepancies were excluded from being notified, this generally occurred for a specific reason, for example because they were already under investigation by the SRI for a different matter. Firms that are similar on observables would therefore not constitute a valid control group, since there are unobserved differences that could introduce significant bias.

We instead exploit a source of variation from the design of the 2008 notifications. The SRI had initially selected a larger group of firms to be notified, but some firms in this sample were not notified due to technology resource constraints. We can thus use the selected-but-not-notified firms as a control group for notified firms. However, this control group is imperfect: SRI staff used discretion in prioritizing firms for notification within the selected sample. We therefore stress that the following analysis provides only suggestive evidence that should be interpreted with great caution.

We restrict the sample to firms that were selected for notification for the 2008 round only, resulting in 2,046 and 1,035 firms in treatment and control groups, respectively. The 2008 notifications were sent in the summer of 2011 and could potentially influence both firms' economic decisions in the latter portion of the year as well as reporting choices in their 2011 tax return (due in March 2012). First, we see that while there are large differences in the levels of these variables across treatment and control, the pre-trends are similar. This indicates that while the treatment and control group are quite different, and results clearly need to be interpreted with caution, the common trend assumption of the difference-in-difference estimator does not seem to be violated. Subsequent to the notification period, we see a divergence, suggesting that treatment firms indeed increased both their reported revenues and costs in 2011 relative to control firms (Figures 6 and A2).

Table A1 shows the analysis in a difference-in-difference regression. We regress revenues, costs, and tax liability on indicators for 2011, having been notified, and the interaction between the two, controlling for firm fixed effects and declared assets (Table A1). Previously notified firms increased their 2011 reported revenues by about \$265,000

more than the control group. At the same time, the relative increase in reported costs is also large (about \$220,000), and differences in reported tax liabilities are small and statistically insignificant. Revenue and cost differences for 2009 and 2010 are small and insignificant (unreported).

One caveat to note on these results is that the changes appear to be concentrated in the top quartile of firms (in terms of baseline declared revenue or assets), which are disproportionately represented in the treatment sample.

6 Conclusion

This paper investigates the impact and potential limitations of tax enforcement based on third party information. Using third party information on revenues and costs, we document substantial misreporting in the universe of firms in Ecuador. Notably, we find evidence that some firms under-report not only revenues but also costs, even when they have positive tax liability. When firms are notified by the tax authority about detected revenue discrepancies, they amend their returns and increase reported revenues, closely matching the amount indicated when it is provided. However, they offset much of this higher declared revenue by an increase in declared costs, resulting in only small changes in their reported profits and corresponding corporate tax liabilities. This is true even when adjustments are in the tens or hundreds of thousands of dollars and highlights the importance of considering such substitution responses when evaluating the impact of tax enforcement measures. These empirical findings can be reconciled in a simple model of third party reporting in which the detection probability depends on the firms reported profit rate.

Our results have a number of implications for public finance in developing countries and for tax enforcement more generally. First, these results indicate limits to the power of enforcement policies based on third party information when such information is partial. In particular, the collection of third party information may have different levels of effectiveness depending on the amount of information available on other margins: as in the O-ring theory of economic development (Kremer, 1993), the weakest link may play a preponderant role for tax collection. Third party reporting is therefore likely to be most effective when there are relatively few margins that are not third party reported and when the tax authority can audit these margins effectively. In many developing countries,

however, third party reporting is highly incomplete and there are severe limits to the effectiveness of traditional auditing. In these types of environments, third party reporting may not be a silver bullet in solving the problem of improving state fiscal capacity.

Second, at least some firms appear to under-report their true costs in addition to under-reporting revenues, which has several important implications. When thinking about informality, it is important to recognize that even firms that are formal in the sense of being registered and filing taxes may have substantial unreported economic activity. On one hand, this could undermine certain types of compliance incentives. For example, one of the main attractive features of the VAT is that it has self-enforcing properties if buyers want to fully declare costs to maximize their input deductions. However, if buyers have incentives to under-report true costs, opportunities for evasion and collusion in the VAT can arise and production chains outside the VAT system can emerge (Keen and Smith, 2006). In addition, the limited ability of firms to deduct input costs from informal suppliers is a disincentive to trade with the informal sector in many countries (De Paula and Scheinkman, 2010). If firms are not fully maximizing their reported costs, this barrier is diminished. As a result, one of the costs of informality (limited ability to trade with the formal sector) may be reduced.

On the other hand, cost under-reporting creates the possibility for positive cross-firm spillovers in enforcement. If firms were required to accompany additional cost deductions with information about the providers of these input costs, the increase in reported costs itself can lead to an increase in third party information about other firms. Such spillovers are consistent with the findings in Pomeranz (2013). Firms could also respond to enforcement by reporting fraudulent costs. Our line-item results suggest that both types of behavioral responses are possible. Gaining a better understanding of the extent of cost under-reporting as well as which types of costs firms keep off the books is an important avenue for future research.

Third, governments should take limits to information and enforcement capacity into account when designing tax policy (Gordon and Li, 2009). In particular, governments may wish to set the tax base according to the degree of third party information on the base as a whole. If firms are easily able to offset reported revenues with reported costs, it may be optimal to have a sales tax rather than a profit tax or a sales tax that limits deductions to cost line items on which third party reporting is complete. Our empirical findings are complementary with Kleven et al. (2013), who show that governments may prefer productively-inefficient turnover taxes to profit taxes if turnover taxes are harder

to evade.

Finally, our results suggest that enforcement strategies based on third party reported information are complementary to the effectiveness of the tax authority's traditional auditing resources. While the immediate impact of enforcement strategies based on third party information may be reduced through substituting behavior, they channel misreporting onto a smaller number of margins. This allows tax authorities to focus their (scarce) auditing resources on the margins that are more difficult to monitor through third-party information, rather than having to manually audit all margins. As the scope of transactions covered by third party information grows, manual auditing can be focused on an increasingly narrow set of hard-to-monitor transactions. However, given the weakest link dynamic, it remains crucial to audit transactions that are hardest to monitor by third party information. Despite the growth of computer-based monitoring methods using cross-checks of third party information, strengthening the auditing and enforcement capacity of developing country governments therefore still remains of first order importance for effective tax collection.

OTHER POINTS THAT WE DISCUSSED BUT THAT ARE NOT INCLUDED ABOVE

Pre-filled returns. Im just not sure what we have to say about this and in particular what we have to say about this that could generalize from the specific context of Ecuador. Unless we can be sharper about this, Im not sure it makes sense to put it in the conclusion. We could add a footnote in Section 5, although Im not sure what such a footnote would be.

Firms as aggregators of information. Lets discuss this one I want to be careful here. The KKS framework doesnt have the firm as an entity as separate from its workers, so I dont want to open up a can of worms here. I also dont want the cost under-reporting to get disproportionate emphasis in the conclusion. Not opposed to putting something back in, but lets talk about it.

