Do firms have a preference for paying exactly zero tax?[*]

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Abstract

Understanding firms' responses to corporate tax rates is crucial for optimal tax design; particularly so for developing countries, which rely more heavily on corporate income taxes. We study administrative data on the taxable income of distribution small businesses in South Africa, around three prominent "kink points" with discontinuous marginal tax rate changes. There is substantial and persistent bunching at the two higher income kink points, with associated implied elasticities between 0.2 and 0.3. Bunching at the lowest kink (where marginal tax rates change from 0% to 7%) appears qualitatively different, with firms seemingly treating moving across this kink as leading to a substantial discrete shift in the level of taxes due (i.e., treating this kink as a "notch"). This is consistent with a preference to avoid paying a positive tax bill. We provide evidence against several natural explanations for this behavior, including hassle factors or misperceptions of the tax schedule.

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1 Introduction

To design an efficient and effective system of business taxes, it is crucial to understand how—and how much—firms alter their activity in response to corporate income taxes. This is particularly important in developing countries, which raise a relatively large share of revenues from such taxes. In this paper, we study this question in South Africa, a natural setting to consider due to its status as a major emerging market economy. We focus on small businesses in this paper, which are of particular interest, as such firms are a major thrust of government policy to enable entrepreneurship and employment, but often deal at the margins of formality, where issues of enforcement and evasion are especially relevant.

South Africa has a large number of firms, and captures high-quality administrative tax data on them.[1] Using the universe of South Africa's small business corporation (SBC) tax returns from 2010–2018, we employ a "bunching" strategy to study firms' responses to tax incentives. Specifically, the SBC tax schedule, in common with many other countries, has a piecewise-linear structure. In this schedule, marginal tax rates step up discontinuously at three income thresholds, creating discontinuities in the marginal incentive for firms to earn income (or to manipulate reported income) at these "kinks." Theory predicts that firm optimization will generate a characteristic pattern of excess mass ("bunching") in the density of reported taxable income around these kinks, the magnitude of which can be used to estimate the elasticity of taxable income with respect to the marginal net-of-tax rate—a key statistic for quantifying the distortionary effect of taxes and thus optimal tax rates.

We document two key empirical findings about the distribution of firms in relation to these thresholds. First, consistent with prior findings (Boonzaaier, Harju, Matikka and Pirttilä, 2019; Lediga, Riedel and Strohmaier, 2019), we document pronounced bunching among South African SBCs at the two higher income kinks, which is consistent with standard theoretical predictions on behavior in response to such kinks. Extending those results, we show that the implied elasticity of taxable income at these thresholds is tightly estimated—most estimates fall between 0.25 and 0.35— and is remarkably consistent across these two kinks, over time and across subsamples. Second, we show that the bunching behavior at the lowest kink—where the marginal tax rate rises from 0% to 7%—does not match the consistent pattern of behavior at the higher income kinks, and in fact, cannot be rationalized by *any* elasticity of taxable income at a tax kink. Instead, this behavior has the trademark features of responses to a tax "notch," which refers to a situation in which the *level* of tax liability changes (as opposed to a kink at which the marginal tax *rate* alters). The magnitude of the implied discontinuity in liability is substan-

[1] In 2016, the Small Business Institute of South Africa estimates 267,959 firms, of which 98.5 are classified as SMEs.

tial: a tax increase of R11625 at the threshold (16.05% of taxable income) would rationalize the observed density.

Puzzlingly, there is no change in statutory tax liabilities at the lower threshold; in fact, several unusual features of our setting allow us to rule out other natural explanations for this behavior, such as transaction costs, filing requirements, or a misunderstanding of the tax schedule. Notably, the key distinguishing feature of the lowest income kink is that it triggers a change from zero to positive tax liability. We therefore interpret the observed bunching behavior as consistent with a preference for avoiding positive tax liability, e.g., owing to tax morale (Luttmer and Singhal, 2014) or a particular form of loss aversion.

This paper contributes to three primary areas of literature. The first is a small literature studying the effects of taxes on SBC behavior in South Africa. Boonzaaier et al. (2019) and Lediga, Riedel and Strohmaier (2019) both document bunching at the SBC tax kinks using earlier versions of the administrative data that we employ. They estimate elasticities of taxable income consistent with our estimates at the higher income kinks, and Boonzaaier et al. (2019) finds evidence that a substantial amount of this bunching is driven by a high elasticity of reported revenues among a subset of firms. We build on these findings by extending them across more recent years (up to 2018) and estimating them separately across several subgroups of interest, including whether the firms pay their director(s) a salary, whether they have any employees, whether they use a professional tax practitioner to file tax returns, and across sub-regions of South Africa. Both Boonzaaier et al. (2019) and Lediga, Riedel and Strohmaier (2019) also document the bunching at the lowest ("zero-to-positive") kink, to which they apply the same bunching elasticity estimation model as at the higher kinks, finding a substantially higher implied elasticity. Our results suggest that this estimation model is mis-specified for the bottom kink (see Section 3), suggesting that this evidence is not explained by a higher income elasticity among lower earning firms, but rather by firms treating the lowest kink point like a notch.

The second related area of literature is the large body of work using bunching around tax bracket thresholds to estimate income elasticities. This estimation strategy was first implemented to estimate personal income elasticities around kinks in Saez (2010) and Chetty et al. (2011), and later extended to notches in Kleven and Waseem (2013). This approach has generated a large literature using bunching strategies to estimate behavioral responses to taxation (see Kleven (2016) for a review). Our findings primarily contribute to the subset of those papers which study the behavior of businesses (e.g., Devereux, Liu and Loretz (2014)) and settings in developing countries (e.g., Best et al. (2015), and Bachas and Soto (2021)). We augment the prevailing theoretical approach by adapting the formulas in Kleven and Waseem (2013) to allow for an arbitrary relationship between the notch value and the change in marginal tax rates at a threshold. We then invert the approach in Kleven and Waseem (2013) to estimate the size of the notch (given an elasticity estimated from the higher kinks), rather than estimating the elasticity from a notch of known size.

The third related literature studies behavioral phenomena in governing responses to taxation. Rees-Jones (2018) studies the behavior of U.S. taxpayers filing for personal income tax refunds, and finds compelling evidence of loss aversion. In particular, he finds bunching around zero in the distribution of realized tax refunds, which suggests taxpayers perceive a greater marginal benefit from reducing a balance owed than from increasing a refund received. This finding motivates one potential behavioral explanation for the observed notch-like bunching we document at the lowest tax kink among South African SBCs: if firms view a tax bill as a loss, then perhaps they will work to avoid that loss by reducing their incomes (or reported incomes) to a point below the "zero-to-positive" kink. Importantly, however, this would imply a different structural form of loss aversion than the type documented in Rees-Jones (2018), which documents symmetric bunching of the kind implied by a discontinuity in perceived *marginal* benefits from income adjustments. In contrast, the notch-like behavior documented here would imply that taxpayers incur a substantial perceived utility cost from incurring *any* loss, regardless of magnitude. (Rees-Jones (2018) considers, and empirically rejects, this potential form of loss aversion in the setting studied there.)

A second related paper that relates behavioral phenomena and taxation is Waseem (2020), which studies the behavior of firms' earnings in response to a tax reform that reduced marginal tax rates by varying amounts for self-employed workers in Pakistan. Most relevant to our application, a subset of workers experienced reductions from a positive marginal tax rate to zero, and Waseem (2020) finds evidence that these firms experience measurably higher income growth in the ensuing years. Consistent with our findings, this suggests that a tax rate of 0% may have a distinctive effect on behavior. However the longitudinal nature of the identification strategy makes it difficult to distinguish between a *marginal* aversion to larger tax payments (consistent with the form of loss aversion in Rees-Jones (2018)) versus a discontinuous preference against paying even a small tax bill. Moreover, the cross-sectional nature of our identification strategy suggests that some of the potential explanations for why a zero marginal tax rate might be particularly important in Waseem (2020)—such as the possibility that tax reductions to zero are more salient than reductions to lower positive rates—do not apply in our setting.

In the remainder of the paper, Section 2 presents the institutional setting and describes the data used for our analysis, Section 3 presents our empirical methodology, and Section 4 discusses our results and their possible explanations. Section 5 concludes.

2 Institutional setting and data

Similar to most developing countries, corporate income taxes represent an important source of revenue for South Africa.[2] In 2017, corporate income taxes contributed 16.2% of total tax revenue in South Africa, considerably higher than the OECD average of 9.3% and in line with the average share for Africa (18.6%) and Latin America (15.3%).[3]

Taxes are collected by the South African Revenue Service (SARS), the central government tax authority. Subject to important exceptions, which will be important for our analysis, South-Africa resident companies are subject to a flat 28% tax on corporate income. Corporate taxable income comprises income generated less non-capital expenses, allowable deductions, and any incurred losses from previous tax years which can be carried forward.[4] There are 3 exceptions to the flat corporate income tax rate system, namely, small business corporations (SBCs), gold mining companies, and micro businesses. All businesses only pay income tax at the national (federal) level with no local taxes.

In this paper, we focus on SBCs. Businesses are eligible to qualify as an SBC if they fulfil the following six requirements:[5]

- The business should be a close corporation, co-operative, private company or personal liability company.[6]
- All shareholders should be natural persons during the year of assessment.
- No shareholders may hold any shares or hold any interest in any other company, subject to certain exemptions.
- The gross income of the company cannot exceed R20 million for the year of assessment.
- Investment income and income from rendering personal services may account for a maximum of 20% of all receipts, accruals and capital gains.
- The company may not be a personal service provider.

Since 2001, SBCs have faced a graduated progressive tax schedule. Table 1 shows the small business tax schedule for tax years 2010 - 2018; there are three kinks in the marginal tax rate.[7]

[2] Gordon and Li (2009) document that emerging economies rely more on corporate income taxes than developed economies.

[3] Data from the OECD available here.

[4] Corporate dividends are taxed at the shareholder level, at a 15% rate.

[5] More information on these requirements can be found in an interpretation note provided by SARS, here.

[6] A close corporation is a firm that was required to have 10 or less owners. After 2019 new companies can no longer incorporate as close corporations, but previously registered close corporations can maintain this form.

[7] The exchange rate in end-2018 was roughly 14.4 rand per USD, corresponding to USD thresholds in 2018 of approximately US$5260, US$25,350, and US$38,200.

