Less is More? Limits to Itemized Deductions and Tax Evasion*

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Abstract

Compliance with taxes, and other regulations, are based partly upon fear of audit; this fear is more effective when conditions triggering an audit are unknown to the taxpayer. In this paper, I show that imposition of an itemizing requirement can be interpreted by taxpayers to mean that returns claiming deductions lower than the itemizing threshold are less likely to be audited. The rational response by taxpayers is to increase their claimed deductions, potentially leading to overall loss of revenue. Thresholds for reporting requirements (in taxation or other regulatory settings) must be chosen carefully, to avoid unintended consequences.

JEL Codes: H24, H26, D83;

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1 Introduction

In several regulatory settings, individuals have to choose whether to comply with or to violate the law; in the case of taxes whether to truthfully report or to evade in the expectation of not being detected. It is well-documented that announcing increased enforcement during a particular time (or on a particular group) is less effective than random enforcement, because it decreases compliance during other times (or by other groups). This decreased compliance is the result of changes in the perceived probability of detection (Alm and McKee, 2006; Dai, Galeotti, and Villeval, 2017; Makofske, 2019; He, Wang, and Zhang, 2020; Makofske, 2021; Eeckhout, Persico, and Todd, 2010). I show evidence that other policies (which are not designed to change monitoring strategies) can be interpreted as monitoring announcements, and could have similar effects on compliance by creating a group of individuals who infer that their behavior is not of interest to the regulator. In particular, I explore how requiring that deductions be itemized for one particular group of taxpayers can backfire, and generate decreased compliance by the taxpayers who have not been required to supply additional information. Deductions for personal expenses are a common feature of income tax. Some countries have a standard deduction, others allow taxpayers to report the actual amount of their deductions, and others have a combination of both. Usually, there is an itemizing requirement for larger deductions for which taxpayers must provide extra information to the tax authority. Most itemizing requirements have embedded thresholds that feature discontinuities. These itemizing thresholds have two well-established intended roles. First, the filing requirement creates a non-monetary hassle cost for receiving the tax benefit, analogous to an ordeal. Second, itemizing deductions make the taxpayer responsible for proving the legality of the deduction and providing the tax authority with additional information to verify the tax benefit. These roles have been analyzed using the discontinuity that the threshold creates on the indirect cost of taking the deduction, and the consensus is that the hassle cost lowers deductions (Wenzel and Taylor, 2004; Serocki and Murphy, 2015; Fack and Landais, 2016; Benzarti, 2017; Gillitzer and Skov,

2018; Tazhitdinova, 2018). This is because the discontinuity creates a group of taxpayers who would be better off taking a lower deduction rather than itemizing their deductions and receiving a larger tax benefit; these taxpayers will decrease their deductions.

In this paper, I show that an itemizing threshold conveys information to the taxpayer about the tax authority's monitoring preferences. Taxpayers can interpret the *itemizing* threshold as equivalent to an *auditing* threshold, and infer that claiming a larger deduction does not meaningfully increase their probability of being audited, as long as it is less than the itemizing threshold. As a result, the itemizing threshold has an unintended role in changing the risk perception of the taxpayers, which can lead to the unintended consequence of an increase in claimed deductions (and thus decrease in tax revenue). I use a simple conceptual framework to illustrate this point, in which I make the monitoring probability endogenous to the reported deduction.

In brief, taxpayers know that some amount of claimed deduction would be high enough to draw scrutiny, but not have any clear sense of what that amount might be. The introduction of the itemizing requirement decreases the uncertainty regarding the value that this auditing threshold can take (specifically, they believe that below the itemizing threshold, the probability of an audit is extremely small, and that the probability rises significantly with claimed deductions greater than the itemizing threshold). Upon the introduction of the itemizing requirement, taxpayers make the conjecture that the itemizing threshold is the revealed preference of the tax authority for auditing (regardless of whether or not that's actually true). This "conjecture response" potentially affects all taxpayers, not only the taxpayers for whom the itemizing rule is binding, because it affects their perceived monitoring probability. Taxpayers may update their beliefs regarding the auditing threshold location *either* upwards or downwards, increasing or decreasing their reported deductions because of this conjecture. The introduction of an itemizing requirement divides taxpayers into two groups: the taxpayers who have made a deduction above a threshold, and the ones who have made a deduction below. The hassle cost only affects the former group. The overall effect on declared deductions and

reported tax liability is uncertain when both mechanisms are in place.

To test if the conjecture response exists, in which case the threshold creates a discontinuity in the perceived auditing probability, I analyze the introduction of an itemizing requirement for taxpayers with personal-expense deductions higher than $7,500 in Ecuador for the fiscal year 2008. For that year, Ecuadorians could deduct up to $10,250 of their expenses on health care, food, clothing, housing, and education from their taxable income. The only cost for taking the deduction was a minor record-keeping cost (people were required to keep the receipts from their purchases in case the tax authority would like to check them in the future as part of an audit process). In Ecuador, the fiscal year coincides with the calendar year, and taxpayers are required to submit their tax returns by the end of March of the following year. For the fiscal year 2008, all taxpayers had declared their income tax by April 2009. In June 2009, the tax authority retroactively required itemization for people who had made a deduction over $7,500. The tax itself remained unchanged; only the reporting rules on deductions were affected.

The retroactive nature of this policy change provides a unique opportunity to study changes in reporting behavior, independent of any changes in real economic activity. I take advantage of the fact that all tax returns are timestamped and estimate the effect of the reform by comparing the original income tax return filed before June 1st (the day when the reform was made public) and the amended tax return filed after June 1st. I focus my analysis on employees because their employers report their income and payroll tax deduction, so the deduction for personal expenses is the only adjustable margin that is not third-party reported in their tax returns. I analyze the behavior of 61,239 employees who filed an income tax return both before and after the reform. They are equivalent to 3.6% of total employees, or 16.51% of employees who had income large enough to pay taxes.

I complement this identification strategy with a difference in difference estimation using the original and amended returns in two different tax years. The announcement of the threshold is analogous to an information treatment. Individuals choose their reporting

strategy for filling out the original tax form, receive the information treatment, update their strategy and report an amended form. There might exist other reasons besides the information treatment to update the tax form. In particular, taxpayers might have reported an incomplete tax form to avoid late fees and plan to amend the form. Therefore, I construct a control group for the information treatment looking at the amended and original forms of a different fiscal year. Unfortunately, I cannot use a fiscal year previous to 2008 because the itemized deductions were introduced on the tax code at the end of 2007. However, since the treatment is not the deduction but the change in the itemizing rule, I can construct my control groups with taxpayers who amended their income tax reform in a later fiscal year. For this paper I use all taxpayers who submitted their 2009 income tax return by June 1st, 2010 and amended the form afterward.

The taxpayers who made a deduction greater than the itemizing threshold on their original tax return of 2008 are affected by both the conjecture response and the hassle cost. These taxpayers might decrease their deductions either because they have updated their beliefs about the auditing threshold downwards or because the tax savings from reporting their total deductions are not large enough to compensate for the filing cost. I observe that these taxpayers decreased their reported deductions by an average of $2,497. Under the conventional wisdom, taxpayers whose claimed deduction was below the itemizing threshold would have no incentive to change their deduction amount after the reform was announced. What I observe is that these taxpayers increased their deductions on average by $1,543, and lowered their reported tax liability an average of $160. Prior to the reform, they took a deduction equivalent to 23 cents of each dollar of taxable income before deductions; after the reform, they took 68 cents. The increase of the reported deductions of this group of taxpayers is evidence that the conjecture response dramatically alters the perceived audit probability. The number of taxpayers who increased their deduction was far greater than the number who lowered their claimed deduction. The overall effect of the introduction of the itemizing requirement was a net loss of $3.5 million dollars of reported tax liability.

This paper contributes most directly to the literature on how taxpayers respond to more burdensome tax reporting requirements. Prior work has found evidence that stronger reporting rules reduce reported deductions and increase tax liability (Wenzel and Taylor, 2004; Serocki and Murphy, 2015; Fack and Landais, 2016; Tazhitdinova, 2018; Gillitzer and Skov, 2018). I present evidence, with a conceptual model and unique natural experiment in Ecuador, that deduction thresholds can have unintended consequences by revealing information about tax auditing procedures. In my setting, the introduction of an itemizing threshold *increased* aggregate reported deductions and *lowered* aggregate tax liability. Consequently, my results imply that tax authorities must be cautious when implementing this type of policy. More broadly, regulators need to be aware that some strategies, such as collecting information only from one group, can be interpreted as low monitoring by the non-targeted group.

The rest of the paper is organized as follows. Section 2 presents a literature review. Section 3 presents the conceptual framework. Section 4 presents an overview of the background and policy interventions I analyze. Section 5 lays out the identification strategy and 6 presents the results. Section 7 concludes.

2 Literature Review

Income tax is calculated based on taxable income; that is, income less deductions. In principle, taxpayers manipulate their taxable income until the marginal cost of decreasing the taxable income by one dollar is equal to the marginal tax rate. Taxpayers have two ways to manipulate the taxable income: underreporting income or overstating deductions. If those mechanisms were equivalent, the taxpayers would be indifferent between them. However, this does not seem to be the case (Doerrenberg, Peichl, and Siegloch, 2017; Hamilton, 2017). Over time, the underreporting of income has lost importance as an evasion mechanism due to the spread of third-party reporting information (e.g. Kleven et al., 2011, or see Slemrod, 2016 for a recent literature review).

The literature about deductions has explored how changes in the rules about deduc-

tions affect the taxable income elasticity, and how stronger reporting rules can generate a decrease in reported deductions. Two mechanisms explain that decrease. First, as the tax authority requires more information from taxpayers, the sheltering cost to overstate a deduction increases. Second, there is an indirect cost of reporting more information borne by the taxpayer: record-keeping and reporting costs. I build on this body of literature and explore how changes in the reporting rules can affect the taxpayers' perceptions about the tax authority's monitoring preferences. I demonstrate that stringent regulations can have an unintended informational role and can actually generate an increase in reported deductions due to this conjecture response.

It has previously been documented that reported deductions decrease when the tax authority adds new requirements to take a deduction, or requests more information from the taxpayers. One mechanism that contributes to this observation is how the cost to overstate a deduction increases. Wenzel and Taylor (2004) find that deductions decrease significantly for Australian taxpayers who have to send in their tax returns with itemized deductions from rental property income compared to those who do not. In their experiment, taxpayers received rental property schedules to itemize their deductions; some taxpayers had to return the tax forms, and some did not. Serocki and Murphy (2015) analyzes the change in the reporting rule for non-cash donations in the United States. Since 1985, the IRS has required a qualified appraisal for donations larger than $5,000. They find an increased post-reform in the percentage of taxpayers claiming non-cash contributions just under the $5,001 threshold, arguably to avoid the more rigorous appraisal requirement. As part of the same reform, the IRS stopped requiring non-cash donations lower than $500 to be described. Tazhitdinova (2018) finds that lifting the requirement generated an increase of reported donations. A second mechanism is an increase in the indirect cost of reporting the deduction or hassle cost. A compelling case is the donation deduction in some European countries. While France imposes the hassle cost on the taxpayer, Denmark levies it on the receiving charities. In France before 1983, people were able to claim charitable contributions freely, whereas after that year,

a receipt from the organization that received the donation needed to be included in the tax filing in order to make the deduction. The reform led to a drop in the number of donations reported (Fack and Landais, 2016). In Denmark, the tax authority has required charities to report contributions by each donor since 2008. The taxpayers receive pre-populated individual tax returns. After the reform, the number of claims increased due to the lower compliance costs, which implies that before the reform, taxpayers were forgoing tax savings to avoid the hassle cost (Gillitzer and Skov, 2018). Benzarti (2017) compares the standard deduction and the itemized deduction. He observes a missing mass in the density of deductions immediately to the right of the standard deduction threshold. He uses the tax change of 1988, when the standard deduction increased from $6,130 to $8,809, to estimate a counterfactual distribution and calculate the indirect cost of itemizing and finds that taxpayers are willing to pay on average $644 extra in taxes to avoid itemizing their deductions.

In summary, deductions are a significant margin for tax non-compliance. In general, additional requirements to take a deduction can potentially decrease the reported deductions due to changes in the cost of sheltering income through deductions or hassle cost of the reporting. In this paper, I show that the information requirements–in particular, the introduction of a threshold for itemizing deductions–can play the unintended role of affecting the taxpayers' perceptions about monitoring from the tax authority. Through that mechanism, some taxpayers increase their deductions when the reporting rules become stringent.

This insight can be relevant to a broader literature. In any relationship where one agent is monitoring another, and there is room for cheating, policies that alter the monitored agent's perception of the enforcement probability can alter their behavior in a way such that unintended consequences can arise. For instance, pre-announced periods of high-monitoring "crackdowns" have shown increased compliance while the crackdown is in place and decreases otherwise. Examples of this behavior are can be found over the literature in monitoring of public transit payments (Dai, Galeotti, and Villeval, 2017),

sanitary inspections in restaurants (Makofske, 2019; Makofske, 2021), traffic violations (Eeckhout, Persico, and Todd, 2010) and pollution monitoring (Makofske, 2021). It is possible that in these other contexts, regulators may introduce policy instruments that inadvertently signal enhanced monitoring for a particular group (and by implication, reduced monitoring for the rest).

3 Conceptual Framework

In this section, I present a straightforward theoretical model that allows me to illustrate how the introduction of an itemizing rule based on a threshold can affect reported deductions. For ease of exposition, I initially ignore the effect of the hassle cost, and focus on the interaction of evasion and uncertainty. First, I explain what the taxpayer would do when uncertain about the probability being audited. Next, I explain the rational response a taxpayer would take when the uncertainty is reduced. Finally, I include the effect of hassle cost.

3.1 Model of Evasion

I use a version of the Allingham and Sandmo model with a risk-neutral taxpayer to illustrate the effect of the conjecture response on reported deductions. I assume a linear tax (t) levied on taxable income (z), that is, income less deductions ($z = y - d$). The only choice variable for an employee is the deduction (d). The reported deduction has two components: the deduction that the taxpayer can legally claim $\hat{d}$ (i.e. the taxpayer has the required paperwork for the goods and services she is claiming) and the false claims e (i.e. evasion). This distinction is important because if the tax authority audits the taxpayer, the fine will be proportional to the tax on the false claims. I model the perceived detection probability as a function of the reported deduction $p(d)$. This is similar to how Kleven et al. (2011) model endogenous audit probability as a function of reported income. The penalty for evading is proportional to the evaded tax and is given by $\theta > 1$. The risk-neutral taxpayer chooses the level of evasion e to maximize

the expected net-of-tax income:

$$\mathbb{E}(U) = \underbrace{[1-p(d)]\left[(y-\hat{d})(1-t)+et\right]}_{\substack{\text{Expected return}\\ \text{of not being audited}}} + \underbrace{p(d)\left[(y-\hat{d})(1-t)-e\theta t\right]}_{\substack{\text{Expected return}\\ \text{of being audited}}} \tag{1}$$

Note that the probability of detection is a function of the total deduction because the tax authority cannot differentiate between the legal and illegal claims $\hat{d}$ and e. However, the taxpayer can make that distinction, so the deduction is equal to the legal claim and evasion ($d = \hat{d} + e$), and $(y - \hat{d})$ can be written as $\bar{y}$. The corresponding first-order condition after some manipulation is:

$$p(d)(1+\theta) + \tfrac{\partial p(d)}{\partial d} e(1+\theta) = 1 \tag{2}$$

The left-hand side of Equation 2 represents the marginal cost for an extra falsely claimed dollar of deduction, and the right-hand side is the marginal benefit. Notice that the change in the probability of being audited depends on the reported deduction (legal and illegal claims), it does not depend only on evasion (illegal claims). The first-order condition can be written as a function of the elasticity of detection probability with respect to the reported deduction $\eta_{p,d} = \frac{\partial p(d)}{\partial d}\frac{d}{p(d)}$.

$$\left[1 + \eta_{p,d} - \tfrac{\hat{d}}{p(d)}\tfrac{\partial p(d)}{\partial d}\right](1+\theta)p(d) = 1 \tag{2a}$$

Notice that if the probability of detection is exogenous, the change in the probability with respect to the reported deduction would be zero ($\frac{\partial p(d)}{\partial d} = 0$), so both the elasticity and $\frac{\hat{d}}{p(d)}\frac{\partial p(d)}{\partial d}$ would be zero. The marginal benefit of evading an extra dollar would be equal to the expected penalty $p(1+\theta)$. Since the probability is endogenous to the reported deduction, the expected penalty has two extra components. The first one is the elasticity of detection with respect to the reported deduction $\eta_{p,d}$, which captures

how the probability of detection changes as the reported deduction changes. The second one captures the trade-off that the taxpayer faces between the legal claims she can make and evasion ($-\frac{\hat{d}}{p(d)}\frac{\partial p(d)}{\partial d}$), because the probability of detection is a function of the total reported deduction. Therefore, for a given level of total deduction, a taxpayer with a larger legal claim will choose a lower evasion level.