Firms taking action to reduce R_T . Could add some discussion of the fact that expansions in third party reporting could result in firms taking actions to reduce R_T . This relates to a broader point about enforcement and informality. Tried to look at this using the same ID strategy as for the real responses and didnt find significant results. Given that, my vote would be to leave it out entirely (even though I do think its an interesting point)

More on spillovers. Previous version had this para: While third party cross-checks may therefore provide limited results in the initial stages, their scope may grow mechanically over time as the substitution behavior leads to the creation of additional reporting of third party information. Further research is required to study where in the network of firms such enforcement spillovers may be strongest, and where tax authorities may therefore want to focus their initial focus of enforcement strategies based on third party information.

This felt very wishy washy to me and didnt seem to add that much value relative to what we have above. I cut it, but lets discuss if you guys feel we should put it back in.

PREVIOUS VERSION OF CONCLUSION STARTS HERE, FOR REFERENCE:

This paper investigates the impact of tax enforcement based on third party information and its limits in the face of firms' evasion substitution behavior. Third party reporting allows tax authorities to verify taxpayer self-reports and has been shown to be a key mechanism through which developed country governments are able to enforce tax collection. In less developed countries, however, incomplete information and limits to enforcement can reduce the effectiveness of this mechanism: taxpayers may simply offset misreporting on margins where third party information is available with other, less verifiable margins.

A natural experiment in Ecuador, as well as analysis of the cross-section of all economically active formal firms in the country, shed light on these mechanisms. The analysis of the cross-section reveals that – as to be expected in a low-enforcement environment – prior to the natural experiment, a substantial share of firms report revenues below third party estimated revenues. However, we find that a significant number of firms under-report not only revenues but also costs, even when they have positive tax liability. This finding is at odds with many standard models of tax evasion, given that increasing declared costs would reduce firms' tax liability. This has important policy implications, as discussed below.

The natural experiment allows testing directly for firm responses to an increase of enforcement based on third party information. The Ecuadorian Tax Authority notified selected firms about discrepancies between their declared revenue and revenue calculated from third party sources. Firms respond strongly to the notifications, amending their returns with higher reported revenues, often exactly matching the amount indicated by the tax authority. However, they offset much of this higher declared revenue by an increase

in declared costs, leaving only small changes in their reported profits and corresponding corporate tax liabilities. This is true even when adjustments are in the tens or hundreds of thousands of dollars.

Our simple conceptual framework examines conditions under which such substitution behavior will occur. Specifically, when monitoring depends on firms' reported profit rates, they will have an incentive not only to under-report revenues but potentially also costs. An increase in third party reporting will cause firms to increase declared revenues but firms will partially offset this change in revenue by increasing declared costs. Our results have a number of implications for public finance in developing countries and for tax enforcement in general. First, and most broadly, they demonstrate the importance of taking possible substitution effects into account when examining the effectiveness of tax enforcement measures. Evaluations that only estimate the impact of a given policy change on the directly affected margin may over-estimate its effectiveness by ignoring compensating behavior on other margins. On a more basic level, the fact that we find such large misreporting behavior indicates that care needs to be taken when using tax records as measures of firm performance. This is particularly the case where the level of enforcement or compliance may be different across treatment and comparison groups that are being analyzed or for outcome measurements in impact evaluations, in which the treatment itself may affect compliance. Second, the results indicate limits to the power of enforcement policies based on third party information when such information is partial. The collection of third party information may have different levels of effectiveness depending on the amount of information available on other margins: as in the O-ring theory of economic development (Kremer, 1993), the weakest link may play a preponderant role for tax collection. Third party reporting is therefore likely to be most effective when there are relatively few margins that are not third party reported and when the tax authority can audit these margins effectively. In many developing countries, however, third party reporting is highly incomplete and there are severe limits to the effectiveness of traditional auditing. In these types of environments, the introduction of enforcement based on third party reporting may not be a panacea in solving the problem of improving state fiscal capacity.

Third, the finding from the cross-sectional results that firms under-report not only revenues, as would be expected in any standard tax evasion model, but also costs, has several important implications, as the incentives for firms to collect and report other information that leads to increased cost deduction diminishes. On the one hand, this

can undermine the self-enforcing mechanism of the VAT. This mechanism is based on the premise that firms have an incentive to declare all input costs for tax deduction purposes. Where that is not the case, the mechanism will unravel. Our results from the natural experiment show, however, that increased enforcement based on available third party information will lead firms to deduct more costs. If firms would be required to accompany any additional cost deductions with additional appendices providing information about the providers of these input costs, the substitution behavior itself can lead to an increase in third-party information. Such spillovers are consistent with the findings in Pomeranz (2013).

In addition, the lack of incentives to report tax-reducing costs can also lead to undermine other instances, where firms act as aggregators of information for the tax authority (Slemrod.) Examples include the less reporting of full salaries of their employees, which can lead to informality or tax evasion by the labor force.

Finally, if getting a receipt, in order to be able to deduct input costs, becomes less important for firms,²³ they may be less reluctant to trade with informal firm, who in most countries are not able to issue formal receipts.²⁴

While third party cross-checks may therefore provide limited results in the initial stages, their scope may grow mechanically over time as the substitution behavior leads to the creation of additional reporting of third party information. Further research is required to study where in the network of firms such enforcement spillovers may be strongest, and where tax authorities may therefore want to focus their initial focus of enforcement strategies based on third party information.

Finally, enforcement strategies based on third party reported information are complementary to the effectiveness of the tax authority's traditional auditing resources. While the immediate impact of enforcement strategies based on third party information may be reduced through substituting behavior, they channel misreporting onto a smaller number of margins. This allows tax authorities to focus their (scarce) auditing resources on the margins that are more difficult to monitor through third-party information, rather than having to manually audit all margins. As the scope of transactions covered by third party information grows, manual auditing can be focused on an increasingly narrow set of hard-to-monitor transactions. However, given the weakest link dynamic, it remains

²³As Scheinkman (year) found to be the case for Brazil.

²⁴Ecuador is an exception in this regard, in that it allows formal firms to fill out a special form for purchases from non-registered firm, which makes those purchases deductible.

crucial to audit transactions that are hardest to monitor by third party information. Despite the growth of computer-based monitoring methods using cross-checks of third party information, strengthening the auditing and enforcement capacity of developing country governments therefore still remains of first order importance for effective tax collection.

Should we add the following somewhere or is this too far out?

The fact that firms try to appear small, since smaller firms have less monitoring, may indicate that as enforcement gets larger, firms may have incentive to actually stay small, to avoid audits. This would be hurtful for economic growth. However, I think this is a somewhat different mechanism than what we do here, right?