A key feature of this tax schedule for our analysis is that small-businesses pay no tax on income earned below the first threshold and thereafter face a 7% marginal tax rate on each rand of additional income up to R365,000. As such, while the movement in the tax rate at the lower threshold is a standard kink in the tax schedule (i.e., an income value where the marginal tax rate increases), it also represents a transition from a zero to a positive tax liability. Since 2014, the marginal tax rates at the middle threshold (R365,000) and upper threshold (R550,000) have been unchanged, while the lower threshold has been adjusted upwards each year, partly to account for inflation. Income above the highest threshold incurs a marginal tax rate of 28%, the standard flat corporate tax rate.

The graduated small business schedule results in a sizeable reduction in tax liability for small-business corporations relative to corporations under the standard flat tax schedule. In addition to a reduced tax liability, SBCs are also eligible for an accelerated depreciation allowance, and are granted more generous deductible allowances for movable assets.

Given these benefits, it is perhaps unsurprising that a large number of corporations choose to incorporate as SBCs. In total, SBCs account for approximately 26% to 31 % of the total number of corporate tax filings between 2010 and 2018. The share of SBCs has also been rising. Panel (a) of Figure 1 shows a clear upward trend since 2013, with SBCs accounting for over 31% of all tax filings in 2018. While large in number, the contribution of SBC tax revenue to total corporate income tax revenue is more modest, with SBCs accounting for 3% of overall corporate tax revenue on average during our sample period. This share has however increased since 2014, rising from around 2.5% to 4%. The jump in share of tax revenue from SBCs between 2013 and 2014 coincides with the year in which the gross income requirement for SBC eligibility was increased from R14 million to R20 million; this allowed a larger number of companies to register as SBCs and therefore increased the fraction of corporate tax revenue originating from SBCs.[8]

To our knowledge, crossing the lower threshold creates no additional compliance for the firm in any of our sample years. All firms in South Africa are compelled by law to submit a tax return each year irrespective of whether they make a profit or a loss or whether they have a zero or positive tax liability.

2.1 Data and descriptive statistics

We use linked administrative tax data for the universe of personal and corporate income taxes in South Africa for the period 2010 - 2018.[9] A key feature of this dataset is the ability to link

[8]Table 1 shows three other changes that occurred from 2013 - 2014: (i) the middle threshold was moved from R350,000 to R365,000 (ii) the marginal tax rate at the middle kink was reduced from 28% to 21% (iii) an upper threshold at R550,000 was introduced with a marginal tax rate of 28%.

[9]In South Africa, tax years run from 1 April to 31 March

employee personal income tax returns to the firm's corporate income tax return, though in this draft, we focus on the corporate income tax returns.[10]

We report summary statistics for the corporate income tax data in Table 2. Mean SBC-firm revenues are far lower than those of non-SBC firms (by a factor of almost 7), but median revenues for SBCs are higher than those of non-SBCs, showing that there is considerably greater skewness in the non-SBC firm size distribution. The eligibility criteria for participating in the SBC programme do appear to bind, meaning that participation in the programme is not merely a function of firm size. This can also be seen in the comparison of the other variables—for example, director wages in SBC firms are, on average, a little more than half of the equivalent average for non-SBC firms despite the large difference in revenues between the two groups of firms. Moreover, median expenses of SBC firms are substantially higher than the equivalent for non-SBC firms.

3 Empirical Methodology

We begin by estimating the elasticity of small business corporate income to the small business corporate income tax rate (e) following the bunching methodology developed in Saez (2010) and Chetty (2012); our implementation most closely follows Mortenson and Whitten (2016).[11] This elasticity measures the percent increase in taxable income resulting from a one percent increase in the net-of-tax "keep rate" for income.[12] Note that the corporate income response here includes changes in firm profitability arising from adjustments in real business inputs (greater owner effort, increased or decreased sales and investment, hiring workers, etc.) as well as changes arising from tax evasion or other reporting manipulation. We conduct this elasticity estimation exercise separately at the lower (transition from 0 to 7 percent marginal tax rate), middle (transition from 7 to 21 percent tax rate), and upper (transition from 21 to 28 percent tax rate) thresholds. Given the fact that each threshold corresponds to a different kink in the marginal corporate income tax rates, we henceforth refer to these thresholds as the lower, middle, and upper "kinks".

To generate an estimate of the structural elasticity e at each kink, we inspect the degree of

[10]See Pieterse, Gavin and Kreuser (2018) for an introduction to the South African administrative tax data.

[11]This bunching estimation strategy has a number of implementations in the literature, including Saez (2010), Chetty (2012), and Mortenson and Whitten (2016), which differ in the specification of the density function that is estimated outside of the bunching window. Theory predicts this function is discontinuous—a feature accommodated by Saez (2010) and Mortenson and Whitten (2016), but not by Chetty (2012). We adopt Mortenson and Whitten (2016), which is similar to Saez (2010), except that it allows the density to differ both in levels and in slopes on each side of the kink.

[12]The net-of-tax keep rate, or "take home" rate for income is the percentage of income kept by the firm after paying the tax rate, i.e., if the marginal tax rate is 7% then the net-of-tax keep rate is 93%.

"bunching" of the number of corporate income tax returns submitted in the neighbourhood of the taxable income threshold for each of these kink points, following the strategy of Mortenson and Whitten (2016). Larger elasticities e should generate greater excess bunching, as a given marginal tax rate increase generates a larger downward shift in taxable income among firms to the right of the kink, resulting in a larger mass of returns piling up at the kink point.

We implement the following steps to generate our estimate:

1. *Define the bunching window/region*: We define the bunching window via subjective visual inspection.

2. *Estimate the counterfactual distributions of firms*: We separately estimate a counterfactual distribution on the left side of z^* where t_0 applies via the linear regression:

$$n_j^0 = \alpha^0 + \beta^0 z_j + \sum_{k=-W}^{0} \gamma_k^0 \cdot 1[j = k] + \epsilon_j^0, \tag{1}$$

   and on the right side of z^* where t_1 applies via the linear regression:

$$n_j^1 = \alpha^1 + \beta^1 z_j + \sum_{k=0}^{W} \gamma_k^1 \cdot 1[j = k] + \epsilon_j^1, \tag{2}$$

   where n_j is the number of firms in bin j, z_j is the income at the center of bin j (z^* is the threshold income level associated with the kink), W is the number of bins in the bunching window on each side of the kink, so we have a fixed effect for each bin with bunching firms, and ϵ_j is the residual. We use the predicted values $\hat{n}_j^i = \hat{\alpha}^i + \hat{\beta}^i z_j$ for $i \in \{0, 1\}$ as our counterfactual distribution.

3. *Estimate bunching firm population, $\hat{B}$*: We sum our fixed effect estimates from the previous step to estimate the number of bunching firms:

$$\hat{B} = \sum_{k=-W}^{0} \hat{\gamma}_k^0 + \sum_{k=0}^{W} \hat{\gamma}_k^1 \tag{3}$$

4. *Estimate the counterfactual income densities at the kink*: We average $\hat{n}_j^i$ from the two bins around z^* and divide by the bin width δ to estimate $h_i(z^*)$ for $i \in \{0, 1\}$.

5. *Solve for the elasticity estimate, e:* We solve equation (5) from Mortenson and Whitten (2016) for e using our estimates from the previous steps:

$$\hat{B} = \frac{z^*}{2}\Big(h_0(z^*) + \Big[\Big(\frac{1-t_0}{1-t_1}\Big)^e - 1\Big] + h_1(z^*) + \Big[1 - \Big(\frac{1-t_1}{1-t_0}\Big)^e\Big]\Big) \tag{4}$$

Figure 2 shows the empirical distribution of firms around the lower, middle and upper kinks and our estimated counterfactuals (shown as orange lines) implementing the method outlined above. All three panels show marked bunching at their associated kinks, but we highlight two visual differences between the pattern observed at the lower kink, when contrasted with the behavior evident at the middle and upper kinks. First, the *magnitude* of bunching at the lower kink is larger, with approximately 4.8 times more firms bunching at the peak relative to the number of firms at the right-hand side of the bunching region (indicated by the grey vertical dashed line). The corresponding ratios are 2.75 and 2.5 at the middle and upper kinks.

Second, Figure 2 shows a marked absence of firms in the bunching region immediately to the right-hand side of the threshold associated with the lower kink point. This relative absence of firms immediately to the right of the threshold is visible both relative to the counterfactual distribution at the lower kink, but also in comparison with the patterns evident at the middle and upper kinks. Implementing equation 4 we estimate a value of e of 1.38 for the lower kink, and 0.29 and 0.25 for the middle and upper kinks respectively. Following Chetty et al. (2011), we compute standard errors using a bootstrap procedure in which we randomly resample the residuals in equation (1) with replacement, 2000 times and repeat our estimation procedure. The elasticities are all highly significant.[13] We also find that the elasticity estimates at the lower kink are significantly different from those at the upper and middle kinks.[14]

The bunching methodology for estimating the elasticity of corporate taxable income to the tax rate assumes that there are no reasons to expect bunching at kink points apart from the change in the marginal tax rate. In support of this assumption, the SBC tax schedule has no additional compliance costs associated with any of these kinks, and we are unaware of different enforcement actions occurring around any of these kinks. Furthermore, the exact locations of the SBC kinks do not appear to be particularly salient numbers; Figure 3 shows the distribution of non-SBC corporate income tax files around the SBC lower, middle, and upper kinks. Visual inspection suggests no bunching at the SBC tax rate kinks for non-SBC firms.

Another striking feature of the data is the significant extent of bunching at the value of zero taxable income for both SBC firms and non-SBC firms, which can be seen in Figure 4.[15] Bunching by SBC firms at zero is particularly interesting given that SBC firms face no change in their tax rate around the zero threshold—all income is untaxed up to the lower kink threshold. As such, bunching at zero offers no benefit in terms of a reduced tax liability when compared to bunching exactly at the lower kink. Contrast this with the threshold of zero taxable income for

[13] P-values are 0.01 for the elasticity at lower kink and 0 for both the middle and upper kink elasticity.

[14] The difference between the lower kink elasticity, and the middle and upper kink elasticities are significant, with p-values of 0.03 and 0.02.

