Third-party Audit and Tax Compliance – Evidence from a Notched Policy in India *

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Abstract

Can resource-constrained tax administrations rely on third-party auditors to overcome conflict of interest and increase compliance? We evaluate a notched policy in India which mandates firms to undergo third-party audit if their reported revenues exceed a specified threshold. We argue that static bunching estimates can be biased in a dynamic setting where firms optimize over several time-periods. Using sample of administrative data, we develop a novel empirical framework to assess the impact of a notched policy on variables other than the running variable. The difference-in-differences estimates suggest that firms remit 20 percent higher taxes and report 16 percent higher taxable income once they are subject to third-party audits. The audit effect is heterogeneous, with firms paying higher taxes if they generate substantial paper trails or employ fewer workers. Finally, extending third-party audit to smaller firms can be cost-effective and substantially increase government revenue.

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1 Introduction

Weak state capacity can attenuate the efforts of governments to mobilize domestic resources and invest them effectively in physical and human capital. As of 2015, 35 of the world's 75 poorest countries collect less than 15 percent of GDP in the form of taxes [World bank (2018), Gordon and Li (2009)]. One way to circumvent the problem of low tax revenue is to rely on private agents to increase tax compliance. Though such policies are quite pervasive, including in the developed world[1] [OECD (2019)], there is little empirical literature analyzing the consequences of privatizing specific functions of tax administrations.

In several contexts, private agents entrusted with regulatory functions face a conflict of interest as they are paid by the economic agents whom they are supposed to regulate. Private auditors have been shown to misreport the truth in many settings like environment audits [Duflo et al.(2013)], credit ratings [Fracassi et al.(2016), Griffin and Tang(2011)], social audit of global supply chains [Short et al.(2016)], among others. This paper evaluates the Indian income tax department's use of third-party auditors to certify tax returns and report discrepancies. In the context of this policy, we investigate whether third-party auditors act as watchdogs on behalf of the tax department, or whether they instead help firms misreport their income to lower their tax liability. We also analyze if certain firm-level characteristics influence the efficacy of the third-party audit.

Our primary data source is an anonymized sample of income tax returns filed by small and medium-sized Indian companies from 2009-16. We use it to get information on firm-level characteristics like revenue, auditor's fee, tax liability etc. We create a unique dataset by merging the administrative data with supply-use tables to get industry-level characteristics of these firms.[2]

[1]For instance, the Internal Revenue Service in USA has run several programs in the past decade, where private agencies are entrusted with collecting outstanding debts from the taxpayers. A list of functions outsourced across countries can be found in the OECD report on Tax Administrations - 2019.

[2]The supply-use tables, created by Ministry of Statistics and Program Implementation, document the final use of the output of each industry. We use these tables to calculate the proportion of output that is sold to the final consumer by the firm in a particular industry.

Our empirical strategy exploits discontinuity in the audit requirement created by tax law, where all companies whose gross revenue, or "turnover", exceeded a specified threshold were required to undergo third-party audit – resulting in an audit notch. This threshold was changed twice between 2009-16, the period of our study, providing quasi-experimental variation for causal analysis. Specifically, we exploit the change in 2012, when the threshold was increased from Rs.6 million to Rs.10 million[3]. We use a difference-in-differences design to estimate the impact of the policy on variables such as tax payments, where the treatment is defined as exemption from third-party audit due to an increase in the threshold. We consider *private firms* in the neighborhood of the notch in 2011, to be the treatment group, while *public firms*[4] in the same neighborhood form the comparison group. Though public firms are also subject to third-party audit, they are much less influenced by this policy because the gains from evasion are diluted amongst the larger number of shareholders but the punishment from being caught falls heavily on managers. The managers of public firms are less likely to be a shareholder than their counterparts in private firms which decreases their incentive to evade taxes [Crocker and Slemrod (2005)].[5]

The neighborhood in which the firms respond to a notch has traditionally been estimated using bunching techniques. The static bunching analysis developed by Kleven and Waseem (2013) relies on the ocular method to determine the lower bound of the treatment neighborhood by assuming that all the bunchers originate from the right side of the threshold and bunch precisely at the threshold. The upper bound is found by constructing a counterfactual density so that the excess bunching mass below the threshold is equal to the missing mass

[3]The average exchange rate from 2009-16 was Rs.55.65 per dollar. This implies that the threshold was increased from $10,782 to $17,969.

[4]The public firms, contrary to private firms, have no restrictions on the sale of securities by its shareholders. Public firms include firms listed and unlisted on the stock exchange and government-owned firms.

[5] The proportion of shareholders to managers is comparatively larger in public firms than private firms due to statutory and operational requirements (see appendix C). Thus, the probability of a manager being a shareholder is lower in a public company than a private company. Another reason for public companies to comply with tax laws - with or without third-party audit - is that if they decide to sell shares to the public, then they must post information about their accounts for the preceding five years in the public domain. Crocker and Slemrod (2005) show that penalties imposed on the tax manager are more effective in reducing evasion than those imposed on shareholders, even in the presence of contracts that incentivize managers to evade taxes.

above it. However, while this method works well in a static one-shot setting, a more realistic model of firm behavior must take into account the dynamic nature of their decision-making. In light of this, our paper provides a theoretical framework to show that static bunching analysis can under-estimate the upper bound of the neighborhood in a dynamic setting. We improve upon static-bunching methodology by considering the possibility that bunchers can originate from the left-side of the threshold in a multiple time-period model. If firms believe that reporting zero growth for multiple time-periods will increase the probability of getting caught, then they are likely to arrest their growth to bunch well below the threshold rather than precisely at it. In such a scenario, the excess mass will be diffused, making it harder to estimate the lower bound visually and hence, harder also to estimate the upper bound.

Empirically, we estimate the upper bound by calculating the likelihood of a firm being in the bunching region (Rs.9 million to 10 million) in 2013, based on its turnover in 2011. However, a firm can be in the bunching region due to reasons other than the impact of the policy change such as natural growth. To quantify the effect of these other reasons, we calculate the likelihood of being in the bunching region in 2011, when there was no notch at Rs.10 million, based on turnover in 2009. The difference between the two probabilities gives us a measure of firms reacting to the policy change. Using our improved methodology, we estimate that any firm having turnover up to Rs.15 million in 2011 has the opportunity to escape third-party audit by bunching below the notch. Above that value, the firms are too big to bunch because of high resource cost of mis-reporting. In comparison, the upper bound of the neighborhood in which the firms respond to the notch as calculated by the static analysis is considerably lower, at Rs.11.5 million.

Our main finding is that third-party audit is effective in increasing compliance by raising government revenue. The difference-in-difference results show that private firms that have an opportunity to escape third-party audit report approximately Rs.41,000 ($736) lower tax liability than similar sized public firms after the policy change. This represents a 20 percent reduction in taxes from the base-year mean tax liability. The decline in the taxable income is Rs.102,000 ($1,832), which is 16 percent of the base-year mean income. This finding that firms lower their tax liability after receiving an exemption from the third-party audit is consistent with the substantial bunching of firms below the audit notch. We also find a larger decline in the tax payments by firms that generate a larger paper trail as extra audit is more likely to catch evasion of such firms, making them more likely to bunch. Firms that employ more workers bunch less due to the higher resource cost of evasion, since it is harder to sustain collusive agreements with multiple agents.

Finally, we comment on the welfare impact of the policy by comparing the marginal administrative cost of extending the third-party audit to one more firm and the resultant reduction in deadweight loss due to lower tax evasion [Slemrod and Yizhaki(1987), Slemrod(1994)]. We find that optimal audit-threshold might be lower than the current statutory limit under strong assumptions.

This study contributes to several strands of literature. First is methodological. Bunching analysis has become a preferred method to estimate the impact of a notched policy in several settings – optimal taxation [Kleven and Waseem(2013), Bachas and Soto(2018)]; housing markets [Best and Kleven(2017)]; fuel economy [Ito and Sallee(2018)], among others. There is a nascent literature on dynamic bunching that improves the static analysis by incorporating path-dependence [Marx(2018)] and predicting the counterfactual value of the running variable using nonparametric methods [Blomquist et al.(2018), Bertanha et al.(2018)] . We propose an alternate novel methodology to study the effect of a notch by incorporating strategic concerns. Second, literature shows that the efficacy of private auditors depends on several factors like technical expertise, length of association with the client, regulation etc [Short and Toffel(2015), Stopler(2009)]. We add to this body of literature by showing that private auditors are effective despite the conflict of interest due to high-quality training, limited competition and self-regulatory oversight. Third, our result showing effectiveness of third-party audit is complementary to the literature that shows significant effect of increased government audits on tax revenue [Basri, Felix, Hanna and Olken(2019), Almunia and Lopez-Rodriguez (2018)]. Finally, we contribute to the literature of tax evasion by showing that auditing and third-party reporting are complementary to each other [Pomeranz (2015), Almunia and Lopez-Rodriguez (2018), Kleven et. al (2011)].

The rest of the paper is organized as follows. In section 2 we introduce the institutional context and the data. In section 3 we provide the conceptual foundation which underpins our study. Section 4 discusses the empirical strategy and Section 5 provides the results. In sections 6 and 7, we conduct welfare analysis and run robustness checks. Section 8 concludes.

2 Context

2.1 Corporate Tax Law in India

The Income Tax Act of India is administered by the Ministry of Finance and recognizes 7 categories of taxpayers[6]. A taxpayer can choose to register as a company by registering under the Companies Act, 2013. The benefit of registering as a company is limited liability and relatively easy access to capital markets. The costs include greater reporting requirements in comparison to other taxpayer categories like submission of annual financial statement to the Ministry of Corporate Affairs.

The corporate income tax in India is 30 percent for all the domestic companies from 2009-15 and was reduced to 29 percent in 2016 for companies with turnover less than Rs.50 million in 2014.[7] In some cases, the company might have to pay a minimum alternate tax.[8]

The focus of our study is third-party tax audit carried out by Chartered Accountants

[6] These are – Individuals, Hindu Undivided Families, Companies, Partnership Firms, Association of Persons, Local Authorities and Artificial Juridical Entities

[7] In addition to the tax, there is a surcharge for companies having net taxable income in excess of Rs.10 million and an education cess of 3 percent on the tax and surcharge paid. Less than 4 percent of the companies in our sample were liable to pay cess and surcharge in any year. More than 95 percent of the companies in our sample qualified for the tax rate cut in 2016.

[8] If the taxes paid by the company are less than 18.5 percent of the book profits then the company has to pay MAT. The extra tax paid by the company, over and above its normal tax liability is available to it as MAT credit. This credit can be carried forward for up to 15 years and adjusted against actual tax liability in the future.

(CAs), who are a class of professional auditors in India. They are regulated by the Chartered Accountants Act and the Institute of Chartered Accountants of India (ICAI), a self-regulating professional body. The CA are licensed to perform both statutory audit and tax audit.[9] The tax audit places a significant compliance requirement on the company, which must now get minute tax-related details of its books of accounts certified by the CA. Examples of extra information include: (i) Details of all persons from whom loans have been taken or given during the year; (ii) Details of all persons whose tax has been withheld; (iii) Quantitative description of stock; (iv) Depreciation schedule of every asset; (v) Details of payments to related parties. Besides information cost, the firms also have to pay an auditor's fee to the CA who conducts the tax audit. The fee is determined according to several factors such as complexity of the firm's operations, location of the firms, among others.

The tax-audit is required if the company's turnover exceeds the thresholds provided in Section 44AB of the Income Tax Act. These thresholds have changed over the years - before 2010, it was Rs.4 million which changed to Rs.6 million in 2010. Subsequently, to reduce the compliance burden of small firms, the threshold was further increased to Rs.10 million in 2012.

Non-compliance with respect to the tax audit report carries a penalty of 0.5% of the turnover of the company subject to a maximum penalty of Rs.150,000. To allow CAs to perform their work independently, the appointment of the CA must be done by the board of directors. This means that CAs cannot be ordinarily removed by the company once appointed unless there are valid grounds to do so which are required to be recorded. In terms of remuneration, while there are no limits on the fees which can be paid to CAs, there is an ethical code which mandates that CAs cannot receive excessive fees. If the government agencies find inconsistencies in the report of the CA, they can recommend imposition of

[9] Every company is required to file a copy of its annual financial statements with the Ministry of Corporate Affairs. These statements comprise of the balance sheet, profit and loss account and the cash flow statement and have to be certified by the CA. The certified report of the CA is often referred to as the "statutory audit report"

fines and even cancellation of their license to practice[10]. Regulatory oversight of CAs in all matters outlined above is exercised by ICAI and the Ministry of Corporate Affairs.

2.2 Data

We use anonymized data of tax returns filed by small companies in India from 2009-16 obtained from the Ministry of Finance, India. The data includes some basic characteristics of the company like its residential status, sector of activity etc. It also includes the profit and loss account and balance sheet of the company. For our analysis, we use a restricted number of line items on the tax-form such as the turnover, profit, tax liability etc.

Table 1 gives the summary statistics of the comparison and the treatment group before and after the policy change in 2012. The count refers to the firm-year observations. The treatment group is defined as the private firms which have gross revenue or turnover between Rs.6 million to Rs.15 million in 2011 - a year before the policy change. The reason for taking this bandwidth of turnover is defined in the empirical strategy section. The comparison group consists of public firms having similar turnover limit in 2011. The public firms are defined as firms that have no restrictions on the sale of securities by its shareholders. These include both listed firms on the stock exchange and unlisted firms, and government firms (See Appendix C for differences between public and private firms). Table 1 shows that the public firms are approximately 3 percent of the number of the private firms.

Due to the large difference in the mean and median of the variables, we remove the effect of the outliers by winsorizing the data above the 97th percentile to that level, for each year. For variables, that can have negative value we censor both the tales at 1.5th and 98.5th percentile. We restrict the sample to companies that show positive turnover in all the years and file income tax form in all the years. This gives us a balanced sample of the active companies.

The turnover, total expenses, audit fee, and profit before interest, taxes and depreci-

[10] According to ICAI documents, there are 132,480 practicing CAs in 2018. Total disciplinary cases considered by ICAI were 598.

ation(PBITD) are taken from the profit and loss statement of the company, whereas the taxable income and tax liability are calculated from the tax schedule of income tax form. We define upstream ratio as percentage of sales that the industry in which the firm operates sells to the intermediate consumers. To get this ratio we use the supply-use tables in 2011, compiled by the Ministry of Statistics and Program Implementation. We match the sectors given in the tables with the sector reported by the firms in the income tax return form. Since, these sectors don't exactly match each other, we are only able to partially match the sectors. Therefore, the regressions using this measure have restricted sample size. The details of the matching are given in the Appendix B.

3 Theoretical Framework

The static bunching model in the presence of a notch was first developed by Kleven and Waseem(2013). An important assumption of the static model is that all the bunchers originate from the right-side of the threshold. In the absence of dynamic concerns, they bunch very close to the threshold, hence the researchers can visually determine the region where the excess mass of bunchers are located in response to the notch. The region from where the bunchers originated from is determined by estimating a counterfactual density after imposing the condition that excess mass is equal to the missing mass.

In our model we allow for the possibility that bunchers can originate from the left-side of the threshold. Some of the left-origin bunchers may slow-down their future growth due to dynamic concerns, resulting in a diffused excess mass below the threshold. This can potentially make it hard to visually determine the region where bunchers are present and consequently, a challenge to determine where the bunchers came from. There is no principled approach to use static analysis in such a scenario. We now present a formal framework to develop the above intuition, and address the lacunae in the empirical section.

Baseline Model: We modify the model presented in Almunia and Lopez-Rodriguez (2018), henceforth referred to as AL(2018), to motivate our empirical analysis. Consider a firm that uses inputs x and z to produce output y according to the production function $y = \psi f(x, z)$, where ψ is the productivity parameter and $f(.,.)$ is continuous, increasing and concave in both the arguments. The firms vary according to the exogenous parameter ψ which is distributed according to the density $d_0(\psi)$ over the base $[\underline{\psi}, \bar{\psi}]$. The prices of x and z are w and q respectively, while y is the numeraire good.

Let t be the tax rate on reported profit, and x be the only tax-deductible input. The firms choose to report $\bar{y}$ and under-report income y by $u \equiv y - \bar{y}$. There is a strictly increasing, continuous and convex resource cost of under-reporting given by $k(u)$. The probability of the firm getting caught, in any period, is given by $\delta = \phi h(u)$, where ϕ is the effective audit intensity faced by the firm. This includes audit by both the tax authorities and the CAs[11]. $h(.)$ is increasing and convex in u. If the firm get caught, it faces a penalty rate of θ on evaded taxes. The firms pay an audit fee of c to the auditors.

The firm chooses x, z and u to maximize expected profits, given by: $E[\pi] = (1 - t)[\psi f(x, z) - u - wx - c] - qz - k(u) + u - \phi h(u)[ut + \theta ut]$. The FOCs are:

$$\psi f_x(x, z) = w$$

$$\psi f_z(x, z) = q/(1 - t)$$

$$t[1 - \phi h(u)(1 + \theta)] = k_u(u) + tu(1 + \theta)\phi h_u(u) \tag{1}$$

Since all the firms are similar in terms of production technology, functional form of resource cost of under-reporting and audit intensity; $\exists$ density function of revenue $g_0(\bar{y})$ which is decreasing and convex in the domain $[\bar{y}(\underline{\psi}), \bar{y}(\bar{\psi})]$.

We depart from the AL model by assuming a multi-period model where time is discrete. At t_0, the firms get a random productivity draw from the underlying distribution, and then grow by a factor of γ in each period. For analytical simplicity, in the counterfactual baseline situation all firms are subject to third-party audit which makes them report their true income

[11] ϕ represents "monitoring effort parameter " in AL(2018)

in all the periods. The shift in the density from time period t_0 to t_1 is shown in Figure 1A.

Heterogeneous firms with strategic mis-reporting: An audit-notch is introduced in t_1 at the income level y_ρ. Firms below this threshold are exempt from the third-party audit and don't have to pay auditor's fee c. The exemption decreases the audit intensity by $d\phi$.

Consider the resource cost of evasion to vary across firms. This results in a joint distribution with density $\tilde{g}(\psi, h(u))$ on the domain $(\underline{\psi}, \bar{\psi}) \times (\underline{h}(u), \bar{h}(u))$. Firms that have lower cost of evasion can evade more, once they are exempt from third-party audit.