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Tables and Figures

Table 1
Descriptive Statistics, All Firms, 2008-2010

Revenue (\$000)	1,576 (42,169) [46]
Costs (\$000)	1,475 (41,560) [46]
Tax liability (\$000)	23 (626) [0]
For 2009-2010 only	
Reported revenue – third party revenue (\$000)	536 (13,505) [5]
Reported costs – third party costs (\$000)	678 (26,861) [24]
% of firms with positive third party revenue	72%
% of firms with positive third party costs	90%
Observations	192,882
Number of Firms	87,076

Notes: Group means are reported along with standard deviations in parentheses and medians in brackets. All monetary figures in USD.

Table 2
Descriptive Statistics By Year, Notified and Amending Firms

	Fiscal Year		
	2008	2009	2010
Panel A: Notified Firms			
Revenue (\$000)	1,542 (6,118) [136]	624 (1,260) [120]	592 (1,237) [103]
Costs (\$000)	1,439 (5,398) [129]	583 (1,170) [113]	552.0 (1,153) [96]
Tax liability (\$000)	26 (171) [1]	11 (31.0) [1]	10 (27.6) [1]
Reported revenue – third party revenue (\$000)	-307 (1,741) [-42]	-176 (312) [-64]	-197 (388) [-66]
Observations	3,136	2,221	2,636
Number of firms with invalid email addresses	–	159	163
Panel B: Amending Firms			
Revenue (\$000)	1,402 (4,367) [179]	370 (944) [56]	417 (959) [34]
Costs (\$000)	1,331 (4,172) [163]	352 (887) [62]	397 (923) [33]
Tax liability (\$000)	18 (70) [1]	5 (17) [0]	5 (13) [0]
Reported revenue – third party revenue (\$000)	-217 (806) [-40]	-151 (299) [-55]	-173 (333) [-63]
Observations	596	249	421
Start of notification period	August 11, 2011	March 26, 2012	March 26, 2012
End of notification period	–	April 20, 2012	April 20, 2012

Notes: Group means are reported along with standard deviations in parentheses and medians in brackets. Notified firms are defined as those to whom the SRI sent an email notification (including those for whom the email bounced back). Amending firms are defined as those who filed an amended return in the post-notification window (see text for details). All monetary figures in USD.

Table 3
Treatment Effects and Robustness Tests for Adjusting Firms:
Revenue and Cost Matching

Specification:	Coefficient	(SE)	N	R^2
Panel A: Regressing Revenue Adjustment on Revenue Discrepancy (2009-2010)				
Baseline (Corresponds to Figure 4B)	0.927***	(0.105)	570	0.728
Robustness Tests				
Only firms notified in no more than one round	1.016***	(0.094)	410	0.798
Censoring to revenue discrepancies < \$1,000,000	0.900***	(0.112)	556	0.623
Censoring to revenue discrepancies < \$250,000	0.917***	(0.052)	495	0.657
Including negative revenue adjustments	0.926***	(0.105)	580	0.285
SRI letter measure of baseline \hat{R}	0.932***	(0.098)	571	0.744
Using only unadjusted variation in R_T	1.111***	(0.151)	249	0.811
Panel B: Regressing Cost Adjustment on Revenue Adjustment (2008-2010)				
Baseline (Corresponds to Figure 5)	0.962***	(0.016)	979	0.982
Robustness Tests				
Only firms notified in no more than one round	0.960***	(0.017)	737	0.983
Censoring to revenue adjustments < \$1,000,000	0.975***	(0.029)	960	0.882
Censoring to revenue adjustments < \$250,000	0.897***	(0.042)	886	0.677
Including negative revenue adjustments	0.974***	(0.015)	1,016	0.988
SRI letter measure of baseline \hat{R}	0.942***	(0.022)	1,054	0.962

Notes: Panel A shows linear regressions of revenue adjustments on revenue discrepancies for adjusting firms in 2009 and 2010. Panel B shows linear regressions of cost adjustments on revenue adjustments for adjusting firms in 2008-2010. All monetary figures in USD. Standard errors clustered by firm in parentheses. Level of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4

Treatment Effects on Overall Revenues, Costs, and Tax Liabilities, 2008-2010

	(1)	(2)	(3)
	Revenue	Costs	Tax Liability
Panel A: Amending Firms			
Post	86,203*** (15,346)	80,155*** (15,037)	1,857*** (222)
Constant	871,286*** (7,673)	827,971*** (7,518)	11,237*** (111)
Firm FE	Yes	Yes	Yes
R^2	0.996	0.995	0.996
Observations	2,532	2,532	2,532
Number of firms	1,175	1,175	1,175
Panel B: Notified Firms			
Post	13,653*** (2,363)	12,695*** (2,310)	294*** (35)
Constant	973,367*** (1,181)	908,564*** (1,155)	16,224*** (17)
Firm FE	Yes	Yes	Yes
R^2	0.998	0.998	0.998
Observations	15,986	15,986	15,986
Number of firms	6,532	6,532	6,532

Notes: Dependent variables are in levels. All monetary figures in USD. Standard errors clustered by firm in parentheses. Level of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