[15] Firm dormancy cannot explain the pronounced zero bunching given that we filter out all firms declared as dormant in our data cleaning process.

non-SBC firms, where the flat tax of 28% is applied to every additional rand earned above a taxable income of zero. As such, moving from a loss or break-even position to a profitable position, incurs a tax on every rand of profit.

3.1 Notch Value Estimate from Lower Kink

Motivated by the visual differences in bunching behavior at the lower versus middle/upper kinks, we develop a methodology to explore the sizeable gap between the elasticities measured at the lower kink and those at the middle and upper kinks of the SBC tax schedule. We focus on the observation that there is a sharp "cliff" seen at the lower kink, i.e., the finding of very little mass immediately to the right of the threshold at this kink. This bunching behavior appears distinct enough that it raises the possibility that firms treat the kink in the marginal tax rate at this threshold as a "notch," i.e., a discontinuous change in the tax *liability* rather than a discontinuous change in the marginal tax *rate*.[16] Put differently, one possible explanation of the visible pattern at the lower kink is that firms' preferences for paying zero rather than positive taxes manifest themselves in the form of a discrete increase in the perceived tax payment that occurs at the lower kink.

Our approach is to first assume that the true structural elasticity amongst firms at the lower kink is the same as that observed at the middle/upper kinks (in practice, these estimated elasticities are close enough to one another that we can use either).[17] We use this assumption to compute a counterfactual. Under the additional assumption that firms treat the lower kink as a notch, we estimate the size of the notch required to rationalize the excess bunching mass relative to this counterfactual. Our estimate of the size of the discrete increase in the perceived tax payment represents a money-metric measure of the value that firms assign to paying zero taxes.

Turning to the specifics, we set z^* to the position of the lower threshold,[18] $t = t_0 = 0$, and $t_1 = .07$, where z^* is now treated as a notch point rather than a kink point.[19] We employ the empirical strategy of Kleven and Waseem (2013), which derives a relationship between the discontinuity in tax liability (the "notch value") at z^* and the extent of one-sided bunching in the

[16] Rees-Jones (2018) explores the possibility of similar reference-dependent behavior with a notch in individual tax returns, and Andersen et al. (2020) find evidence consistent with reference-dependent preferences that exhibit a notch in a large population of house sellers.

[17] Using our bootstrapped standard errors, we cannot reject the null that the difference between the elasticities is statistically significant and different from 0, with a p-value of 0.117.

[18] The position of the lower threshold is adjusted upwards each year to account for inflation. To normalize the position of the lower threshold across tax years, for each value of taxable income, we calculate the distance from the kink point. We then normalize the values so that a distance of 0 represents a taxable income of R72,442, the average position of the lower threshold over the years in our sample.

[19] We set $t = t_0$ in this case as we are estimating the notch value at the lower kink, making the notation consistent with the more general formulation in the appendix with notation t and Δt.

income distribution. We first derive a condition which slightly generalizes that approach to accommodate arbitrary values of the change in marginal tax rates and notch values (which are linked in Kleven and Waseem (2013), since their application deals with changes in average tax rates). This condition is expressed in equation (9) below, and is derived formally in the online appendix. We then invert their approach, in order to compute the notch value from a known elasticity, rather than the reverse. We take $\Delta t = t_1 - t_0 = .07$ and $t = t_0 = 0$ as given, and proceed with the following steps to estimate the notch value ΔT:

1. *Initialize the lower boundary of the bunching region/window, z_L*: We select an initial value z_L via visual inspection.

2. *Estimate a counterfactual distribution of firms and define the upper boundary of the bunching region, z_U:* We estimate a counterfactual firm distribution assuming no change in the marginal tax rate across z^* via the linear regression:

$$n_j^0 = \sum_{m=0}^{p} \beta_m \cdot (z_j)^m + \sum_{\ell=z_L}^{z_U} \gamma_\ell \cdot 1[z_j = \ell] + \epsilon_j \tag{5}$$

   where n_j^0 is the counterfactual number of firms in bin j, z_j is the income at the center of bin j, p is the order of the polynomial, ℓ is the observed income corresponding to each bin in the bunching region so we have a fixed effect for each bin with bunching firms, and ϵ_j is the residual. We estimate the number of bunching firms as $\hat{B} = \sum_{\ell=z_L}^{\ell<z^*} \hat{\gamma}_\ell$ and the number of post-notch missing firms $\hat{M} = \sum_{\ell>z^*}^{\ell=z_U} \hat{\gamma}_\ell$. We employ a baseline polynomial of order $p = 3$, and we choose z_U such that $\hat{B} \approx \hat{M}$. We use $\hat{n}_j^0 = \sum_{m=0}^{3} \hat{\beta}_m \cdot (z_j)^m$ as our counterfactual distribution. It is worth noting here that we use the Mortensen-Whitten (2016) approach, which employs a piecewise linear counterfactual, for elasticity estimation at the middle and upper kinks. In this notch analysis, staying closer to Kleven and Waseem (2013), we work with the polynomial counterfactual approach, but employ the estimated elasticity from the kink analysis as an input into calculating the notch value.[20]

3. *Estimate the counterfactual income density at the notch:* We average $\hat{n}_j^0$ from the two bins around $z^*$and divide by the bin width δ to estimate $h_0(z^*)$.

4. *Generate a discrete increase in tax liability for each possible upper boundary of the dominated region*: We compute ΔT, the size of the notch, for each possible upper boundary of the strictly dominated income region, $z^* + \Delta z^D$, where $z^* + \Delta z^D \leq z^U$. We use the condi-

[20]While we follow this approach in the current draft, in subsequent drafts, we intend to make the kink and notch estimation exercises more consistent with one another.

tion:

$$\Delta T = (1 - t - \Delta t) \cdot \Delta z^D \tag{6}$$

to generate a range of possible values for ΔT.

5. *Estimate the share of unresponsive firms a^* for each possible dominated region*: For each possible dominated region D defined as the bins for which $z_j \in (z^*, z^* + \Delta z^D]$, we generate an estimate a^* of the share of unresponsive firms as:

$$a^* = \sum_{j \in D} n_j \Big/ \sum_{j \in D} \hat{n}_j^0 \tag{7}$$

6. *Estimate the upper boundary of the earnings response region, $z^* + \Delta z^*$, for each possible dominated region*: We estimate the width of the earnings response region as:

$$\Delta z^* = \frac{\hat{B}}{h_0(z^*) \cdot (1 - a^*)} \tag{8}$$

for each estimated value of a^*.

7. *Choose the notch value estimate, ΔT*: We choose the ΔT that minimizes the absolute value of the left-hand side of the following condition:

$$\frac{1}{1 + \Delta z^*/z^*}\left[1 + \frac{\Delta T/z^* - \Delta t}{1 - t}\right] - \frac{1}{1 + 1/e}\left[\frac{1}{1 + \Delta z^*/z^*}\right]^{1+1/e} - \frac{1}{1+e}\left[1 - \frac{\Delta t}{1 - t}\right]^{1+e} = 0 \tag{9}$$

using our estimates from the previous steps and given parameters.

Figure 5 reproduces the distribution of SBCs around the lower kink, but now also plots the counterfactual estimated as described immediately above to evaluate the size of the notch. The red vertical dashed line in the plot indicates the top of the estimated dominated region. No firm would choose a taxable income between z^* and the top of the dominated region, because a post-tax income in this region (including any costs associated with the perceived notch) would be worth less to the firm than post-tax income at z^*, even if the elasticity e were equal to zero. There is also missing mass between the red dashed line and the estimated upper boundary z_U. In our setup, these are firms for which the combined negative cost associated with paying positive tax, plus the lower benefit of additional taxable income (as governed by the parameter that governs the elasticity of taxable income) makes it optimal for them to bunch at the lower kink point as well. The large estimated notch value arises from attributing this missing mass, i.e., the large "hole" relative to the counterfactual, to the high degree of bunching seen at the kink point.

In our baseline estimates, using the value of e estimated from the middle kink, we estimate an implied "as-if" increase in tax liability at the lower kink threshold of approximately R11625, which is roughly 16.05% of the corporate taxable income at the threshold. We also repeat this exercise when we make different assumptions on the intensive margin elasticity e, as our estimate of ΔT is sensitive to this input. Figure 6 plots estimated notch values in thousands of rand against the different assumed intensive margin elasticities, and shows that the notch value estimate decreases inversely with the estimated elasticity. Intuitively, a high elasticity e means that the firm has an easier ability to adjust income in response to variations in the "keep rate", meaning that we are able to rationalize the degree of bunching seen with a lower notch value, and vice versa. Put differently, to explain the same amount of excess bunching, and the size of the associated "hole," our inferences about the preferences of the firm are less extreme when it is easier for the firm to adjust income, and vice versa.

4 Discussion

What explains the notch-like behavior that we observe at the lower kink? Importantly, a satisfactory explanation should account not only for excess mass—which can be generated by a change in marginal incentives at the kink—but a discontinuity (whether real or perceived) in the level of utility at this threshold.[21]

We first consider a natural possibility: that some real cost (whether expected or deterministic) *other* than statutory tax liability varies discontinuously across this tax bracket threshold. One natural candidate is the hassle cost of filing taxes. However a distinctive feature of the South Africa SBC context is that all firms are required to file tax returns, regardless of whether they have positive tax liability. Thus the only discontinuous change in effort costs across this threshold would involve the act of submitting a tax payment itself. It is difficult to reconcile the large notch values estimated in the preceding section with the low apparent costs of submitting tax payments in South African: SARS accepts payments from online bank accounts, or through eFiling on mobile or desktop applications (in addition to accepting payments at a local tax authority branch offices). Nonetheless, despite our view that this is unlikely, it is possible that difficult to observe hassle factors vary at the lower kink, and we ultimately cannot rule out the presence of real costs that vary at the threshold.

Another potential real cost that could vary at the lower threshold—at least in expectation—

[21] Explanations that involve income (mis)reporting, such as income shifting across years, reclassification of business vs. personal income, or other forms of manipulation (e.g., those discussed in Boonzaaier et al. (2019)) produce discontinuities in marginal incentives, and thus they are ill-suited to account for the notch-like patterns seen here unless they are coupled with some preference or behavioral rule involving a discontinuity in the perceived level of utility around the zero-to-positive threshold.

are tax evasion penalties or probabilities of detection. On the basis of several discussions with tax practitioners in South Africa, we have not found any indication of a belief that penalties or audit probabilities vary discontinuously at this threshold.[22] To further explore this possibility, we are currently working to obtain data on the variation in audit probabilities by taxable income.