3.1.1 Prior to the itemizing requirement

I propose a particular structure for the probability of detection. The taxpayer believes that there is a level of deduction (i.e., auditing threshold) that will invite attention from the tax authority, and if the declared deduction is lower (higher) than this threshold, the probability will be low (high), but the taxpayer is uncertain about the precise location of that threshold. This is effectively a compound lottery, and the equivalent reduced lottery corresponds to a steady increase of audit probability as the deduction increases, with considerable breadth due to the taxpayer's uncertainty.

It is easiest to analyze this scenario in the space for income and deductions[1], as shown in Figure 1. First note the "zero-tax line", which runs at a 45° angle, along which the deduction is equal to the income. Taxpayers in Region A, which lies below this line, pay no tax at all. This region should contain only honest taxpayers (those with receipts to justify their claimed deduction), since evaders gain no additional benefit from being in this region, but may experience an additional risk of audit.

A taxpayer in Region B believes that her income is lower than the auditing threshold. If she chooses a deduction lower than or equal to the auditing threshold, the tax authority will not verify her deductions, so the payoff will be equal to her income less the tax. The tax is calculated over the reported income less the reported deduction, so $U = y - (y - d)t$. Her incentive is to take a deduction equal to her income ($d = y$), moving to the zero-tax line, where her tax liability will be zero ($T = 0$), for example income y_1 in Figure 1. This puts her on the boundary line between Region B and Region

[1] I analyze the most important cases here, but see Appendix A.2.1 for an exhaustive description of the solution of the model.

A. In principle she may claim a larger amount, putting her in Region A, but gains no benefit to doing so (an honest taxpayer might report an amount in this region, but an evader would not claim an amount greater than her income if she has any uncertainty about the precise location of the audit threshold).

Regions C and D consist of taxpayers who believe that their income is greater than the auditing threshold. When the income is larger than the threshold $y \geq h^A$, a taxpayer may make a claim larger than the threshold, putting herself in Region D. But the taxpayer knows that doing so means she is much more likely to be audited, so she will not evade ($e = 0$) because of the penalty ($et\theta$), and her declared deduction will be equal to the legal claim $d = \hat{d}$. Thus Region D consists primarily honest taxpayers who can prove their deductions are valid. Evaders do not wish to be in this region, since their evasion is likely to be discovered. Instead, a taxpayer who is evading will choose the deduction equal to the threshold $d = h^A$ (Region C), for example incomes y_2 and y_3 in Figure 1.

3.1.2 Conjectured response after the reform

The difficulty for the evading taxpayer is that her return is subject to "Schrödinger's audit": it might be audited, or it might not be, and she can't be certain which region she is in. This is an analogy to the famous thought experiment, in which a cat is sealed in a box along with a mechanism which may or may not kill the cat. The cat's status (alive or dead) is indeterminate until the experimenter opens the box. When the taxpayer submitted her return, the status (audited or not) was indeterminate, until the reform announcement. This effectively "opened the box" and revealed which quadrant her return was in. An evading taxpayer will try to move as far to the right as she dares, by claiming either the smaller of 1) her income, or 2) her guess about the auditing threshold. But if the taxpayer is wrong about the location of the auditing threshold, she might imagine herself to be in Region B or C, even though she is actually in Region

D.

The introduction of the itemizing rule causes taxpayers to update their beliefs about the location of the auditing threshold. In the most extreme case, all taxpayers would update their beliefs such that h^A in the model would now coincide with the itemizing threshold. While prior to the reform each taxpayer had considerable uncertainty about what would trigger an audit, following the announcement she has a new conjecture about which region her return is in, and she will respond accordingly.

A taxpayer whose original belief was that the threshold was greater than h^I will discover that she is in Region D, and she will decrease her deduction (see Figure 2 left panel). She might reduce it merely to the threshold boundary, but realizing that she may have already been flagged for audit, she might reduce her claim down to the legal claim (i.e. what she can clearly show with receipts).

Consider the alternate case, where the new threshold is larger than the original belief of the taxpayer ($h^I > h^A$): this taxpayer will initially make a deduction equal to h^A to avoid scrutiny from the tax authority. If she conjectures that the threshold is larger than she originally thought, she will increase her deduction based on the new threshold h^I (see Figure 2 right panel). Her new deduction will now be be the smaller of either zero-tax line (if she learned that she was in Region B) or h^I (if she learned that she was in Region C).

3.2 Model with Evasion and Hassle Cost

Finally, I combine the effects of both the hassle cost and the conjecture response into a single model. To illustrate the combined effect on the reported deductions, I make some simplifying assumptions. First, I consider a step function for the probability. The taxpayer believes that if her deduction is lower than the auditing threshold, the probability is zero, and if it is larger than the threshold, the probability will be one, as in Equation 3. Second, I assume that if the tax authority verifies the deduction, it will detect evasion (since the taxpayer won't have receipts to justify the deduction). The

notation is the same: y is income, d is the reported deduction, $\hat{d}$ is the legal claim, e is evasion, t is the tax rate, and the penalty is a fine of $\theta > 1$ times the evaded tax.

$$p(d,h) = \begin{cases} 0 & if \quad \hat{d} + e \leq h^A \\ 1 & if \quad \hat{d} + e > h^A \end{cases} \tag{3}$$

In this simplified scenario, when the taxpayer reports her deduction, she is choosing the realization of the world in which the tax authority will verify her deduction or not. Her objective remains to maximize her after-tax income.

Second, taking a deduction larger than the itemizing threshold has a filing cost c.[2] When taking the deduction has a cost c, there are two rationales for adjusting the deductions: the possibility of the government detecting false claims, and the hassle cost of filling out the itemizing form. The amount of evasion (e) depends on the relationship among the income (y), the legal claim of deduction the individual can make ($\hat{d}$), the threshold for itemized deductions (h^I), and the original auditing threshold the taxpayer had in mind before the reform (h^A). Now that the auditing threshold coincides with the itemizing threshold, the probability function becomes:

$$p(d,h) = \begin{cases} 0 & if \quad \hat{d} + e \leq h^I \\ 1 & if \quad \hat{d} + e > h^I \end{cases} \tag{4}$$

As before, the taxpayer chooses a scenario in which the tax authority will verify her deductions, or a scenario in which it will not, by choosing a deduction smaller than or larger than h^I. Her objective remains to maximize her after-tax income. If she chooses a deduction lower than or equal to the threshold h^I, the tax authority will not verify her deductions, and her payoff will be equal to her income less the tax calculated over the income without the reported deduction, $U = y - (yd)t$. If she chooses a deduction larger than the threshold, the tax authority will detect evasion with certainty, so she will declare only her legal claims as deduction (so $e = 0$, $d = \hat{d}$), and then she will have

[2]There is also a record-keeping cost that does not change and is normalized to zero.

to itemize her deductions. So her payoff will be her income less the tax calculated over the difference between her income and her legal claims, less the hassle cost of itemizing, $U = y - (y - \hat{d})t - c$.

Finally, there is a group of taxpayers who could legally make a deduction larger than h^I, but face the cost c of itemizing their deductions. These taxpayers will itemize their deductions as long as their savings from reporting their legal claim is larger than the cost of itemizing the deduction, $c < (\hat{d} - h^I)t$. (See Appendix A.2.2 for an exhaustive description of the solution of the model.)

The introduction of the itemizing rule has an undetermined effect on the distribution of deductions. Some taxpayers will increase their deductions because they have updated their beliefs about the monitoring preferences of the tax authority upwards. These taxpayers increase their deductions in order to make their taxes zero as long as this deduction is lower than the itemizing threshold; otherwise, they will make a deduction equal to the threshold. As a result, an excess mass around the threshold appears. Second, the taxpayers who update their beliefs downwards will decrease their deduction for one of two reasons: either because they were making a false claim before and have updated their beliefs about the auditing threshold downwards (thus resulting in a decrease of evasion), or because the savings from making the extra deduction are lower than the cost of itemizing it. The taxpayers who decrease their deductions could do so either to the level of deductions they can legally claim (for those paying the hassle cost) or to the auditing threshold. Due to the filing cost, an excess mass will also appear at the threshold from the taxpayers who are in the dominated region created by the filing cost.

4 Background and Policy Intervention

My empirical setting is a change in the reporting rule for deductions of personal expenses for the income tax in Ecuador in 2008. Ecuador has a progressive income tax with nine tax brackets and marginal tax rates from 0% to 35%. For the fiscal year 2008,

everyone who had an income less than \$7,850[3] was in the first tax bracket and paid zero tax. The taxable income for employees is wage less the payroll tax (a flat rate of 9%) and less deductions. All taxpayers are entitled to a deduction for consumption in the categories of education, clothing, health care, housing, and food.[4] Before the reform, the deduction based on consumption was up to \$10,205 for 2008, and there was no filing requirement, only the record-keeping cost of saving the invoices of the purchases in case of a future audit.

The tax year runs from January 1st to December 31st of each calendar year. Employers must withhold taxes from their employees as well as fill out a tax return in their name in February of the following year. People who worked for only one employer and whose withholdings cover their taxes do not have to fill out an extra tax return unless they are asking for a refund. Everyone who does not fall into the previous category (i.e., those who have several sources of income, worked for more than one employer, or are asking for a refund) must fill out a tax return in March of the following year. Taxpayers can amend their tax returns as many times as needed. Refunds of excess withholdings are not made automatically; taxpayers have to ask for a refund formally. As part of the process of requesting a refund and just before submitting the request, the taxpayer receives an automatic notification that explicitly states the tax authority will scrutinize the tax form closely before issuing a refund. This threat is intended to prevent taxpayers from overstating their deductions to request a refund.

In June 2009, the tax administration started requiring all taxpayers who had made a deduction larger than \$7,500 fill out an extra tax form for all years in the future and retroactively for 2008. This additional tax form required taxpayers to itemize their consumption for the total of their deduction (Figure 3 describes the timeline of the reform). The tax authority issued a decree creating the itemizing form, but no change in the deductions rules was made. Neither the itemizing form nor the decree provided

[3]Ecuador has used the United States dollar as currency since 2000.

[4]Seniors and disabled people are allowed additional flat deductions, which I subtract along with the payroll tax

extra information about the items that could be deducted [5]. In practical terms, taxpayers who made a deduction larger than $7,500 had to cover two costs: the same record-keeping cost as all taxpayers who take a deduction and a hassle cost. The only change implemented by the reform was the creation of the itemizing form.

The creation of the itemizing form was well publicized, as can be seen in the Google trends for that year (Figure A4). To the best of my knowledge and according to conversations with tax authority employees, the submission of the itemizing form was not heavily enforced. Only 49.5% percent of the taxpayers who were supposed to fill out the itemizing form did so. In more recent years, the tax authority sent letters to employers with the list of employees who were supposed to fill out the itemizing form, asking them to let their employees know of their obligation, but this was not common in 2009.

5 Data and Empirical Strategy

I treat the creation of the itemizing requirement as a treatment with two components: first, a filing cost for some taxpayers and second, an information treatment that the threshold of $7,500 is relevant for the tax authority. The treated group is all taxpayers who amended their 2008 income tax return after June 1st, 2009. The change affects the 2008 fiscal year and all the subsequent fiscal years. I analyze the 2008 fiscal year because of the retroactive nature of the policy. The itemizing form and the threshold that establishes who must itemize were announced two months after the tax season for 2008 was over. In my main specification, I construct the control group for these two treatment components. I use a rich set of administrative data for the income tax returns for the fiscal year 2008 in Ecuador. I take advantage of the fact that the tax returns are timestamped and compare the tax returns filed before June 1st (the day when the reform was made public) and the amended tax returns filed after June 1st[6]. The taxpayers had made all their economic choices of consumption and labor supply

[5] A translation of the decree is in the Appendix A.1

[6] Only 0.64% of all taxpayers had more than one tax return after the reform. In those cases, I use the last tax return filed by the taxpayer before the reform, and the first tax return filed after the reform.

during 2008. All taxpayers were required to submit their tax returns by the end of March 2009. This earlier tax return reflects their decisions regarding how much income and deductions to report under the institutional setting before the reform (when there was no itemizing requirement, only the record-keeping cost). The reform introduces a hassle cost for taxpayers with a deduction larger than $7,500, who under the new rules had to itemize all their deductions. The taxpayers learned about the new institutional setting and could amend their income tax returns. I estimate the reform's effect by comparing the original income tax return reported before June 1st and the amended tax return reported after June 1st.

The identifying assumption is that the taxpayers amended their deduction due to the reform (which is the same identification strategy used by Carrillo, Pomeranz, and Singhal, 2017). To be more precise, the exposure to the itemizing requirement can be described as a binary random variable $R = 1, 0$. The outcome of interest is the reported deduction d. If the taxpayer i is not exposed to the itemizing requirement, her reported deduction is d_{0i}. If she is exposed to the itemizing requirement, her reported deduction is d_{1i}. The retroactive nature of the reform and availability of the original and amended tax returns for the same taxpayers allows me to observe the same individual in both scenarios: when not exposed to the itemizing requirement and when exposed. If the taxpayers would not have amended their deductions in the absence of the reform, the original tax reform is my first counterfactual for not being exposed to the reform.

In particular, I estimate the following equation:

$$Y_{i\tau} = \beta_0 + \beta_1 Amendment_{\gamma i} + \eta_i + \mu_{i\tau} \tag{5}$$

where Y is my variable of interest, that is, deductions for personal expenses, or the reported tax liability of the individual i in Version γ of the tax form; $Amendment_{\gamma i}$ is a binary variable that is equal to one for the amended tax return and zero for the original tax return; η_i are the individual fixed effects; and $\mu_{\gamma i}$ is the error term.

I compare the amendment rate by week for the fiscal year 2008 with the fiscal years 2007

and 2009 to illustrate how the reforms affected amending behavior. Figure 4 shows the amendment rate by week for the fiscal year 2007 reported in 2008 (the deduction for personal expenses did not exist in 2007), the fiscal year 2008 reported in 2009 (taxpayers did not know about the itemizing rule before June 2009 and then they were affected by the reform), and the fiscal year 2009 reported in 2010 (affected by the reform but with taxpayers informed prior to filing). This graph compares the amending rate for 2007, 2008, and 2009 in the following calendar year once the filing period is over. Notice that the amendment rate has a similar pattern before the first week of June, but the amendment rate for 2008 increases after and in particular during the filing period of the itemizing tax form. Additionally, I compare the number of amended tax returns for the fiscal years 2007 and 2008 during the same period in 2009. If there had been any change previously reported that affected several fiscal years, the number of amended tax returns for 2007 would have shown an increase, but that is not the case.