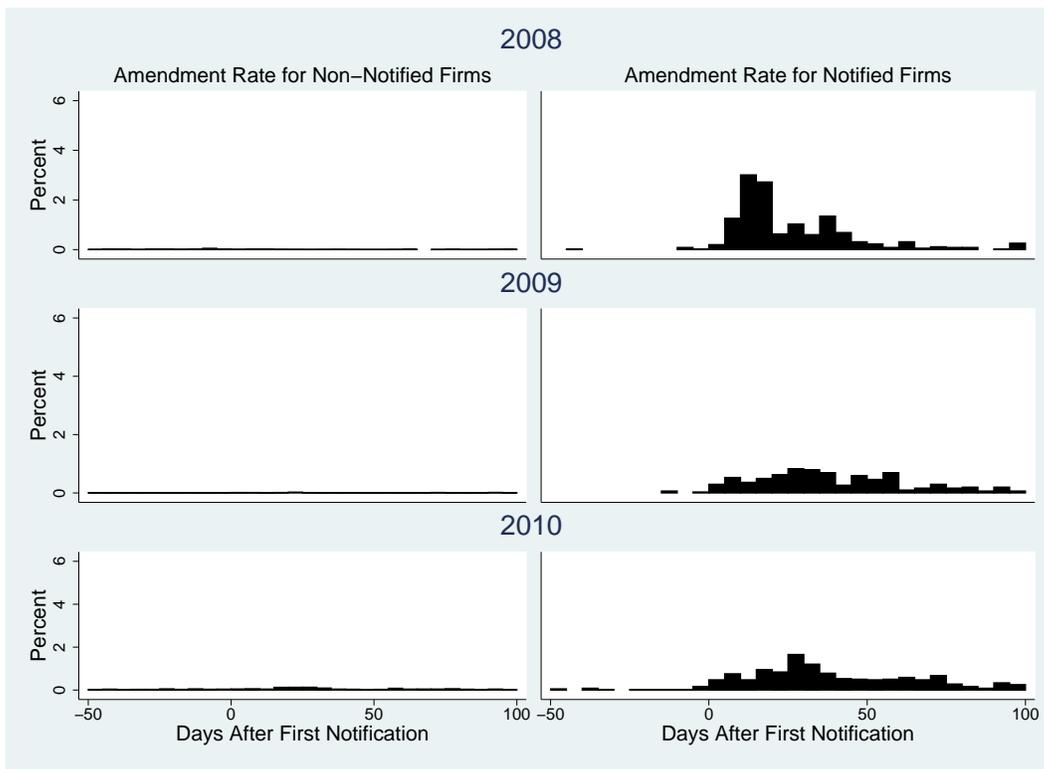
Table 5

Placebo Tests: Simulated Treatment Effects for Non-Notified Firms, 2008-2010

	(1) Revenue	(2) Costs	(3) Tax Liability
Panel A: All Non-Notified firms			
Post	1,820 (1,616)	-1,524 (2,417)	546 (598)
Constant	1,488,306*** (811)	1,393,331*** (1,214)	22,099*** (299)
Firm FE	Yes	Yes	Yes
R^2	0.848	0.836	0.856
Observations	400,128	400,128	401,482
Number of firms	90,264	90,264	90,264
Panel B: Amending Non-Notified Firms			
Post	304,909 (308,155)	-225,026 (461,319)	86,403 (114,806)
Constant	9,535,873*** (158,031)	9,370,717*** (236,578)	36,668*** (58,876)
Firm FE	Yes	Yes	Yes
R^2	1.000	0.999	0.513
Observations	2,611	2,611	2,611
Number of firms	1,230	1,230	1,230

Notes: Linear regressions for non-notified firms, supposing that they would have been notified on the first day of the notification period for each year. Panel A displays all non-notified firms, Panel B non-notified firms that happened to amend during the relevant period. All monetary figures in USD. Standard errors clustered by firm in parentheses. Level of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

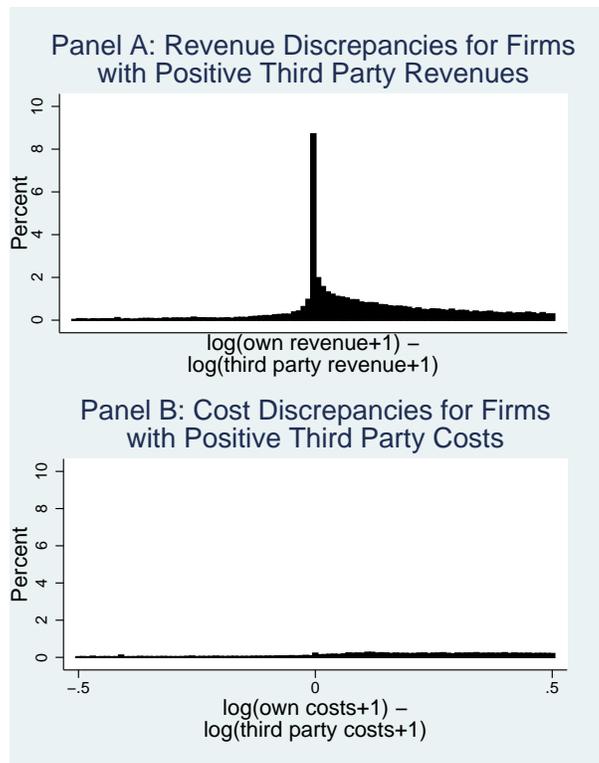
Figure 1
Amendment Rates



Notes: The left Column plots amendment rates for the universe of non-notified firms before and after the start of the intervention. The right Column does the same for notified firms. Start date imputed for 2008 (see text for details).

Figure 2

Revenue and Cost Discrepancies, All Firms with Positive Third Party Information



Notes: Results are shown for the sample of 59,937 active firms for which there are positive third party revenues and the sample of 74,519 active firms for which there are positive third party costs. Both panels show data for 2009-2010, the years for which complete third party information is available. Results are similar if histograms are separated by year. Bins are of size 0.01, and the top and bottom 1% of the sample are omitted when calculating bin heights for computational purposes. 3.8% of reports match revenues exactly; 0.1% match costs exactly.