Absent a clear source of discontinuity in real costs at this income threshold, we consider the possibility that this pattern of bunching arises from a behavioral friction or preference. Naturally, such phenomena cannot be observed directly, so in the remainder of this section we perform a variety of heterogeneity analyses to explore the correlates of this bunching behavior, potentially providing suggestive evidence of its source.

One possibility is that at least some SBCs believe that the kink is indeed a notch. For example, if taxpayers mistake marginal statutory tax rates for average tax rates. Previous work finds substantial evidence for misinterpretations of the tax code (Finkelstein, 2009; Liebman and Zeckhauser, 2004; Rees-Jones and Taubinsky, 2020), and there is evidence of confusion between marginal and average prices in other contexts as well (Ito, 2014).

To investigate this possibility further, Figure 7 separately estimates the patterns seen previously (i.e., bunching at the lower, middle, and upper kinks and associated estimates of elasticities and notch values) for firms that file with and without the aid of a tax practitioner. Under the assumption that it is unlikely that tax practitioners would confuse average and marginal tax rates, we might expect greater notch-like behavior amongst firms that did not use a tax practitioner.

The figure shows several interesting patterns. First, the estimated elasticity for firms without a tax practitioner is, if anything, higher than the corresponding elasticity estimate for firms with a tax practitioner (this is certainly true at the middle kink, which is the estimate that we prefer given the relatively low presence of firms without a tax practitioner at the upper kink). This suggests that the ability to either adjust "real" inputs, or engage in "creative" accounting is potentially just as high, if not higher, for firms without a tax practitioner.

A second notable pattern concerns the size of the estimated notch: visually, the notch is more apparent in Figure 7 (a) than Figure 7 (d). However, firms that do use a tax practitioner are still far less common to the right of the lower kink relative to the counterfactual. This missing mass of firms to the right of the tax practitioner firm distribution is large enough to imply a larger notch value estimate for firms that use a tax practitioner versus firms that do not. Indeed, the corresponding point estimate of the notch value is substantially larger (by a factor of roughly

[22] Indeed, speculative discussions suggest that a perceived discontinuity in audit probabilities would, if anything, generate asymmetric bunching to the *right* of the threshold, if a small positive tax payment were viewed as less likely to be a result associated with misreporting than a taxable income precisely at the threshold.

3) for the firms *with* a tax practitioner than for those without. While higher elasticity estimates do contribute to smaller estimated notch values, as in Figure 6, the variation in elasticity across the tax practitioner dimension is too small to capture the large differences between the notch value estimates that we observe. We conclude that misinterpretation of the tax schedule is not the most likely explanation for the notch-like behavior that we observe, at least to the extent that the use of a tax practitioner makes such misinterpretation less likely.

A second possibility that we consider is that there is a tax morale-based explanation for the notch-like behavior. One potential source of tax morale is the political or ethnic affiliation of firm owners. We attempt to get at this explanation by exploiting regional variation in the location of firms across South Africa. Figure 8 shows the firm distribution bunching plots at the lower, middle, and upper kinks along with estimated elasticities and notch values separately for firms in three representative provinces: Gauteng, KwaZulu-Natal and the Western Cape. A key difference between these regions is that while Gauteng and Kwazulu-Natal were governed by the ruling national party controlling the central government, i.e., the African National Congress (ANC), the Western Cape was governed by the official opposition, the Democratic Alliance (DA). The three provinces are also the economic hub of the country, contributing to 65% of national GDP. However, despite the likely differences between the political affiliations of firms in these locations, we see fairly consistent notch-like behavior across the three locations.

A third possibility is that there may be stronger incentives for firms to manipulate reported earnings and pay lower taxes if the firm constitutes an important fraction of personal income for the management. While our paper analyzes small businesses, we note considerable research on the behavior of large firms shows that earnings management is lower for firms with a greater fraction of independent directors, and that better governance reduces the incidence of accounting manipulation by firms (see, for example, Millon Cornett, Marcus and Tehranian (2008)).

Figure 8 shows the firm distribution at the lower, middle, and upper kinks along with estimated elasticities and notch values separately for firms that paid versus did not pay at least one director a salary—a simple measure of the incentives of small business owner/managers. The results for firms that did not pay a director are similar to the results for firms that did not use a tax practitioner; firms that did not pay a director a salary have a more pronounced hole just to the right of the kink, but a smaller estimated dominated region overall. In contrast, firms that did pay a director have a less pronounced hole immediately to the right of the kink, but a larger overall missing mass and wider dominated region. Overall, the size of the estimated notch is greater for firms in which directors receive a salary.

A fourth, simpler, possibility has to do with company scale–smaller firms might simply be less sophisticated, i.e., more prone to "schmeduling." Some of the patterns detected along the dimensions of tax practitioners and director salaries may also simply arise because they correlate with firm size. Since the outcome variable is corporate taxes, we use a different, non-pecuniary measure of firm scale in Figure 10, which splits firms by whether they paid at least one employee. The results are again similar, with firms not paying employees having a more visibly pronounced hole, but overall, a smaller dominated region and a smaller estimated notch value than larger firms on this measure.

Given the likely correlations between the conditioning variables that capture heterogeneity in the preceding analysis, Table 3 summarizes the relationship between firm characteristics and the tendency to bunch at or just below the lower kink in a multivariate analysis. The table reports the results from a probit regression where the dependent variable is whether a firm is present in the bunching region of taxable income at the lower kink, which we define as between R62,442 and the lower kink threshold at R72,442.

Column (1) of the table includes the full sample of firms in the region of the lower kink, with incomes between R22,442 and R122,442, representing firms within R50,000 of the lower kink. Column (2) only includes firms in with a taxable income between R62,442 and R82,442, representing firms within R10,000 of the lower kink. Consistent with the graphical evidence above, we find that firms using tax practitioners are statistically significantly more likely to bunch than those not using a tax practitioner, even controlling for a range of other attributes simultaneously, including industry dummies, regional dummies, total employee salaries, firm total income, and firm total assets. Furthermore, there do not appear to be major differences in bunching behavior across provinces aside from the excluded province, the Eastern Cape. We also note that a broad general pattern visible from the table is that bunching in taxable income seems to be more common amongst larger firms, where size is measured by gross income, total costs, or total assets. This evidence, taken together, seems inconsistent with a tax schedule misperception or confusion-based explanation. Finally, we note that the overall explanatory power of the probit is quite low—meaning that unobservable factors, (including, but not limited to preferences) are more likely determinants of firms' observed behavior.

5 Conclusion

In this paper, we use high-quality administrative data on the universe of small businesses in South Africa to document evidence on firms' propensity to pay exactly zero taxes. The South African tax schedule has an interesting feature that enables us to document this pattern, since marginal tax rates move from zero to a higher positive level (seven percent) at positive levels of taxable income. We find significant bunching of tax returns at this kink in the tax schedule, as well as at kinks situated at higher levels of taxable income, which move marginal tax rates from positive to higher positive numbers. However, the behavior that we observe at the zero to positive kink is visually distinct from the behavior at the higher kinks, exhibiting missing mass immediately to the right of the threshold point. This behavior is consistent with firms behaving as if there is a discrete increase in the size of the tax liability when moving from zero to positive taxes, i.e., a "notch" in the tax schedule, rather than a kink.

We explore a variety of possible reasons for the patterns that we observe, and while there is some evidence of heterogeneity in responses consistent with other explanations, we conclude that it is possible that firms exhibit a strong preference for paying zero taxes. In subsequent drafts we intend to explore this intriguing possibility in more detail.

6 Appendix

We follow Kleven and Waseem (2013) in considering a setting in which firm owners (henceforth "firms") maximize a quasilinear utility function

$$u(z) = z - T(z) - \frac{n}{1+1/e} \cdot \left(\frac{z}{n}\right)^{1+1/e}, \tag{10}$$

where z is the firm's pre-tax taxable income, $T(z)$ is the firm's tax liability, n is a parameter measuring the firm's income-earning potential, and $e \equiv \frac{\partial z}{\partial(1-t)} \cdot \frac{1-t}{z}$ is the elasticity of income with respect to the marginal keep rate $1-t$. We therefore assume there are no income effects. We consider a non-linear tax function with marginal tax rates $t(z)$, which increase in a step-wise fashion. Assuming the elasticity is homogeneous within the population of firms across a given interval of income, rearranging the first-order condition from the firm's utility optimization problem yields[23]

$$z = n(1-t)^e. \tag{11}$$

Now, suppose the tax function features a notch at z^* such that all firms with pre-tax income $z > z^*$are subject to a discrete increase $\Delta T > 0$ in their tax liability; in addition, the marginal tax rate increases at the notch point, from t for $z \leq z^*$ to $t + \Delta t$ for $z > z^*$. This notch generates a strictly dominated income choice interval $[z^*, z^* + \Delta z^D]$ over which all firms can increase their post-tax income by decreasing their pre-tax income to the notch point z^*, avoiding assessment of ΔT. Due to the disutility costs of production, additional firms with $z > z^* + \Delta z^D$ in the absence of the notch can also increase their utility by decreasing their income to z^* in the presence of the notch. As a result, a mass of firms with income $z > z^*$ under the counterfactual of $\Delta T = 0$ and no change in marginal tax rates instead earn income z^* when $\Delta T, \Delta t > 0$, resulting

[23]We rearrange $u'(z) = 1 - T'(z) - \left(\frac{z}{n}\right)^{1/e} = 0$, yielding $z = n(1 - T'(z))^e$. We denote $T'(z) = t$, giving the result in equation (11).

in bunching at that point.

The marginal buncher is the firm with the highest counterfactual income that bunches at the notch point and is indifferent between earning z^* and $z^I > z^*$ in the presence of the notch. We denote the marginal buncher's income-earning potential as $n^* + \Delta n^*$ and counterfactual pre-tax income as $z^* + \Delta z^*$. Thus, all firms with counterfactual incomes within the interval $[z^*, z^* + \Delta z^*]$ reduce their income to z^* in the presence of the notch. In addition, no firms will earn $z \in (z^*, z^I)$ in the presence of the notch since all firms with counterfactual income $z \in (z^*, z^* + \Delta z^*)$ will strictly prefer earning z^* to any $z \in (z^*, z^I)$.