The amendment rate is low, but it is not zero. In Ecuador, taxpayers must fill out the tax forms by the due date or pay a late fee of $ 30 even if the tax liability is zero; there is also an interest rate that is charged only on unpaid taxes[7]. The baseline amendment rate is not zero for this fee structure. Taxpayers can submit incomplete or empty tax forms to avoid the late fee and amend it later on. Getting a tax refund is not an automatic process in Ecuador. The taxpayer has to submit a request, and the tax authority approves after "closely checking the tax return," according to the statement of the tax authority itself. Therefore, the rational taxpayer filling out an incomplete tax return should declare lower values of tax liability on the original tax return than in the amended tax return. Therefore, comparing the original and amended tax returns could be biased downward. I construct a second control group for the conjecture response to account for the amending rate. I use a difference-in-difference estimation using the fiscal year 2009 as the control. Taxpayers made their declarations for the fiscal year 2009 in 2010. Since the beginning of 2010, they knew about the itemizing threshold, so

[7]Chapter IX La Ley de Régimen Tributario Interno (Registro Oficial Suplemento 242 de 29 de Diciembre del 2007)

there was no change in the information available to the taxpayers. They had already taken into account the itemizing threshold on their original tax return for 2009. My control group for the difference-in-difference estimation is the taxpayers who filled out a tax return for 2009 before June 1st, 2010, and amended it afterward. The treatment group is the taxpayers who filled out a tax return for 2009 before June 1st, 2009, and amended it afterward. In this estimation, the analogue of the pre-treatment period is the original tax return and that of the post-treatment period is the amended tax return. My difference-in-difference estimation

$$Y_{i\tau t} = \beta_0 + \beta_1 Amendment_{\gamma i} + \beta_2 Fiscal\ Year_t i + \beta_3 Amendment \times Fiscal\ Year_{\gamma ti} + \Omega X_i + \mu_{i\gamma t} \tag{6}$$

where Y is my variable of interest, that is, deductions for personal expenses, or the reported tax liability of the individual i in Version γ of the tax form of the fiscal period t; $Amendment_i\gamma$ is a binary variable that is equal to one for the amended tax return and zero for the original tax return; $Fiscal\ Year_i t$ is a binary variable that is equal to one if the tax from is for the fiscal year 2008 and zero if it is for the fiscal year 2009; X is a vector of fixed demographic characteristics; and $\mu_{\gamma ti}$ is the error term.

I focus my analysis on employees because their employers report their income and payroll tax deduction, so the deduction for personal expenses is the only adjustable margin in their tax returns. I exclude everyone who has some part or all of her income from self-employed work in practical terms. Hence, I analyze the behavior of 61,239 employees that filled out an income tax return before and after the reform (the original tax return and amended tax return, respectively). They are equivalent to 3.6% of total employees or 16.51% of employees who have income larger than $7,850 and thus pay nonzero tax (since the marginal tax rate of taxable income under $7,850 is zero in Ecuador)[8].

Analysis of the characteristics of the taxpayers who amended their tax returns allows

[8] In 2008, 1,843,425 people filed an income tax return; of those, 93.01% were employees, and their income is third-party reported. 90,662 taxpayers changed their income tax return after the reform; of those, 67.55% were employees.

for the observation that they have a higher income than those who did not amend. This difference is reasonable because taxpayers with higher reported tax liability have incentives to amend their tax returns. Employees with wages lower than $7,850 pay zero tax, and 69% of the employees who amended their return made more than $7,850, while only 19% of the employees who did not amend earned more than that amount. The average annual wage of the employees who amended is $14,434 versus $5,035 for the employees who did not. The average deduction for personal expenses for the employees who did not amend is $424. The employees who amended their tax returns made a deduction on their original tax form of $2,037 on average. Descriptive statistics of both groups are presented in Table 1.

The itemizing rule affects the distribution of deductions through two mechanisms: conveying information about the tax authority's audit procedures (conjecture response) and creating hassle cost (resulting in the discontinuity in the indirect cost). The taxpayers who initially made a deduction lower than $7,500 are affected only by the conjecture response because the itemizing rule is not binding for them, and the record-keeping cost has not changed. These taxpayers will increase their deductions because they have updated their beliefs about which part of the distribution of deductions the tax authority is likely to check upwards. Comparing the deduction made in the original return with the deduction made in the amended tax return produces an estimate of the effect of the conjecture response on this group.

The taxpayers who initially made a deduction higher than $7,500 are affected by both the conjecture response and the hassle cost. These taxpayers will decrease their deductions because they have updated their beliefs downwards or because the tax savings from reporting their total deductions are not large enough to compensate for the hassle cost they need to cover by filling out the itemizing form. Comparing the deductions in the original and the amended tax returns illustrates the effect of the two mechanisms.

I estimate Equation 5 twice. I use the employees who had a deduction lower than or equal to the itemizing threshold of $7,500 on the original tax return to estimate the ef-

fect of the conjecture response, and the employees who had a deduction higher than the itemizing threshold to estimate the combined effect of the information and the hassle cost. I estimate the Equation 6 only for the former group because the control group of the difference-in-difference estimation is only for the information treatment.

6 Results

This section is organized as follows: first, I demonstrate that the discontinuity in the perceived auditing probability was in play by analyzing the behavior of the individuals with original deductions less than or equal to $7,500. The cost of taking the deduction has not changed for these taxpayers, so in the absence of the discontinuity in the perceived auditing probability, they should not have changed their deduction. Second, I present the response of the individuals with original deductions higher than $7,500, whose response is a combination of two discontinuities: one in the perceived probability and one in the indirect cost.

6.1 Conjecture Mechanism

The taxpayers who took a deduction lower than or equal to $7,500 before the reform are only affected by the discontinuity in the perceived auditing probability, so the itemizing threshold affects the taxpayers' behavior through information because the cost of taking the deduction has not changed for them. If these taxpayers thought that the auditing probability depends on the amount of deduction they took, and before the reform they had thought the threshold was lower than $7,500, they should increase their reported deductions but stay under the itemizing threshold. I estimate the effect of the conjecture response on deductions and reported tax liability using Equation 5 (see Table 2). The average increase in reported deductions was $1,543, resulting in an average decrease of $160 in the reported tax liability. These changes are large for the Ecuadorian context: to give a sense of scale, the average original deduction was $882, and the average reported tax liability was $712.

I use a difference-in-differences estimation using the fiscal year 2009 as the control. For the fiscal year 2009 taxpayers, there is no information treatment for the announcement of the creation of the itemizing form. It is not possible to use a year prior to 2008 because the deductions for personal expenses were created at the end of 2007 and were implemented for the fiscal year 2008 onwards. To construct the control group using the 2009 fiscal year, I am able to repeat the same procedure to build the panel of taxpayers who presented the original tax return for 2009 and amended it later on. I take a placebo date for the reform on June 1, 2010, one year after the announcement of the creation of the itemizing form, and repeat the construction of the sample for the fiscal year 2009. When taxpayers filled out their income tax return for the fiscal year 2009 in the first months of 2010, they already knew about the itemizing form, and the deadline to fill out the itemizing form was before the deadline to fill out the income tax return. Therefore, there is no information treatment between the original and amended tax returns. The results are presented in Table 3. The interaction of "Amended" and "fiscal year 2008" shows that the taxpayers who amended their income tax return for the fiscal year 2008 increased their deduction by an average of $416 more than the taxpayers who amended their tax return for the fiscal year 2009.

There could be a concern that taxpayers amended their income tax returns because of the structure of the late fees. When the amending behavior is generated by the late fees structure–when filling out a tax return late has a hefty penalty–the original tax returns are incomplete, and the amended are completed. In that case, line items are more likely to be revised upwards. This is not the case in the previous estimations; the increase in the deductions is accompanied by a decrease in the tax liability that is consistent with the conceptual framework presented in Section 3. I look at the heterogeneous effects of the difference-in-difference estimation to address any additional concerns about which mechanism is driving the amending behavior. If we suppose taxpayers amend their tax returns due to the discontinuity in the perceived auditing probability, then, taxpayers who pay higher marginal tax rates have more incentives to amend their tax returns.

Figure 5 shows the plot of the change in the deduction between the amended and original filing as a function of the marginal tax rate on the original tax return in 2008 and 2009. The marginal effect of the marginal tax rate on the interaction term is the difference between the 2008 and 2009 lines. Taxpayers with higher marginal tax rates have more incentives to adjust their deduction when the itemizing threshold is announced. As expected, the difference between deductions in 2008–the year of the reform when there was a change in the information taxpayers had at the time of filing the original form–and 2009–when taxpayers knew about the itemizing threshold from before filling out the original tax return–increases as the marginal tax rate increases.

To provide further evidence of the presence of an conjecture response, I compare the patterns of the changes predicted by the model with the patterns observed in the data.

Prediction: Not all taxpayers who increase their deductions take a deduction at the itemizing threshold. Instead, they take the deduction that makes their tax liability zero.

In general, taxpayers have an incentive to report higher deductions until they reach a taxable income of $7,850 because the marginal tax rate becomes zero at that level. If the employees take the deduction to minimize their reported tax liability but stay under the itemizing threshold, the deduction should be equal to the taxable income before deduction, or $7,500, whichever is lower. I calculate the taxable income before the deduction: wages less the payroll tax, the deduction for disability and old age, and the tax-free income of $7,850. If the taxpayers increase their deductions to minimize their tax liability, they should make a deduction equal to that taxable income before the deduction. In practical terms, the introduction of the itemizing threshold for the fiscal year 2008 affected the taxpayers' beliefs about monitoring, and they updated their perceived probability of being audited downwards. As a result, taxpayers should adjust their deduction more aggressively to pay zero tax on their amended tax return as compared with their original tax return (but no more than that, since a refund request generates increased scrutiny, or at least so the Ecuadorian tax authority claims in the refund request form).

Figure 6 shows a scatter plot of the claimed amended deduction and the reported tax liability before the deduction on the right side of the graph. There is a clear cluster of employees around the zero-tax line, where the amended deduction is equal to the taxable income before the deduction. This pattern is not discernable with the original deduction in the left panel of the same graph. The model predicts that taxpayers should cluster along a line defined by the zero-tax line and the itemizing threshold. On the original tax return, 37% of taxpayers took a deduction within $250 of the line predicted by the model, while on the amended tax return, that percentage increased to 56%. On the original tax return, only 8% of taxpayers claimed a deduction larger than their taxable income before the deduction, while 23% did so in the amended tax return. I analyze this behavior in two parts. For the taxpayers whose taxable income before the deduction is lower than $7,500, I estimate how predictive the taxable income before the deduction is for the claimed deduction in the original tax return and the amended tax return. Also, I estimate the probability of claiming a deduction close to $7,500 to capture the behavior of taxpayers with taxable income before deductions larger than $7,500.

Formally, I estimate the following for the taxpayers who originally took a deduction lower than or equal to $7,500 and had a taxable income before the deduction lower than $7,500:

$$d^{original} = \beta_0 + \beta_1 TI + X\beta + \mu \tag{7}$$

$$d^{amended} = \beta_0 + \beta_1 TI + X\beta + \mu \tag{8}$$

where d is the reported (original or amended) deduction, TI is the taxable income before the deduction, and X is a vector of demographic characteristics. A coefficient of β_1 equal to one would mean that the taxpayer took the exact deduction that would make her reported tax liability zero. Conditional on making a deduction lower than or equal to $7,500 on the original tax return and having a taxable income lower than $7,500, for each dollar of taxable income before the deduction, the employees on average took a

deduction of 23 cents on the original tax return and 68 cents on the amended tax return (See Table 4). Among the civil servants, women took lower deductions on average, while married and older people took higher ones.

The employees whose taxable income before the deduction was higher than or equal to \$7,500 were not able to eliminate their reported tax liability by taking a deduction without itemizing their consumption. Therefore, these taxpayers have incentives to take a deduction just below the itemizing threshold. I estimate the probability of taking a deduction in an interval around the itemizing threshold ($P(d \in \left(h^I - \delta, h^I\right] | Amendment = 1)$). The probability of an employee taking a deduction just below the itemizing threshold on the original tax return is less than 1% and in the amended tax return is around 5% (see Table 5).

One alternative explanation for the increase in claimed deductions is that taxpayers who originally did not claim the deduction at all became aware of it following the announcement introducing the itemizing rule (i.e., the extensive margin). The creation of the itemizing form was well publicized. These taxpayers might originally have had an incomplete understanding of the deduction and became aware of it only after the policy change announcement.

However, I can confirm that the conjecture response was in effect by focusing on the intensive margin (i.e. those taxpayers who originally had a positive deduction). Repeating the previous estimations but restricting the sample to the intensive margin, we can observe that for each dollar of taxable income before the deduction, the employees on average took a deduction of 24 cents on the original tax return and 52 cents on the amended tax return. For this group, the probability of taking a deduction around the threshold also increases from around 1% on the original tax return to about 3% on the amended return.

I conclude that the introduction of the itemizing threshold effectively decreases the uncertainty over the auditing threshold. Therefore, a larger share of taxpayers minimize their reported tax liability using the deduction, as illustrated by the scatter plot of

taxable income before the deduction and the amended deduction.

6.2 Discontinuity in the Indirect Cost of Taking Deduction

The taxpayers who took a deduction higher than $7,500 before the reform and changed their deduction after the reform are affected by two mechanisms. On the one hand, there is a group of taxpayers who thought that the monitoring probability depended on the amount of deduction they took, and before the reform, they had thought the threshold was higher than $7,500. These taxpayers should decrease their deductions. On the other hand, the taxpayers with legitimate expenses faced a hassle cost if they decided to keep their original deduction. I estimate the effect of both mechanisms (information and hassle cost) on deductions using Equation 5 (Table 6). The average decrease in reported deductions was $2,497. The taxpayers who took a deduction larger than the itemizing threshold in the original tax form can be divided into two groups. Some employees (48%) amended their deduction to an amount lower than or equal to the itemizing threshold, and the rest (52%) amended their deduction by a small amount, staying over the itemizing threshold.

Of the taxpayers who decreased their deduction, some declared a value close to $7,500, but they also declared smaller amounts, as shown in Figure 7. This heterogeneous response illustrates the presence of the hassle cost and conjecture responses. The taxpayers who had documentable expenses but decreased their deductions solely because of the filing cost have the information to report the itemizing deduction, so even if the tax authority found the decrease in the deduction suspicious and audited these taxpayers, they would have all the required receipts. Therefore, there was no reason to take a deduction far from the threshold. In contrast, the taxpayers who decreased their deduction because of the conjecture response could have been concerned about the reaction of the tax authority and take a deduction lower than the threshold. If the only mechanism in play was the hassle cost, no taxpayer should deduct far from the threshold. The taxpayers who took an original deduction over the itemizing threshold and an amended

deduction under it decreased their reported deduction on average by $5,098.

The group of taxpayers who took a deduction over the itemizing threshold on both tax returns (i.e., original and amended) made more minor adjustments: on average, they decreased their deduction by $87, which is equivalent to a change of 1%. These taxpayers had probably made a rough estimate of their deduction the first time they filed their income tax, which was corrected once they had to go over all the receipts for filling out the itemizing form.

The effect of the change in the audit probability can be sizable and, like in this case, generate a behavioral response large than the change in the indirect cost of taking a deduction. Using a bunching estimator, I compare the behavioral response around the threshold of the taxpayers affected by the conjecture response and by both the conjecture response and the hassle cost (the details of the estimation are in the appendix). Even if we assume that all the employees who decreased their deductions did so because of the hassle cost, the bunching around the itemizing threshold from the employees who increased their deductions due to the conjecture response is several times larger. In fact, the over all of effect of the policy was an increase in the overall reported deduction. When comparing the reported tax liability from the original tax return and the amended tax return, the net effect was a loss of around $3.5 million across the 61,239 employees who amended their return[9].

7 Conclusions and Policy Recommendations

Thresholds in the requirements for itemizing deductions are an important instrument for tax authorities to reduce the rate and magnitude of reported deductions. However, there is a nontrivial opposing side effect: increased deductions by taxpayers below the threshold. Depending on the context, this effect could be sizable. The threshold creates two discontinuities: first, in the perceived auditing probability; and second, in the indi-

[9]This is the difference between the reported tax liability on the original and amended tax returns. It is possible that an employee owed tax in the original tax return but amended it, and in the new tax return, the tax due is zero. Under the Ecuadorian Tax Code, the original debt disappears.

rect cost of taking the deduction. The discontinuity created in the perceived auditing probability creates an opportunity for some taxpayers to increase their claimed deductions (up to the value of the itemizing threshold), either by including purchases that are of questionable legitimacy or through outright fabrication.