Figure 3
Revenue Adjustments among Amending Firms

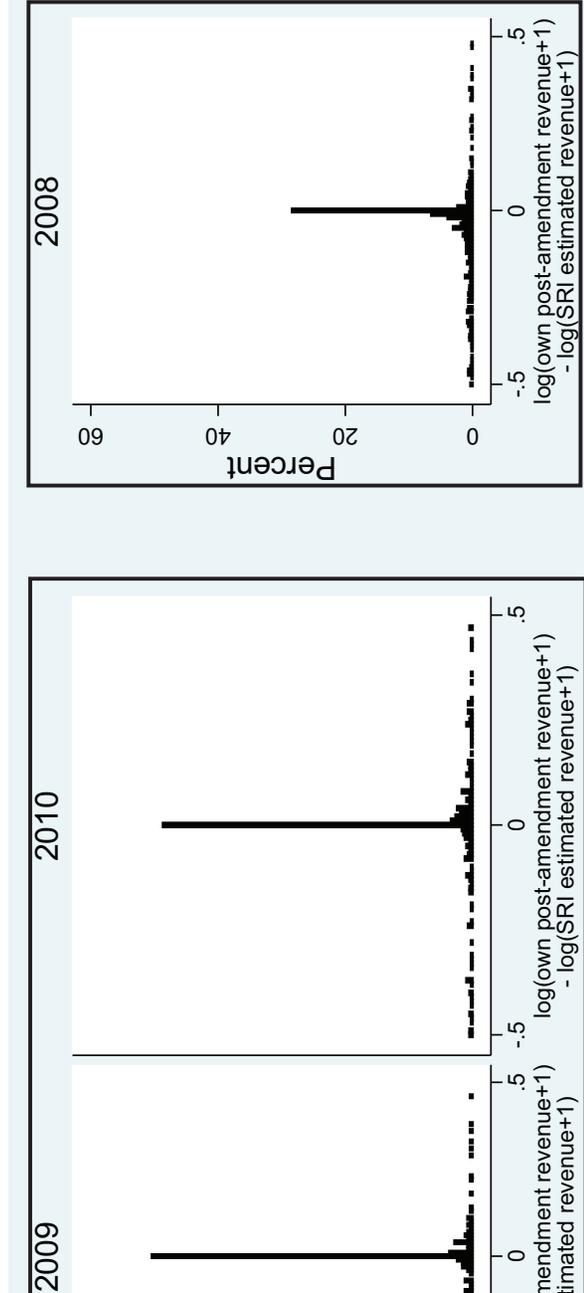
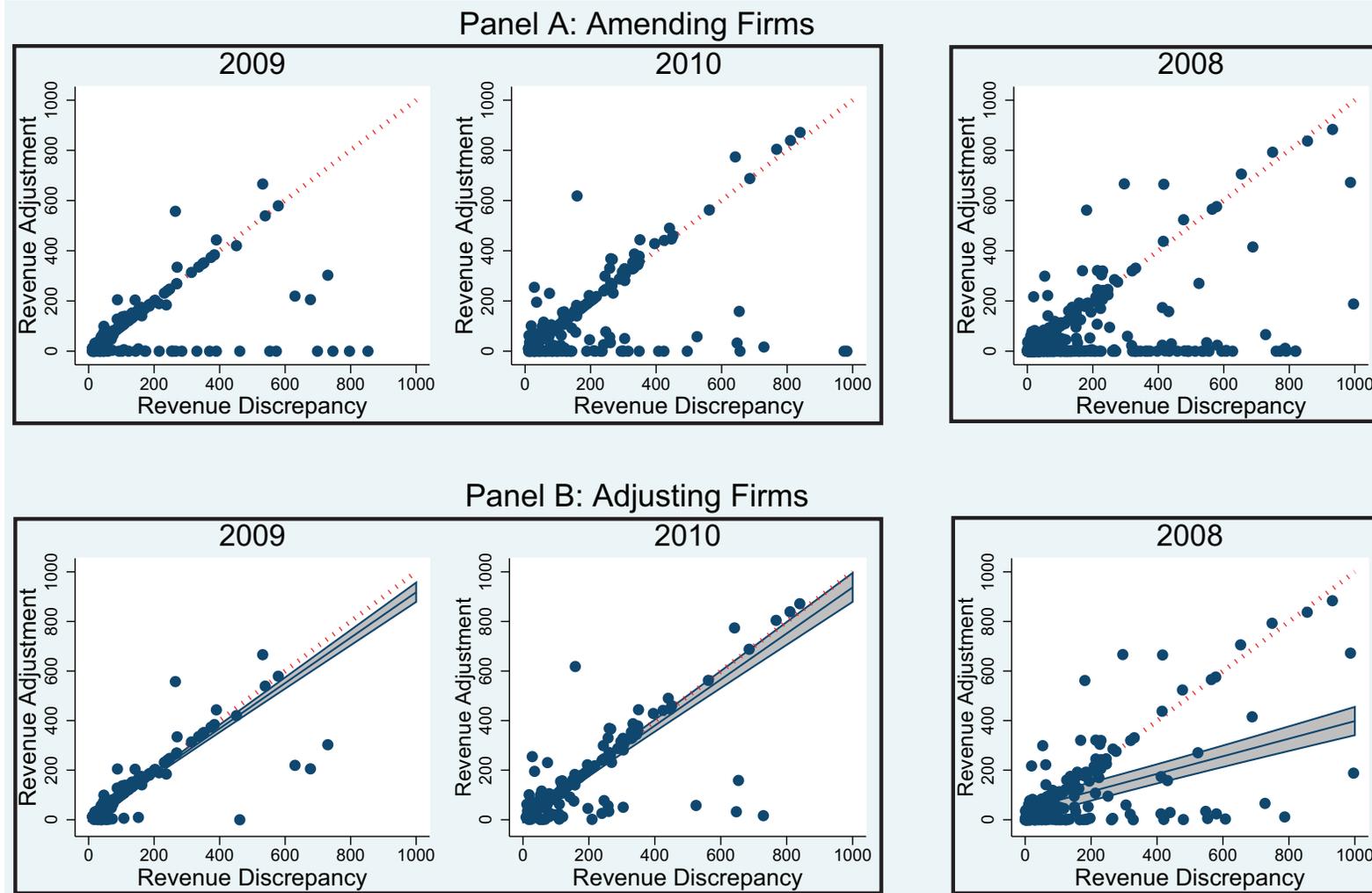
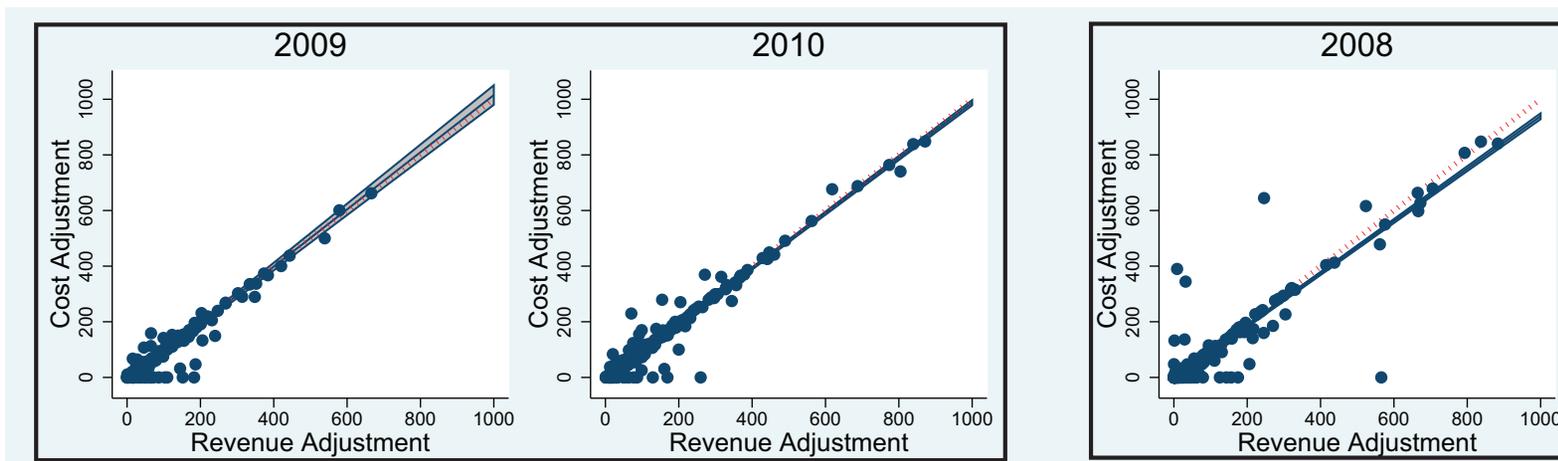