Given the notch point z^*, an estimate of e, the pre-notch marginal tax rate t, and the post-notch increase in the marginal tax rate Δt, we can use the fact that the marginal buncher is indifferent between earning z^* and z^I in the presence of the notch to generate an estimate for ΔT.[24] When the marginal buncher earns z^*, the firm's utility can be expressed as

$$u(z^*) = z^*(1-t) - \frac{n^* + \Delta n^*}{1 + 1/e}\Big(\frac{z^*}{n^* + \Delta n^*}\Big)^{1+1/e}. \tag{12}$$

Similarly, the marginal buncher earning z^I results in a firm utility of

$$u(z^I) = z^*(1-t) + (z^I - z^*)(1 - t - \Delta t) - \Delta T - \frac{n^* + \Delta n^*}{1 + 1/e}\Big(\frac{z^I}{n^* + \Delta n^*}\Big)^{1+1/e}. \tag{13}$$

Assuming a constant elasticity across the range of incomes under consideration and using the relationship in equation (11), we have

$$n^* + \Delta n^* = \frac{z^* + \Delta z^*}{(1-t)^e} \tag{14}$$

and

$$z^I = (n^* + \Delta n^*)(1 - t - \Delta t)^e. \tag{15}$$

Substituting equation (14) into equation (15), we find the following relationship:

$$z^I = (z^* + \Delta z^*)\Big(\frac{1 - t - \Delta t}{1 - t}\Big)^e. \tag{16}$$

Using this relationship and the fact that $u(z^*) = u(z^I)$, we rearrange to obtain a condition, analogous to Kleven and Waseem (2013) equation (5), which describes the relationship between the notch point income z^*, the marginal buncher's earning response Δz^*, the elasticity e, and the characteristics of the tax function:

[24] Due to the absence of income effects, note that the marginal buncher would choose the same $z^I < z^* + \Delta z^*$ if $\Delta T = 0$ but the marginal tax rate change remained the same, $\Delta t > 0$.

$$\frac{1}{1+\Delta z^*/z^*}\left[1+\frac{\Delta T/z^*-\Delta t}{1-t}\right]-\frac{1}{1+1/e}\left[\frac{1}{1+\Delta z^*/z^*}\right]^{1+1/e}-\frac{1}{1+e}\left[1-\frac{\Delta t}{1-t}\right]^{1+e}=0. \qquad (17)$$

Given values for z^*, t, and Δt from the tax code and an estimate of Δz^* based on the observed mass of bunching firms, an assumed counterfactual income distribution, and an estimated share of unresponsive firms due to frictions, we can use equation (17) to estimate the value of a perceived notch ΔT, even when no discrete tax liability is assessed on firms with $z > z^*$ (i.e., in reality, $\Delta T = 0$).

Derivation of Equation (17)

The following outlines the steps taken to obtain the condition in equation (17) from equations (12)–(16).

$$u(z^*) = u(z^I) \Rightarrow$$

$$z^*(1-t)-\frac{n^*+\Delta n^*}{1+1/e}\left(\frac{z^*}{n^*+\Delta n^*}\right)^{1+1/e} = z^*(1-t)+(z^I-z^*)(1-t-\Delta t)-\Delta T-\frac{n^*+\Delta n^*}{1+1/e}\left(\frac{z^I}{n^*+\Delta n^*}\right)^{1+1/e} \Rightarrow$$

$$(z^I-z^*)(1-t-\Delta t)-\Delta T = \frac{n^*+\Delta n^*}{1+1/e}\left[\left(\frac{z^I}{n^*+\Delta n^*}\right)^{1+1/e}-\left(\frac{z^*}{n^*+\Delta n^*}\right)^{1+1/e}\right] \Rightarrow$$

$$\left[(z^*+\Delta z^*)\left(\frac{1-t-\Delta t}{1-t}\right)^e - z^*\right](1-t-\Delta t)-\Delta T = \frac{n^*+\Delta n^*}{1+1/e}\left[\left((1-t-\Delta t)^e\right)^{1+1/e}-\left(\frac{z^*(1-t)^e}{z^*+\Delta z^*}\right)^{1+1/e}\right] \Rightarrow$$

$$\left[(z^*+\Delta z^*)\left(1-\frac{\Delta t}{1-t}\right)^e - z^*\right](1-t-\Delta t)-\Delta T = \left(\frac{1}{1+1/e}\right)\left(\frac{z^*+\Delta z^*}{(1-t)^e}\right)\left[(1-t-\Delta t)^{1+e}-\left(\frac{z^*}{z^*+\Delta z^*}\right)^{1+1/e}(1-t)^{1+e}\right] \Rightarrow$$

$$\left[(1+\Delta z^*/z^*)\left(1-\frac{\Delta t}{1-t}\right)^e-1\right](1-t-\Delta t)-\Delta T/z^* = \left(\frac{1}{1+1/e}\right)(1+\Delta z^*/z^*)\left[(1-t-\Delta t)\left(1-\frac{\Delta t}{1-t}\right)^e-\left(\frac{1}{1+\Delta z^*/z^*}\right)^{1+1/e}(1-t)\right] \Rightarrow$$

$$\left[\left(1-\frac{\Delta t}{1-t}\right)^e-\frac{1}{1+\Delta z^*/z^*}\right](1-t-\Delta t)-\frac{1}{1+\Delta z^*/z^*}(\Delta T/z^*) = \left(\frac{1}{1+1/e}\right)\left[(1-t-\Delta t)\left(1-\frac{\Delta t}{1-t}\right)^e-\left(\frac{1}{1+\Delta z^*/z^*}\right)^{1+1/e}(1-t)\right] \Rightarrow$$

$$\left[\left(1-\frac{\Delta t}{1-t}\right)^e-\frac{1}{1+\Delta z^*/z^*}\right]\left(1-\frac{\Delta t}{1-t}\right)-\frac{1}{1+\Delta z^*/z^*}\left[\frac{\Delta T/z^*}{1-t}\right] = \left(\frac{1}{1+1/e}\right)\left[\left(1-\frac{\Delta t}{1-t}\right)^{1+e}-\left(\frac{1}{1+\Delta z^*/z^*}\right)^{1+1/e}\right] \Rightarrow$$

$$-\frac{1}{1+\Delta z^*/z^*}\left[\left(1-\frac{\Delta t}{1-t}\right)+\frac{\Delta T/z^*}{1-t}\right]=\left(\frac{1}{1+1/e}-1\right)\left[1-\frac{\Delta t}{1-t}\right]^{1+e}-\frac{1}{1+1/e}\left[\frac{1}{1+\Delta z^*/z^*}\right]^{1+1/e}\Rightarrow$$

$$\frac{1}{1+\Delta z^*/z^*}\left[1+\frac{\Delta T/z^*-\Delta t}{1-t}\right]-\frac{1}{1+1/e}\left[\frac{1}{1+\Delta z^*/z^*}\right]^{1+1/e}-\frac{1}{1+e}\left[1-\frac{\Delta t}{1-t}\right]^{1+e}=0$$

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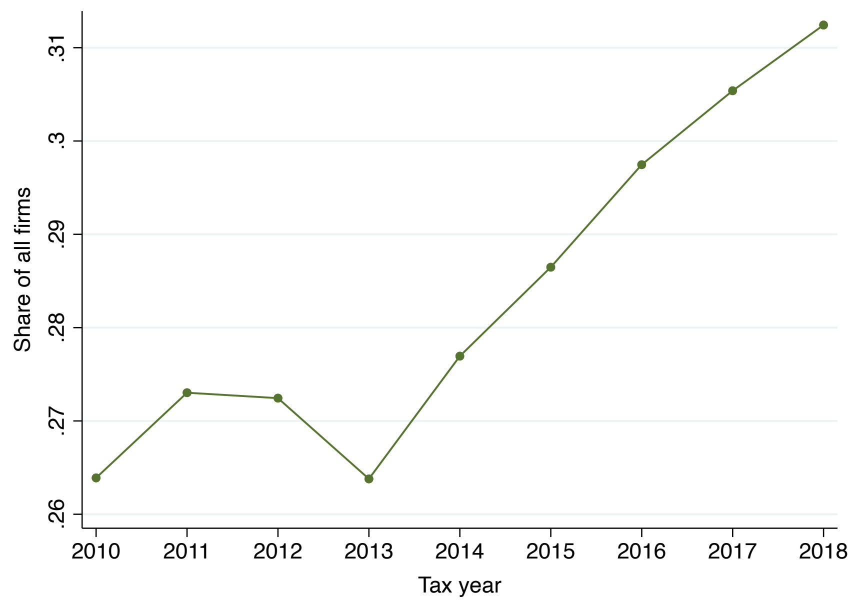
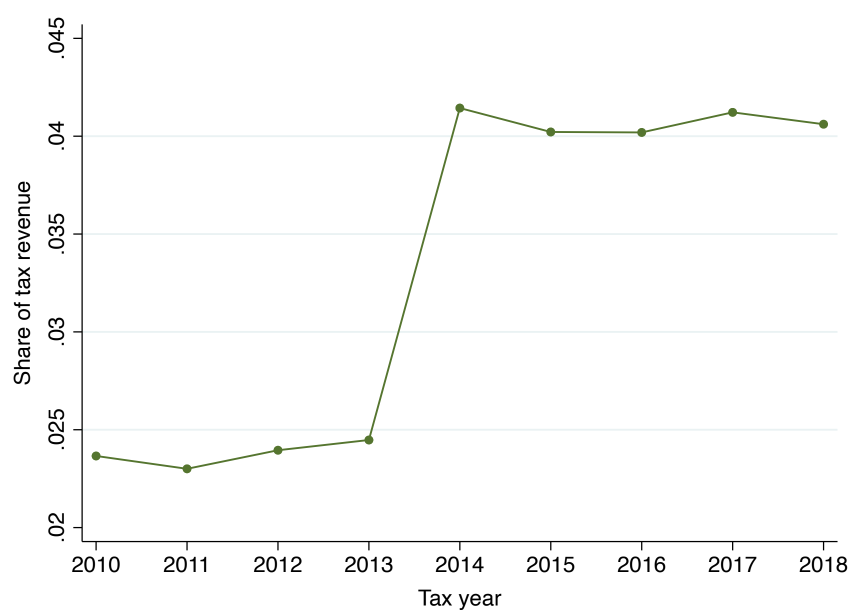
Figure 1: Small Business Corporation (SBC) prevalence and contribution to tax revenue

Panel (a) shows the share of SBC tax filings relative to all corporate tax filings between tax years 2010 and 2018. Panel (b) shows the share of corporate tax revenue contributed by SBC's as a percentage of total tax revenue between tax years 2010 and 2018. In 2014, the income ceiling for SBCs was raised from R14 million to R20 million, generating a substantial increase in their contribution to total revenues. To calculate tax revenue, we sum up the tax liability of firms. We do not observe whether a payment was made and as a result, the figure should be viewed as indicative of taxes owed.