I took advantage of a natural experiment in Ecuador in which the itemizing rule was changed retroactively after all tax returns had been filed. Taxpayers were allowed to amend their returns. I estimate the effect of the reform by comparing the original income tax return reported before the reform and the amended tax return reported afterward for the same individuals for the same year. Hence, I observe the same individuals, both not exposed and exposed to the reform. The original tax reform is the perfect counterfactual for not being exposed to the reform. While many taxpayers did reduce their deductions (as generally expected), I find that the majority of taxpayers amended their returns to report an increased deduction, on average more than doubling their deductions. The overall effect was a decrease in reported tax liability. Imposing a non-monetary cost to access a larger tax benefit can be a useful tool to focus the benefit. However, taxpayers adjust their behavior to the structure of the tax system. Countries with weak enforcement capacity should be aware that changes in obligations around a threshold can be interpreted as a decrease in the monitoring under the threshold.

I show the possibility of taxpayers' inferring auditing preferences from reporting rules. This result needs to be understood in the institutional context of Ecuador and, more generally, in developing countries. Tax enforcement is less effective in developing countries because taxpayers rely on the fact that the tax authorities might not have the resources to follow up within the allotted time for prosecution. Hence, taxpayers are more willing to take incredibly suspicious actions. One example is presented here: when taxpayers increase their deductions to pay zero taxes even when they have already declared a lower value. This behavior is not only observed among individuals but also in business. Less than 20% of Ecuadorian companies notified by the tax authority about discrepancies in their reported revenue take any action (Carrillo, Pomeranz, and Sing-

hal, 2017). This behavior is not only observed in Ecuador, either. In Pakistan, when the tax authority changed the tax rates for different kinds of business after the fiscal year was over, businesses reclassified themselves to receive a lower tax rate before declaring the taxes of the fiscal year that had already ended (Waseem, 2018). It is difficult to believe that tax officials do not find those changes suspicious; instead, they do not have the resources to follow up with most taxpayers. In developing countries, the probability of detecting tax evasion and the probability of enforcing the tax law are two different things, making the design of tax monitoring and reporting rules crucial. Tax authorities should actively manage taxpayers' expectations about enforcement and avoid reporting rules that can potentially reveal their lack of enforcement capacity.

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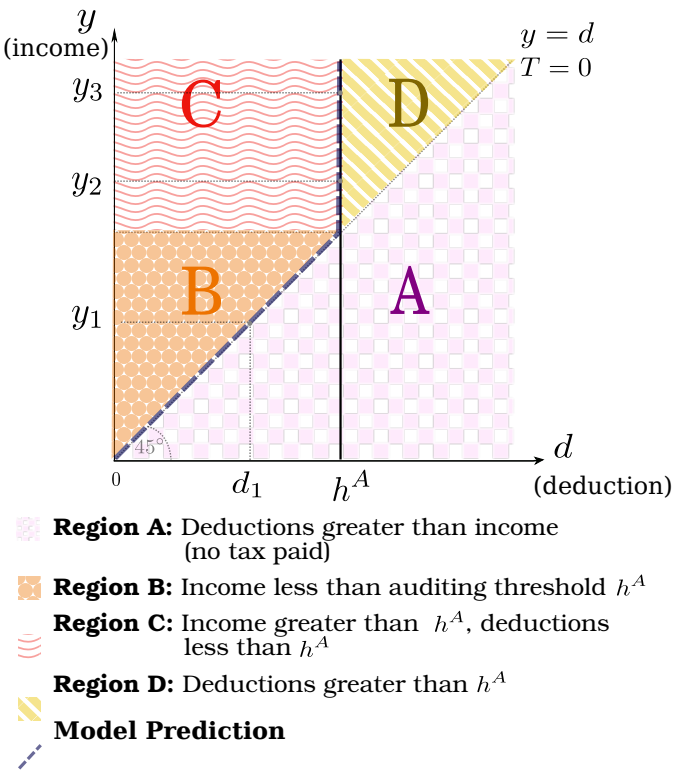
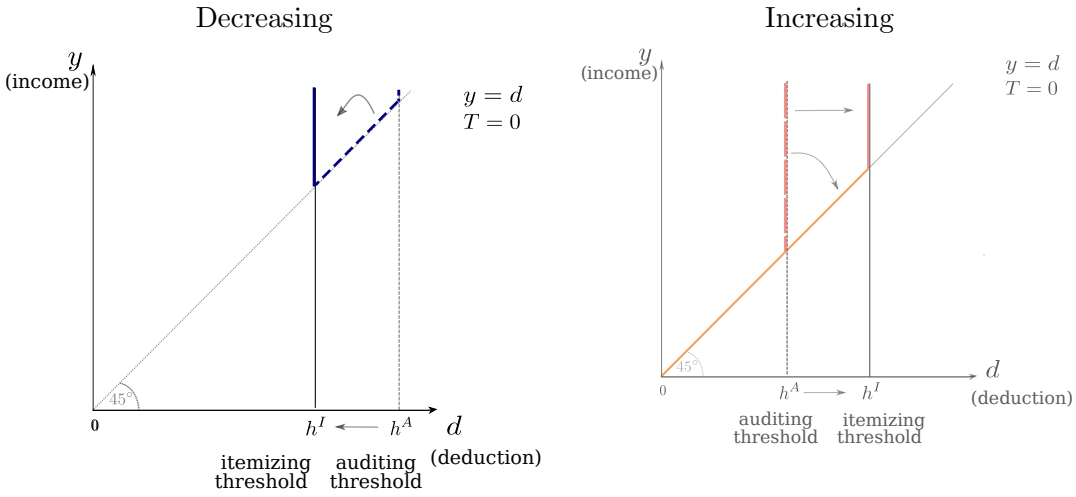
8 Figures

Figure 1: Taxpayer Behavior Depends on Income and Perceived Audit Threshold



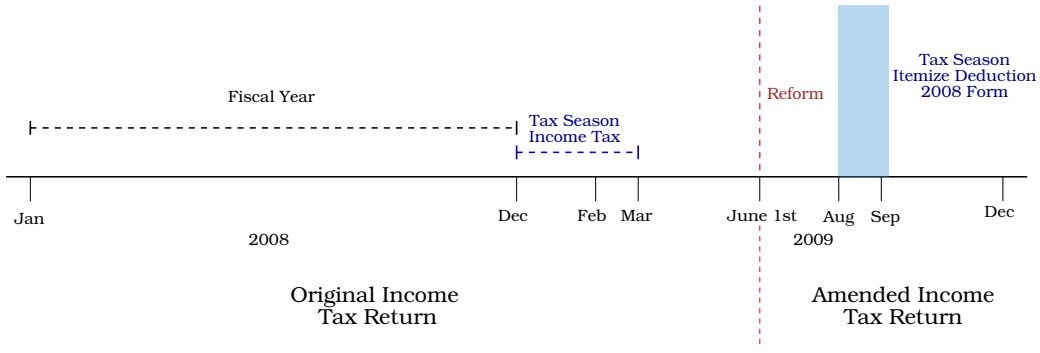
Taxpayers claim deductions depending both upon their income, as well as their guess about the location of the auditing threshold. Region A consists of people whose deductions exceed their income; anybody in this region pays zero tax. Honest taxpayers may appear in this region, but evading taxpayers should not. Region B consists of people who believe that their income is less than the auditing threshold (h^A); they have an incentive to evade by increasing their claimed deduction until they reach the zero-tax line. Region C consists of people who believe that their income is greater than the auditing threshold (h^A); evaders will increase their claimed deduction until they believe they are at the auditing threshold. Region D consists of people whose taxable income is greater than the auditing threshold. Honest taxpayers may appear in this region; evaders do not want to be in this region, since their evasion will be discovered.

Figure 2: Change in Deductions Upon Learning the Itemizing Threshold



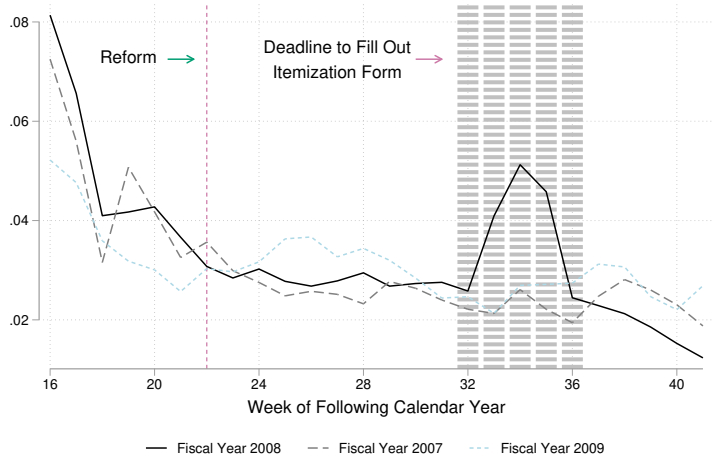
Once the itemizing threshold is revealed, taxpayers in Region D have an incentive to lower their claimed deduction to the itemizing threshold (either because of hassle cost, or fear of audit). Taxpayers in Regions B & C have an incentive to *increase* their claimed deduction, to either the zero-tax line or itemizing threshold.

Figure 3: Timeline of the Reform



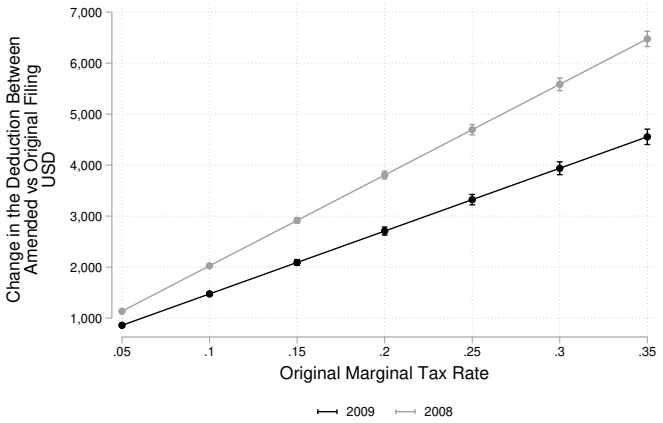
All income and consumption decisions were made during 2008; tax returns must be filed by March 2009 to avoid a penalty. In June 2009 the tax authority announced the change in the itemizing rule, and required taxpayers to amend their return if claiming more than $7,500. A special tax season to allow the itemizing form was opened in August 2009.

Figure 4: Income Tax Amendment Rate for Fiscal Year 2007, 2008 and 2009 in the Following Year



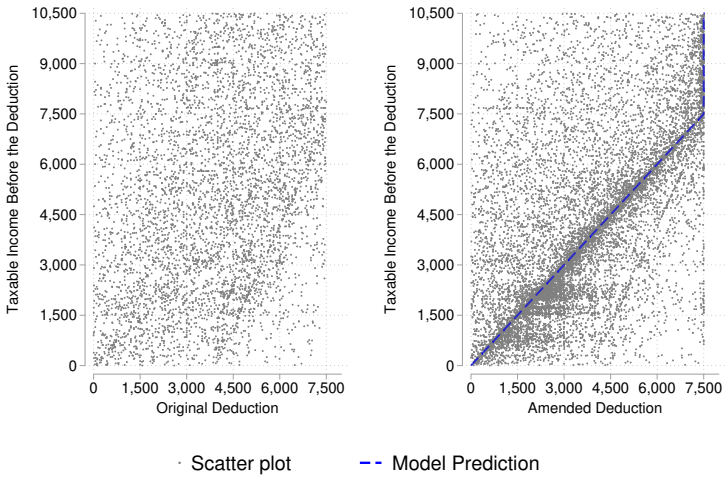
Amended forms filed each week / Total of amendment forms filed after tax season

Figure 5: Marginal Effect on the Difference Between Amended and Original Deduction in 2008 and 2009 of the Original Marginal Tax Rate



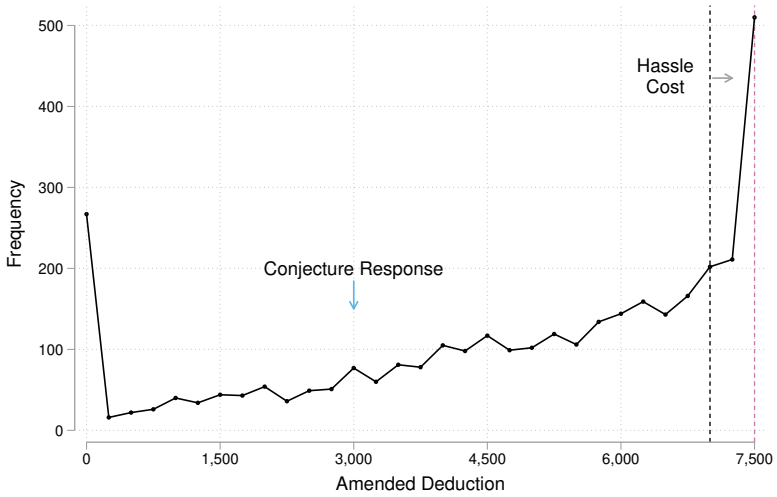
The graph shows the marginal effect of amending the tax form by fiscal year and marginal tax rate on the original tax return. A tax form is amended if the taxpayer submitted a new income tax form after June 1st (the creation of the itemizing deduction form for 2008 and the placebo date for 2009). Employees who made a deduction lower than or equal to $ 7,500 in the original tax return are included. Monetary amounts are in US dollars. Confidence intervals were calculated at 95%.

Figure 6: Deductions vs Taxable Income, Before/After Itemizing Announcement (Includes Employees with $d^{original} \leq 7,500$)



Left: for returns filed prior to the announcement of the itemizing threshold, the deductions are distributed fairly smoothly. Right: for ammended returns filed following the announcement of the itemizing threshold, there is a clear clustering along the zero-tax line and the itemizing threshold.

Figure 7: Frequency of Deductions Reported on the Amended Tax Return
(Includes Employees with $d^{original} > 7,500$ and $d^{amended} \leq 7,500$)



This figure shows that taxpayers exhibit the conjecture response to the itemizing threshold. Data are for taxpayers who initially claimed an amount greater than the itemizing threshold (i.e., those originally in Region D). As expected under conventional thinking, there is a clear bunching near the itemizing threshold due to honest taxpayers who didn't want to pay the hassle cost. But many taxpayers report an amended deduction far below the itemizing threshold, which can't be explained by hassle cost alone. This behavior is compatible with taxpayers conjecturing that the itemizing threshold is equivalent to an auditing threshold: taxpayers who believe they are more likely to be audited (because their initial, unsupported claim was above the threshold) may reduce their amended claim to that which can be supported with receipts.

9 Tables

Table 1: Descriptive Statistics from Employees' Original 2008 Tax Return

	(1) Non-amending Mean/S.D.	(2) Paying a non-zero tax rate Mean/S.D.	(3) Amending Mean/S.D.
From the tax return:			
Wage	5,035.33	15,426.51	14,433.85
	(7,289.15)	(11,915.84)	(13,930.96)
Personal Expenses Deduction	424.08	1,877.19	2,037.36
	(1,578.78)	(2,975.38)	(3,425.40)
Taxable Income	4,884.83	12,260.60	13,152.52
	(6,869.65)	(10,367.92)	(13,288.59)
Tax Liability	148.43	615.23	918.70
	(1,153.62)	(2,162.85)	(2,636.24)
Wage larger than $7,850	0.19	1.00	0.69
	(0.40)	(0.00)	(0.46)
Demographic characteristics:			
Women	0.35	0.34	0.29
	(0.48)	(0.47)	(0.45)
Married	0.42	0.58	0.60
	(0.49)	(0.49)	(0.49)
Age	36.97	42.92	43.11
	(12.27)	(11.43)	(10.72)
Observations	1,632,225	360,467	61,239

Means are reported along with standard deviations in parentheses. Non-amending employees are those who filled out a tax return before June 1st (when the itemizing rule was established) and did not fill out an amended tax return. Amending employees are those who filled out a tax return before June 1st and amended it afterward. Monetary amounts are in US dollars.
Column 1 is all taxpayers who did not ammend, including those whose income is too low to pay income tax. Column 2 is taxpayers with enough income to pay income tax, whether or not they ammended. Column 3 is taxpayers who ammended; their data appears in Figure 6.
Note that Columns 2 & 3 are similar, suggesting that taxpayers who actually ammended were generally similar to those who had an incentive to take a deduction.