Figure 1B depicts the change in the density due to introduction of the audit-notch. The green dashed line represents the density in presence of audit-notch. According to the behavior in the presence of notch, the firms can be classified into 4 categories:

1) *Small firms* – Let $\bar{y}_L$ be the income at t_0 where an income growth of γ results in income of y_ρ in t_1. Therefore, $\bar{y}_L$ is equal to $y_\rho/(1+\gamma)$. Firms with productivity draw in the range of $[\underline{\psi}, \psi^L)$ and income $[\bar{y}(\underline{\psi}), \bar{y}_L)$ get exempt from the third-party audit after the introduction of the notch. These firms don't undergo third-party audit even if they report their entire growth. On average, the small firms will under-report some portion of their growth resulting in downward shift of the density.

2) *Potential Left-origin bunchers* – Firms with income in the range $[\bar{y}_L, y_\rho)$ in t_0 will grow above the threshold limit in t_1. Firms with small resource cost will bunch below the audit-threshold. A proportion of bunchers will strategically mis-report to be well below the threshold rather than at the threshold, if they think that reporting zero growth can substantially increase their probability of getting caught[12] [See Appendix D for a formal proof of this claim]. These firms will report small incremental growth in future time periods to remain below the threshold, and avoid the attention of tax authorities. As a result, the bunchers will not be concentrated precisely below the notch, but diffused in an area below

[12]Not all the bunchers will strategically mis-report, because of heterogeneity in resource cost. There could be other sources of friction like uncertainties in returns on investment which translate into stochastic growth and firms are not able to reach the notch precisely. Such factors are similar to optimization frictions that result in diffused missing mass in the static model of Kleven and Waseem (2013).

the notch. This is shown as a plateau in Figure 1B for illustrative purposes.

Firms that have high resource cost will not react to notch, and report growth. Consequently, there would be diffused mass above the threshold instead of a hole in the density – which is also predicted in the static model.

3) *Potential Right-origin bunchers* - There would be a firm with income $\bar{y}_H$ in t_0 such that $\bar{y}_H > \bar{y}_\rho$, which will be indifferent between remaining above or bunching below the notch. For this firm, the $E[x, z, u \mid \phi, \psi^H, c] = E[x, z, u \mid (\phi - d\phi), \psi^H, 0]$. Among firms with reported income in the range $[y_\rho, \bar{y}_H)$ in t_0, a proportion will bunch below the threshold if their resource cost of evasion is not high. As compared to left-origin bunchers, smaller fraction of right-origin bunchers will strategically under-report far below the threshold. The reason is that they are mis-reporting more than the left-origin bunchers in terms of levels to get below the notch, which increases their resource cost of evasion.[13] The remaining firms with high resource cost will not bunch and continue to be under third-party audit.

4) *Big firms* - For all the firms with income above $\bar{y}_H$ in t_0, the cost of bunching (resource cost and increase in probability of getting caught) is strictly greater than the benefit. These firms will report the growth and continue to be under third-party audit. This implies that in Figure 1B, the density in t_1 after the income level of $\bar{y}_H + \gamma\bar{y}_H$ remains unaffected due to the introduction of the notch.

Bias in static analysis: In the empirical application of the static analysis, the lower bound (the minimum value of the running variable where the bunchers locate themselves) is determined visually to be the point where the density has positive slope. In figure 1C, this would be $\bar{y}_L^S$. In our model, the excess mass of bunchers starts from $\bar{y}_L$ due to strategic misreporting and optimization frictions. Error in determining the lower bound will cause underestimation of the actual mass of bunchers. The upper bound of bunching (maximum value of running variable where the bunchers come from) is estimated by fitting a counterfactual

[13] Also, the optimization frictions would be less for right-origin bunchers as compared to the left-origin bunchers, because they have to misreport on $\bar{y}_0$ to reach the notch. In contrast, the left-origin bunchers have to make investments with uncertain returns to grow from $\bar{y}_0$ and reach the threshold precisely.

density so that the excess mass is equal to the missing mass. The upper bound in the figure 1C is $\bar{y}_H^S$ which is an under-estimate of the true upper bound: $\bar{y}_H + \gamma\bar{y}_H$.

4 Empirical Strategy

The key empirical challenge, for this study, is to estimate the impact of a notched policy on variables other than the running variable. The methodology to estimate the impact on the running variable was first developed by Kleven and Waseem (2013). Some recent papers [Hamilton (2018), Bachas and Soto(2018)] attempt to estimate the effect of a notch on non-running variables by combining bunching methods with other estimation strategies such as difference-in-differences, discontinuity designs etc. We contribute to this literature by proposing a method that estimates the treatment region of the notch more accurately.

We want to identify the treatment region where firms have an opportunity to get exempt from the third-party audit, after the audit-notch moves to Rs.10 million. All the firms which were between the old and new notch get treated if they continue to report revenue below the notch. Additionally, some firms above Rs.10 million will select themselves into the treatment by bunching below the notch. After identifying the treatment region, we can calculate the intention-to-treat (ITT) effect $\mathbb{E}[Y_i \mid Z = 1] - \mathbb{E}[Y_i \mid Z = 0]$, where Y_i is the outcome of interest of firm i and Z is the treatment assignment. We consider private firms in the treatment region to be affected by the notch ($Z = 1$), whereas the public firms in the treatment region remain unaffected by the notch($Z = 0$). The public firms are a valid comparison group because the managers of public firms face a moral hazard against misreporting revenue as the punitive repercussions of evasion fall on them disproportionately, while the gains are split among shareholders.[14]

We use a difference-in-differences strategy to ensure that the differences in means be-

[14]Firms register themselves as public firms because they want to raise money from sources besides the shareholders. One potential source of capital is listing the firms on the stock exchange. Under company law, before listing on the exchange, the firm has to disclose auditors' reports and any legal action pending against it for the preceding five years. This incentivizes the auditors to conduct rigorous audits and discourages firm's managers from evading taxes.

tween the public and private firms capture the effect of the audit-notch and not any other confounder. Taking advantage of the panel structure of the data, we estimate regressions of the form:

$$TaxDue_{ist} = \alpha_i + \beta treat_i \times after_t + \lambda_t + \gamma_s t + u_{ist} \tag{2}$$

where the dependent variable is tax paid by company i operating in industry s at year t. The coefficient of interest is β which is interpreted as the difference in tax payments between the comparison and treatment firms, before and after the change in policy in 2012. Regressions include firm fixed effects to control for time-invariant differences across various firms. Year fixed effects capture any macro-economic changes that affect both the treatment and comparison group in any given year. Finally, we also include industry-specific time trends to control for any heterogeneous trend in the tax payments across different industries.

To validate the Difference in Difference estimates, we establish absence of any pre-trends between the treatment and comparison group by conducting an event-study analysis. We obtain year-wise diff-in-diff coefficients from a regression of the following form:

$$TaxDue_{ist} = \alpha_i + \sum_j \beta_j \, treat_i \times \mathbb{1}(year = j)_t + \lambda_t + \gamma_s t + \epsilon_{ist} \tag{3}$$

where the coefficients of interest are β_j which are equal to the difference in tax payment between the treatment and comparison firms in year j, as compared to the base year. The base year is defined as the year before the policy change.

Estimation of the treatment region – In our context, the lower bound of the treatment region is equal to the level of revenue where the previous notch was defined de jure, that is, Rs.6 million. A standard approach to identify the upper bound of the treatment region is by doing a bunching analysis at the notch [Kleven and Waseem (2013)]. As discussed in the theory section, if there is heterogeneous resource cost and strategic misreporting, excess mass can be diffused before the threshold which results in biased estimates.

To estimate the upper bound of the treatment region, we calculate the probability of being in the bunching region conditional on lagged income, where the bunching region is defined as the bin just below the notch. A firm i is placed in bin b_t of width ω if its income in a year t, $y_{it} \in [b, b+\omega)$. For all the firms in the bin b_{t-1}, the probability of being in the bunching region(BR) in the year t is given by:

$$\Pi_{t,b_{t-1}} = \sum_i [\mathbb{1}(y_{it} \in BR) \mid (y_{i,t-1} \in b_{t-1})] \Big/ \sum_i \mathbb{1}(y_{i,t-1} \in b_{t-1}) \tag{4}$$

For our analysis, if the policy change happens in period t, then we calculate the probability of being in the bunching region one year later $(t+1)$ conditional on income in the year before the policy change $(t-1)$. This probability is calculated one year after the policy change to allow the firms to adjust.

A firm can be in the bunching region due to natural growth or in response to the notch. To quantify the former effect, we recalculate the probability of being in the bunching region before the introduction of the notch ($\Pi_{t-1,b_{t-3}}$) conditional on two-year lagged income. Difference between the two calculated probabilities will capture the incentive of firms to be in the bunching region in response to the notch. The upper bound is given by $ub = b^*$ such that,

$$\Pi_{t+1,b^*_{t-1}} - \Pi_{t-1,b^*_{t-3}} = 0 \quad \text{and} \quad b^* > y_\rho$$

where, y_ρ is the revenue-level of the notch. Firm with revenue above b^* in the year before the policy change is too big to react to the introduction of the notch. Any firm with $y_{i,t-1} \in [y_\rho, y_{b^*+\omega}]$ is potential right-origin buncher. In the Robustness Check section, we develop a formal method to test if the probability of being in the bunching region is significantly different for firms in the treatment region versus non-treatment region.

A potential concern is that inter-temporal macro-economic changes in economy can lead to mechanical differences between the predicted probabilities of being in a particular bin across years. To alleviate such concerns, we calculate the probability of being in a placebo region that is unrelated to any notch. We expect the difference in probabilities to be insignificant for the placebo region.

5 Results

5.1 Effect of third-party audit on tax payments.

First, we estimate the upper bound of the treatment neighborhood using the difference in probabilities method described in the previous section. To reiterate, audit-notch was moved from Rs.6 million to Rs.10 million in 2012. Figure 3 depicts the probability of a firm of reporting revenue in the bunching region, conditional on its lagged revenue. The probability is defined as the proportion of firms, grouped according to lagged-revenue bins of 0.5 million, that report revenue just below the notch i.e. in the range of Rs.9-10 million.[15] The blue curve represents the probability of being in the bunching region in 2013, conditional on revenue in 2011. We calculate the probability in 2013 instead of 2012 to allow the firms to react to the policy change. The firms can in the bunching region for reasons other than the effect of the notch. We quantify the effect of confounding factors by calculating the probability of being in the bunching region in 2011, conditional on revenue in 2009. Figure 3 shows that firms having revenue between Rs.8-15 million are more likely to bunch below the notch after the introduction of the notch in 2012. Thus, we consider Rs.15 million to be the upper bound of the effect of the notch. Relatedly, the graph also establishes the presence of left-origin bunchers who are not explicitly accounted for in the static-bunching analysis.

It could be that the slowdown in Indian economy between 2009 and 2011 can mechanically increase the probability of remaining in the original bin. To alleviate this concern, we graph

[15] Any firm below the notch is exempt from undergoing third-party audit. So ideally, we should calculate the probability of reporting revenue less than the new notch. We don't do this, because the probability of being just above Rs 6 million, in the pre-period, will be affected by the presence of the previous notch at Rs.6 million. Also, reporting revenue below Rs.10 million can be due to many reasons other than the notch. Therefore, we calculate the propensity to report revenue close to the new notch to only capture the effect of the notch at Rs.10 million.

probabilities of being in a few placebo bins that are not related to the notch. Appendix Graphs 1A and 1B depict the probabilities of being in the Rs.18-19 million and Rs.24-25 million bin. There is no systematic difference in the two curves across time for these placebo bins.

Next, we provide evidence that public firms are a valid comparison group. The assumption is that the third-party audit doesn't affect them, as much as private firms, since they have incentives to report taxe payments honestly.[16] To validate this assumption, we plot the density of public firms and compare their bunching behavior to the private firms (See Appendix Graph 3). The histogram of public firms shows some bunching at round numbers which are not related to notch. We also calculate the change in the probability of being in the bunching region before and after the policy change, for the public firms. Appendix graph 2 shows that the difference in the probabilities is only large just below the bunching region. It suggests that some public firms are bunching from the left-side of the notch. Even if a small proportion of public firms do respond to the notch, this will make the regression coefficients an under-estimate of the actual effect.

Now, we present the difference-in-differences results where all the private firms having revenue between Rs.6-15 million in 2011, are considered to be treated firms. These firms were undergoing third-party audit in 2011 and can choose to manipulate their turnover in 2012 to get exempt from the third-party audit. We consider all the public firms present in the treatment neighborhood in 2011 as the comparison group. Table 2 documents the results of regression equations 2 and 3. To ensure robustness, we run the regressions with and without the sector-specific time trends. Averaging across the post-reform years, firms that have an option to get exempt from third-party audit reduce their tax liability by around Rs. 41,000 (Columns 1 and 3), which is equal to 20 percent of the average tax payment in 2011. This result is consistent with firms bunching below the notch to avoid third-party audit. In other words, the third-party auditors are effective in increasing the government revenue, despite a

[16] Reason for this includes moral hazard faced by managers of the public firms against evasion, and the release of past financial information once the firm decides to invite public to buy its shares.

potential conflict of interest.

To rule out pre-trends, we do an event analysis as described by Equation 3. The year-wise diff-in-diff coefficients are plotted in Figure 4A and documented in the columns 2 and 4 of Table 2. The year before the policy change, 2011, is taken as the base year. There is no significant difference in the tax payments of public and private firms before the policy change. After the introduction of the notch, a gap in the tax payments appears across the two category of firms.

5.2 Effect of third-party audit on taxable income and profits.

Firms have to change the tax base to manipulate the tax payments. Some components of tax base are easier to manipulate than others. For instance, business profits can be mis-reported with relative ease since firms don't have to give any extra-information on the tax-form to prove the accuracy of their claim. Conversely, it is hard to claim certain tax-exemptions like area-based exemptions for which extra documentation is required.

We use difference-in-differences framework of equation 2 to assess the effect on tax base and business profits. Table 3 columns 1 & 2 show that private firms, as compared to the public firms, decrease their business profits after the policy change. There is an average decline of around Rs.700K (56 percent of the average profits in 2011) in the PBITD i.e. profit before interest, tax and depreciation. The decrease in reported profits results in a decline of taxable income of approximately Rs.102,000, which is equal to 16 percent of the average taxable income in 2011 (column 3).[17] To rule out pre-trends, we estimate year-wise difference-in-difference coefficients, and plot them using Figure 4B-D. Reassuringly, the difference between private and public firms for all the variables is insignificant before the policy change.

[17]The decrease in the tax is not exactly equal to 30 percent of the decline in the tax base. If the tax calculated is less than 18.5 percent of the book profits, then the firms have to pay at least that much tax called minimum alternate tax (MAT). The extra tax paid is available to the firms in the future years. Additionally, any income accrued by exporting goods or by establishing firm in an economically-backward area is subject to special rates.

Table 3 also documents a significant decline in the fee paid to the auditors by the private firms. This suggests that the firms are no longer hiring third-party auditors for tax-audit after getting exempt from the requirement. The decline in fee is modest in magnitude (9 percent of the average fee paid in 2011) as the firms report combined expenditure on both the statutory and tax audit in the tax-form.

5.3 Comparison with the Static Model

We also calculate the upper bound using static bunching analysis, and compare the results to our main analysis. First, we construct a histogram using pooled data after the policy change in 2012. Figure 2A suggests that the lower bound is Rs.8.5 million - the point where the slope of the density becomes positive. Next, we collapse the data in bins of Rs 0.5 million revenue[18] to calculate the number of firms . The counterfactual density is estimated by using a fourth-degree polynomial equation:

$$C_b = \sum_{i=0}^{4} \beta_i Y_b^i + \sum_{b=y^{lb}}^{y^{ub}} \delta_b \mathbb{1}(Y_b = b) + \eta_m + \epsilon_b \tag{5}$$

where C_b is the actual count of firms in the bin b. A firm is in bin b if its income $y_i \in [b, b+0.5million)$. The β coefficients represent the polynomial terms, and δ coefficients are the dummy for bins in the omitted region – which can be interpreted as the difference between the actual and counterfactual density. The omitted region includes both reduced and excess mass regions. We also control for potential round-number bunching by including dummy for whether the bin contains multiple of Rs.1 million which is represented by η_m. The standard errors are estimated using a bootstrapping procedure.

The static bunching analysis estimates the upper bound at Rs.11.5 million [Figure 2B] – the point where the excess mass is equal to the reduced mass. As discussed before, this is an under-estimate of the true bound. In Appendix Table 1, we document the diff-in-diff

[18]We also use other bin-sizes to estimate the upper bound. The results are reported in Appendix Table 5

estimates by using the treatment neighborhood from Rs.6-11.5 million. As expected, all the coefficients are smaller in magnitude than what we found in our main analysis because the new treatment neighborhood excludes larger firms that responded to the audit-notch. However, none of the coefficients are significantly different from the estimates we found earlier because the number of firms that get treated in the range of Rs.11.5-15 million are much smaller than the number of treated firms in the overlapping range across the two alternative treatment neighborhoods.

5.4 Heterogeneity in the effect of third-party audit

Firms can vary in terms of marginal benefit of bunching. The increase in audit-intensity ($d\phi$) due to third-party audit can be larger for some firms than others. In particular, firms that generate substantial paper-trail during business transactions will be more circumspect of exposing their accounts to the auditor. Under a value added tax(VAT) regime, firms which sell intermediate goods generate more receipts than the firms which sell final-consumption goods. The reason is that both the supplier and consumer of an intermediate goods producer demand receipts to claim deductions under VAT. On the other hand, the final consumer of a retailer firm doesn't need a receipt as there are no deductions available to him. In other words, audit intensity and deterrence from paper trail can be complementary [Pomeranz(2015), AL(2018)].

As we don't have transaction-level data at the firm level, we use industry-level supply-use tables(SUTs) that provide details of final use of each industry's output. We match the industry description given in the SUTs to the industry codes reported by the firms in the income tax form (Details of the matching are given in the appendix). Each firm is given a score which is equal to the proportion of sales it makes to other industries instead of the final consumer. We modify equation 2 to include an interaction of diff-in-diff term ($treat_i$ x $after_i$) with the $UpstreamRatio$ score.