Figure 4
Revenue Matching



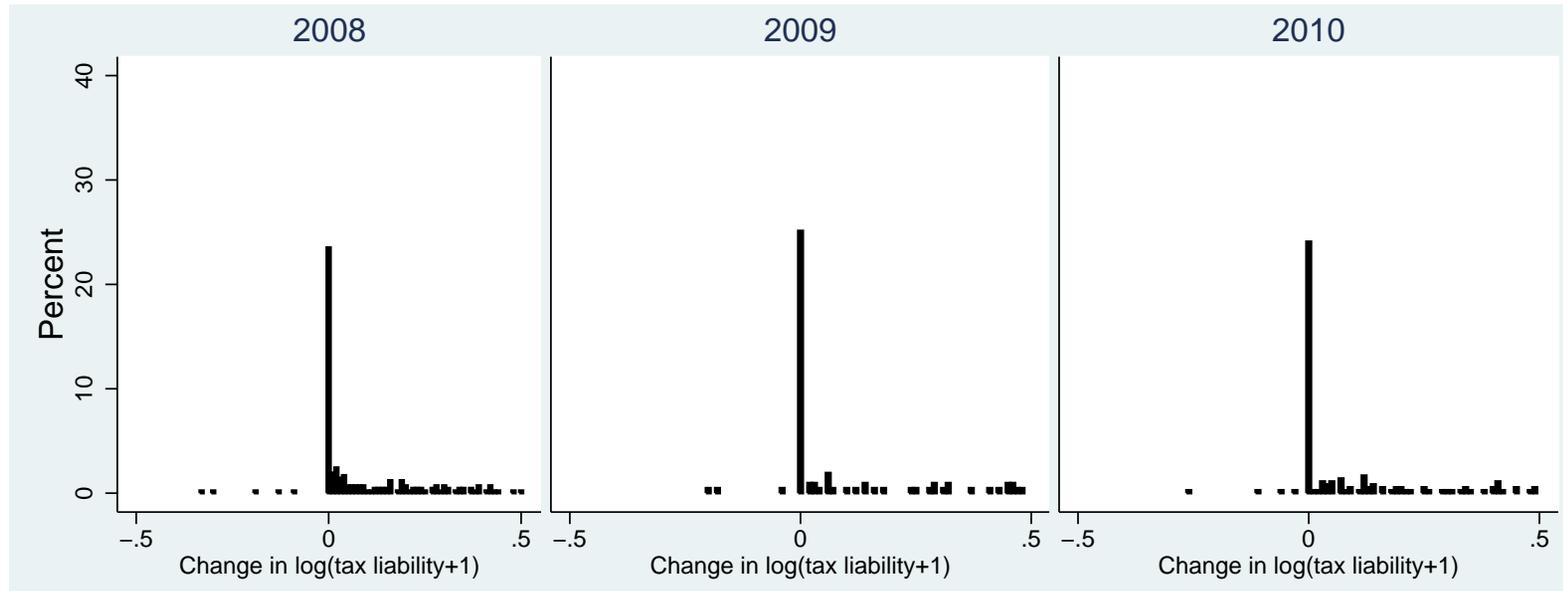
Notes: The dashed line indicates a 45-degree line. Also shown is a fitted line, and a 95% confidence interval for the fitted line. Axes are restricted to show zero to one million, but the fitted line and confidence interval reflect the unrestricted sample. Axes are in thousands of USD.

Figure 5
Cost Matching (Adjusting Firms)



Notes: The dashed line indicates a 45-degree line. Also shown is a fitted line, and a 95% confidence interval for the fitted line. Axes are restricted to show zero to one million but the fitted line and confidence interval reflect the unrestricted sample. Axes are in thousands of USD.

Figure 6
Changes in Taxes Among Adjusting Firms

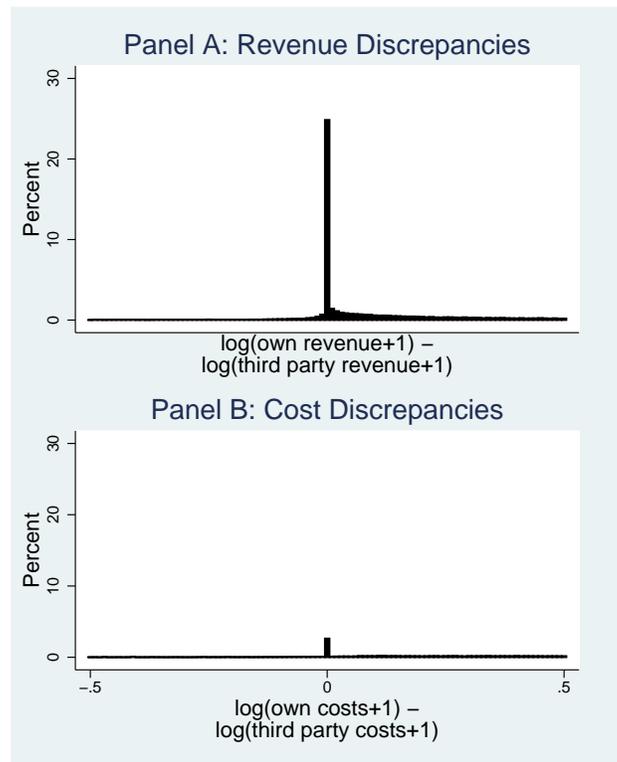


Notes: Histograms of the change in $\log(\text{tax liability} + 1)$ between pre- and post-notification for amending firms that made a positive revenue adjustment. Bins are of size 0.01, and the bottom 1% of the sample is omitted when calculating bin heights for computational reasons.