Table 2: Effect of the Conjecture Mechanism
Includes Employees with $d^{original} \leq 7,500$

	(1) Deductions	(2) Tax Liability
Amended Tax Form	1,542.92***	-160.31***
	(13.27)	(6.11)
Constant	882.50***	712.37***
	(6.63)	(3.05)
Individual Fixed Effects	Yes	Yes
Num. Observations	105,832	105,832
Num. Individuals	52,916	52,916

The dependent variables are in the column title. Amended tax form is a binary variable that takes the value of one if the income tax form was filled out after the creation of the itemizing deduction form; otherwise, zero for the original tax return.
Employees who made a deduction lower or equal to $7,500 in the original tax return are included.
This table has the result of the regression specified in Equation 5.
Across all taxpayers who initially claimed a deduction less than the itemizing threshold.
Monetary amounts are in US dollars.
Robust standard errors are in parentheses.
$*p < 0.10$, $**p < 0.05$, $***p < 0.01$

Table 3: Effect of the Conjecture Mechanism
Difference-in-Differences Treatment Estimation
Includes Employees with $d^{original} \leq 7,500$

	(1) Deductions	(2) Deductions	(3) Tax Liability	(4) Tax Liability
Amended Tax Form × 2008	415.75***	415.97***	-37.27*	-37.27*
	(22.93)	(22.75)	(21.80)	(21.47)
Amended Tax Form	1,127.17***	1,127.45***	-123.04***	-123.11***
	(16.68)	(16.50)	(17.28)	(17.00)
Fiscal Year 2008	-393.98***	-425.49***	-49.56***	-87.29***
	(13.02)	(13.05)	(15.28)	(15.23)
Civil Servant		227.22***		-685.82***
		(11.76)		(11.41)
Female		-147.85***		-253.13***
		(12.91)		(11.42)
Married		120.67***		119.99***
		(12.14)		(10.77)
Age		124.30***		34.49***
		(3.02)		(4.54)
Age Squared		-1.29***		-0.07
		(0.03)		(0.05)
Finished High School		440.23***		88.03***
		(19.76)		(23.18)
Have a College Degree		438.60***		218.51***
		(19.70)		(23.67)
Constant	1,276.48***	-2,027.46***	761.93***	-382.86***
	(10.04)	(66.74)	(12.10)	(89.86)
Num. Observations	207,644	207,562	207,644	207,562
Num. Individuals	103,822	103,781	103,822	103,781

An amended tax form is a binary variable that takes the value of one if the income tax form was filled out after June 1st of the following year (the creation of the itemizing deduction form for 2008 and the placebo date for 2009); otherwise, zero for the original tax return. 2008 is a binary variable that takes the value of one if the fiscal year is 2008; otherwise, zero for the fiscal year 2009. 2008 x Amended Tax Form is the interaction of Amended tax form and 2008.
Employees who made a deduction lower than or equal to $7,500 in the original tax return are included.
Monetary amounts are in US dollars.
Robust standard errors are in parentheses.
$*p < 0.10$, $**p < 0.05$, $***p < 0.01$

Table 4: Reported Deduction and Taxable Income Before the Deduction
Includes Employees with $d^{original}$ and Taxable Income Lower than $7,500

	Original Tax Return		Amended Tax Return	
Taxable Income Before the Deduction	0.21***	0.23***	0.68***	0.68***
	(0.00)	(0.00)	(0.01)	(0.01)
Civil Servant		-278.71***		-114.48***
		(16.14)		(18.60)
Female		133.38***		-178.23***
		(17.03)		(19.84)
Married		56.61***		84.22***
		(15.49)		(18.47)
Age		7.67*		41.28***
		(4.04)		(5.24)
Age Squared		-0.04		-0.45***
		(0.04)		(0.06)
Finished High School		169.06***		124.93***
		(21.77)		(28.64)
Have a College Degree		387.93***		-67.61**
		(22.37)		(29.70)
Constant	236.24***	-248.43***	582.32***	-265.03**
	(7.14)	(88.20)	(9.85)	(113.08)
Num. Observations	40,690	40,671	40,690	40,671

The dependent variable is the deduction. Taxable income before the deduction is equal to: the wage less the payroll tax, the deduction for disability and old age, and the tax free income of $7,850. Only the employees with taxable income lower than $7,500 are included.
Monetary amounts are in US dollars.
Robust standard errors are in parentheses.
$*p < 0.10$, $**p < 0.05$, $***p < 0.01$

Table 5: Probability of Making a Deduction Just Below the Itemizing Threshold - Includes Employees with $d^{original} \leq 7,500$

	(7,400;7,500]	(7,300;7,500]	(7,200;7,500]	(7,100;7,500]	(7,000;7,500]
Deductions Reported on:					
Original Tax Return	0.003***	0.005***	0.008***	0.011***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Amended Tax Return	0.029***	0.039***	0.044***	0.048***	0.053***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Num. Observations	105,832	105,832	105,832	105,832	105,832
Num. Individuals	52,916	52,916	52,916	52,916	52,916

The dependent variable is a binary variable that takes the value of one if the reported deduction falls in the interval described in the column row.
Employees who made a deduction lower or equal to $7,500 in the original tax return are included.
The probability was calculated with a Probit Model.
Standard errors are in parentheses.
$*p < 0.10$, $**p < 0.05$, $***p < 0.01$

Table 6: Effect of the Discontinuity on the Hassle Cost and Conjecture Mechanism - Includes Employees with $d^{original} > 7,500$

	(1) Deductions	(2) Tax Liability
Amended Tax Form	-2,497.25***	4.42
	(36.40)	(18.92)
Constant	9,379.77***	2,230.48***
	(18.20)	(9.46)
Individual Fixed Effects	Yes	Yes
Num. Observations	16,646	16,646
Num. Individuals	8,323	8,323

The dependent variables are in the column title. Amended tax form is a binary variable that takes the value of one if the income tax form was filled out after the creation of the itemizing deduction form; otherwise, zero for the original tax return.
Employees who made a deduction larger than $7,500 in the original tax return are included.
Monetary amounts are in US dollars.
Robust standard errors are in parentheses.
$*p < 0.10$, $**p < 0.05$, $***p < 0.01$

A Appendix

A.1 Context and Background - Appendix

A.1.1 Translation of the Decree NACDGERCGC09-003101

Decree NACDGERCGC09-003101

June 1st, 2009

RESOLUTIONS:

Article 1.- Individuals whose personal deductible expenses exceed $ 7,500.00 must present the information related to personal expenses corresponding to the immediately preceding year;

The information in the itemizing form will be delivered according to the format provided by the Ecuadorian Tax Authority, which is available free of charge at the SRI offices or on its website: `www.sri.gov.ec`

Article 2. - The information must be sent via the Internet in February.

Article 3. - The taxpayer is obliged to present to the Tax Administration the sales vouchers reported in the itemizing form when these are required.

Article 4.- The Tax Administration, in use of its determining power, may request the presentation of the information in the itemizing form when required, in the format indicated in Article 1 of this resolution, even of those taxpayers who do not meet the conditions provided for in said article.

Article 5.- Late submission, failure to submit, or submission with errors will be sanctioned according to the current legal regulations.

SOLE TRANSITORY PROVISION

The itemizing form corresponding to the fiscal year of 2008 will be submitted in August 2009.

This resolution will come into effect from the date of its publication in the Official Registry.

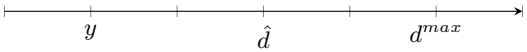
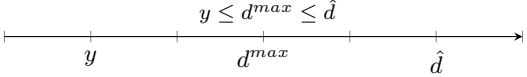
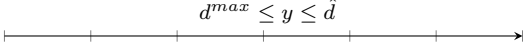
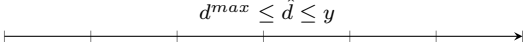
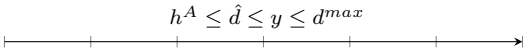
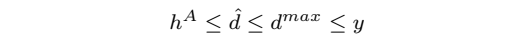
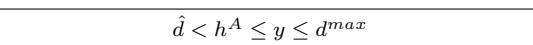
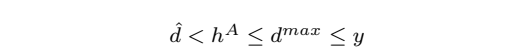
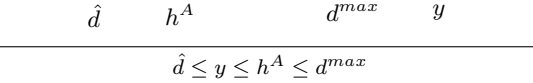
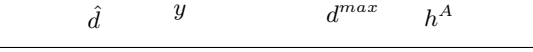
A.2 Conceptual Framework - Appendix

A.2.1 Model Before the Reform

Before the reform each taxpayer holds a belief about the auditing threshold where the tax authority will revise the deductions claims. Taking the deduction is without cost. A false claim (e) depends on the relation between the income (y), the legal claim of deduction the individual could make ($\hat{d}$), and her belief of where the auditing threshold is for the change in the probability. The legal claims $\hat{d}$ and the false claims e are known for the taxpayer and not observable for the tax authority, who only observes the total deductions d. Depending on the relative values of the income y, legal claim $\hat{d}$, and the maximum deduction d^{max}, the taxpayer will choose the evasion or false claim e that minimizes her tax.

There are six possible situations in which a taxpayer can find herself depending on her past labor and consumption decisions. These situations are presented in the following table as cases described by a set of conditions and solutions. Case 1 and Case 2 describe the situations in which a taxpayer can make a legal deduction larger than the deduction she needs to minimize her tax. In these cases, the taxpayer will always take the deduction that minimizes her tax. Cases from 3 to 6 describe the situations in which the taxpayer has incentives to evade taxes by making a false claim. Case 3 describes the situation in which the taxpayer thinks that the auditing threshold is lower than her legal claim, so she decides to take a deduction equal to her legal claim. Cases from 4 to 6 describes the opposite conditions: the taxpayer thinks the auditing threshold is larger than her total legal claim, so she has incentive to declare a deduction equal to her believed auditing threshold. Case 4 describes the situation in which the taxpayer thinks that the auditing threshold is somewhere in between her legal claim and her income. In this case, she will take a deduction equal to the auditing threshold. In Case 5 the taxpayer thinks that the auditing threshold is larger than her income, which means she will take a deduction equal to her income. Finally and for completeness, Case 6 describes the situation in which the taxpayer thinks that the tax authority does not care about the deductions at all: in the model, this is equivalent to thinking that the auditing threshold is larger than the maximum deduction.

Table A1: Model with Step Probability Function - Before the Reform
Description for All Possible Cases

Description	**Conditions**	**Solutions**
Case 1: People who can make a deduction large enough to pay zero tax without making a false claim.	$y \leq \hat{d} < d^{max}$  $y \leq d^{max} \leq \hat{d}$  	$d = y$ $e = 0$ $T = 0$
Case 2: People who can make the maximum deduction without making a false claim.	$d^{max} \leq y \leq \hat{d}$  $d^{max} \leq \hat{d} \leq y$  	$d = d^{max}$ $e = 0$ $T = (y - d^{max})t$
Case 3: People who think the auditing threshold is lower than their total legal claim.	$h^A \leq \hat{d} \leq y \leq d^{max}$  $h^A \leq \hat{d} \leq d^{max} \leq y$  	$d = \hat{d}$ $e = 0$ $T = (y - \hat{d})t$
Case 4: People who think the auditing threshold is lower than their income but larger than their total legal claim.	$\hat{d} < h^A \leq y \leq d^{max}$  $\hat{d} < h^A \leq d^{max} \leq y$  	$d = h^A$ $e = h^A - \hat{d}$ $T = (y - h^A)t$
Case 5: People who think the auditing threshold is larger than their income but need to make a false claim to pay zero.	$\hat{d} \leq y \leq h^A \leq d^{max}$  $\hat{d} \leq y \leq d^{max} \leq h^A$  	$d = y$ $e = y - \hat{d}$ $T = 0$
Case 6: People who think the probability is always zero because deductions are small relative to their income.	$\hat{d} \leq d^{max} \leq h^A \leq y$  $\hat{d} \leq d^{max} \leq y \leq h^A$  	$d = d^{max}$ $e = d^{max} - \hat{d}$ $T = (y - d^{max})t$

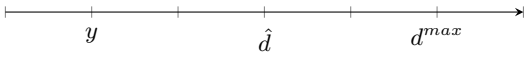
A.2.2 Model After the Reform

Case 1:

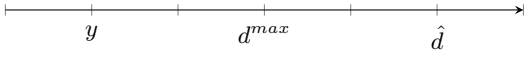
This group of people can legally claim a deduction large enough to pay zero. This group might be affected only by the hassle cost of itemizing deductions resulting from the change in the law. The solution for this group of taxpayers before the change in the law is to take a deduction equal to their taxable income before the deduction, so both the false claim and tax are zero.

Conditions Before the Law:

$y \leq \hat{d} < d^{max}$



$y \leq d^{max} \leq \hat{d}$



Solution Before the Law:

$$\begin{aligned} d &= y \\ e &= 0 \\ T &= 0 \end{aligned}$$

There are three possible cases in this group depending on where the \$7,500 itemizing threshold (h^I) falls within the other categories.

- The itemizing threshold h^I is less than the income before the deduction. This group of taxpayers paid zero in their income tax declaration before the change and had a deduction larger than the \$7,500. They could decide to keep their original deduction and fill out the itemizing form or amend their income tax form and not fill out the itemizing form. The individuals who itemized their deductions reveal that their original deductions were legal and their savings from taking the deduction are larger than the hassle cost. The individuals who move to the itemizing threshold h^I have a hassle cost larger than the savings in taxes they would receive by filling out the form.

Conditions After the Law:	*Solutions*		
	Before the Law:	*After the Law:*	
$\boldsymbol{h^I} \leq y \leq \hat{d} < d^{max}$		if $(y - h^I)t > c$	if $(y - h^I)t \leq c$
$\boldsymbol{h^I}$ y $\hat{d}$ d^{max}	$d = y$	$d = y$	$d = h^I$
$\boldsymbol{h^I} \leq y \leq d^{max} \leq \hat{d}$	$e = 0$	$e = 0$	$e = 0$
$\boldsymbol{h^I}$ y d^{max} $\hat{d}$	$T = 0$	$T = 0$	$T = (y - h^I)t$
		Itemize: Yes	Itemize: No

- The itemizing threshold h^I is higher than the income and lower than the legal deduction they could take. These taxpayers keep their previously reported deduction equal to their income.

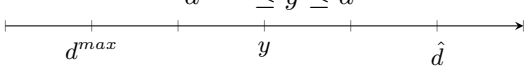
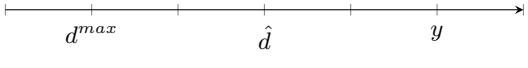
Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
$y \leq \boldsymbol{h^I} \leq \hat{d} < d^{max}$		
y $\boldsymbol{h^I}$ $\hat{d}$ d^{max}	$d = y$	$d = y$
$y \leq \boldsymbol{h^I} \leq d^{max} \leq \hat{d}$	$e = 0$	$e = 0$
y $\boldsymbol{h^I}$ d^{max} $\hat{d}$	$T = 0$	$T = 0$
		Itemize: No

- The itemizing threshold is larger than the income and the legal deduction. As before, these taxpayers keep the previously reported deduction equal to their income.

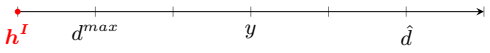
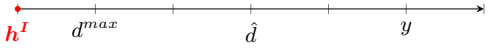
Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
$y \leq \hat{d} \leq \boldsymbol{h^I} < d^{max}$	$d = y$	$d = y$
y $\hat{d}$ $\boldsymbol{h^I}$ d^{max}	$e = 0$	$e = 0$
	$T = 0$	$T = 0$
		Itemize: No

Case 2:

The taxpayers in this group can claim a legal deduction larger than the maximum allowed, so they take the maximum deduction before the reform. The change in the regulation can only generate a change for this group of taxpayers through the hassle cost.