Table 4 column 1 shows that as the proportion of intermediate sales increases, firms decrease their tax revenue. The bottom panel shows the differential change in the tax liability at different levels of upstream ratio. Firms that operate in industries which are at the bottom quartile of upstream ratio - sell mostly to final consumers - don't find it beneficial to decrease their turnover to bunch below the threshold. The increase in audit-intensity due to third-party audit is not substantial for such firms. Conversely, firms that sell most of their products to other firms experience a substantial increase in audit-intensity due to third-party audit. These firms bunch below the audit-notch and reduce their tax payments.

Firms can also vary according to resource cost of evasion ($k(u)$). Literature suggests that an increase in the number of agents who know about evasion decisions, increases the cost of evasion. Firms find it difficult to sustain the collusive arrangements across several such agents who can whistleblow against the firm due to reasons like monetary incentives from the government or preferences such as honesty. These economic agents can be well-informed workers [Kleven, Kreiner, and Saez (2016)] or incentivized final consumers [Naritomi (2019)].

We proxy for the total number of workers by using the ratio of expenditure on employees to the total expenditure of the firm. As labor intensity may not be perfectly correlated with the total number of workers, we also use the total labor expenditure of a firm as an alternative proxy variable[19]. We again modify equation 2 to include an interaction of diff-in-diff term ($treat_i$ x $after_i$) with the proxy variables.

Table 4 columns 2 & 3 show that firms with more workers do not change their tax payments once they have an opportunity to get exempt from the third-party audit. On the other hand, the decrease in tax payments by firms that employ smaller number of workers is almost 75 percent larger than the average effect we found earlier. Thus, contracting costs have a significant effect on the ability of firms to manipulate their turnover and evade third-party audit.

[19] One potential issue with using total labor expenditure is that firms with highly productive workers might have high labor cost but low number of workers. Therefore, we use both total and proportional labor expenditure as a proxy for the total number of workers. The results using both the measures are consistent with each other.

6 Welfare Analysis and Policy Impact

In this section we conduct a simple welfare analysis to assess the impact of an introduction of a third-party audit notch. First, we derive the change in the welfare due to an increase in the audit intensity. In the baseline model, this doesn't alter the real output as production and under-reporting decisions are additively separable.[20] Intuitively, there will be no change in the deadweight loss due to increase in the audit intensity if the cost of evasion is zero. Any change in the under-reported income is merely a transfer from the government to the firms which doesn't affect the aggregate welfare. Conversely, if there is a resource cost of evasion and administrative cost of increasing audit-intensity, then changes in the reported income will affect the overall level of welfare.[21]

We now modify the AL(2018) model to conduct welfare analysis. Let W represent the aggregate welfare which is equal to the after-tax profit of the firms and the net revenue of the government. We now assume that the government hires the third-party auditors to do audit on its behalf and pays them a fee of $c(\phi)$ per firm. The fee is proportional to the current level of audit-intensity(ϕ) as the government will have to hire more competent auditors to increase the intensity even further. Thus, $c(\phi)$ is increasing and convex in ϕ. The expected value of the welfare is given by the following equation:

$$E[W] = \int_{\bar{y}(\underline{\psi})}^{\bar{y}(\bar{\psi})} \{(1-t)[\psi f(x,z) - u - wx] - qz - k(u) + u - \phi h(u)[ut + \theta ut]\} .g_0(\bar{y})\, d\bar{y}$$
$$+ \int_{\bar{y}(\underline{\psi})}^{\bar{y}(\bar{\psi})} \{t[\psi f(x,z) - u - wx] + \phi h(u)[ut + \theta ut] - c(\phi)\} .g_0(\bar{y})\, d\bar{y}$$

The first term in the curly bracket represents the expected after-tax profit of the firm, while the second term represents the expected revenue of the government net of the cost of

[20] The FOCs of the inputs in equation 1 do not depend on the audit intensity. No change in the real output is similar to the conclusion drawn in Keen and Slemrod(2017) and Basri et al.(2019).

[21] This intuition is similar to one provided by Chetty(2009) in the context of personal taxation. In their analysis, the elasticity of taxable income is a sufficient statistic for deadweight loss caused by an increase in tax rate, as long as "sheltering"(tax evasion or avoidance) has no resource cost. If the marginal cost of sheltering is not equal to tax rate, then there is an excess deadweight loss created by sheltering besides the amount created by change in real behavior.

hiring auditors. Since the firms have already chosen the inputs and under-reported income optimally, we can use the envelope theorem while taking the derivative with respect to ϕ for the first term. The change in expected welfare due to the change in audit-intensity is given by :

$$\frac{dE[W]}{d\phi} = \int_{\bar{y}(\underline{\psi})}^{\bar{y}(\bar{\psi})} \left[-t\frac{du}{d\phi} + \phi t(1+\theta)\left(h(u)\frac{du}{d\phi} + u\frac{\partial h}{\partial u}\frac{du}{d\phi}\right) - c_{\phi}(\phi)\right].g_0(\bar{y})\, d\bar{y}x$$

$$= \int_{\bar{y}(\underline{\psi})}^{\bar{y}(\bar{\psi})} \left[-k_u(u)\frac{du}{d\phi} - c_{\phi}(\phi)\right].g_0(\bar{y})\, d\bar{y} \qquad (6)$$

The second equality follows by substituting the first-order condition obtained by taking the derivative of the net profit of the firm with respect to the under-reported income in the baseline model (Equation 1). With the increase in audit-intensity, the firms decrease under-reporting. This decreases the resource cost incurred on evasion and thus, increases welfare. The increase in welfare is attenuated by the increase in administrative cost incurred on raising the audit intensity.

To calculate the welfare change associated with the notch at Rs.10 million, we ask what would be the welfare gain/loss if one more firm comes under third-party audit as a result of lowering the notch by an epsilon rupee amount. By conducting the marginal analysis, we don't have to make assumptions across the entire distribution of firms using parameters that are estimated locally. The average taxable income in the dominated region[22] above the notch is Rs.496,626. According to the difference-in-differences estimates, the reduction in taxes and reported taxable income due to the notch is Rs.41,285 and Rs.102,575 respectively. This implies that the firms that were unable to bunch had a resource cost of at least Rs.41,285 which is equal to 8.3 percent of the average reported taxable income. Thus, $k_u(u)$ is 0.083. If

[22]We estimated that firms under third-party audit pay Rs.2197 to the auditors. Data shows that firms having turnover between Rs.10 million and Rs.10.1 million have profit equal to 6 percent of the turnover. This implies that the no firm should be located in the region between Rs.10 million and Rs.10.036 million, as the auditor fee is higher than the profits the firms will get. This is the dominated region.

we assume that this is locally constant for the firms, then the total resource cost of evasion is 0.083 times the reduction in taxable income, which is equal to Rs.8,514. This is the marginal welfare gain of auditing one more firm.

The marginal cost is the extra fee which firms pay to the auditors when they undergo tax-audit. In the empirical section, we estimated this cost to be Rs. 2,574. Thus, the total welfare gain of extending the third-party audit to one more firm is Rs.5,940.

We can also calculate the optimal threshold under very strong assumptions. If we assume that the marginal resource cost of evasion is same for all the firms in the entire distribution, then $k_u(u) = 0.083$. Let the average change in the reported tax base as a proportion of turnover $(\Delta u/\bar{y})$ be equal to $102,575/10,000,000 = 0.0102$. The increase in the administrative cost is Rs.2,574. Thus, the optimal threshold $(\bar{y}^*)$ can be derived from the following formula: $[\Delta u/\bar{y}] \times \bar{y}^* \times k_u(u) = c_\phi(\phi)$. This gives us the optimal threshold to be Rs.3,040,396. In 2009, this would imply adding around 51,000 firms in the third-party audit regime[23]. Thus, under the above assumptions, it would be welfare enhancing to have more firms under the third-party audit by reducing the audit-threshold.[24]

7 Robustness Checks

7.1 Test for change in probability due to audit-notch.

In the main analysis, we calculate the probability of being in the bunching region based on lagged revenue by two years. We argue via difference in probability method that there is a significant change in the probability of being in the bunching region after the introduction of notch for the private firms that are in the treatment region versus firms that are not in

[23] We do this calculation for 2009 because the threshold at that time was Rs.4 million and the density from Rs. 7.4 to Rs.10 million is less likely to be affected by that threshold. The calculated number of firms is still an upper bound as some of the firms will bunch below the new threshold.

[24] If we use the estimates calculated from the treatment neighborhood found from static-bunching analysis, then the reduction in taxes and taxable income are Rs.40,462 and Rs.81.007 respectively. As a result, $k_u = 0.0815$ and $\Delta u/\bar{y} = 0.008$. The optimal threshold is Rs.2,516,871

the treatment region. This claim can be tested by using the following regression framework:

$$\Pi_{t,b_{t-2}} = \alpha_b + \beta_1.after_t + \beta_2.\mathbb{1}(b_{t-2} \in [k_1, k_2]) \times after_t + \epsilon_{t,b_{t-2}}$$

where $\Pi_{t,b_{t-2}}$ is the probability of being in the bunching region based on 2-year lagged income-bin. k_1 and k_2 represent the estimated upper and lower bound of the region from where the firms can manipulate their revenue to bunch below the threshold. From Figure 3, we know that the upper and lower bound is Rs.8 million and Rs.15 million, respectively. We expect β_2 to be positive and significant for the private firms when we correctly specify the bunching region. Appendix Table 6 documents the results. For private firms, β_2 is significant with expected sign. For public firms, the effect of being in the treatment neighborhood is insignificant (column 4). We can also conduct a placebo test by mis-specifying the bunching region. Columns 2 and 3 show no significant change in the probability of firms of being present in the placebo bunching region after the policy change.

7.2 Placebo test for Difference-in-Differences specification

We conduct a placebo test by mis-specifying the treatment region that gets affected in response to the policy change in 2011. In theory, the big firms (as defined in the model) should not get affected by the notch because, the cost of manipulating their revenue to bunch below the threshold is too high for them. In our setting, any firm with turnover above Rs.15 million in 2011 doesn't bunch below the threshold. Thus, we consider private firms with turnover between Rs.15-25 million in 2011 as the treatment group. All the public firms in the same revenue-bandwidth are labeled as the comparison group. To ensure robustness, we also consider an alternative placebo range where both the treated and comparison group firms have turnover between Rs.30-50 million in 2011. Appendix Table 2 documents the impact of the notch on key dependent variables. The coefficient are insignificant with the magnitude of change in taxable income smaller than what we found in the main analysis, even though the average firm size is now larger.

7.3 Other Concerns

In our main analysis, we calculate the Intention to Treat effect by arguing that all the firms between Rs.6-15 million have an opportunity to escape the third-party audit due to the shift in audit-notch from Rs.6 million to Rs.10 million in 2012. A potential concern is that firms around Rs.6 million in 2011 did have an opportunity to bunch as they were close to the threshold. Including these firms in the sample could cause selection bias as they chose to not bunch at the old threshold. To alleviate this concern, we restrict the sample to firms that have turnover large enough in 2011 to make it sub-optimal for them to bunch at the old audit-notch. We estimate the treatment effect by restricting the sample to firms with turnover between Rs.10-15 million in 2011, and check if the estimates vary qualitatively. Appendix Table 3 shows that the treatment effect is of similar sign as before. The magnitude of all the coefficients increases as we are only considering the potential right-side bunchers.

The sample used in the primary specification, does not include firms that switch between public and private firm status. Among the firms that do change their status, 58 percent firms change their status more than once in the sample period, which suggests errors in coding or mistakes while filling up the tax form. Also, less than 5 percent of the firms switch their status in any given year. To make sure that our estimates are not sensitive to the inclusion of switchers, we reproduce our results in Appendix table 4. All the coefficients have similar sign as before with the effect on tax payments and taxable income statistically similar to the coefficients in the main analysis.

8 Conclusion

In this study, we evaluate a notched policy implemented by the Indian tax department where, conditional on reported revenues being greater than a specified threshold, firms are required to undergo a third-party audit before filing their tax returns. Since the auditors are chosen and paid by the firms, they face a potential conflict of interest. Despite this, we find that the policy is effective in increasing government revenue as firms report higher taxable income. The effect of the policy is heterogeneous. First, firms that generate substantial paper trail report more taxes when their accounts are scrutinized by private auditors. Second, employing greater number of workers makes evasion difficult and such firms do not change their tax payments when subjected to extra audit. We also conduct a marginal welfare analysis and show that the net benefit of extending the policy to one more firm is welfare-enhancing.

The contribution of this paper is twofold. First, we argue that static bunching analysis can understate the neighborhood in which the firms will respond to an introduction of a notch in a dynamic setting. Second, we demonstrate that this underestimation exists in our setting, and propose an empirical methodology to correct for the bias.

It is becoming increasingly common to outsource the government's regulatory functions in both developed and developing countries, especially in sectors such as emissions control and food safety. With the enforcement budget of tax agencies like the IRS in USA on the decline[25], there is a case for privatizing more regulatory functions in the realm of tax administration. However, there are concerns that private auditor will not deliver desired results because of factors like conflict of interest, corruption etc. In this study we show that third-party audits were effective in increasing tax revenue in the context of India. Given that developing countries often suffer from low tax compliance and limited state capacity, our paper suggests that outsourcing this regulatory function in particular could be hugely beneficial.

[25] The percentage of Corporate Income tax returns examined by the IRS has fallen from 1.4 percent in 2013 to 0.9 percent in 2018 (IRS Service Data Books)

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Tables and Figures

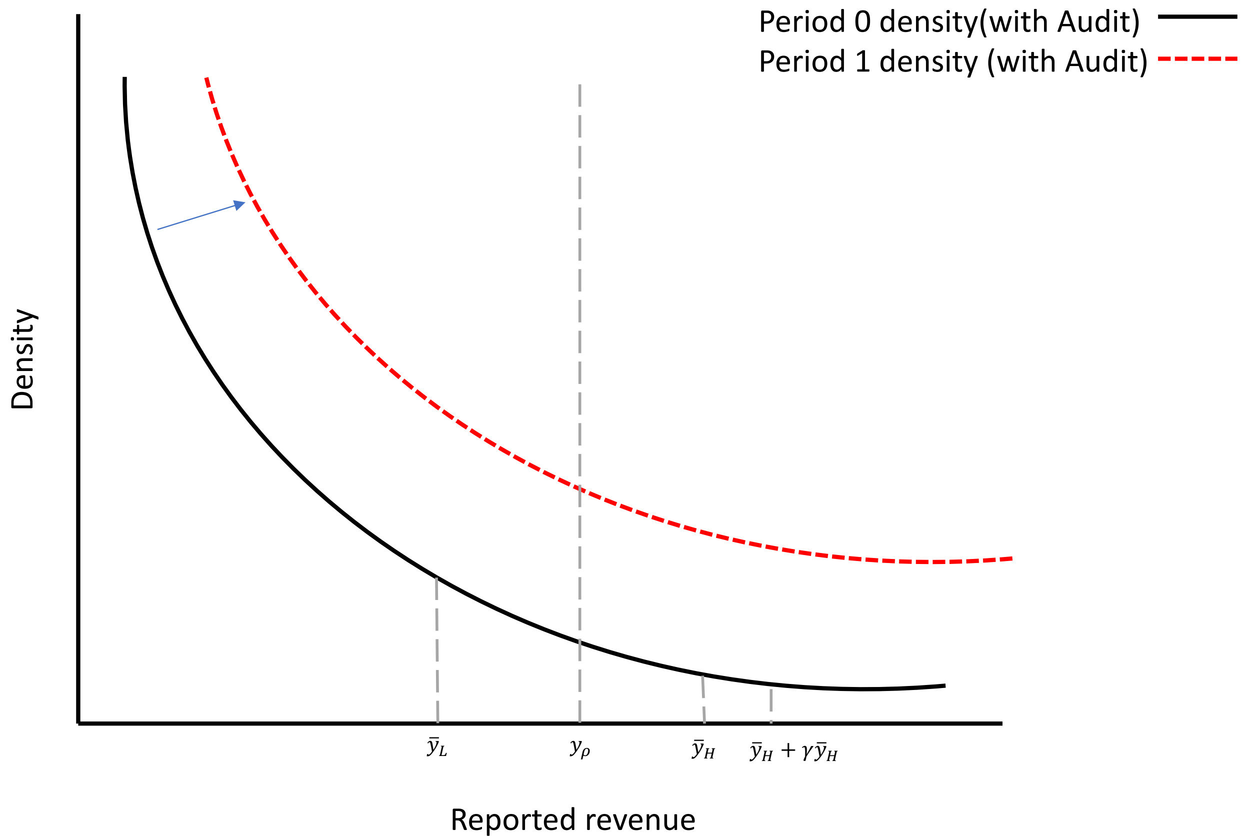


Figure 1A: No Audit-Notch.

Note – The horizontal axis represents the running variable - reported revenue of the firms. The black and red lines represent the density in the time periods t_0 and t_1, respectively. We assume that every firm undergoes third-party audit in both the time periods. For analytical simplicity, firms report their true income when they undergo third-party audit. At t_1 firms grow by a factor of γ and report their entire growth.