Appendix

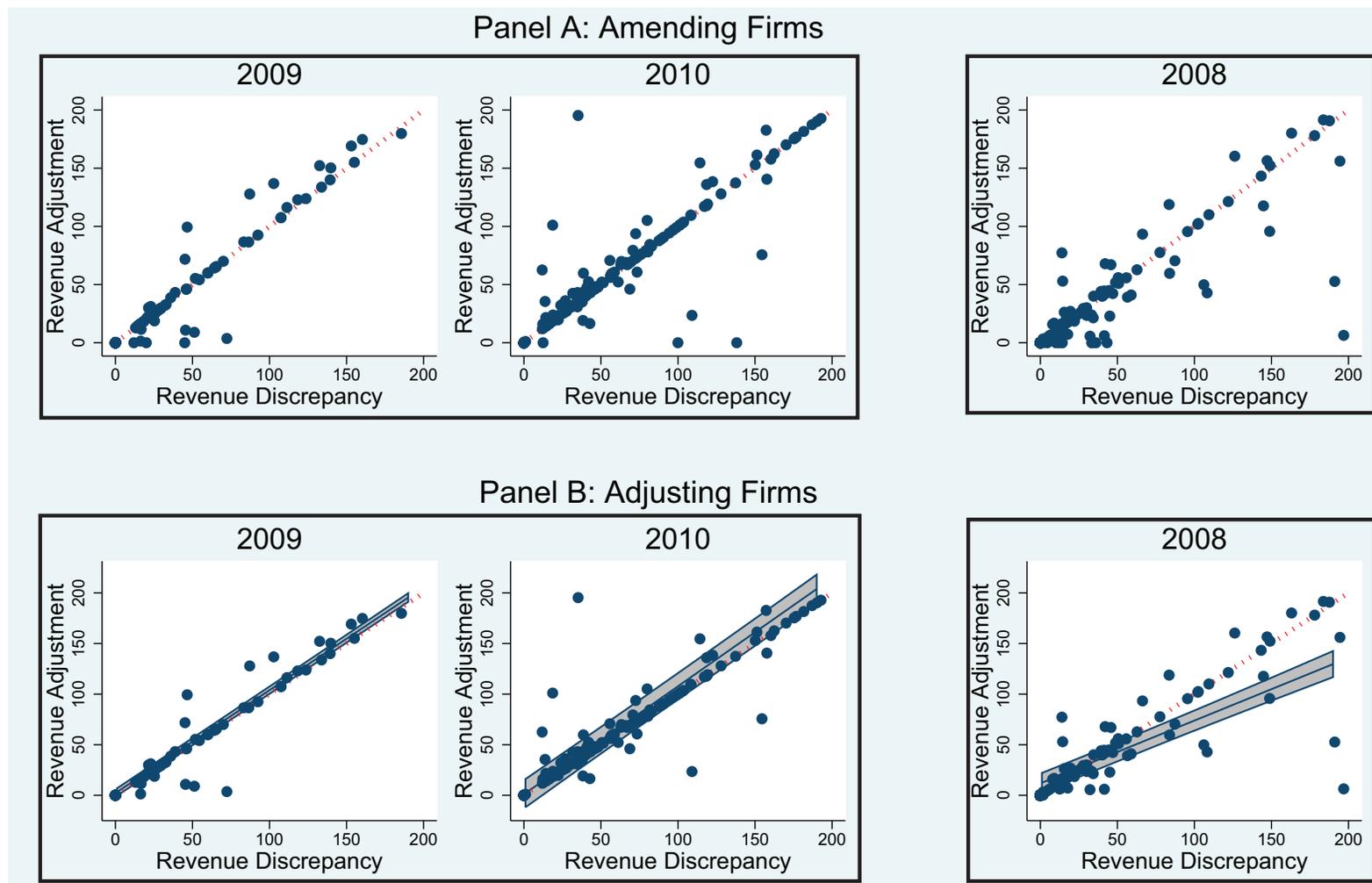
Appendix A1: Additional Figures

Figure A1
Revenue and Cost Discrepancies, All Firms
(Includes Filings with Zero Third Party Reports)



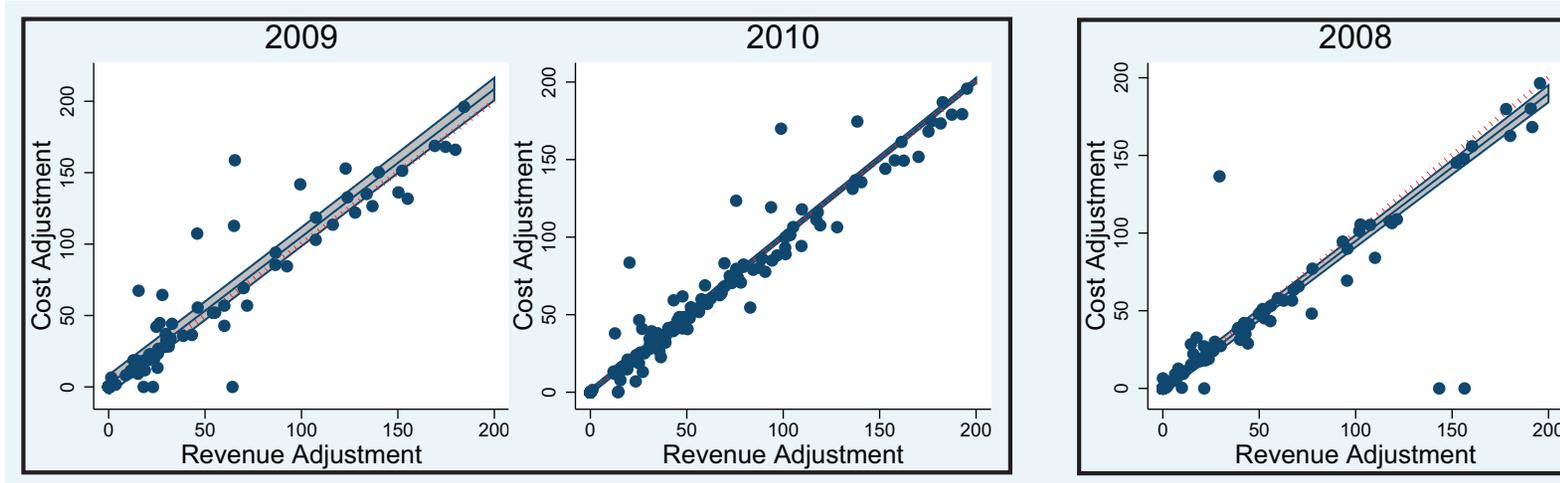
Notes: Results are shown for the entire sample of 82,774 active firms. Both panels show data for 2009-2010, since third party costs are not available for 2008. Results are similar if histograms are separated by year. Bins are of size 0.01, and the top and bottom 1% of the sample are omitted when calculating bin heights for computational reasons. 21.0% of reports match revenues exactly; 2.5% match costs exactly.

Figure A2
Revenue Matching, Scaled by Baseline Reported Revenues



Notes: Variables are scaled by dividing by (pre-notification reported revenue +1). The dashed line indicates a 45-degree line. Also shown is a fitted line, and a 95% confidence interval for the fitted line. Axes are restricted to show zero to 200 thousand, but the fitted line and confidence interval reflect the unrestricted sample. Axes are in thousands of USD.

Figure A3
Cost Matching, Scaled by Baseline Reported Revenues, Adjusting Sample



Notes: Variables are scaled by dividing by (pre-notification reported revenue +1). The dashed line indicates a 45-degree line. Also shown is a fitted line, and a 95% confidence interval for the fitted line. Axes are restricted to show zero to 200 thousand but the fitted line and confidence interval reflect the unrestricted sample. Axes are in thousands of USD.

Appendix A1: Policy Intervention Message: Year 2008

SERVICIO DE RENTAS INTERNAS *DEPARTAMENTO DE GESTIÓN TRIBUTARIA*

Quito, 5 de septiembre del 2011

Señor (a) xxxxxx

Gerente General de xxxxxx

El Art. 67 del Código Tributario y el segundo artículo de la Ley de Creación del Servicio de Rentas Internas otorgan a esta Administración Tributaria la facultad para efectuar la determinación, recaudación y control de los tributos internos del Estado.