Conditions Before the Law:	*Solution Before the Law:*
$d^{max} \leq y \leq \hat{d}$ 	$d = d^{max}$
$d^{max} \leq \hat{d} \leq y$ 	$e = 0$
	$T = (y - d^{max})t$

- The taxpayers with a high cost for filling out the form will move from the maximum deduction to the itemizing threshold $(d^{max} - h^I)t \leq c$.

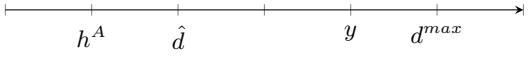
Conditions After the Law:	*Solutions*		
	Before the Law:	*After the Law:*	
		if $(d^{max} - h^I)t > c$	if $(d^{max} - h^I)t \leq c$
$h^I < d^{max} \leq y \leq \hat{d}$ 	$d = d^{max}$	$d = d^{max}$	$d = h^I$
$h^I < d^{max} \leq \hat{d} \leq y$ 	$e = 0$	$e = 0$	$e = 0$
	$T = (y - d^{max})t$	$T = (y - d^{max})t$	$T = (y - h^I)t$
		Itemize: Yes	Itemize: No

Case 3:

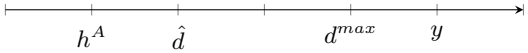
This group of taxpayers needs to make a false claim to pay zero tax and thinks that the auditing threshold is lower than their legal claim. Before the reform, these taxpayers did not report a false claim, and their total deduction is equal to the legal claim they can make.

Conditions Before the Law:

$$h^A \leq \hat{d} \leq y \leq d^{max}$$



$$h^A \leq \hat{d} \leq d^{max} \leq y$$



Solution Before the Law:

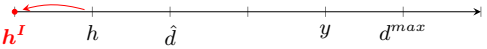
$$\begin{aligned} d &= \hat{d} \\ e &= 0 \\ T &= (y - \hat{d})t \end{aligned}$$

Depending on where the itemizing threshold falls in relation to the other monetary amounts of the taxpayer's tax form, there are four possible scenarios for a change.

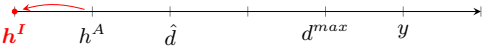
- The itemizing threshold is lower than the taxpayer's previously believed auditing threshold, the legal deduction, and the income. In this case, the taxpayer can either assume the cost of filling out the itemizing form and keep declaring $\hat{d}$ or make a deduction of h^I.

Conditions After the Law:

$$\boldsymbol{h^I} \leq h^A \leq \hat{d} \leq y \leq d^{max}$$



$$\boldsymbol{h^I} \leq h^A \leq \hat{d} \leq d^{max} \leq y$$



Solutions

Before the Law:	*After the Law:*	
	if $(\hat{d} - h^I)t > c$	if $(\hat{d} - h^I)t \leq c$
$d = \hat{d}$	$d = \hat{d}$	$d = h^I$
$e = 0$	$e = 0$	$e = 0$
$T = (y - \hat{d})t$	$T = (y - \hat{d})t$	$T = (y - h^I)t$
	Itemize: Yes	Itemize: No

- The itemizing threshold is higher than the taxpayer's previous believed auditing threshold, but lower than her legal claim. As before, the taxpayer can either

assume the cost of filling out the itemizing form and keep declaring d or make a deduction of h^I.

Conditions After the Law:	*Solutions*		
	Before the Law:	*After the Law:*	
		if $(\hat{d} - h^I)t > c$	if $(\hat{d} - h^I)t \leq c$
$h^A \leq \boldsymbol{h^I} \leq \hat{d} \leq y \leq d^{max}$	$d = \hat{d}$	$d = \hat{d}$	$d = h^I$
	$e = 0$	$e = 0$	$e = 0$
$h^A \leq \boldsymbol{h^I} \leq \hat{d} \leq d^{max} \leq y$	$T = (y - \hat{d})t$	$T = (y - \hat{d})t$	$T = (y - h^I)t$
		Itemize: Yes	Itemize: No

- The itemizing threshold is higher than the taxpayer's believed auditing threshold from before the reform and higher than her legal claim, but lower than her income. This taxpayer has incentive to report a deduction equal to the itemizing threshold.

Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
$h^A \leq \hat{d} \leq \boldsymbol{h^I} \leq y \leq d^{max}$	$d = \hat{d}$	$d = h^I$
	$T = (y - \hat{d})t$	$T = (y - h^I)t$
$h^A \leq \hat{d} \leq \boldsymbol{h^I} \leq d^{max} \leq y$	$e = 0$	$e = h^I - \hat{d}$
		Itemize: No

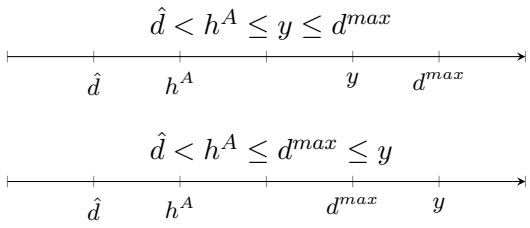
- The itemizing threshold is higher than the taxpayer's previous believed auditing threshold, legal claim, and income. This taxpayer has incentive to report a deduction equal to her income.

Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
	$d = \hat{d}$	$d = y$
$h^A \leq \hat{d} \leq y \leq \boldsymbol{h^I} \leq d^{max}$	$T = (y - \hat{d})t$	$T = 0$
	$e = 0$	$e = y - \hat{d}$
		Itemize: No

Case 4:

For this group of taxpayers, their belief about the auditing threshold before the reform was binding. Their believed auditing threshold falls between their legal claim and their income.

Conditions Before the Law:



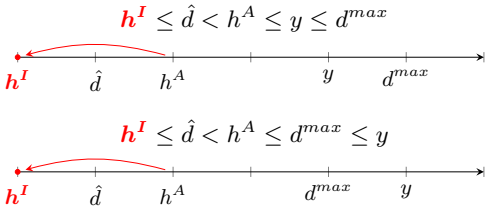
Solution Before the Law:

$$\begin{aligned} d &= h^A \\ e &= h^A - \hat{d} \\ T &= (y - h^A)t \end{aligned}$$

Depending on where the itemizing threshold falls in relation to the other monetary amounts of the taxpayer's tax form, there are four possible scenarios for a change.

- The itemizing threshold is lower than the legal deduction the taxpayer can make, the taxpayer's previous believed auditing threshold, and the income. In this case, the taxpayer can either assume the cost of filling out the itemizing form and keep declaring $\hat{d}$ or make a deduction equal to h^I.

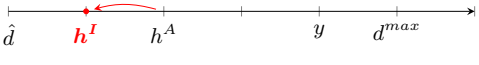
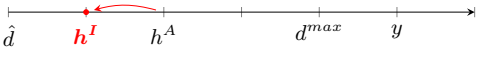
Conditions After the Law:



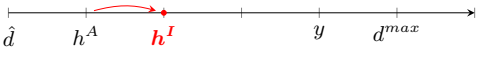
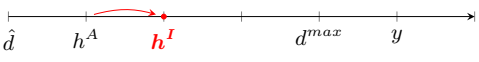
Solutions

Before the Law:	*After the Law:*	
	if $(\hat{d} - h^I)t > c$	if $(\hat{d} - h^I)t \leq c$
$d = h^A$	$d = \hat{d}$	$d = h^I$
$e = h^A - \hat{d}$	$e = 0$	$e = 0$
$T = (y - h^A)t$	$T = (y - \hat{d})t$	$T = (y - h^I)t$
	Itemize: Yes	Itemize: No

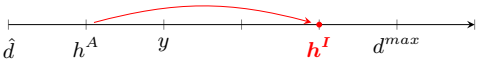
- The itemizing threshold is higher than the legal deduction the taxpayer can make but lower than the belief she used to hold about the auditing threshold and her income. The taxpayer decreases her deduction to the itemizing threshold because she cannot justify the false claims she made previously.

Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
$\hat{d} \leq \boldsymbol{h^I} < h^A \leq y \leq d^{max}$ 	$d = h^A$	$d = h^I$
	$e = h^A - \hat{d}$	$e = h^I - \hat{d}$
$\hat{d} \leq \boldsymbol{h^I} < h^A \leq d^{max} \leq y$ 	$T = (y - h^A)t$	$T = (y - h^I)t$
		Itemize: No

- The itemizing threshold is higher than their legal claim and the belief the taxpayer holds about the auditing threshold before, but lower than her income. This taxpayer has incentive to report a deduction equal to the itemizing threshold.

Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
$\hat{d} < h^A \leq \boldsymbol{h^I} \leq y \leq d^{max}$ 	$d = h^A$	$d = h^I$
	$e = h^A - \hat{d}$	$e = h^I - \hat{d}$
$\hat{d} < h^A \leq \boldsymbol{h^I} \leq d^{max} \leq y$ 	$T = (y - h^A)t$	$T = (y - h^I)t$
		Itemize: No

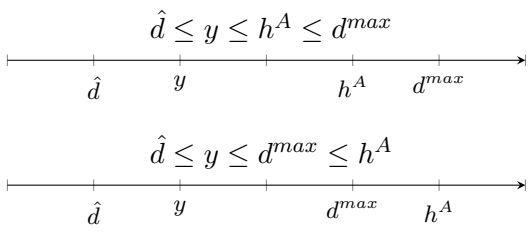
- The itemizing threshold is higher than the taxpayer's legal claim, previously believed auditing threshold, and income. This taxpayer has incentive to report a deduction equal to her income.

Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
	$d = h^A$	$d = y$
$\hat{d} < h^A \leq y \leq \boldsymbol{h^I} \leq d^{max}$	$e = h^A - \hat{d}$	$e = y - \hat{d}$
	$T = (y - h^A)t$	$T = 0$
		Itemize: No

Case 5:

This group of taxpayers initially believed that the auditing threshold was larger than their income, so they were making a total deduction equal to their income and paid zero tax before the reform.

Conditions Before the Law:



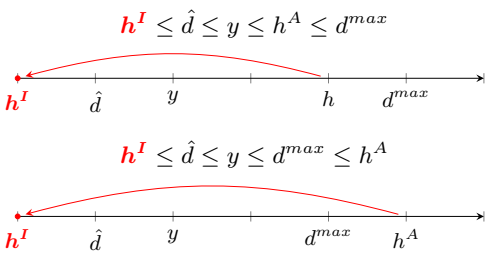
Solution Before the Law:

$$\begin{aligned} d &= y \\ e &= y - \hat{d} \\ T &= 0 \end{aligned}$$

Depending on where the itemizing threshold falls in relation of the other amounts of the taxpayer's tax form there are four possible scenarios for a change.

- The threshold of the itemizing rule is lower than the legal deduction the taxpayer can make, her income, and her believed auditing threshold from before the reform. In this case, the taxpayer can either assume the cost of filling out the itemizing form and keep declaring $\hat{d}$ or make a deduction equal to h^I.

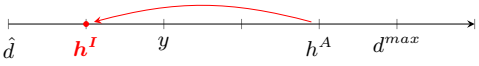
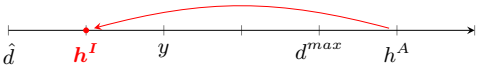
Conditions After the Law:



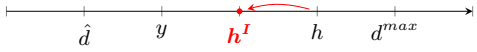
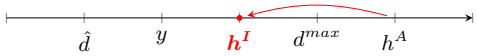
Solutions

Before the Law:	*After the Law:*	
	if $(\hat{d} - h^I)t > c$	if $(\hat{d} - h^I)t \leq c$
$d = y$	$d = \hat{d}$	$d = h^I$
$e = y - \hat{d}$	$e = 0$	$e = 0$
$T = 0$	$T = (y - \hat{d})t$	$T = (y - h^I)t$
	Itemize: Yes	Itemize: No

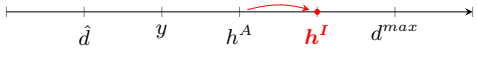
- The itemizing threshold is higher than the legal deduction the taxpayer can make, but lower than her income and the belief they used to hold about the threshold. The taxpayer decreases her deduction to the itemizing threshold because she cannot justify the false claims she made previously.

Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
$\hat{d} \leq \boldsymbol{h^I} \leq y \leq h^A \leq d^{max}$ 	$d = y$	$d = h^I$
	$e = y - \hat{d}$	$e = h^I - \hat{d}$
$\hat{d} \leq \boldsymbol{h^I} \leq y \leq d^{max} \leq h^A$ 	$T = 0$	$T = (y - h^I)t$
		Itemize: No

- The itemizing threshold is higher than the legal deduction the taxpayer can make but lower than her income, and her previously believed auditing threshold. The taxpayer decreases her deduction to the itemizing threshold because she cannot justify the false claims she made previously.

Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
$\hat{d} \leq y \leq \boldsymbol{h^I} \leq h^A \leq d^{max}$ 	$d = y$	$d = y$
	$e = y - \hat{d}$	$e = y - \hat{d}$
$\hat{d} \leq y \leq \boldsymbol{h^I} \leq d^{max} \leq h^A$ 	$T = 0$	$T = 0$
		Itemize: No

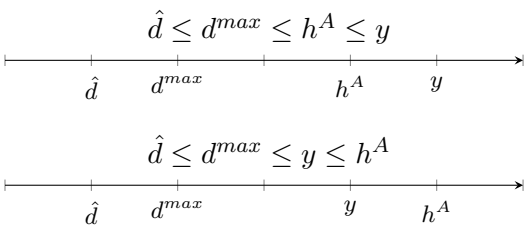
- The itemizing threshold is higher than the taxpayer's legal claim, income, and previously believed auditing threshold. Since this taxpayer was already paying zero tax and believes the tax authority will not check her deductions, she has no incentive to change her tax form.

Conditions After the Law:	*Solutions*	
	Before the Law:	*After the Law:*
$\hat{d} \leq y \leq h^A \leq \boldsymbol{h^I} \leq d^{max}$ 	$d = y$	$d = y$
	$e = y - \hat{d}$	$e = y - \hat{d}$
	$T = 0$	$T = 0$
		Itemize: No

Case 6:

The taxpayers in this group think that the deduction is not large enough relative to their income to call the attention of the tax authority. Hence, they think the probability of detection is always zero and were already taking the maximum deduction before.

Conditions Before the Change:



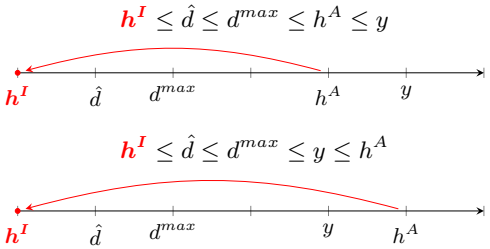
Solution Before the Change:

$$\begin{aligned} d &= d^{max} \\ e &= d^{max} - \hat{d} \\ T &= (y - d^{max})t \end{aligned}$$

Depending on where the itemizing threshold falls in relation to the other monetary amounts of the taxpayer's tax form, there are two possible scenarios for a change.

- The itemizing threshold is lower than the legal deduction the taxpayer can make, her income, and her believed auditing threshold from before the reform. In this case, the taxpayer can either assume the cost of filling out the itemizing form and keep declaring d^{max} or make a deduction equal to h^I.

Conditions After the Law:

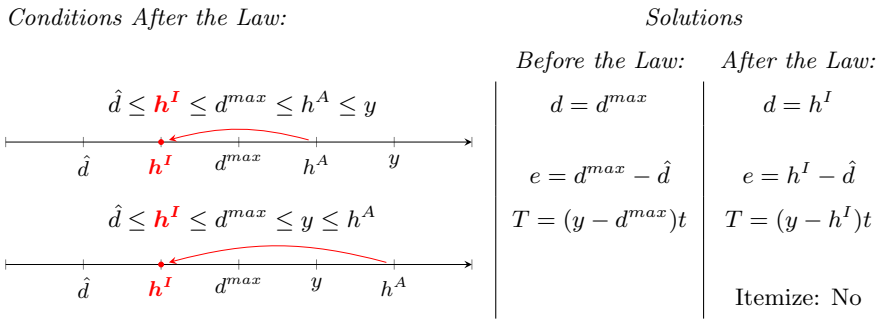


Solutions

Before the Law:	*After the Law:*	
	if $(y - h^I)t > c$	if $(y - h^I)t \leq c$
$d = d^{max}$	$d = \hat{d}$	$d = h^I$
$e = d^{max} - \hat{d}$	$e = 0$	$e = 0$
$T = (y - d^{max})t$	$T = (y - \hat{d})t$	$T = (y - h^I)t$
	Itemize: Yes	Itemize: No

- The itemizing threshold is higher than the legal deduction the taxpayer can make, but lower than her income and her previously believed auditing threshold. The

taxpayer decreases her deduction to the itemizing threshold because she cannot justify the false claims she made previously.