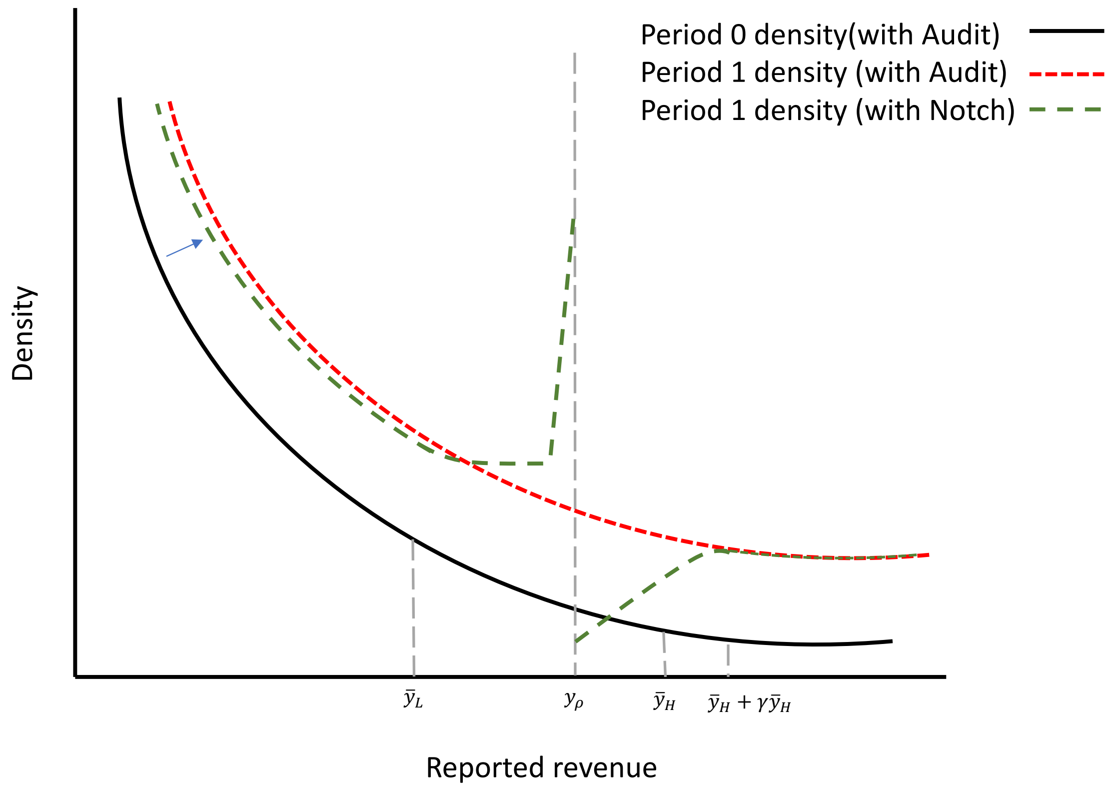


Figure 1B: With Audit Notch.

Note – The horizontal axis represents the running variable - reported revenue of the firms. The black and red lines represent the density in the time periods t_0 and t_1, when there is no audit-notch and all the firms report their true income due to third-party audit. At t_1, the firms grow by a factor of γ. The green dashed line, labeled as with notch, represents the density when an audit-notch is introduced at y_ρ. All the firms below the notch are exempt from third-party audit. $\bar{y}_L$ is the income at t_0 where an income growth of γ results in income of y_ρ in t_1. Therefore, $\bar{y}_L$ is equal to $y_\rho/(1+\gamma)$. The left-origin bunchers will have $\bar{y_0} \in [\bar{y}_L, y_\rho)$. Firm with income $\bar{y}_H$ in t_0 is indifferent between remaining above or bunching below the notch in t_1. The right-origin bunchers will have $\bar{y_0} \in [y_\rho, \bar{y}_H)$. A proportion of bunchers will strategically mis-report to be below the notch if they believe that reporting zero growth for multiple time-periods will increase their probability of getting caught. This results in diffused excess mass much below the threshold - shown as plateaued density in the diagram.

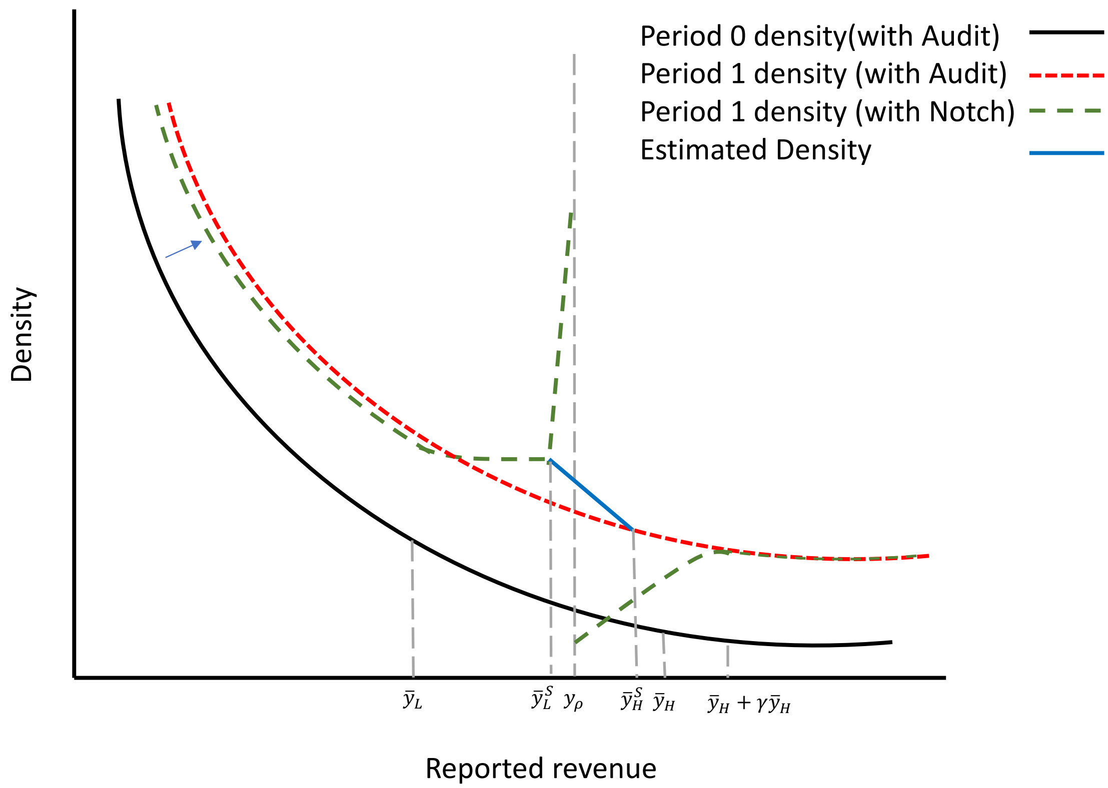


Figure 1C: Bias in the Static Bunching Analysis

Note – The lower bound used in the static bunching method is the point where the observed density has a positive slope near the audit-notch i.e. $\bar{y}_L^S$. Using this lower bound will result in under-estimation of the excess mass. In the static bunching method, the upper bound is estimated by fitting a counterfactual density (blue line) so that the excess mass is equal to the missing mass. $\bar{y}_H^S$ is the estimated upper bound by the static-bunching method which is an under-estimate of the actual upper bound $\bar{y}_H + \gamma\bar{y}_H$.

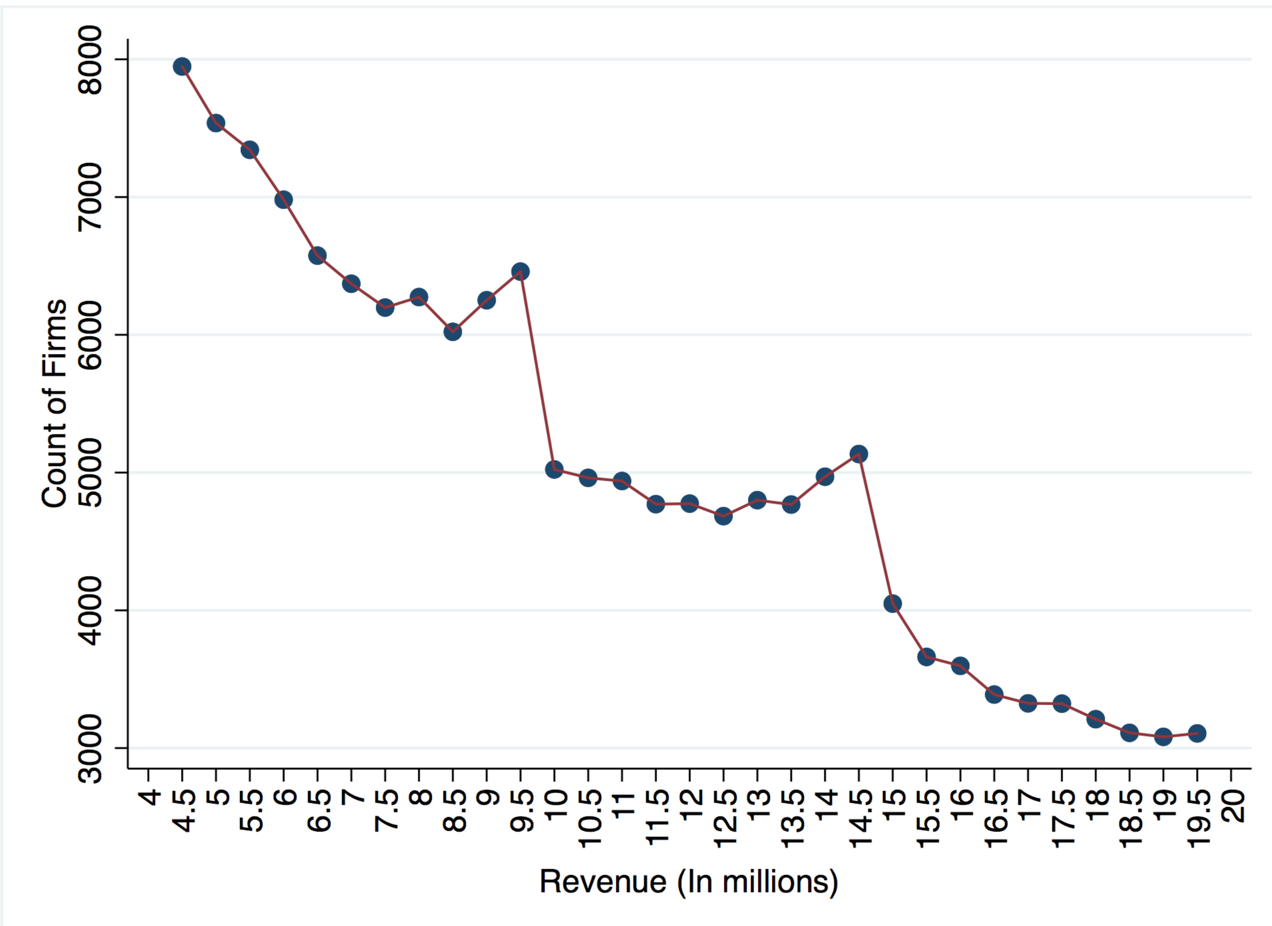


Figure 2A: Bunching Analysis: Frequency of Private firms from 2012-16

Note – We use ocular method to estimate the lower bound to used in the static analysis. This is Rs. 8.5 million, where the slope becomes positive. All the data for this table is derived from Corporate Income Tax returns from 2012-16.

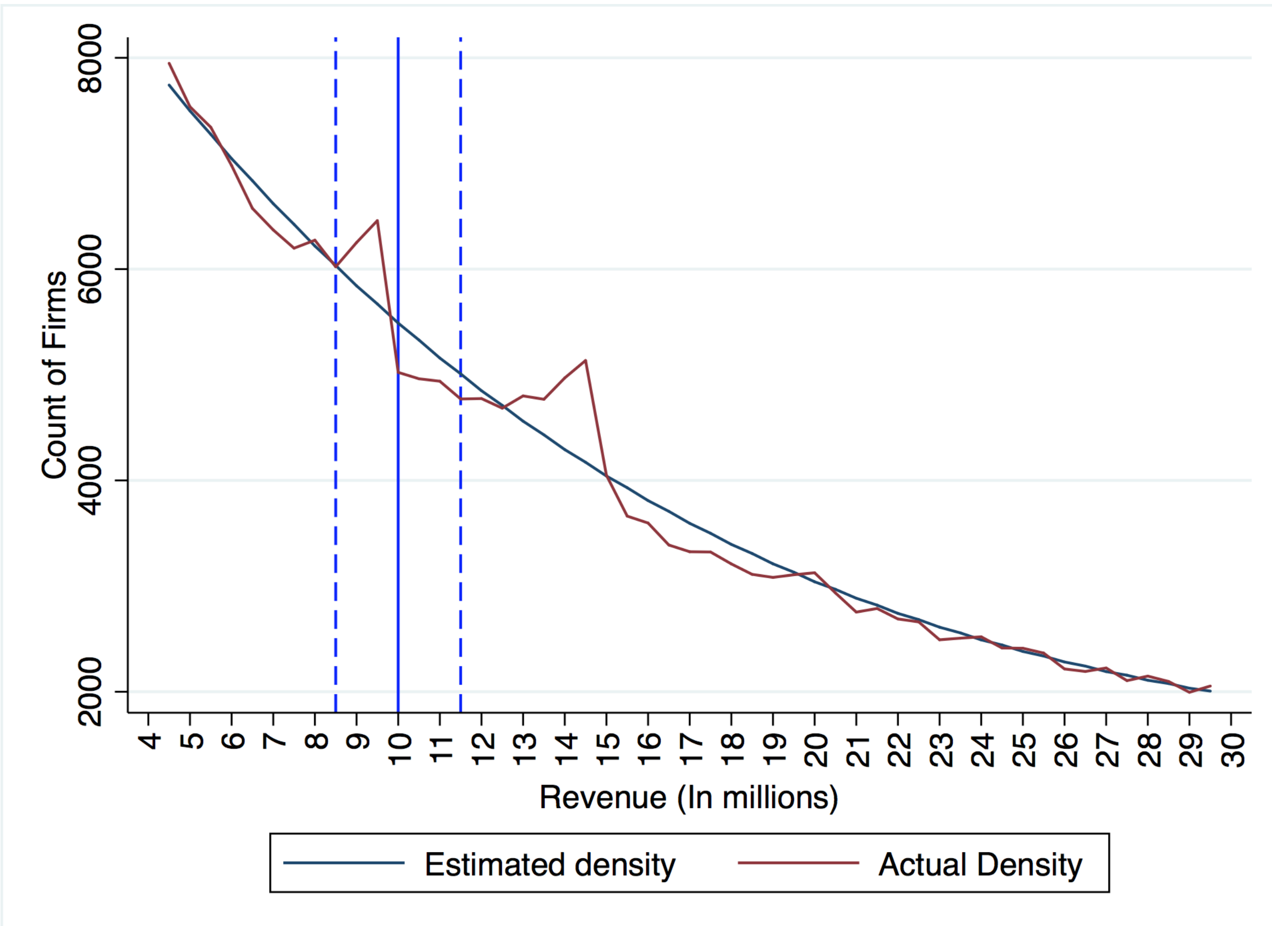


Figure 2B: Static Bunching Analysis

Note – This figure shows the actual density and the counterfactual density estimated by using the static bunching analysis. The counterfactual density is estimated by using the data from 2012-16 – the period after the change in the audit-threshold to Rs.10 million. The lower bound is determined visually to be at Rs.8.5 million, while the upper bound is estimated as Rs.11.5 million by equating the excess mass to the missing mass. Both the upper and lower bound are displayed using dashed lines, while the notch is depicted by the solid line. The counterfactual density is estimated by using a fourth-degree polynomial . The bin size is Rs 0.5 million. All the data for this table is derived from Corporate Income Tax returns from 2012-16.

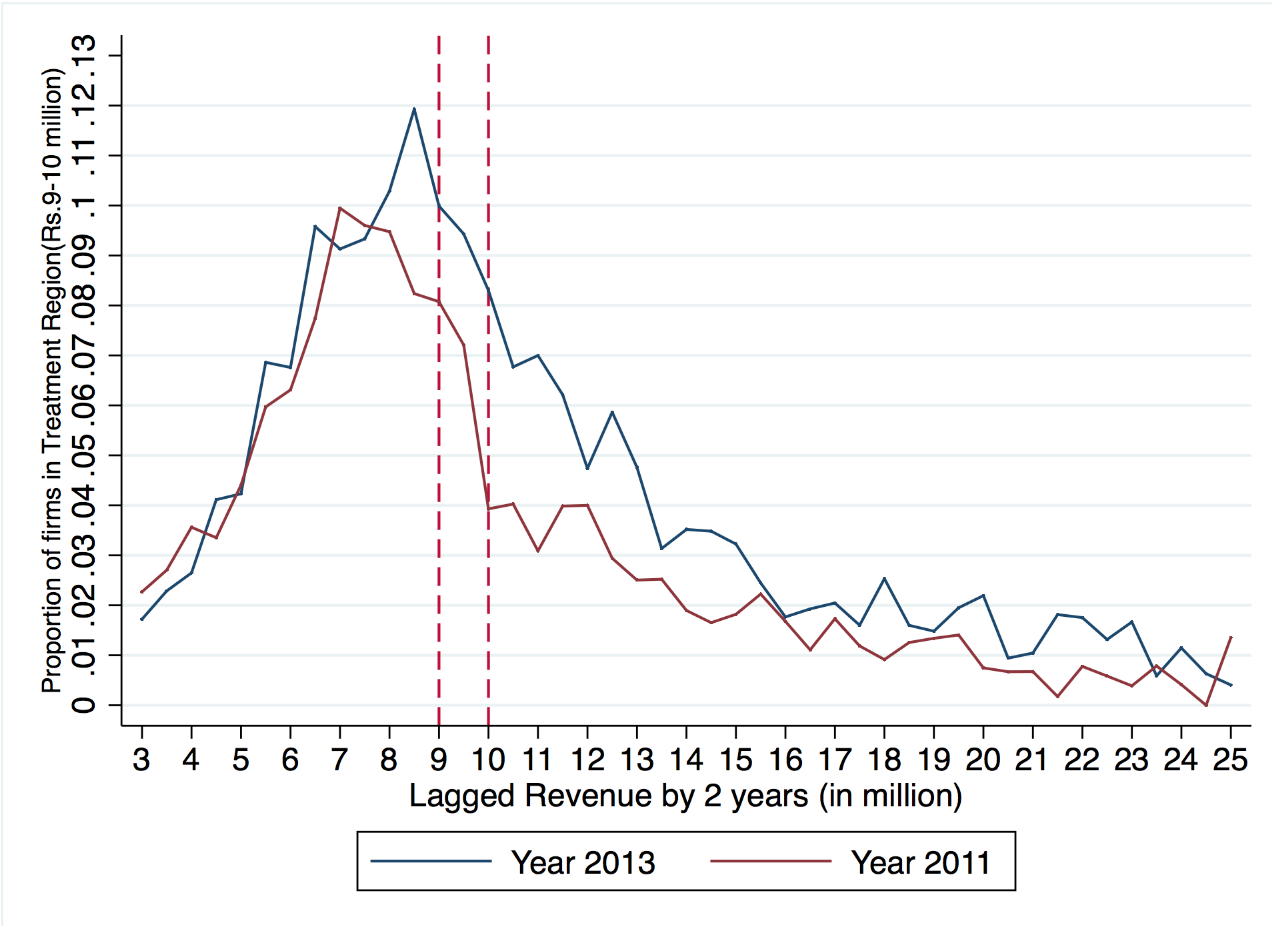


Figure 3: Likelihood of being in the Bunching Region (Private Firms)

Note – In this graph, we plot the probability of being in the treatment region based on two-year lagged revenue. The notch was introduced at Rs.10 million in 2012. The blue line represents the probability of reporting revenue between Rs.9-10 million in 2013, conditional on reported-revenue in 2011. Similarly, the red line represents the probability of reporting revenue in the same range in 2011, conditional on reported-revenue in 2009. The difference between the two probabilities gives the effect of the notch. The upper bound estimated from this graph is Rs.15 million which is larger than the upper bound estimated by static-bunching method. The bin size used in this graph is Rs 0.5 million. All the data for this graph is derived from Corporate Income Tax returns from 2009-13.