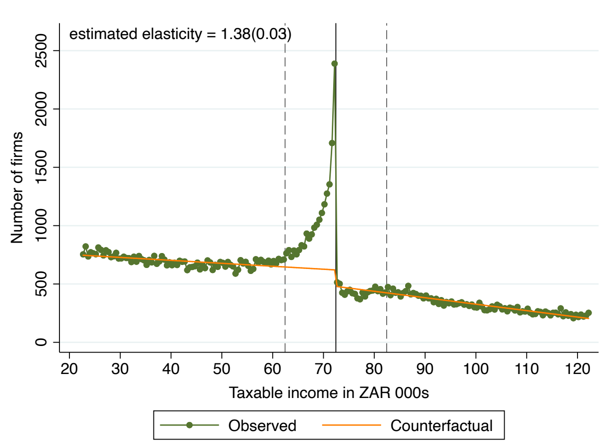
(a) SBCs as a share of all firms



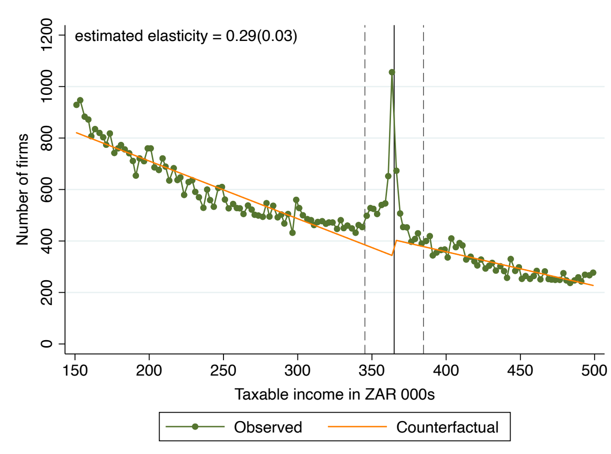
(b) SBCs contribution to total tax revenue

Figure 2: Distribution of taxable income for Small Business Companies and estimated elasticity

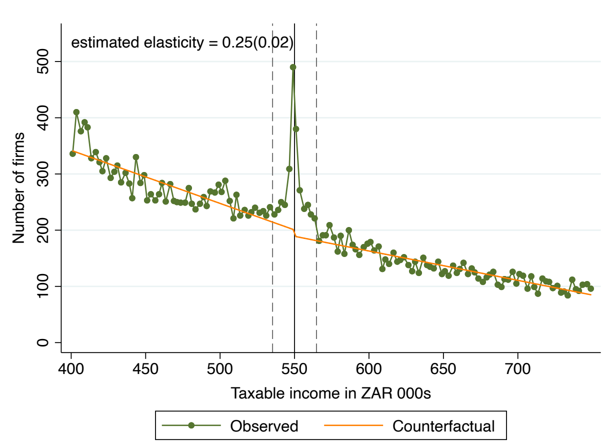
This figure shows the histogram of taxable income among SBCs, pooled across years 2014–2018, at the three kinks in the SBC tax schedule. The solid vertical line indicates the “kink points” in the tax schedule, at which the marginal tax rate changes discontinuously. The solid orange line indicates the counterfactual density estimation as described in the text, and dashed vertical lines indicate the excluded region. Panel (a) represents firms around the lower kink using income bins of R500. This threshold is indexed to inflation; to facilitate pooling across years, we have slightly shifted the distributions so that the kink points align at their average value. Panel (b) represents firms around the middle kink using income bins of R2,500. Panel (c) represents firms around the upper kink using income bins of R2,500. We also report the estimated elasticity in each panel. We include bootstrapped standard errors in parenthesis.



(a) Lower kink



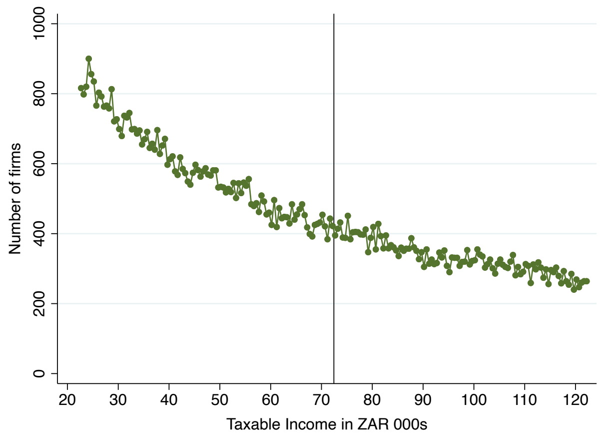
(b) Middle kink



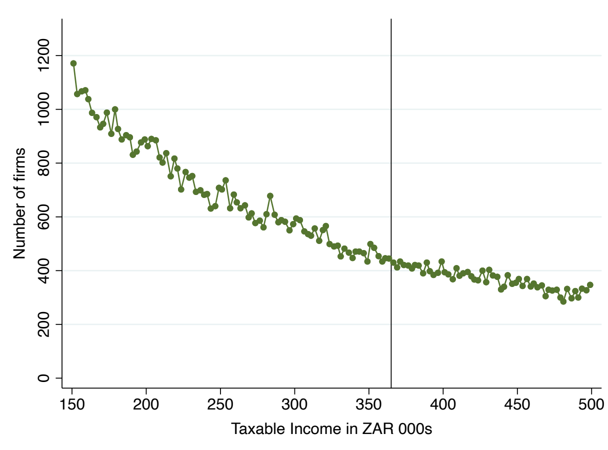
(c) Upper kink

Figure 3: Distribution of taxable income for non-SBCs

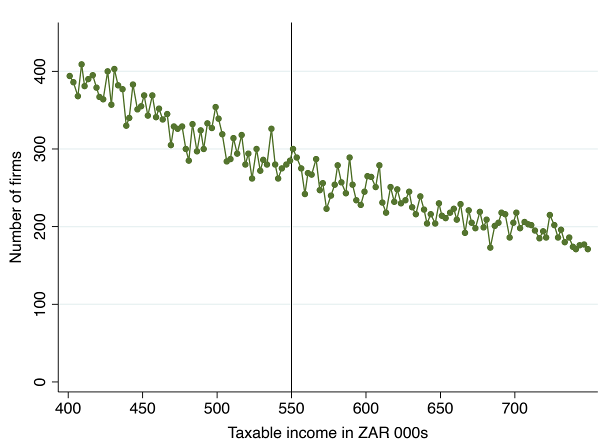
This figure shows the observed distribution (dotted line) and the counterfactual distribution (solid line) of taxable income across non-SBCs between 2014 and 2018 at all three kinks in the SBC tax schedule. The solid vertical line indicates the location of the kink point. Panel (a) represents firms around the lower kink using income bins of R500. Panel (b) represents firms around the middle kink using income bins of R2,500. Panel (c) represents firms around the upper kink using income bins of R2,500. We also report the estimated elasticity in each panel.



(a) Lower kink



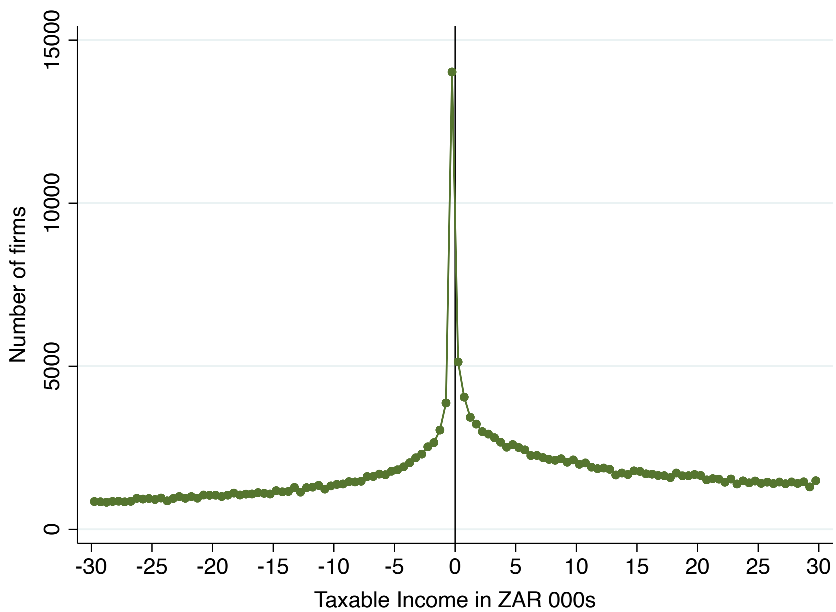
(b) Middle kink



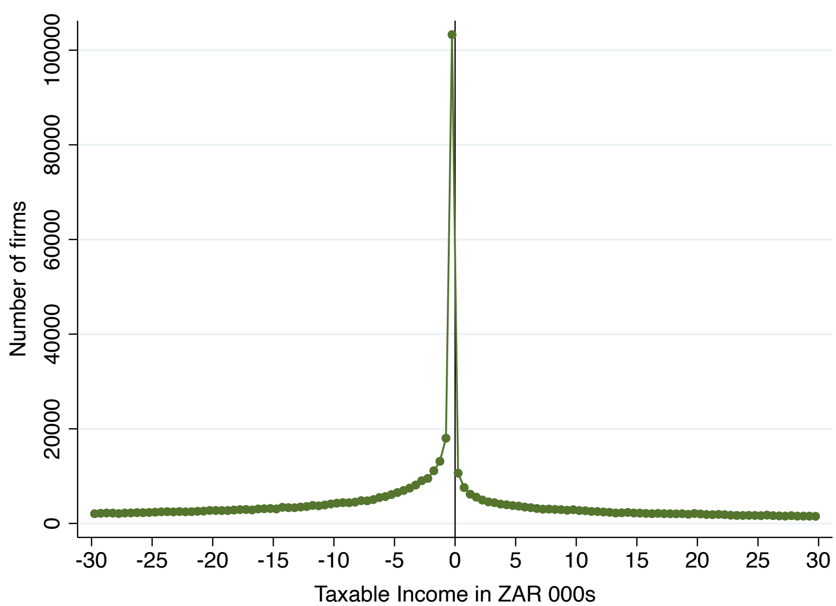
(c) Upper kink

Figure 4: Bunching at zero taxable income for SBCs and non-SBCs

Both panels show the observed distribution of firms by taxable income for the tax years 2010-2018 around a value of zero taxable income. Panel (a) shows the distribution of SBC firms and panel (b) shows the distribution of non-SBC firms.