Esta Administración Tributaria, luego de revisar las bases de datos con las que cuenta, *ha identificado valores atribuibles a ingresos de la sociedad a la que usted representa superiores al monto registrado en la declaración de impuesto a la renta correspondiente al ejercicio fiscal 2008.*

De conformidad a lo establecido por los artículos 89 del Código Tributario y 101 de la Ley de Régimen Tributario, las declaraciones de impuestos efectuadas por los sujetos pasivos tienen el carácter de definitivas y vinculantes, por lo que hacen responsable al declarante y, en su caso, al contador que firme la declaración, por la exactitud y veracidad de los datos que contenga; sin embargo el sujeto pasivo, a petición expresa del Servicio de Rentas Internas podrá, dentro de los seis años siguientes a la fecha de presentación de la declaración original, rectificar en una declaración sustitutiva, *los rubros requeridos por la Administración Tributaria.*

El Art. 19 de la Ley de Régimen Tributario Interno y el artículo 37 de su reglamento, establecen que todas las sociedades están obligadas a llevar contabilidad y declarar el impuesto en base a los resultados que arroje la misma. Adicionalmente los libros contables tienen que estar debidamente respaldados por los correspondientes comprobantes de venta y demás documentos pertinentes, documentación toda que puede ser requerida en cualquier momento por la Administración Tributaria para fines de control.

En atención a los antecedentes y a las normas legales citadas, esta Administración le

solicita presente la declaración sustitutiva correspondiente al impuesto a la renta del ejercicio fiscal 2008 vía Internet, dentro de los diez (10) días hábiles posteriores a la presente comunicación.

Adicionalmente le recordamos que en la declaración del impuesto a la renta del año 2008, debe registrar el valor del anticipo calculado de impuesto a la renta con cargo al ejercicio fiscal 2009, de conformidad al artículo 41 de la Ley de Régimen Tributario Interno.

A la vez se le informa que de ser el caso, el sujeto pasivo, deberá calcular el impuesto, interés y multa a pagar considerando los pagos previos efectuados, conforme la normativa tributaria vigente respecto a la imputación al pago.

Finalmente, se advierte al sujeto pasivo que la Administración Tributaria se reserva el derecho de verificar oportunamente la información contenida en las declaraciones de impuestos, que en el caso de que el sujeto activo ejerza su facultad determinadora procederá a cobrar un recargo del veinte por ciento (20%) calculado en base al impuesto determinado, y que en caso de comprobar la existencia de actos de ocultación o falsedad, por los que se haya dejado de pagar en todo o en parte los tributos debidos, en provecho propio o de un tercero, tales hechos se considerarán defraudación fiscal, conforme lo señala el artículo 342 del Código Tributario y cuyas sanciones se especifican en el Libro Cuarto del mismo cuerpo legal que se refiere al Ilícito Tributario.

En caso de requerir mayor información sobre la presente comunicación puede acercarse a las oficinas del Departamento de Gestión Tributaria, ubicadas a nivel nacional.

El envío de este correo es automático, por favor no lo responda.

Atentamente,

Servicio de Rentas Internas

Nota: Ahora es más fácil cumplir con sus obligaciones tributarias, utilizando nuestro servicio gratuito de declaraciones y anexos por internet, que le permitirá presentar ágilmente la información. Obtenga su clave de seguridad y el programa en cualquiera de las oficinas del Servicio de Rentas Internas a nivel nacional.

Appendix A3: Policy Intervention Message: Years 2009 - 2010



SERVICIO DE RENTAS INTERNAS
DEPARTAMENTO DE GESTIÓN TRIBUTARIA

Quito, a viernes, 20 de abril de 2012

Señor (a) xx

Representante Legal de xx

El Art. 67 del Código Tributario y el segundo artículo de la Ley de Creación del Servicio de Rentas Internas otorgan a esta Administración Tributaria la facultad para efectuar la determinación, recaudación y control de los tributos internos del Estado.

El Servicio de Rentas Internas, ha realizado el cruce especial de información donde se verifican los valores declarados en el rubro Ventas Gravadas y No Gravadas. Así, luego de revisar las bases de datos con las que cuenta, ha detectado valores atribuibles a la sociedad a la que usted representa, diferentes a los montos registrados en la declaración de impuesto a la renta correspondiente al ejercicio fiscal 20XX, según se puede observar en el siguiente detalle:

Año Fiscal	Casillero de la Declaración de Impuesto a la Renta	Valor calculado por la Administración Tributaria	Valor declarado por el contribuyente
20XX	699 - TOTAL INGRESOS	777.499,10	719.153,50

De conformidad a lo establecido por los artículos 89 del Código Tributario y 101 de la Ley de Régimen Tributario, las declaraciones de impuestos efectuadas por los su-

jetos pasivos tienen el carácter de definitivas y vinculantes, por lo que hacen responsables al declarante y al contador que firmen la declaración, por la exactitud y veracidad de los datos que contenga la misma; sin embargo el sujeto pasivo, a petición expresa del Servicio de Rentas Internas podrá, dentro de los seis años siguientes a la fecha de presentación de la declaración original, rectificar en una declaración sustitutiva, los rubros requeridos por la Administración Tributaria.

El Art. 19 de la Ley de Régimen Tributario Interno y el artículo 37 de su reglamento, establecen que todas las sociedades están obligadas a llevar contabilidad y declarar el impuesto en base a los resultados que arroje la misma. Adicionalmente los libros contables tienen que estar debidamente respaldados por los correspondientes comprobantes de venta y demás documentos pertinentes, documentación toda que puede ser requerida por la Administración Tributaria para fines de control.

En atención a los antecedentes y a las normas legales citadas, esta Administración le apremia a presentar la declaración sustitutiva correspondiente al impuesto a la renta del ejercicio fiscal 20XX vía Internet.

Adicionalmente se le recuerda que en la declaración del impuesto a la renta del año 20XX debe registrar el valor del anticipo calculado de impuesto a la renta con cargo al ejercicio fiscal 20XX, de conformidad al artículo 41 de la Ley de Régimen Tributario Interno.

De ser el caso, el sujeto pasivo deberá calcular el impuesto, interés y multa a pagar, considerando los pagos previos efectuados, conforme la normativa tributaria vigente respecto a la imputación al pago.

Finalmente, se informa al sujeto pasivo que la Administración Tributaria se reserva el derecho de verificar oportunamente la información contenida en las declaraciones de impuestos, y que en el caso de que el sujeto activo ejerza su facultad determinadora procederá cobrar un recargo del veinte por ciento (20%) calculado en base al impuesto determinado; así como también, que en caso de comprobar la existencia de actos de ocultación o falsedad, por los que se haya dejado de pagar en todo o en parte los tributos debidos, en provecho propio o de un tercero, tales hechos se considerarán defraudación fiscal, conforme lo señala el artículo 342 del Código Tributario y cuyas sanciones se especifican en el Libro Cuarto del mismo cuerpo legal que se refiere al Ilícito Tributario.

La asesora que se requiera para el cumplimiento de obligaciones tributarias, la puede obtener en todas las oficinas del Servicio de Rentas Internas a nivel nacional o a través de nuestra página web (www.sri.gob.ec).

Atentamente,

Servicio de Rentas Internas