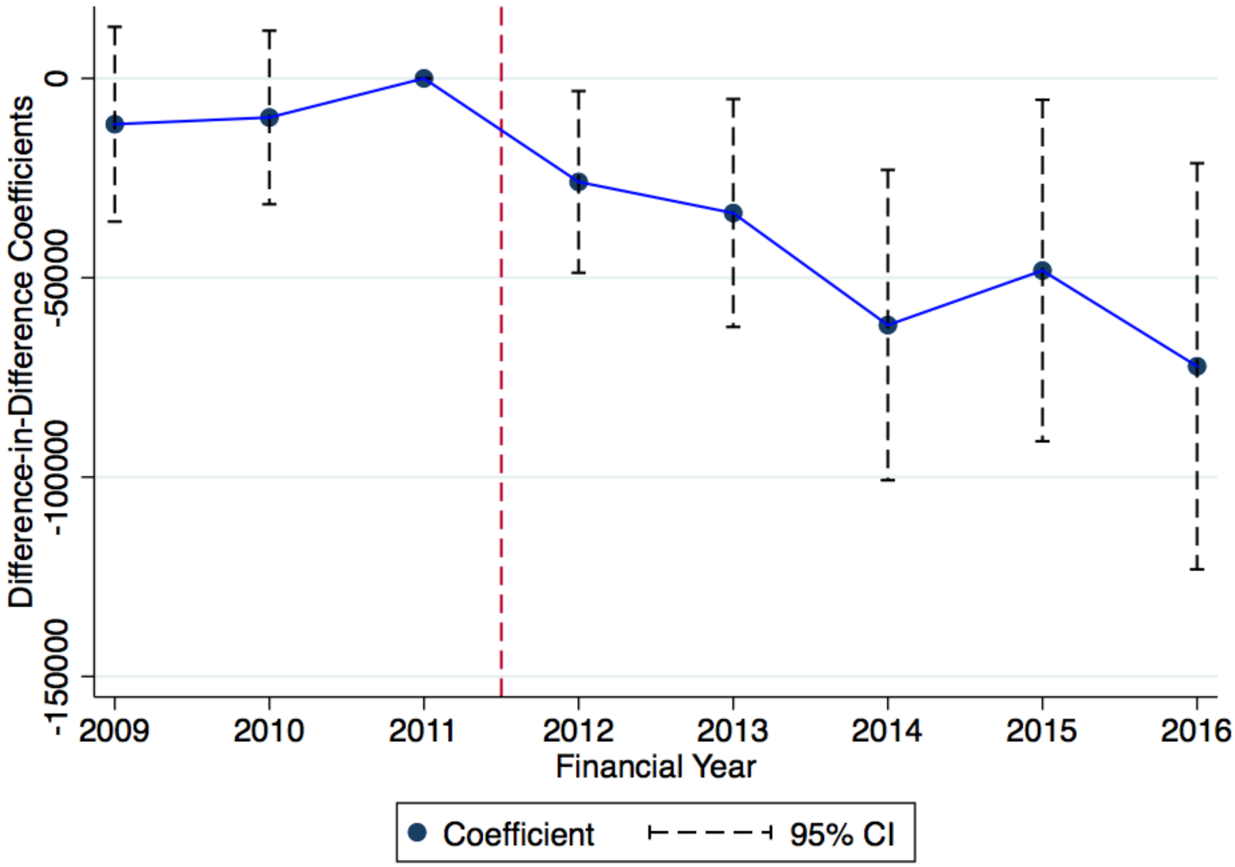


Figure 4A: Event Analysis for Tax Payments – Year-wise diff-in-diff coefficients.
Note – In this graph, we plot the difference-in-differences coefficients of Table 2. The dependent variable is tax liability in rupees. The notch was introduced at Rs.10 million in 2012. The base year is 2011. All the data for this graph is derived from Corporate Income Tax returns from 2009-16.

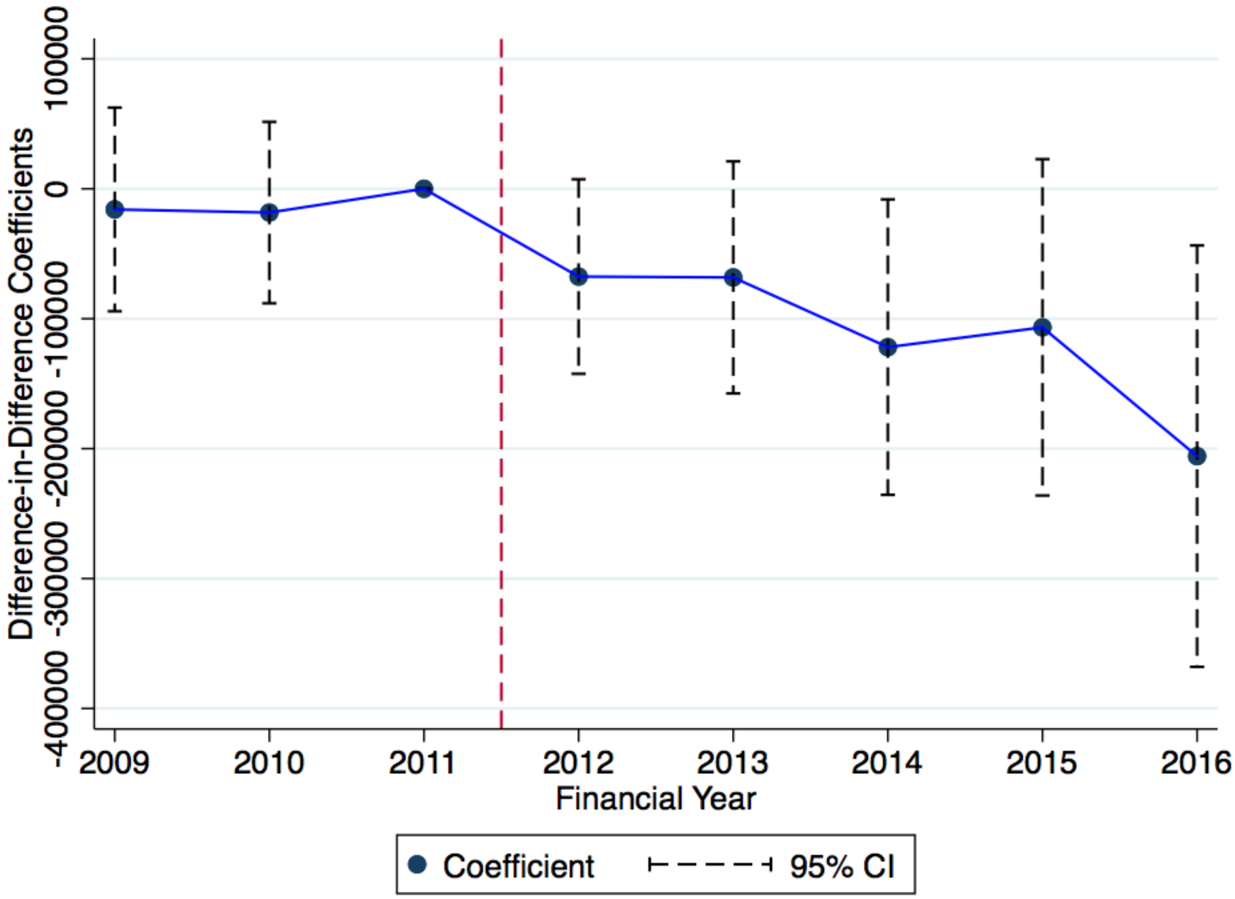


Figure 4B: Event Analysis of Taxable Income – Year-wise diff-in-diff coefficients.

Note – In this graph, we plot the difference-in-differences coefficients across years. The dependent variable is taxable income in rupees. The notch was introduced at Rs.10 million in 2012. The base year is 2011. All the data for this graph is derived from Corporate Income Tax returns from 2009-16.

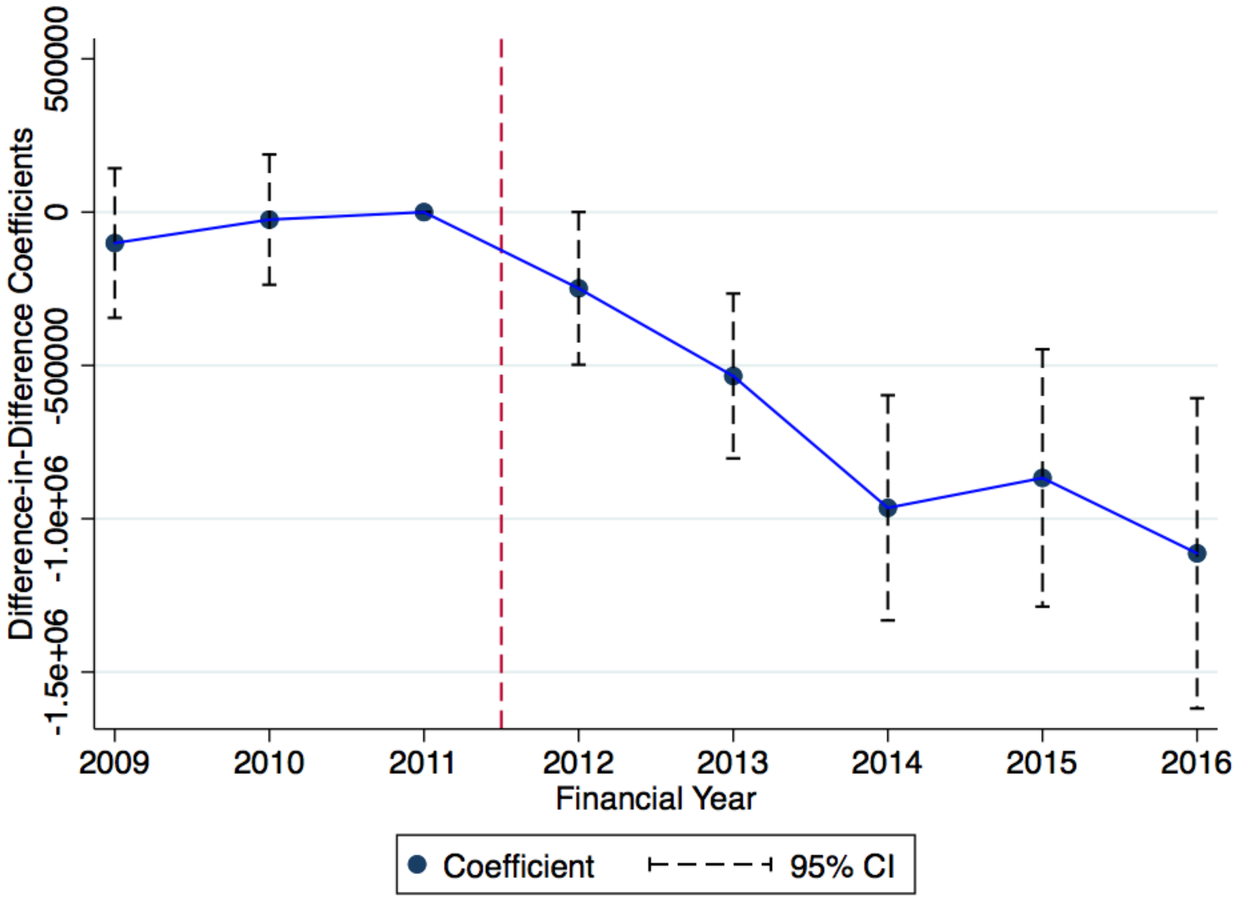


Figure 4C: Event Analysis of PBITD – Year-wise diff-in-diff coefficients.

Note – In this graph, we plot the difference-in-difference coefficients across years. The dependent variable is PBITD (profit before interest, tax and depreciation) in rupees. The notch was introduced at Rs.10 million in 2012. The base year is 2011. All the data for this graph is derived from Corporate Income Tax returns from 2009-16.

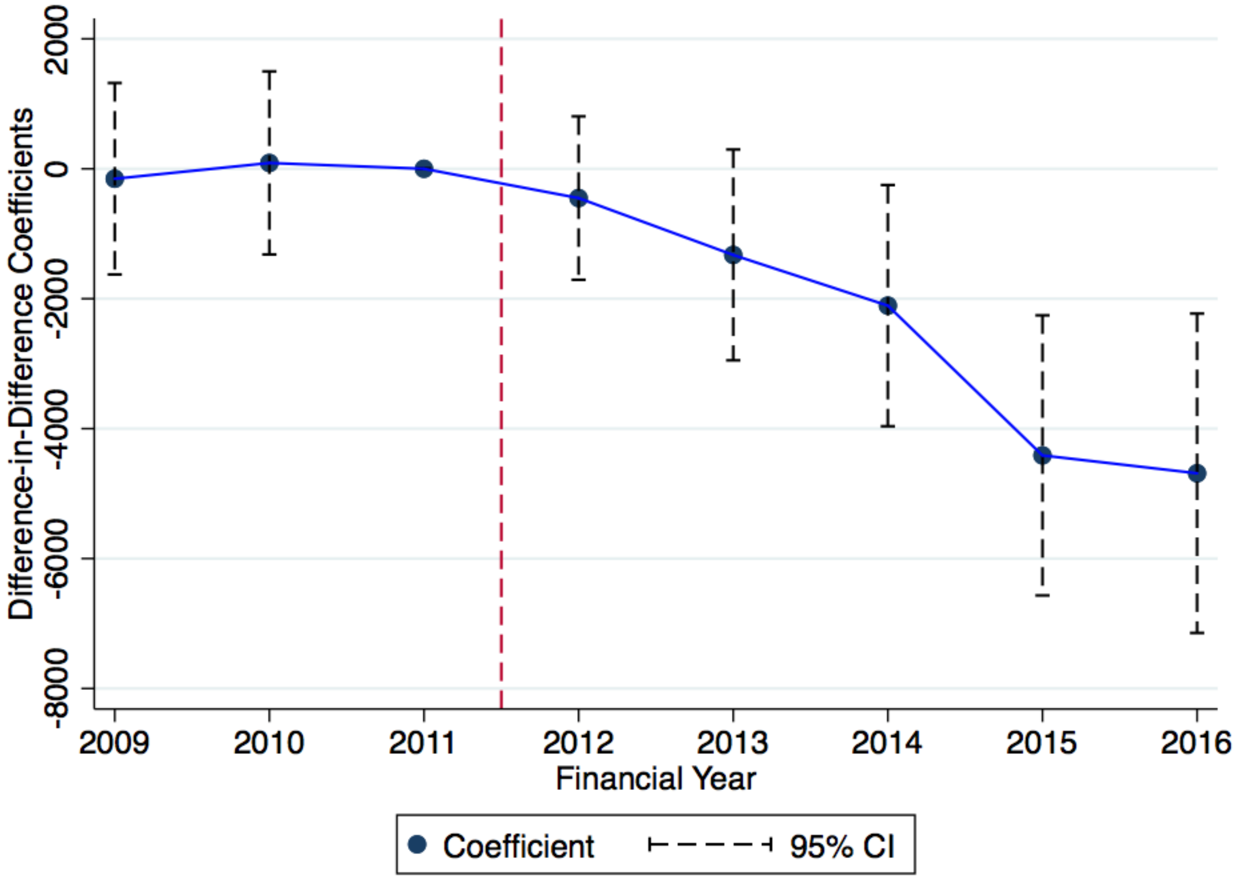


Figure 4D: Event Analysis of Audit Fee – Year-wise diff-in-diff coefficients.
Note – In this graph, we plot the difference-in-difference coefficients across years. The dependent variable is audit fee in rupees. The notch was introduced at Rs.10 million in 2012. The base year is 2011. All the data for this graph is derived from Corporate Income Tax returns from 2009-16.

Table 1: Summary Statistics

	Treatment Group							
	Before 2012				After 2012			
	Count	Mean	Median	Std.Deviation	Count	Mean	Median	Std.Deviation
Turnover	63,506	9,892,906	9,184,198	5,447,840	105,870	15,323,545	11,687,982	14,084,555
Total Cost	63,504	11,668,229	9,789,557	12,063,096	105,870	17,456,300	12,827,539	16,613,845
PBITD	63,506	1,173,221	679,802	1,854,479	105,870	1,741,391	845,072	3,142,611
Taxable Income	63,506	477,149	138,706	818,614	105,870	733,533	178,195	1,374,110
Tax Paid	63,506	159,867	54,191	259,771	105,870	242,605	69,127	436,786
Audit Fee	63,506	22,618	18,000	19,435	105,870	30,773	25,000	27,846
Wage Ratio	63,481	0.21	0.13	0.21	105,841	0.22	0.14	0.25
Wage	63,506	1,800,028	1,189,462	1,776,788	105,870	2,895,673	1,683,453	3,394,915
Upstream Ratio	51	0.36	0.33	0.34	51	0.36	0.33	0.34

	Comparison Group							
	Before 2012				After 2012			
	Count	Mean	Median	Std.Deviation	Count	Mean	Median	Std.Deviation
Turnover	1,896	11,064,946	9,633,706	6,985,863	3,160	16,884,050	11,707,338	17,099,600
Total Cost	1,896	14,952,564	10,890,315	19,367,045	3,160	20,180,162	12,890,495	21,565,627
PBITD	1,896	2,261,207	1,215,544	3,273,161	3,160	3,536,390	1,345,231	5,665,575
Taxable Income	1,896	789,058	114,441	1,207,152	3,160	1,149,721	98,330	1,969,816
Tax Paid	1,896	267,041	66,664	380,352	3,160	391,436	72,187	628,930
Audit Fee	1,896	31,136	21,852	26,201	3,160	41,914	29,207	37,260
Wage Ratio	1,891	0.22	0.13	0.21	3,155	0.24	0.15	0.23
Wage	1,896	1,965,551	1,190,394	2,019,811	3,160	2,881,183	1,703,390	3,405,506
Upstream Ratio	36	0.41	0.43	0.34	36	0.41	0.43	0.34

Table 2: Effect on Tax liability

Variable	(1) Tax Paid	(2) Tax Paid	(3) Tax Paid	(4) Tax Paid
Treat x Post2012	-41,691***		-41,285***	
	(15,139)		(15,114)	
Treat x FY2009		-11,086		-11,493
		(12,436)		(12,458)
Treat x FY2010		-8,891		-9,805
		(11,108)		(11,104)
Treat x FY2012		-25,909**		-25,973**
		(11,642)		(11,624)
Treat x FY2013		-33,659**		-33,764**
		(14,618)		(14,579)
Treat x FY2014		-61,597***		-61,866***
		(19,841)		(19,852)
Treat x FY2015		-48,447**		-48,189**
		(21,863)		(21,846)
Treat x FY2016		-72,136***		-72,204***
		(25,978)		(25,980)
Sectoral Time trends	No	No	Yes	Yes
Observations	174,432	174,432	174,432	174,432
R-squared	0.602	0.602	0.603	0.603

Robust standard errors (clustered at Company level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note- The dependent variable is tax liability measured in rupees. All the regressions include company fixed effects and year fixed effects. The treated group consists of private companies with revenue between Rs.6-15 million in 2011, a year before the notch was moved from Rs.6 million to Rs.10 million. The comparison group consists of public companies within same turnover bandwidth in 2011.