(a) SBCs



(b) Non=SBCs

Figure 5: SBC estimated notch value

This figure shows the observed distribution (dotted line) and the counterfactual distribution (solid line) of taxable income across SBCs between 2014 and 2018 at the lower kink. The solid vertical line indicates the location of the kink point, the long dashed red vertical line indicates the dominated region, the left most short dashed vertical line, labelled Z_L indicates the lower bound of the bunching region while the right most short dashed vertical line, labelled Z_R indicates the upper bound of the bunching region. The counterfactual distribution is estimated using equation (5). We also report the assumed elasticity and the estimated notch value.

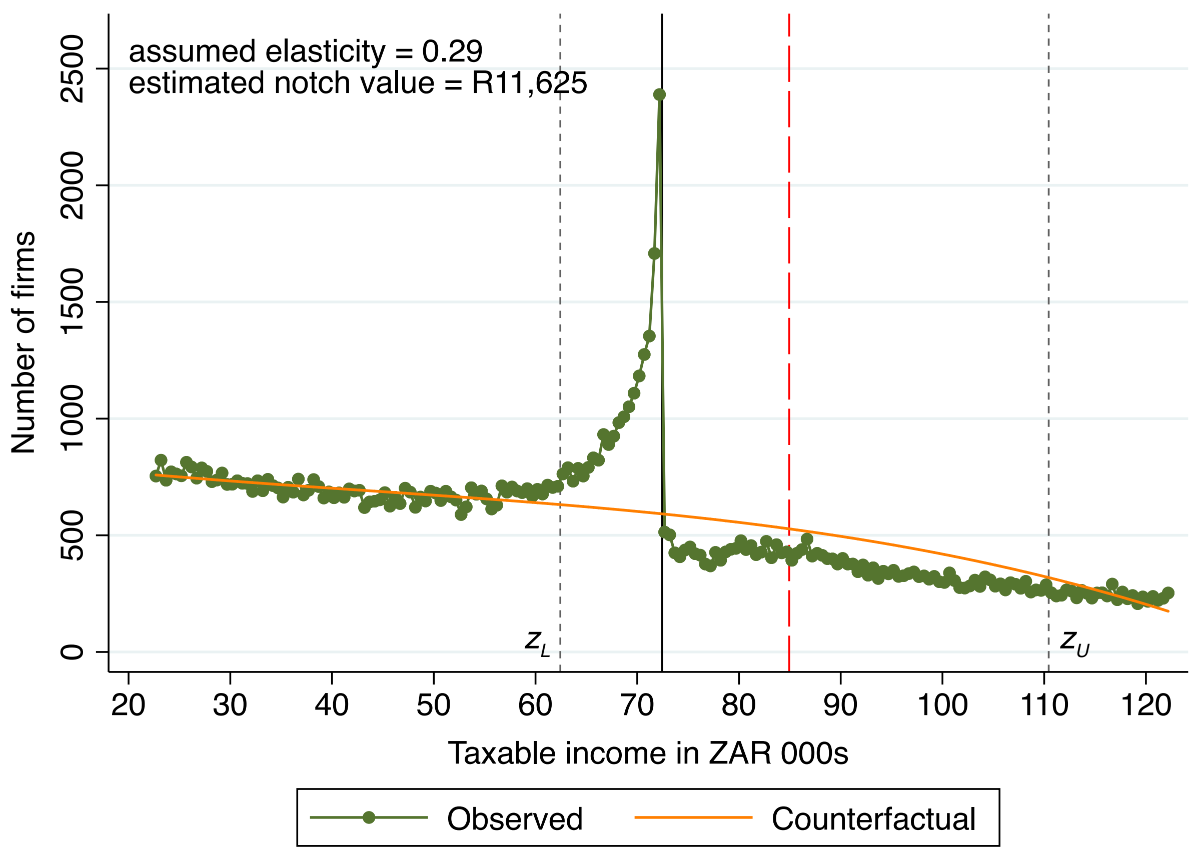


Figure 6: Sensitivity of estimated notch value to variations in the assumed elasticity

This figure shows the estimated value of the notch at the lower kink for different values of the assumed elasticity. The solid dashed vertical line indicates the value of the notch using the elasticity estimated at the middle kink.

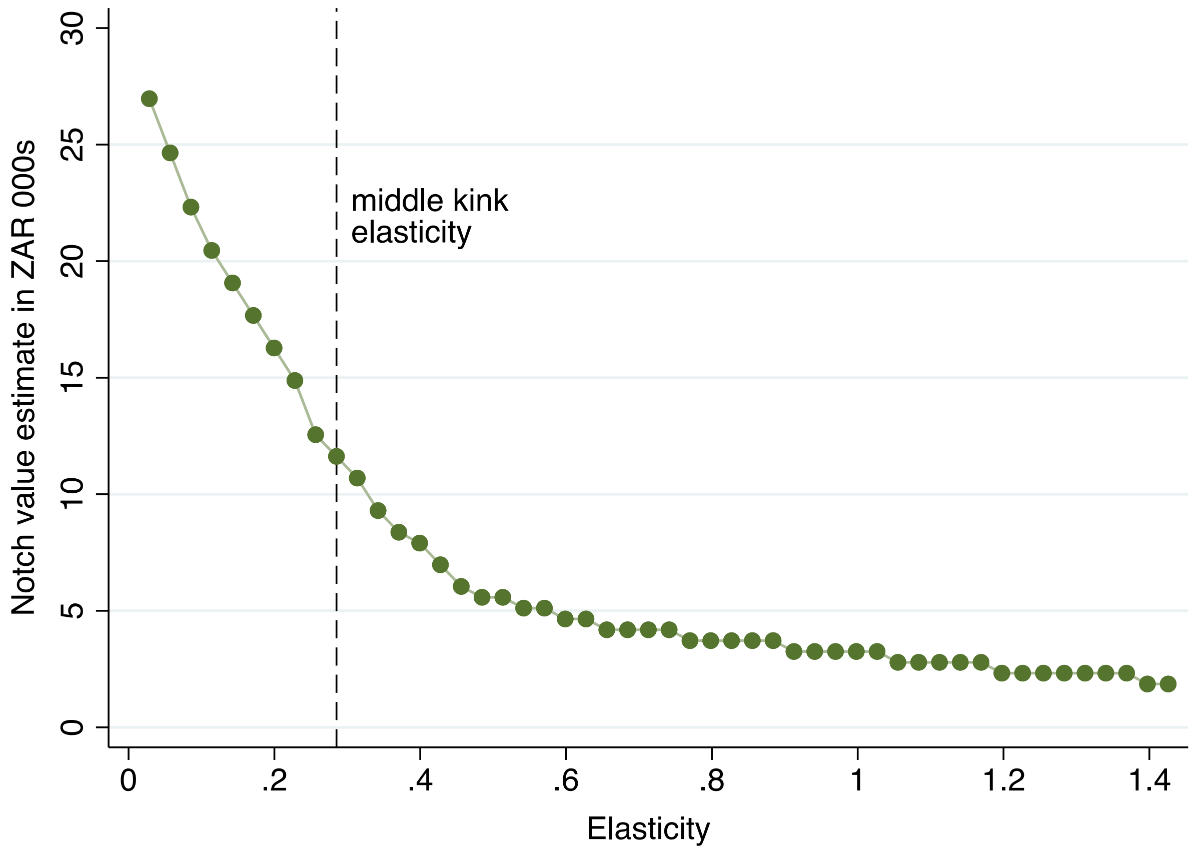
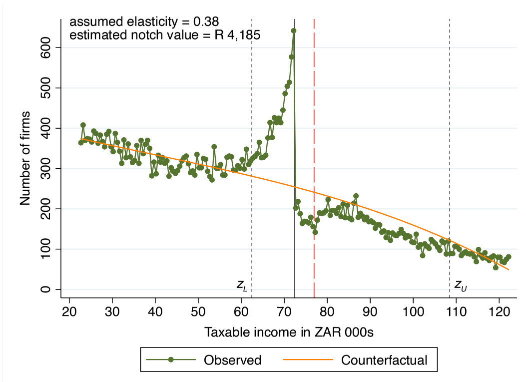


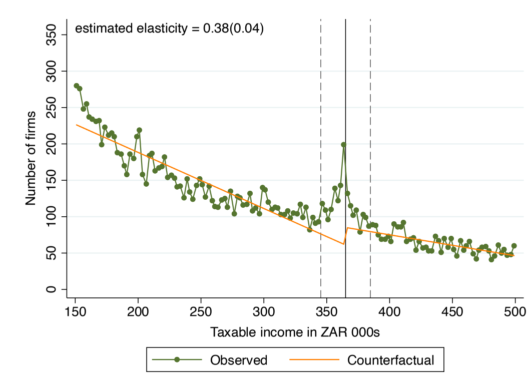
Figure 7: Heterogeneity By Tax Practitioner Hiring

This figure shows the observed distribution (dotted line) and the counterfactual distribution (solid line) of taxable income across SBCs between 2014 and 2018 at all three kinks in the SBC tax schedule split by firms who do not use a tax practitioner (top row) and firms which report using a tax practitioner (bottom row). In the figures in the first column, the solid vertical line indicates the location of the kink point, the long dashed red vertical line indicates the dominated region, the left most short dashed vertical line, labelled Z_L indicates the lower bound of the bunching region while the right most short dashed vertical line, labelled Z_R indicates the upper bound of the bunching region. We also report the assumed elasticity and the estimated notch value. In the figures in the second and third columns, the solid vertical line indicates the location of the kink point while the dashed vertical lines indicate the excluded region. We also report the estimated elasticity in each panel. We include bootstrapped standard errors in parenthesis.