A.2.3 Model with Hassle Cost and without Evasion

I start by considering a notch point created by the itemizing cost, the analysis of which was developed by Kleven and Waseem (2013). Taxpayers maximize their income after taxes. Their utility function is $U(z-T(z))$, where z is taxable income and $T(z)$ is the tax scheme. There is heterogeneity in income [10] that translates into a smooth distribution of taxable income $b_0(z)$ [11] as well as a smooth distribution of deductions $b_0(d)$ before the introduction of the notch. The tax scheme is a linear tax where the taxpayer is required to itemize and expend the cost c if her deduction is larger than the itemizing threshold, $T(z) = tz + c \cdot \mathbf{1}(d > d^*)$. When the notch is introduced at d^*, the tax liability increases by the hassle cost without a change in the marginal tax rate. Consider the taxpayer who in the absence of the hassle cost will choose a deduction $d^* + \epsilon$. She is strictly better off taking a lower deduction and reporting $z^* = y - d^*$ because of the hassle cost. The itemizing cost creates a region above the threshold that includes all taxpayers with taxable income in the interval $(z^*, z^* + \Delta z^*)$, which is strictly dominated by z^*. The taxpayer at $z^* + \Delta z^*$ is indifferent between either reporting z^* and not itemizing the deduction, or alternatively reporting $z^* + \Delta z^*$, itemizing the deduction, and covering the cost c. The taxpayers in the dominated region decrease their deduction as a result of the introduction of the itemizing rule. The density distribution of the deductions

[10] Usually, this heterogeneity of income is the result of heterogeneity in ability.
[11] $b_0(\cdot)$ is the original distribution of the variable inside the parenthesis.

exhibits an excess mass at d^* and a missing mass in the dominated region. Figure A1 illustrates the changes generated by the notch on the budget set, as shown in Figure A2.

A.3 Results - Appendix

A.3.1 Decomposition of the Bunching at the Itemizing Threshold

To ascertain the relative importance of the information and hassle cost mechanisms of the behavioral response around the itemizing threshold, I use the deductions declared on the original tax forms to create a counterfactual distribution of deductions, along with a bunching estimator. The excess number of taxpayers who increased their deduction to an amount near the itemizing threshold (and who were only affected by the conjecture response) was around 1,710; this bunching results only from the conjecture response. The taxpayers who initially made a deduction higher than $7,500 are affected by both mechanisms (the hassle cost and the conjecture response). The excess number of taxpayers who decreased their deduction to an amount near the threshold was around 459. The bunching in this second group could have resulted from both mechanisms. Even if we assume that all the taxpayers who decreased their deductions did so solely because of the hassle cost, the response from the taxpayers who increased their deductions due to the conjecture response was several times larger.

In June 2009, the tax administration started requiring all taxpayers who had taken a deduction larger than $7,500 to itemize their consumption. There was no other contemporary reform that affected the deductions. Before the reform, the $7,500 threshold was not meaningful in any way: there was no reason to believe that taking a deduction just below $7,500 was different from taking a deduction just above that value (see Figures A5 and A6). The filing requirement created a notch in the monitoring. Ideally, the distribution of the deductions before the reform should be compared with a placebo distribution that had not been exposed to the reform. The retroactive nature of the reform for the fiscal year 2008 creates this placebo distribution. I compare the original

income tax return for the fiscal year 2008 with the amended tax return, filed after the reform, for the same fiscal year. As shown in the previous section, two mechanisms drive the behavioral response of the employees. First, the employees who initially took a deduction lower than $7,500 increased their deduction due to the conjecture response. As a result, an excess mass around the threshold appears. This excess mass represents employees who would have taken a larger deduction if the threshold had been higher (as illustrated in Figure A3). Second, the employees who initially took a deduction larger than $7,500 decrease their deduction because they were making a false claim before (conjecture response), or because the savings from taking the extra deduction are lower than the hassle cost (as illustrated in Figure A3.)

Both movements, employees' increasing or decreasing their deductions after the reform, create an excess mass of employees just below the threshold for itemizing the deduction. I use a bunching estimator and the original declaration as a counterfactual distribution to ascertain the relative importance of each group. First, I estimate the excess mass from the employees who increase their deductions on the amended tax return. Then I repeat the exercise with the employees who decreased their deduction.

I combine the empirical distribution of the original deductions and the amended deductions by using the information from the amended tax returns for the employees who initially took a deduction lower than or equal to $7,500 and the information from the original tax form for the remaining employees. Then I closely follow a standard bunching estimation as in Chetty et al. (2011). I start by subtracting $7,500 from the reported deduction and create the bins from the distribution to center the bunching at zero. For instance, for bins with a width of $125, the bin -125 has the count of employees who reported a deduction larger than $7,375 and lower than or equal to $7,500 on their amended tax form, and the bin $+125$ has the count of employees who reported a deduction larger than $7,500 and lower than or equal to $7,625 on their original tax form. I use the binned data to fit a polynomial, excluding the data near the kink to construct a counterfactual distribution. I compare that result with the

polynomial created including the excluded area, and I iterate the process as described below.

I estimate Equation 9 and compare it with the estimation of Equation 10.

$$C_j = \sum_{i=0}^{q} \beta_i^0 (D_j)^i + \varepsilon_j^0 \tag{9}$$

$$C_j = \sum_{i=0}^{q} \beta_i^0 (D_j)^i + \sum_{i=-R}^{R} \gamma_i^0 \cdot 1[D_j = i] + \varepsilon_j^0 \tag{10}$$

where C_j is the number of employees in the deduction bin j, D_j is the deduction relative to the threshold of \$7,500 in US dollars, q is the order of the polynomial, and R is the width of the excluded region in US dollars. The excess number of employees (B_N) is the difference between Equation 10 and Equation 9 with some caveats. The initial estimation for the counterfactual distribution is $\hat{C}_j^0 = \sum_{i=0}^{q} \hat{\beta}_i^0 (D_j)^i$, and the initial excess number of employees is the difference between the count on the bin and the contrafactual count ($B_N^0 = C_j - \hat{C}_j^0 = \sum_{i=-R}^{R} \gamma_i^0$). This initial estimate does not account for the fact that the excess of employees under the threshold would otherwise be located over the threshold, so the counterfactual distribution is moved to the right until the number of employees within R of the threshold is the same (integration constraint). The counterfactual distribution ($\hat{C}_j = \sum_{i=0}^{q} \hat{\beta}_i (D_j)^i$) is the fitted value of the following estimation:

$$C_j \cdot \left(1 + 1[j > R] \frac{\hat{B_N}}{\sum_{j=R+1}^{\infty} C_j} \right) = \sum_{i=0}^{q} \beta_i (D_j)^i + \sum_{i=-R}^{R} \gamma_i \cdot 1[D_j = i] + \varepsilon_j \tag{11}$$

where $\hat{B}_N = C_J - \hat{C}_j = \sum_{i=-R}^{R} \gamma_i$. In Equation 11 the dependent variable depends on the estimation of the estimates on the right-hand side, so Equation 11 is estimated by plugging the estimate of $\hat{B}_N$ of the previous estimation[12] until a fixed point is reached.

[12]Starting from $\hat{B}_N^0$ calculated with Equations 9 and 10.

Finally, and following the bunching literature, I define the excess mass around the kink relative to the average density of the counterfactual distribution of deductions between $-R$ and $+R$ as:

$$\hat{b} = \frac{\hat{B}_N}{\frac{\sum_{j=-R}^{R} \hat{C}_j}{2R+1}} \tag{12}$$

The standard errors for $\hat{b}$ are calculated using a bootstrapping procedure. In order to get a sense of scale concerning all the employees, not just those who amended their returns, I add the frequency of employees who did not amend to the bin and repeat the procedure. The excess number of employees who increased their deduction and were only affected by the conjecture response is around 1,710, which is equivalent to 5.4 times the average height of the counterfactual distribution for the employees who changed their tax return, or 1.7 times the total number of employees in that area. (See Figures A7 and A9 and Table A2)

The employees who initially took a deduction higher than $7,500 are affected by two mechanisms (information and hassle costs). Part of the excess mass of employees under the threshold corresponds to these employees. I follow the same procedure as before, but I use the information from the amended tax forms for the employees who initially took a deduction larger than $7,500 and the information from the original tax form for the rest. As before, I subtract $7,500 from the reported deduction and create the bins from the distribution. For instance, for a bin with a width of $125, the bin -125 has the count of employees who reported a deduction larger than $7,375 and lower than or equal to $7,500 in their original tax return, as well as the employees who initially had taken a deduction larger than $7,500 and later took a deduction within that range on the amended tax form. The bin $+125$ has the count of employees who reported a deduction larger than $7,500 and lower than or equal to $7,625 in their amended tax form. I also repeated the procedure, adding the frequency of the employees who did not amend their tax return to the bins depending on their original deduction, to have

a sense of scale.

The excess number of employees who decreased their deduction and were affected by the conjecture response and the hassle cost is around 459, which is equivalent to 2.3 times the average height of the counterfactual distribution for the employees who changed their tax return, or 0.7 times the total of employees in that area. (See Figures A8 and A10 and Table A3).

In the case of the creation of the itemizing rule for personal expenses in Ecuador, the conjecture response generated a substantial part of the behavioral response of employees who bunch at the threshold of the itemizing rule. Even if we assume that all the employees who decreased their deductions did so because of the hassle cost, the response from the employees who increased their deductions due to the conjecture response is several times larger.

The overall effect of requiring employees with deductions larger than $7,500 to itemize the deduction was an increase in the overall reported deduction. When comparing the reported tax liability from the original tax return and the amended tax return, the net effect was a loss of around $3.5 million across the 61,239 employees who amended their return[13]. As shown in the previous subsections, the behavioral response has two components: the behavior of the taxpayers who bunched around the itemizing threshold and the behavior of the taxpayers who increase/decrease their deductions far from the threshold. The employees who initially took a deduction lower than $7,500 increased their reported deductions on average, while the employees who initially took a deduction higher than $7,500 decreased their reported deductions on average. The overall effect on reported tax liability is driven by the fact that far more employees increased their deductions than decreased their deductions.

A.4 Figures and Tables - Appendix

[13]This is the difference between the reported tax liability on the original and amended tax returns. It is possible that an employee owed tax in the original tax return but amended it, and in the new tax return, the tax due is zero. Under the Ecuadorian Tax Code, the original debt disappears.