[Source] All the data for this table is derived from Corporate Income Tax returns from 2009-16.

Table 3: Effect on Tax Base and Audit-fee

VARIABLES	(1) PBITD	(2) PBITD	(3) Taxable Income	(4) Taxable Income	(5) Audit Fee	(6) Audit Fee
Treat x Post2012	-703,408***		-102,575**		-2,574***	
	(147,840)		(47,659)		(752.4)	
Treat x FY2009		-100,890		-15,892		-153.5
		(124,377)		(39,985)		(751.8)
Treat x FY2010		-24,412		-18,324		89.71
		(108,415)		(35,615)		(718.9)
Treat x FY2012		-248,640*		-67,561*		-451.1
		(127,024)		(38,190)		(641.6)
Treat x FY2013		-534,433***		-68,220		-1,326
		(137,117)		(45,563)		(827.8)
Treat x FY2014		-964,452***		-121,879**		-2,107**
		(187,319)		(58,000)		(947.3)
Treat x FY2015		-866,987***		-106,650		-4,412***
		(214,124)		(66,030)		(1,100)
Treat x FY2016		-1.113e+06***		-205,776**		-4,687***
		(258,201)		(82,736)		(1,254)
Observations	174,432	174,432	174,432	174,432	174,432	174,432
R-squared	0.581	0.581	0.603	0.603	0.726	0.726

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note- The dependent variables are nominal values measured in rupees. PBITD refers to Profit before Interest, Taxes and Depreciation. All the regressions include company fixed effects, year fixed effects and sector-specific time trends. The treated group consists of private companies with turnover between Rs.6-15 million in 2011, a year before the notch was moved from Rs.6 million to Rs.10 million. The comparison group consists of public companies within same turnover bandwidth in 2011.

[Source] All the data for this table is derived from Corporate Income Tax returns from 2009-16.

Table 4: Heterogeneity in the Effect of the Notch

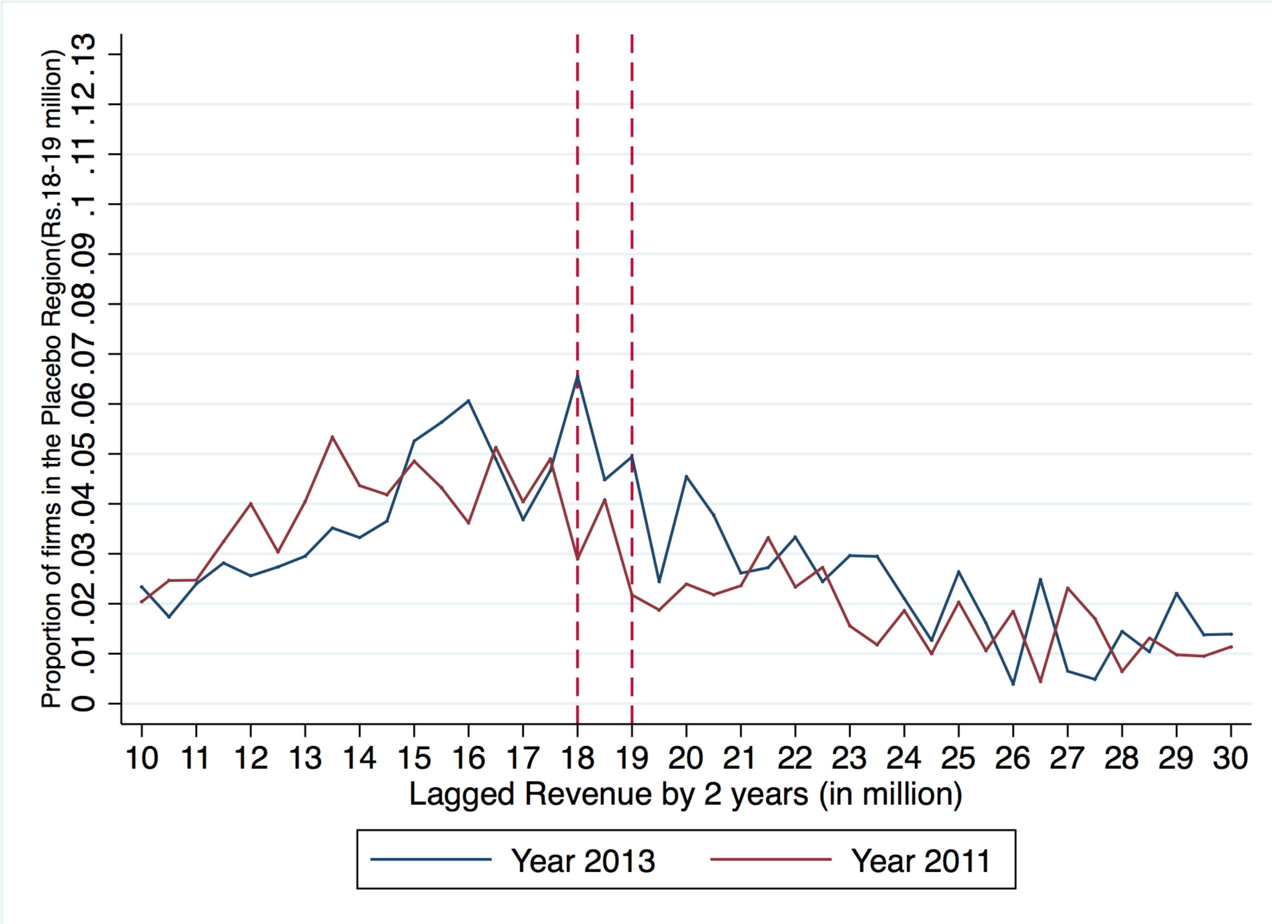
VARIABLES	(1) Tax Paid	(2) Tax Paid	(3) Tax Paid
Treat x Post2012	-4,210	-72,574***	-74,956***
	(21,853)	(15,242)	(15,237)
Treat x Post2012 x UpstreamRatio	-60,179***		
	(8,392)		
Treat x Post2012 x WageRatio		144,423***	
		(11,766)	
Treat x Post2012 x Wage			0.0161***
			(0.00134)
Treat x Post2012 + Treat x Post2012 x p(25)	-5,968	-63,991***	-63,526***
	(21,808)	(15,177)	(15,137)
Treat x Post2012 + Treat x Post2012 x p(90)	-55,359 **	8,818	5,613
	(21,655)	(15,901)	(15,785)
Observations	77,855	174,392	174,432
R-squared	0.614	0.604	0.605

Robust standard errors (clustered at Company level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note- The dependent variable is nominal tax payment measured in rupees. All the regressions include company fixed effects, year fixed effects and sector-specific time trends. UpstreamRatio is defined as proportion of sales that are used as intermediate inputs by other industries. This is calculated at the industry-level. Wage ratio is the proportion of total expenses of a firm spent on the employees one year before the policy change in 2011. Wage is the total wage payments by the firm in 2011. Both the variables proxy for the total number of employees in a firm. $p(25)$ and $p(90)$ are the 25th and 90th percentile of the variable interacted with the difference-in-difference interaction term. The treated group consists of private companies with turnover between Rs. 6-15 million in 2011, a year before the notch was moved from Rs.6 million to Rs.10 million. The comparison group consists of public companies within same turnover bandwidth in 2011.

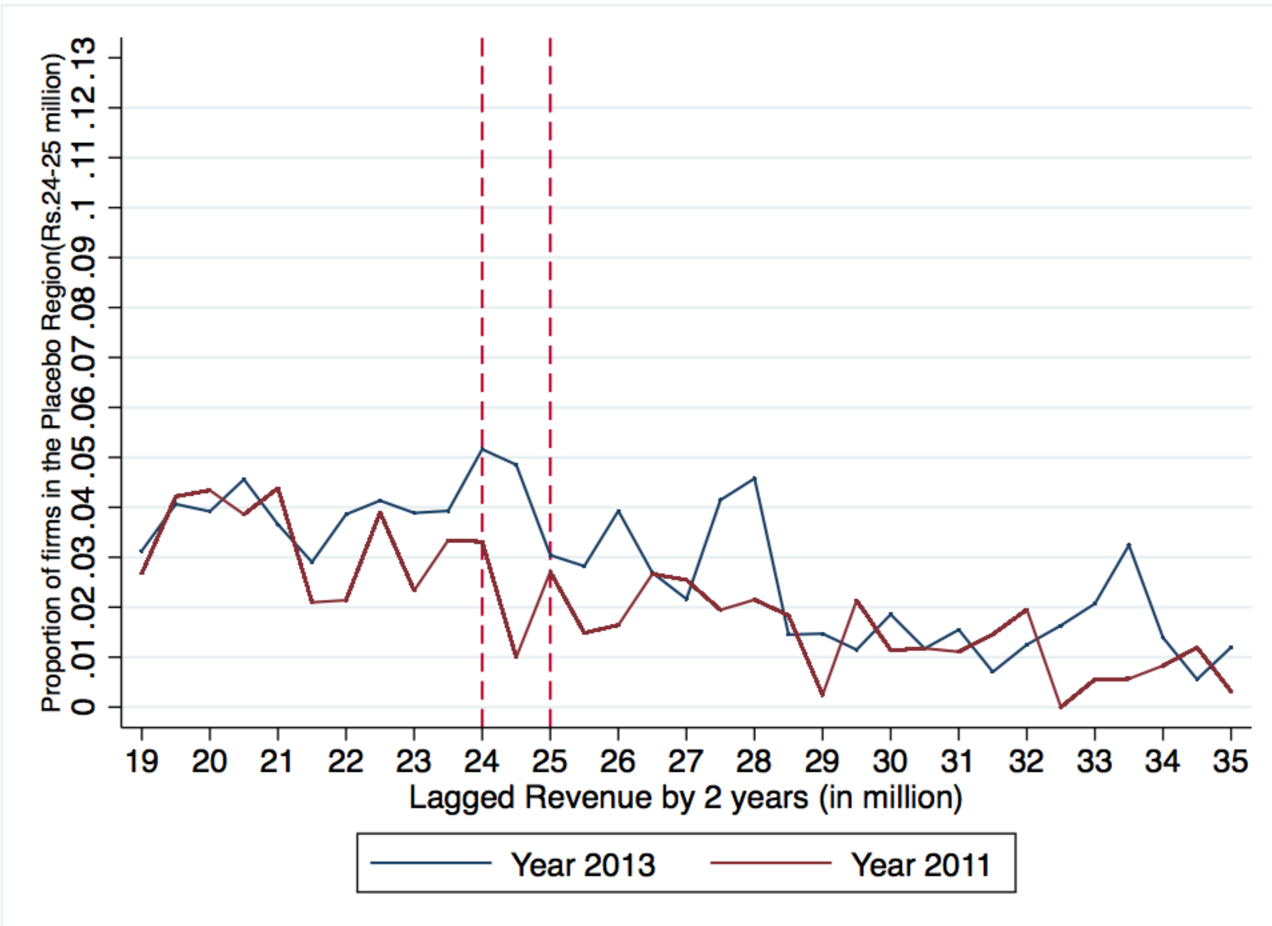
[Source] All the tax and expense data for this table is derived from Corporate Income Tax returns from 2009-16. For the industry-level intermediate consumption we use the Supply and Use Tables of 2011-12 complied by Ministry of Statistics and Program Implementation.

Appendix A. Supplemental Graphs and Tables



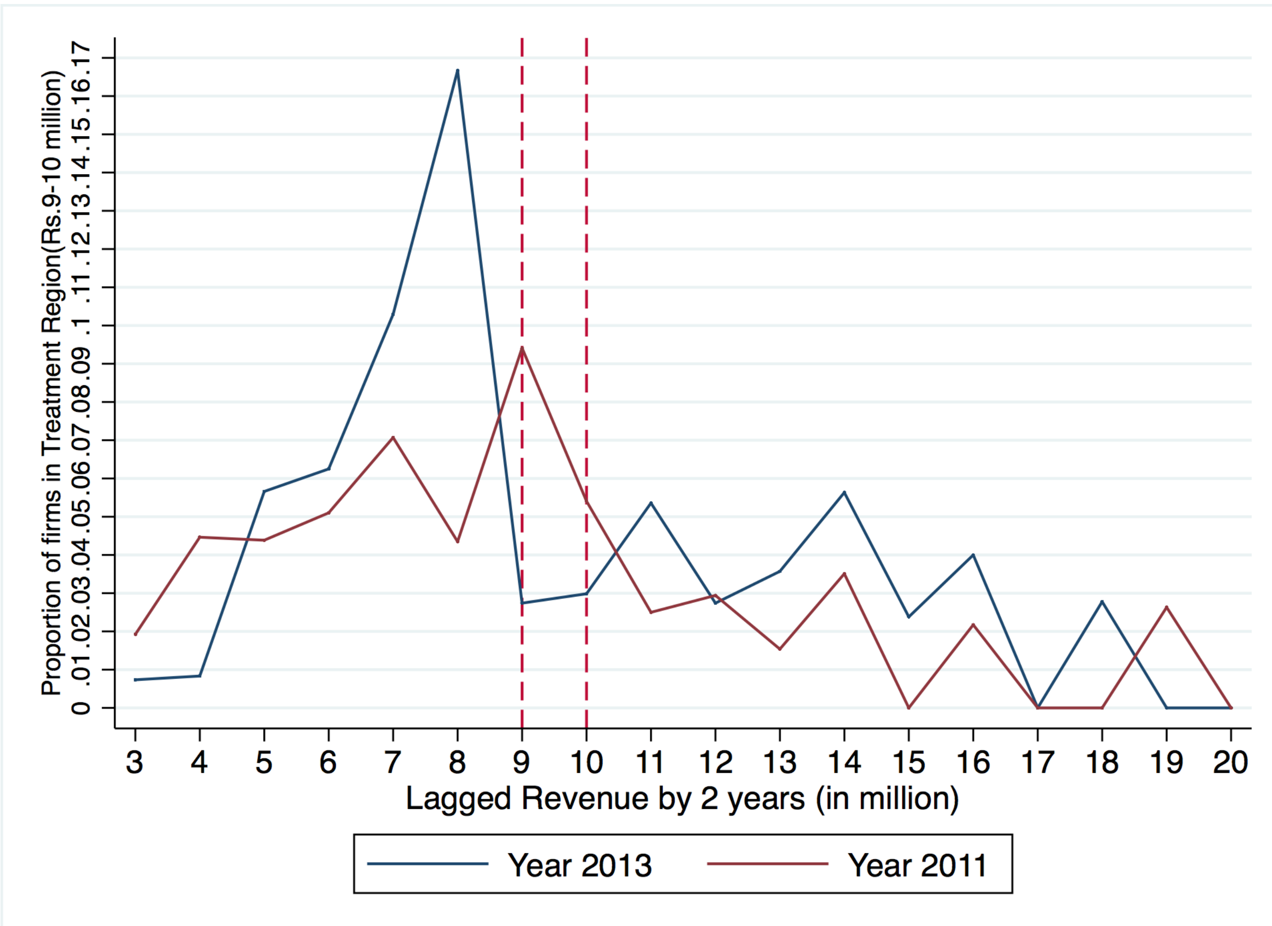
Appendix Graph 1A: Likelihood of being in a Placebo region

Note – In this graph, we plot the probability of being in a placebo region based on lagged revenue bins. The notch was introduced at Rs.10 million in 2012. The blue line represents the probability of being in Rs.18-19 million bin in 2013, conditional on revenue in 2011. The red line represents the probability of being in the same region in 2011, conditional on revenue in 2009. The difference between the two probabilities give us the effect of the notch. The bin size is Rs 0.5 million. All the data for this graph is derived from Corporate Income Tax returns from 2009-13.



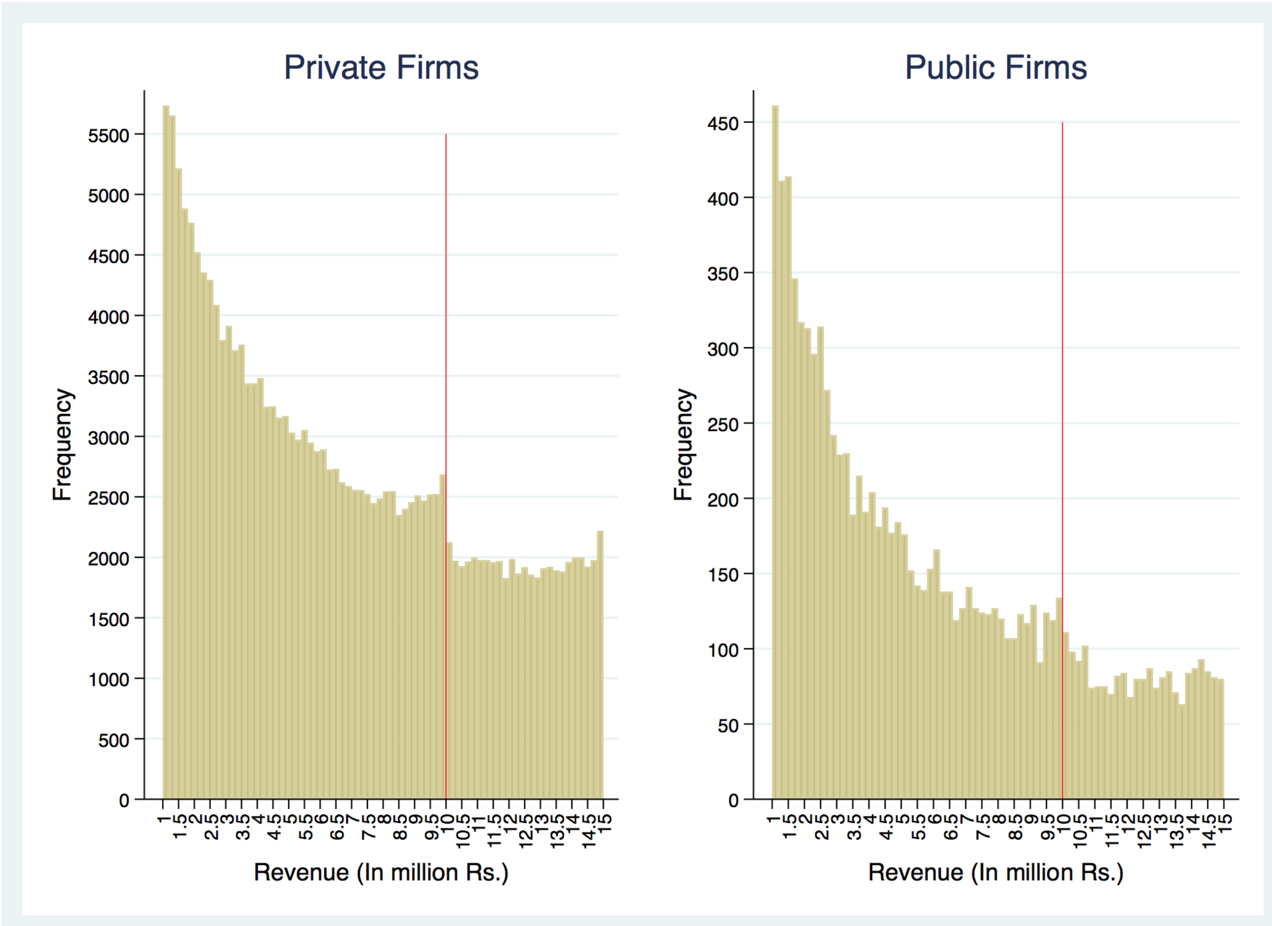
Appendix Graph 1B: Likelihood of being in a Placebo region

Note – In this graph, we plot the probability of being in a placebo region based on lagged revenue bins. The notch was introduced at Rs.10 million in 2012. The blue line represents the probability of being in Rs.24-25 million bin in 2013, conditional on revenue in 2011. Similarly, the red line represents the probability of being in the same region in 2011, conditional on revenue in 2009. The difference between the two probabilities give us the effect of the notch. The bin size is Rs 0.5 million. All the data for this graph is derived from Corporate Income Tax returns from 2009-13.



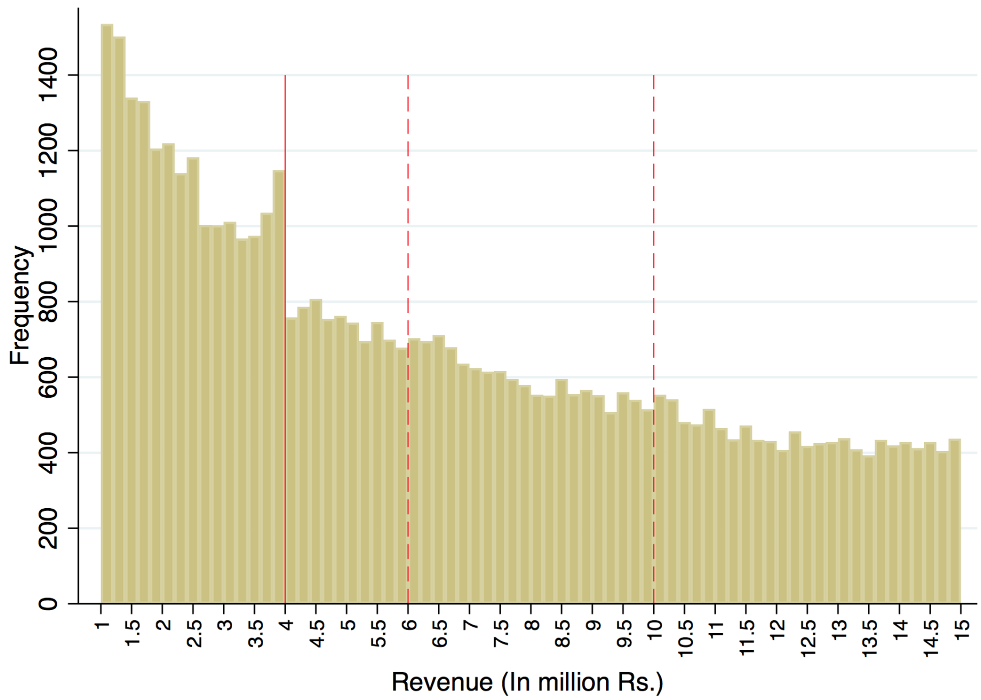
Appendix Graph 2: Likelihood of being in the Treatment region for public firms

Note – In this graph, we plot the probability of being in the treatment region based on lagged revenue bins for public firms. The notch was introduced at Rs.10 million in 2012. The blue line represents the probability of being in Rs.9-10 million in 2013 based on revenue in 2011. Similarly, the red line represents the probability of being in the same region in 2011, based on revenue in 2009. The difference between the two probabilities give us the effect of the notch. The bin size is Rs.1 million. All the data for this graph is derived from Corporate Income Tax returns from 2009-13.

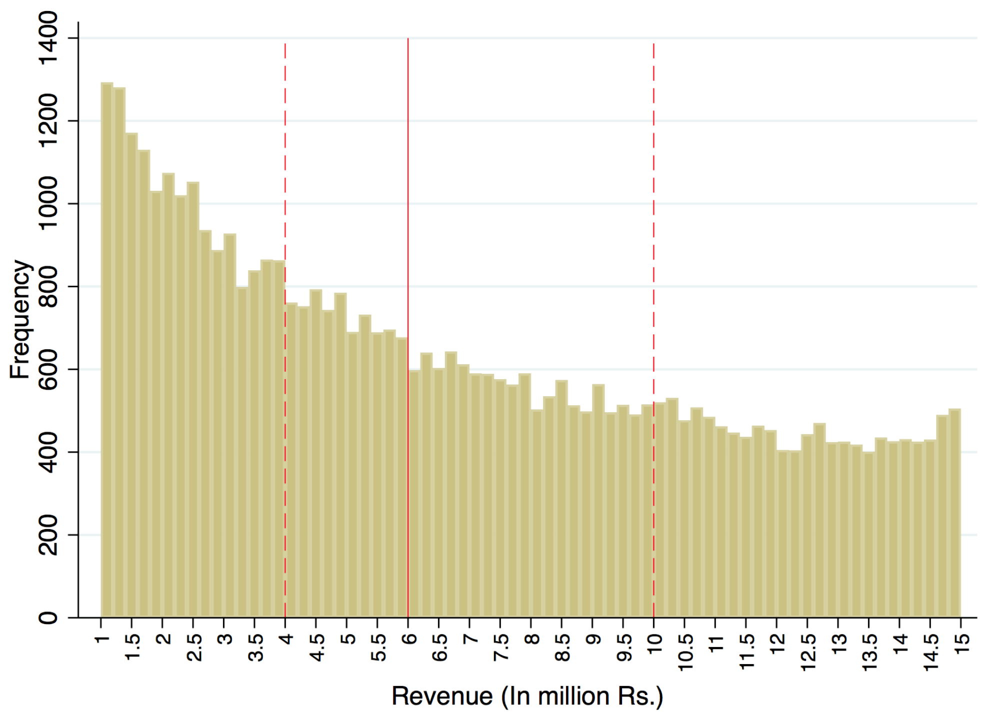


Appendix Graph 3: Histogram of Public and Private Firms from 2012-16.

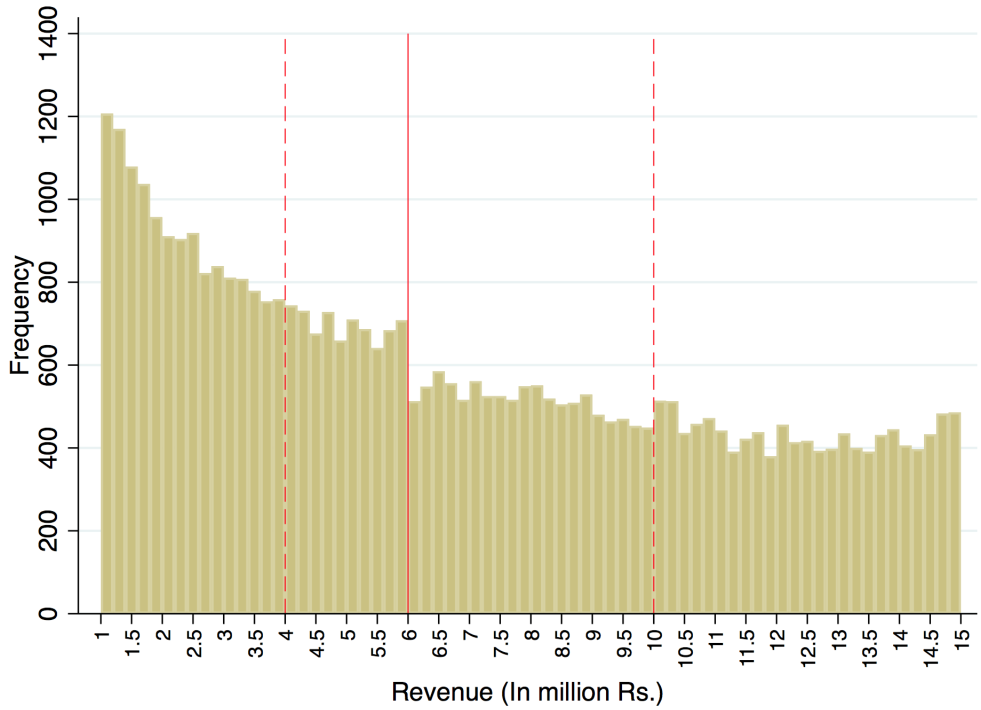
Note – In this graph, we plot the density of firms from 2012-16 separately for public and private firms. The third-party audit threshold was Rs.10 million during this period. All the data for this graph is derived from Corporate Income Tax returns from 2012-16.



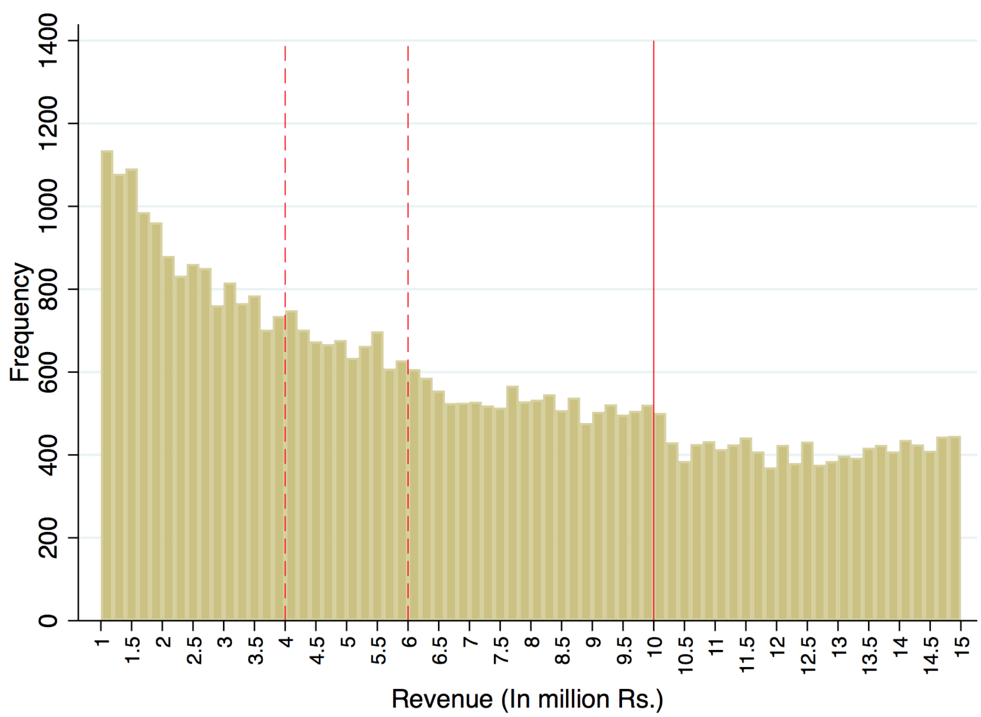
Appendix Graph 4: Density of Private firms in 2009 when audit threshold was Rs.4 million.



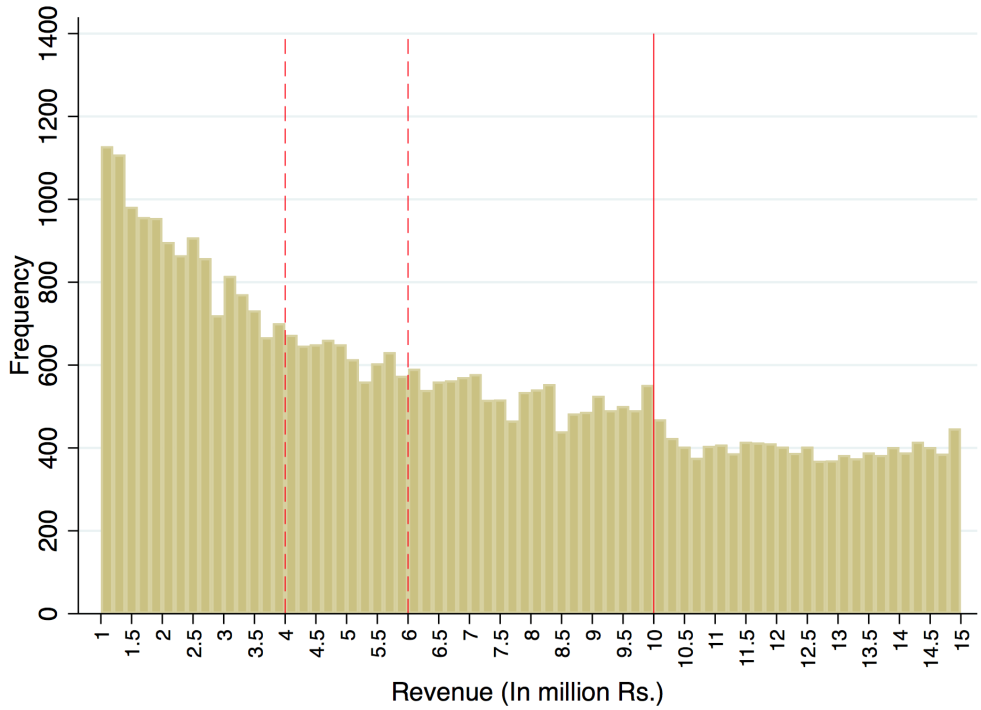
Appendix Graph 4: Density of Private firms in 2010 when audit audit threshold was Rs.6 million.



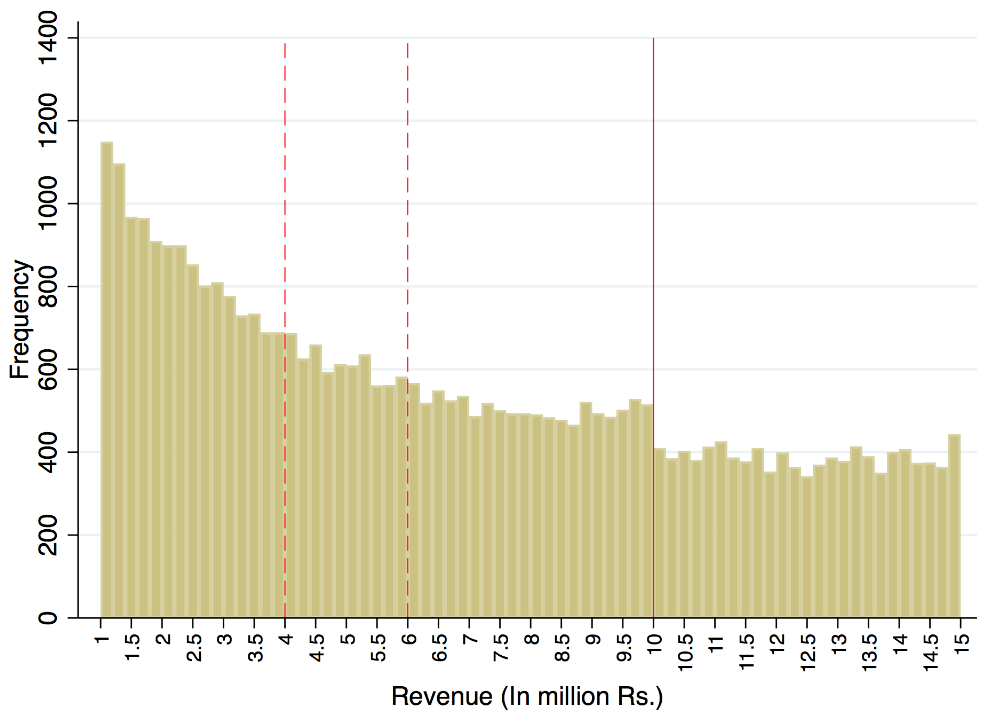
Appendix Graph 4: Density of Private firms in 2011 when audit threshold was Rs.6 million.