Figure A1: Budget Set

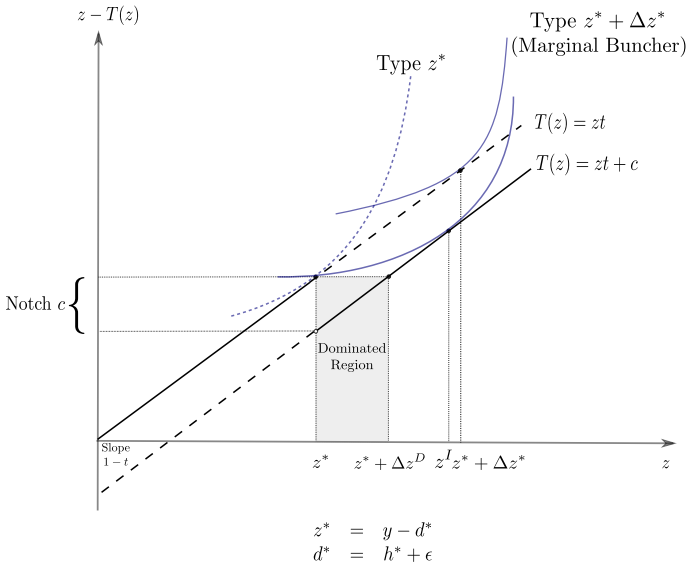


Figure A2: Density Distribution Diagram

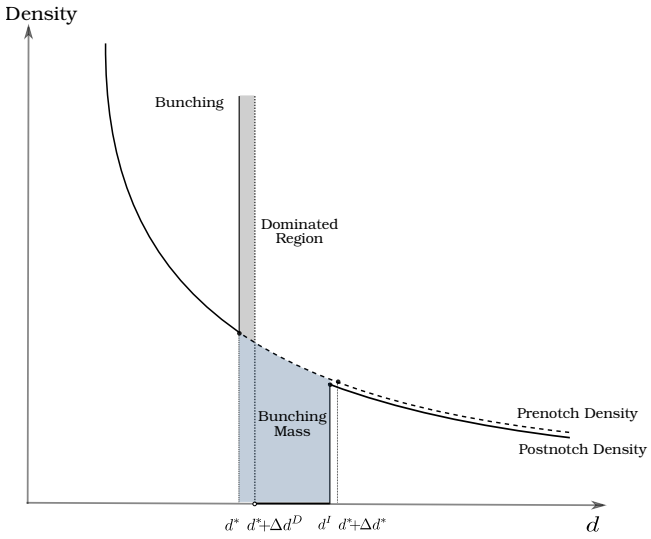


Figure A3: Change in the Distribution of the Deduction

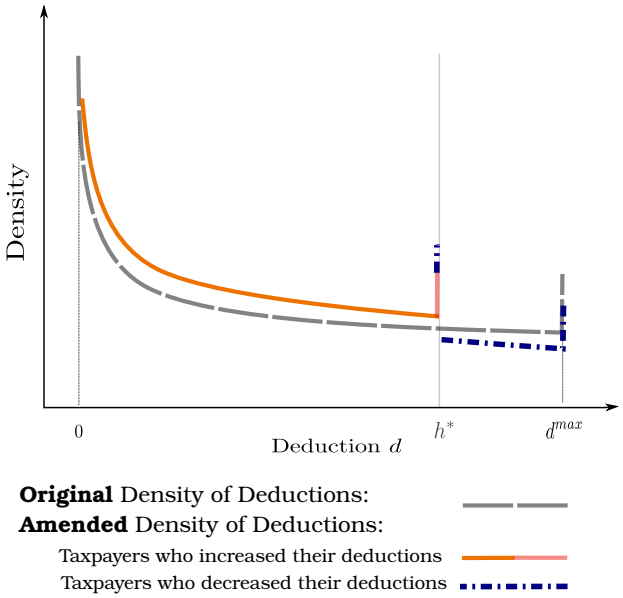
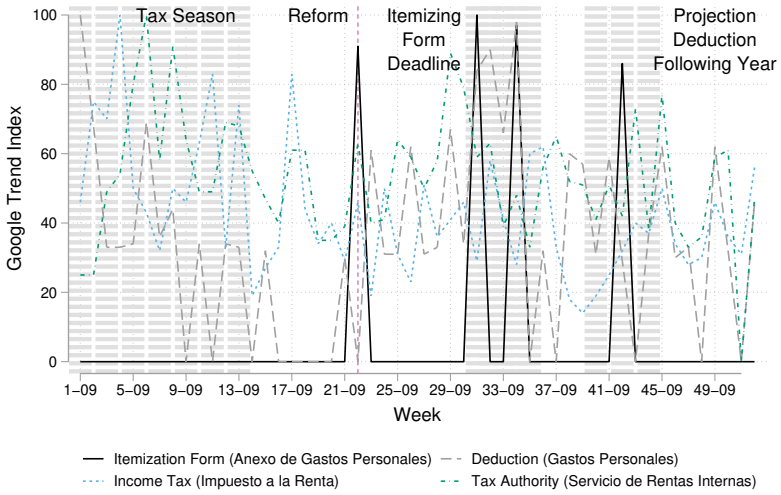
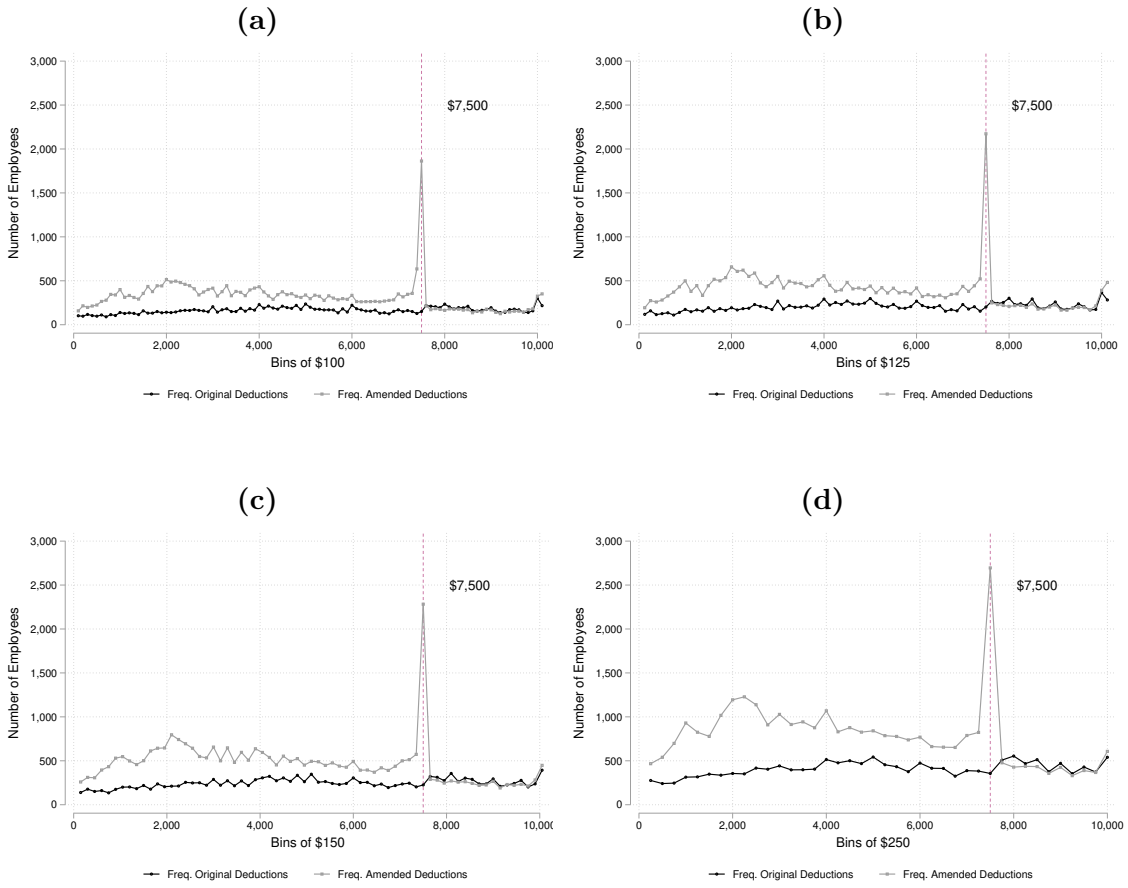


Figure A4: Google Trends 2009



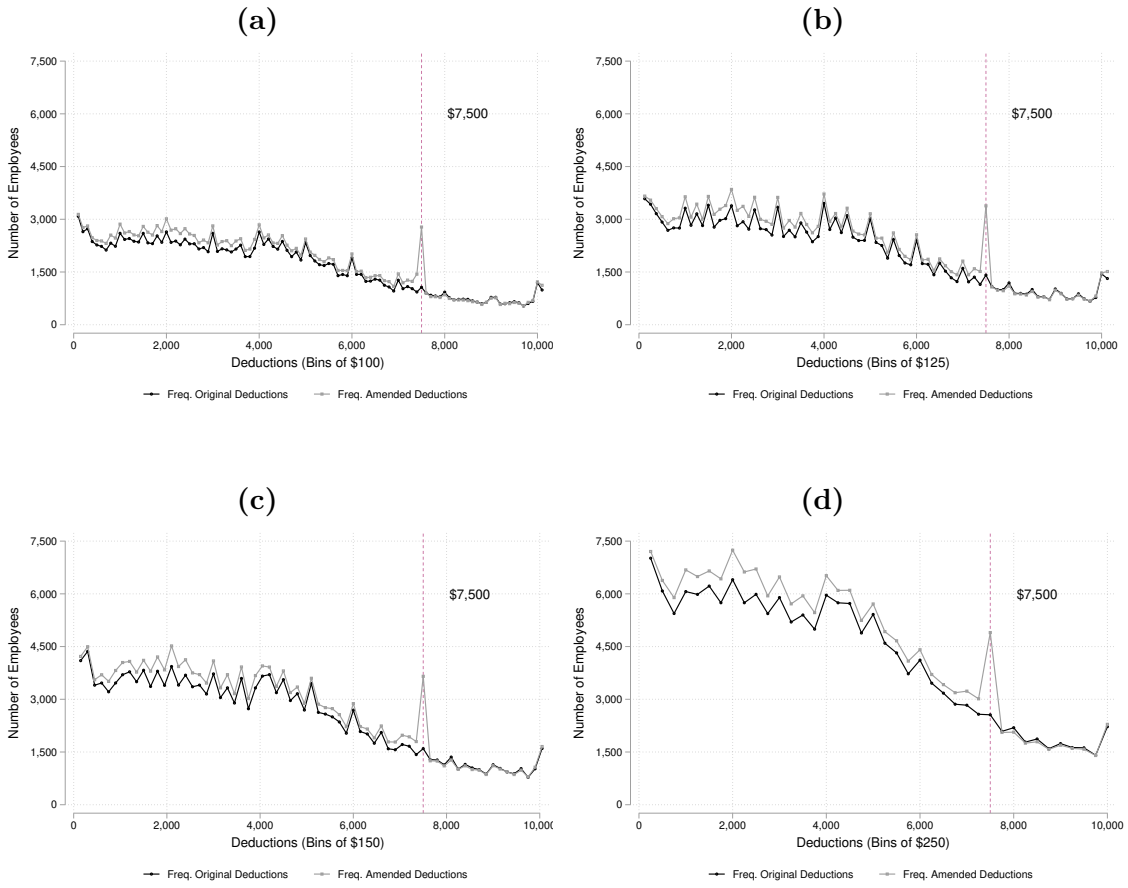
The numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term (Google Trends).

Figure A5: Frequency of the Deductions on the Original and Amended Tax Returns - (Includes Employees Who Amended)



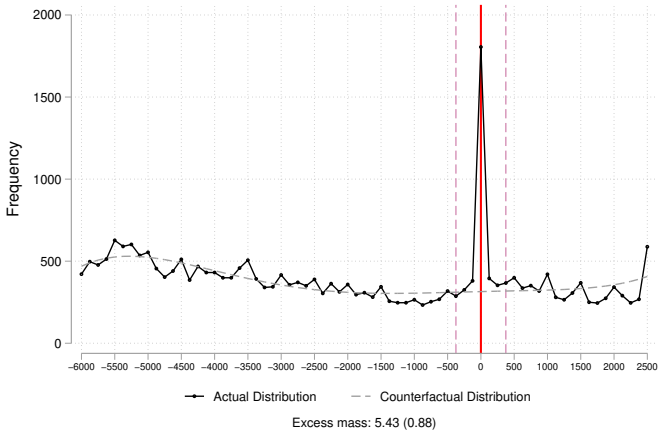
The bins for zero deduction and the maximum deduction are excluded from the graph.

Figure A6: Frequency of the Deductions on the Original and Amended Tax Returns Includes All Employees



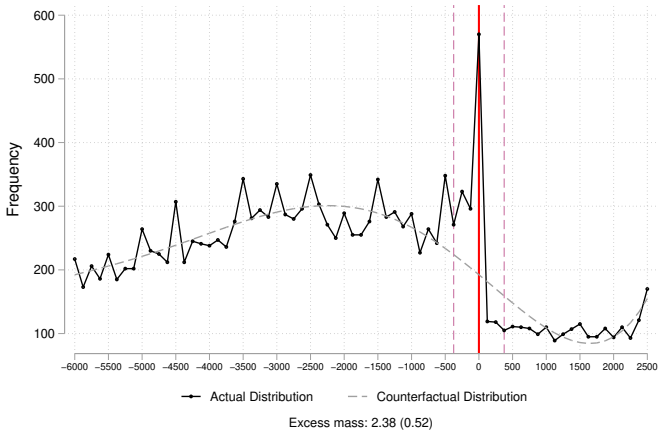
The employees who did not amend their income tax return are assigned a deduction for the amendment equal to the deduction in the original tax return. The bins for zero deduction and maximum deduction are excluded from the graph.

Figure A7: Bunching Estimator for the Employees Affected Only by the Conjecture Response (Only Employees who Amended their Tax Return)



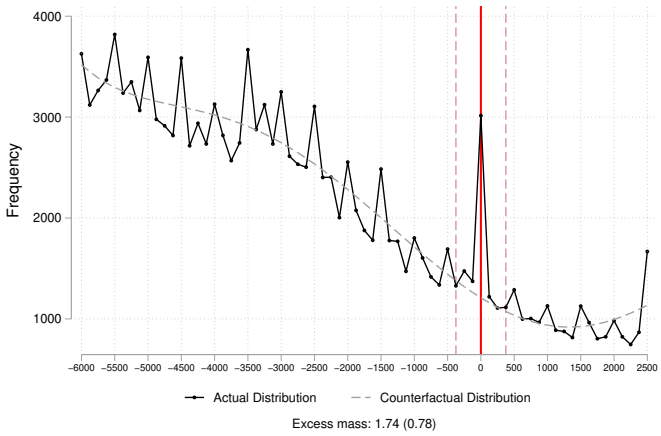
The binned data includes the amended deductions of the employees who initially made a deduction lower than or equal to $7,500 and the information from the original tax form for the rest of the taxpayers.

Figure A8: Bunching Estimator for the Employees Affected by the Conjecture and Hassle Cost Mechanisms (Includes Only Employees who Amended their Tax Return)



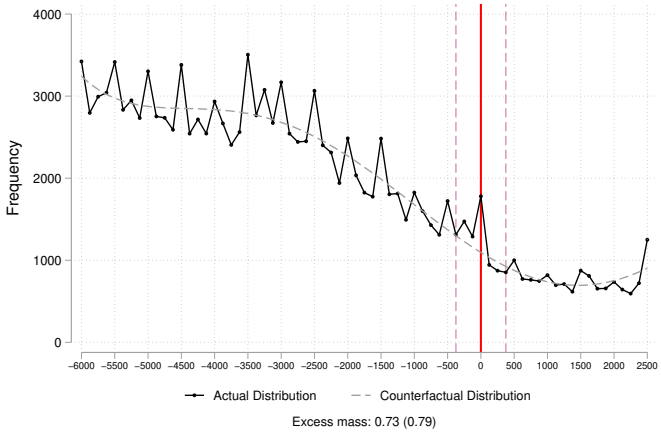
The binned data includes the amended deductions of the employees who initially made a deduction higher than $7,500 and the information from the original tax form for the rest of the taxpayers.

Figure A9: Bunching Estimator for the Employees Affected Only by the Conjecture Mechanism (Includes All Employees)



The binned data includes the amended deductions of the employees who initially made a deduction lower than or equal to $7,500 and the information from the original tax form for the rest of the taxpayers. The taxpayers who only filled in a tax return before the reform are included in the bins too.

Figure A10: Bunching Estimator for the Taxpayers Affected by the Conjecture and Hassle Cost Mechanisms (Includes All Employees)



The binned data includes the amended deductions of the employees who initially made a deduction higher than $7,500 and the information from the original tax form for the rest of the taxpayers. The taxpayers who only filled in a tax return before the reform are included in the bins, too.

Table A2: Bunching Estimator - Employees Affected Only by Conjecture Mechanism

Excess Mass Around the Kink $\hat{b}$	**Bootstrap SE** $\hat{b}_{SE}$	**Excess Num. of Taxpayer** B_N	**Excluded Area Around The Kink**	**Range**	**Bandwidth**	**Polynomial Degree**	**Num. of Bins**	**Num. Taxpayers in Range**
Taxpayers who amended their tax form								
5.44***	(0.87)	1,710	±375	[−6000, 2500]	125	5	69	27,173
4.81***	(0.67)	1,593	±375	[−6000, 2500]	125	7	69	27,173
4.62***	(0.79)	1,737	±450	[−6300, 2550]	150	5	60	28,287
3.86***	(0.64)	1,553	±450	[−6300, 2550]	150	7	60	28,287
4.81***	(0.89)	1,779	±450	[−5850, 2550]	150	5	57	26,905
4.25***	(0.64)	1,650	±450	[−5850, 2550]	150	7	57	26,905
All Taxpayers								
1.74**	(0.78)	2,114	±375	[−6000, 2500]	125	5	69	146,655
1.45*	(0.78)	1,824	±375	[−6000, 2500]	125	7	69	146,655
1.55**	(0.71)	2,297	±450	[−6300, 2550]	150	5	60	155,380
1.46*	(0.73)	2,185	±450	[−6300, 2550]	150	7	60	155,380
1.72**	(0.73)	2,497	±450	[−5850, 2550]	150	5	57	143,495
1.72**	(0.74)	2,491	±450	[−5850, 2550]	150	7	57	143,495

The distribution of deduction that was binned is the combination of the empirical distribution of the deduction reported on the original and amended tax returns. For the sample of taxpayers who amended their tax form, it includes the amended deduction for the taxpayers who initially made a deduction lower or equal to $7,500 and the information of the original tax form for the rest of taxpayers. The sample of all taxpayers also includes deduction reported before the reform for the rest of the taxpayers. I subtract $7,500 from the deduction to make the reference point zero. Bootstrapped standard errors are in parentheses.
$*p < 0.10$, $**p < 0.05$, $***p < 0.01$

Table A3: Bunching Estimator - Employees Affected by the Conjecture and Hassle Cost Mechanisms

Excess Mass Around the Kink $\hat{b}$	**Bootstrap SE** $\hat{b}_{SE}$	**Excess Num. of Taxpayer** B_N	**Excluded Area Around The Kink**	**Range**	**Bandwidth**	**Polynomial Degree**	**Num. of Bins**	**Num. Taxpayers in Range**
Taxpayers who amended their tax form								
2.39***	(0.55)	459	±375	[−6000, 2500]	125	5	69	15,364
2.3***	(0.6)	446	±375	[−6000, 2500]	125	7	69	15,364
2.38***	(0.47)	541	±450	[−6300, 2550]	150	5	60	15,886
2.46***	(0.57)	554	±450	[−6300, 2550]	150	7	60	15,886
2.34***	(0.51)	534	±450	[−5850, 2550]	150	5	57	15,207
2.47***	(0.56)	556	±450	[−5850, 2550]	150	7	57	15,207
All Taxpayers								
0.73	(0.75)	808	±375	[−6000, 2500]	125	5	69	134,846
0.54	(0.79)	612	±375	[−6000, 2500]	125	7	69	134,846
0.77	(0.65)	1,033	±450	[−6300, 2550]	150	5	60	142,979
0.83	(0.72)	1,108	±450	[−6300, 2550]	150	7	60	142,979
0.9	(0.71)	1,182	±450	[−5850, 2550]	150	5	57	131,797
1.02	(0.71)	1,320	±450	[−5850, 2550]	150	7	57	131,797

The distribution of deduction that was binned is the combination of the empirical distribution of the deduction reported on the original and amended tax returns. For the sample of taxpayers who amended their tax form, it includes the amended deduction for the taxpayers who initially made a deduction higher or equal to $7,500 and the information of the original tax form for the rest of taxpayers. The sample of all taxpayers also includes deduction reported before the reform for the rest of the taxpayers. I subtract $7,500 from the deduction to make the reference point zero. Bootstrapped standard errors are in parentheses.
$*p < 0.10$, $**p < 0.05$, $***p < 0.01$