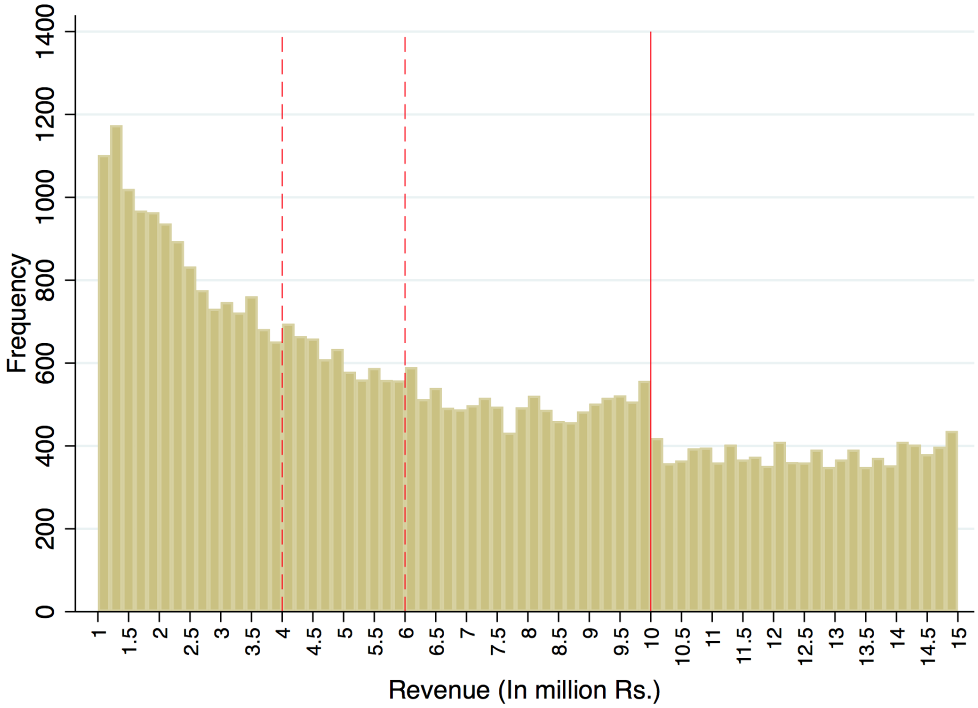
Appendix Graph 4: Density of Private firms in 2012 when audit threshold was Rs.10 million.



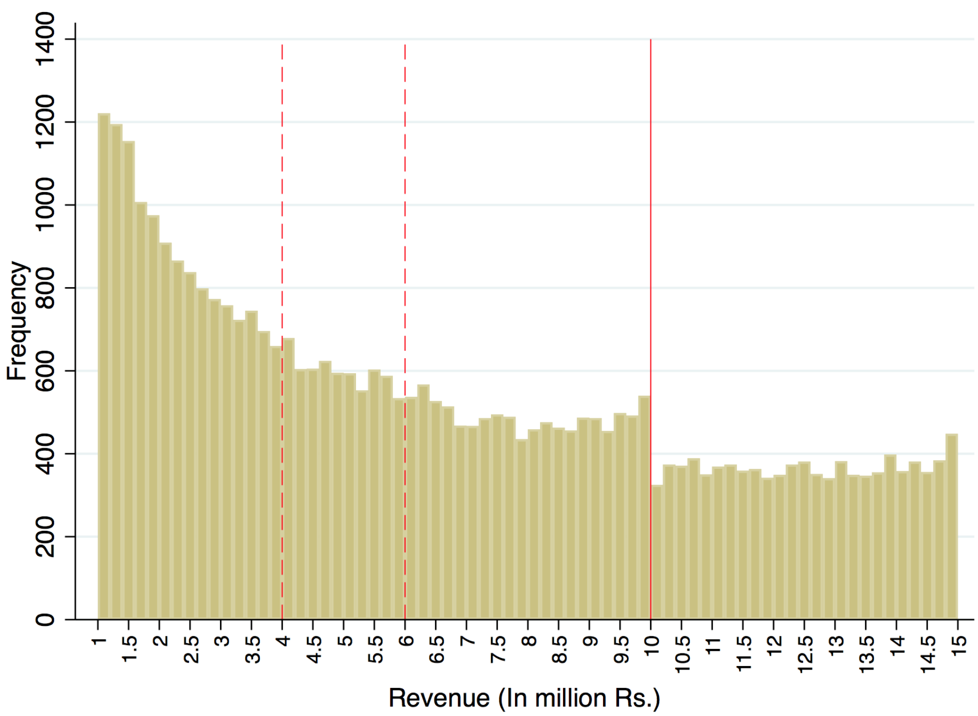
Appendix Graph 4: Density of Private firms in 2013 when audit threshold was Rs.10 million.



Appendix Graph 4: Density of Private firms in 2014 when audit threshold was Rs.10 million.



Appendix Graph 4: Density of Private firms in 2015 when audit threshold was Rs.10 million.



Appendix Graph 4: Density of Private firms in 2016 when audit threshold was Rs.10 million.

Appendix Table 1: Estimates using the treatment neighborhood from Static Bunching analysis.

VARIABLES	(1) PBITD	(2) Taxable Income	(3) Tax Paid	(4) Audit Fee
Treat x Post2012	-649,838***	-81,007	-40,462**	-1,641*
	(173,333)	(55,502)	(18,002)	(891.2)
Observations	113,336	113,336	113,336	113,336
R-squared	0.579	0.595	0.594	0.722

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note – In this table, we use the upper bound of the treatment neighborhood obtained by static bunching analysis instead of difference in probabilities method. The treated group consists of private companies with turnover between Rs.6-11.5 million in 2011, a year before the notch was moved from Rs.6 million to Rs.10 million. The comparison group consists of public companies within the same turnover bandwidth in 2011. The dependent variables are measured in rupees. PBITD refers to Profit before Interest, Taxes and Depreciation. All the regressions include company fixed effects, year fixed effects and sector-specific time trends.

[Source] All the data for this table is derived from Corporate Income Tax returns from 2009-16.

Appendix Table 2: Placebo Test

VARIABLES	(1) Tax Paid (Rs.15-25 mil)	(2) Taxable Income (Rs.15-25 mil)	(3) Tax Paid (Rs.30-50 mil)	(4) Taxable Income (Rs.30-50 mil)
Treat x Post2012	-41,888	-74,083	-60,938	-20,291
	(31,408)	(98,483)	(40,952)	(120,293)
Observations	104,179	104,179	103,857	103,857
R-squared	0.611	0.610	0.620	0.620

Robust standard errors (clustered at Company level) in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note- In the first and second column, we consider private (public) firms with turnover between Rs.15-25 million in 2011 as the treatment (comparison) group. In columns 3 & 4, we restrict the sample to firms with turnover between Rs.30-50 million in 2011. The coefficients are insignificant implying that there is no effect of the audit-notch on big firms. The dependent variables are measured in rupees. All the regressions include company fixed effects, year fixed effects and sector-specific time trends. [Source] All the data for this table is derived from Corporate Income Tax returns from 2009-16.

Appendix Table 3: Estimates using a subsample of firms that have no potential selection bias.

VARIABLES	(1) PBITD	(2) Taxable Income	(3) Tax Paid	(4) Audit Fee
Treat x Post2012	-831,327***	-183,172**	-48,566**	-4,121***
	(235,198)	(74,799)	(22,320)	(1,195)
Observations	89,379	89,379	89,379	89,379
R-squared	0.581	0.609	0.611	0.733

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note- In this table, the treated group consists of private companies with turnover between Rs.10-15 million in 2011, a year before the notch was moved from Rs.6 million to Rs.10 million. The comparison group consists of public companies within the same turnover bandwidth in 2011. We want to test if excluding the firms between Rs.6 million to Rs.10 million changes the coefficients qualitatively. There is a potential concern that firms between Rs.6 million to Rs.10 million had an opportunity to bunch in 2011, when the notch was at Rs.6 million. Excluding these firms from the sample will remove any potential bias from the estimates. The dependent variables are measured in rupees. PBITD refers to Profit before Interest, Taxes and Depreciation. All the regressions include company fixed effects, year fixed effects and sector-specific time trends.
[Source] All the data for this table is derived from Corporate Income Tax returns from 2009-16.

Appendix Table 4: Estimates after including firms that switch between public and private status.

VARIABLES	(1) PBITD	(2) Taxable Income	(3) Tax Paid	(4) Audit Fee
Treat x Post2012	-197,062***	-72,561***	-23,108***	-730.4**
	(47,535)	(19,266)	(6,072)	(328.1)
Observations	195,947	195,947	195,947	195,947
R-squared	0.581	0.603	0.603	0.722

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Note – In the main specification, we do not include firms that switch between public and private firms as they change their status more than once in the sample period – suggesting coding error or mis-reporting. In this table we include those firms, and test if our estimates are different. The dependent variables are measured in rupees. PBITD refers to Profit before Interest, Taxes and Depreciation. All the regressions include company fixed effects, year fixed effects and sector-specific time trends. The treated group consists of private companies with turnover between Rs.6-15 million in 2011, a year before the notch was moved from Rs.6 million to Rs.10 million. The comparison group consists of public companies within same turnover bandwidth in 2011.
[Source] All the data for this table is derived from Corporate Income Tax returns from 2009-16.

Appendix Table 5: Different bin-size for Static Analysis.

	(1)	(2)	(3)
Bin Size (million Rs.)	0.1 mil	0.3mil	0.5mil
Upper Bound	12	13	11.5
(Standard Error)	(8.204)	(4.548)	(8.795)

Note- This table provides estimates of the upper-bound using different bin-sizes for the static analysis. The standard errors are estimated using a bootstrap procedure using 50 iterations. The bin-size used in the main analysis is Rs.0.5 million.
[Source] All the data for this table is derived from Corporate Income Tax returns from 2012-16.

Appendix Table 6: Test for change in probability.

Dependent Variable: (Proportion of firms in bunching region)	(1) Private Firms	(2) Private Firm	(3) Private Firms	(4) Public Firms
Treatment Bin x After	0.0218***	0.00755	0.00857	0.0176
	(0.00336)	(0.00551)	(0.00517)	(0.0222)
After	0.000861	0.00643**	0.00470	-0.000267
	(0.00144)	(0.00274)	(0.00406)	(0.00693)
Constant	0.00926***	0.04734***	0.0391***	0.00761**
	(0.000640)	(.0013735)	(0.00197)	(0.00333)
Treatment Bins $[k_1, k_2]$	[8,15]	[17.5,21]	[21.5,26.5]	[8,15]
Bunching Region	[9,10)	[18,19)	[24,25)	[9,10)
Observations	105,499	26,153	19,209	3,442
R-squared	0.980	0.851	0.779	0.602

Robust standard errors clustered at bin-level in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Note- This table tests if there is a differential change in the probability of being in the bunching region for firms that are in the treatment bins as compared to the neighboring bins after the policy change. In column 1, we correctly specify the bunching region associated with the policy change that moved the notch to Rs.10 million. The treatment bins are estimated by using Figure 3. In column 4, we run the same test for public firms. In columns 2 & 3 we conduct a placebo test by incorrectly specifying the bunching region. The treatment bins are estimated using Appendix Graphs 1A and 1B.
[Source] All the data for this table is derived from Corporate Income Tax returns from 2009-13.

Appendix B. Table of upstream ratios of industries

This table was created by matching the description of industry codes in Income Tax forms to the Supply-Use Tables compiled by the Ministry of Statistics and Program Implementation in 2011. The upstream ratio is the proportion of sales to the intermediate consumer to the total consumption. Below we present the industries which we were able to match with the Use tables.

Description	ITR Code	Upstream Ratio
Automobile and Auto parts	102	0.33
Cement	103	0.99
Drugs and Pharmaceuticals	105	0.74
Electronics including Computer Hardware	106	0.38
Engineering goods	107	0.15
Fertilizers, Chemicals, Paints	108	0.84
Flour & Rice Mills	109	0.85
Petroleum and Petrochemicals	113	0.87
Power and energy	114	0.79
Printing & Publishing	115	0.45
Rubber	116	0.89
Steel	117	0.88
Sugar	118	0.17
Tea, Coffee	119	0.69
Textiles, handloom, Power looms	120	0.45
Tobacco	121	0.54
Vanaspati & Edible Oils	123	0.53
Chain Stores	201	0
Retailers	202	0
Wholesalers	203	1
Builders	401	0.06
Estate Agents	402	0.12
Property Developers	403	0.56
Others	404	0.12
Civil Contractors	501	0.12
Legal professionals	603	0.50
Medical professionals	604	0
Nursing Homes	605	0
Specialty hospitals	606	0
Beauty Parlours	702	0

Description	ITR Code	Upstream Ratio
Consultancy services	703	0
Courier Agencies	704	0
Computer training/educational and coaching institutes	705	0.02
Forex Dealers	706	0.00
Hospitality services	707	0.43
Hotels	708	0.43
I.T. enabled services, BPO service providers	709	0.03
Security agencies	710	0
Software development agencies	711	0.03
Transporters	712	0.27
Banking Companies	801	0.67
Chit Funds	802	0.67
Financial Institutions	803	0.67
Financial service providers	804	0.67
Leasing Companies	805	0.67
Non-Banking Finance Companies	807	0.67
Cable T.V. productions	901	0.06
Film distribution	902	0.06
Film laboratories	903	0.06
Motion Picture Producers	904	0.06
Television Channels	905	0.06

Appendix C. Differences between private and public company.

The Company Act (2013) defines a public company as i)Not a private company and ii) has a minimum paid-up share capital of Rs.500K. Private company differs from a public company as they have restrictions on raising capital by selling shares. Section 2(68) requires private companies to restrict the sale of shares under Articles of Association. On the other hand, Section 58(2) provides that the securities or other interest of any member in a public company shall be 'freely transferable', unless there is a sufficient cause. Second, a private company must have at least 2 shareholders, while a public company must have at least 7 shareholders. Additionally, a private company must have at least 2 directors whereas a public company must have at least 3 directors. There are no restrictions on the managerial remunerations of a private company whereas they are capped at 11 percent of the net profit for the public company. These differences imply that managers of public company face a potential moral hazard where they have to split the gains of tax evasion with more shareholders but incur the same penalty as that of private company's manager if they get caught.

If a public company wants to raise capital by selling its shares, then it has to issue a prospectus. Among other things, it has to provide information on "reports by the auditors of the company with respect to its profits and losses and assets and liabilities.." and "any litigation or legal action pending or taken by a Government Department or a statutory body during the last five years immediately preceding the year of the issue of prospectus against the promoter of the company".

In our context, a public company has incentive to report honestly to the tax-authorities even when it doesn't undergo third-party tax audit because it might have to issue a prospectus at some point in the future. The Chartered Accountants also have an incentive to perform statutory-audit more rigorously as their reports will become public once the company decides to raise capital in a stock exchange.

Appendix D. Model of evasion with dynamic considerations.

In this appendix, we present a stylized model which develops the intuition that firms misreport their income in a staggered way if they believe that their chances of getting caught increases when they report zero-growth to the tax-authorities.

Static case - Consider a two-period model where a firm has to choose reported income, $\bar{y}_1$ and $\bar{y}_2$ at period $t = 1$ and $t = 2$. For analytical simplicity, assume that firm's true income y doesn't change in both the periods. Thus, the under-reporting in time periods 1 and 2 is given by $u_1 = y - \bar{y}_1$ and $u_2 = y - \bar{y}_2$, respectively.

Let t be the tax rate on reported profit. There is a strictly increasing, continuous and convex resource cost of under-reporting given by $k(u)$. The probability of the firm getting caught, in any period, is given by $\delta = \phi h(u)$, where ϕ is the effective audit intensity faced by the firm. $h(.)$ is increasing and convex in u. If the firm get caught, it faces a penalty rate of θ on evaded taxes.

In the static model, the firm maximizes identical objective function in both the periods : $E[\pi] = (1-t)[y-u] - k(u) + u - \phi h(u)[ut + \theta ut]$. The FOC characterizing the optimal level of under-reporting is given by:

$$k_u(u) + tu(1+\theta)\phi h_u(u) - t[1 - \phi h(u)(1+\theta)] = 0 \tag{1}$$

Let u^* and $\bar{y}^*$be the optimal level of under-reporting and reported income in the static-model.

Dynamic Case: To model the strategic concern, we assume that the probability of getting caught in time period 2 also depends on the growth of reported income. Let $\delta_1 = \phi h(u_1)$ and $\delta_2 = \phi h(u_2) + f(g)$, where $g = (\bar{y}_2 - \bar{y}_1)/\bar{y}_1$. Lower reported growth results in higher probability of getting caught which implies that $f'(g) < 0$. The firm now jointly chooses u_1

and u_2 to maximize:

$$\begin{aligned} E[\pi] =& (1-t)[y-u_1] - k(u_1) + u_1 - \delta_1[u_1 t + \theta u_1 t] \\ &+ (1-t)[y-u_2] - k(u_2) + u_2 - \delta_2[u_2 t + \theta u_2 t] \end{aligned}$$

The FOCs with respect to u_1 and u_2 is given by:

$$k_u(u_1) + tu_1(1+\theta)\phi h_u(u_1) - t[1-\phi h(u_1)(1+\theta)] + [tu_2\bar{y}_2(1+\theta)f'(g)]/\bar{y}_1^2 = 0 \quad (2)$$

$$k_u(u_2) + tu_2(1+\theta)\phi h_u(u_2) - t[1-\phi h(u_2)(1+\theta)] + t(1+\theta)[f(g) - u_2 f'(g)/\bar{y}_1] = 0 \quad (3)$$

Let u_1^* and u_2^* solve the above equations. Now, assume that $A(u)$ represents the LHS of equation 1, then equation 2 can be written as:

$$A(u_1) + B(u_1, u_2) = 0,$$

where $B(u_1, u_2) = [tu_2\bar{y}_2(1+\theta)f'(g)]/\bar{y}_1^2 < 0$. Simple comparative stats reveal that $\frac{\partial A}{\partial u} > 0$. Combining the fact that $A(u^*) = 0$, $B(u_1, u_2) < 0$ and $\frac{\partial A}{\partial u} > 0$ gives us the result that,

$$u_1^* > u^* \implies \bar{y}_1^* < \bar{y}^*$$

Similarly, we can argue that

$$u_2^* < u^* \implies \bar{y}_2^* > \bar{y}^*$$

Thus, if the firms believe that reporting zero growth will increase the probability of getting caught, then they don't report the same level of income across different time periods and stagger their growth. For our main analysis, this implies that the excess mass of bunchers can be diffused rather than concentrated at the notch.