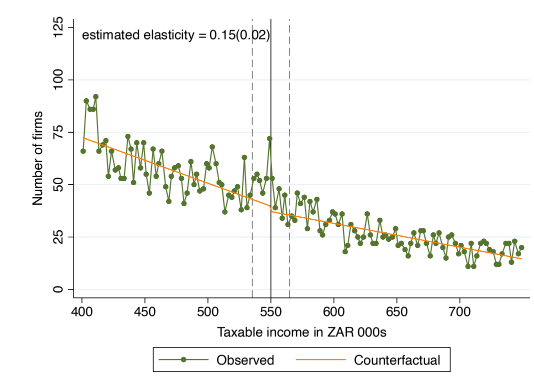
(a) Firm does not hire tax practitioner, lower kink



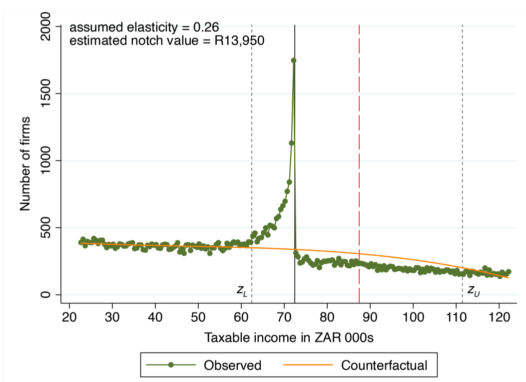
(b) Firm does not hire tax practitioner, middle kink



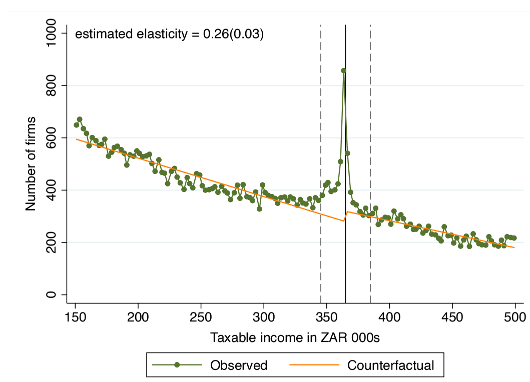
(c) Firm does not hire tax practitioner, upper kink



(d) Firm hires tax practitioner, lower kink



(e) Firm hires tax practitioner, middle kink



(f) Firm hires tax practitioner, upper kink

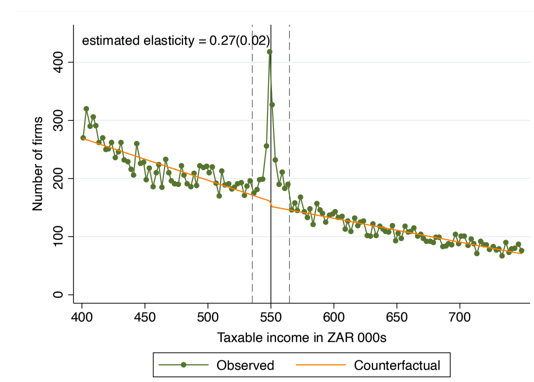
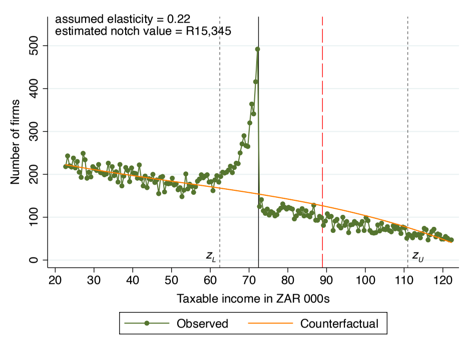


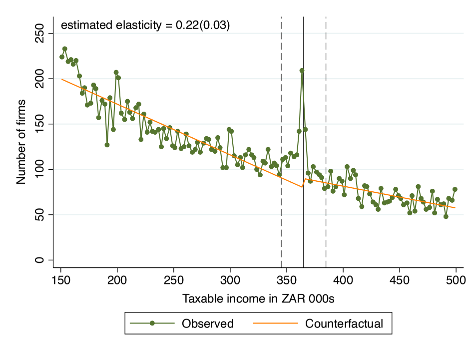
Figure 8: Heterogeneity Across Provinces

This figure shows the observed distribution (dotted line) and the counterfactual distribution (solid line) of taxable income across SBCs between 2014 and 2018 at all three kinks in the SBC tax schedule split by firm location across the three major provinces in South Africa: Gauteng (top row), Kwazulu-Natal (middle row) and the Western Cape (bottom row). In the figures in the second and third columns, the solid vertical line indicates the location of the kink point while the dashed vertical lines indicate the excluded region. We also report the estimated elasticity in each panel. In the figures in the first column, the solid vertical line indicates the location of the kink point, the long dashed red vertical line indicates the dominated region, the left most short dashed vertical line, labelled Z_L indicates the lower bound of the bunching region while the right most short dashed vertical line, labelled Z_R indicates the upper bound of the bunching region. We also report the assumed elasticity and the estimated notch value. We include bootstrapped standard errors in parenthesis.

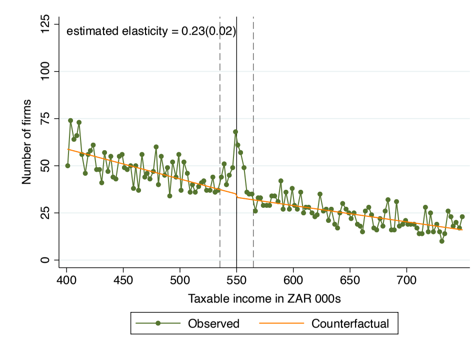
(a) Gauteng, lower kink



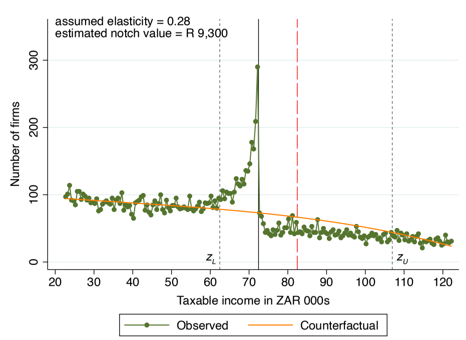
(b) Gauteng, middle kink



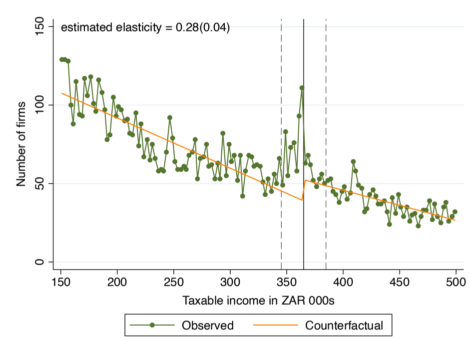
(c) Gauteng, upper kink



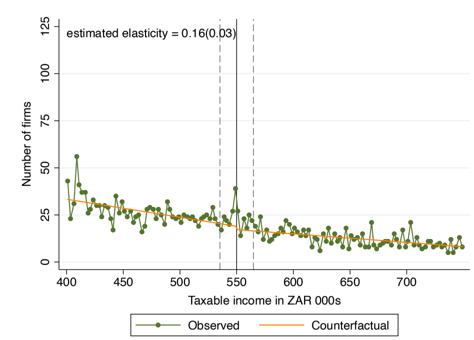
(d) KwaZulu-Natal, lower kink



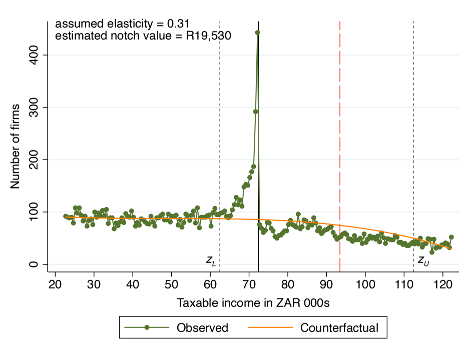
(e) KwaZulu-Natal, middle kink



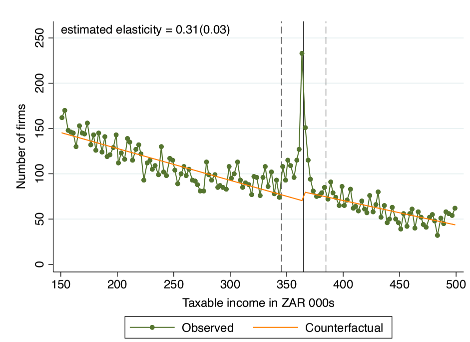
(f) KwaZulu-Natal, upper kink



(g) Western Cape, lower kink



(h) Western Cape, middle kink



(i) Western Cape, upper kink

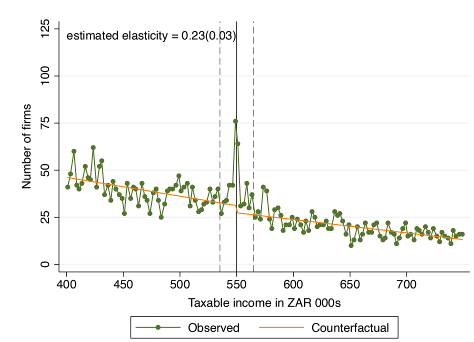
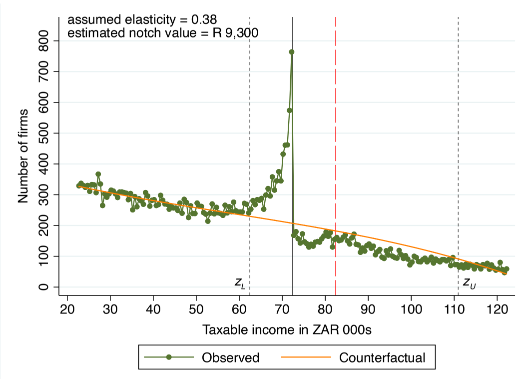


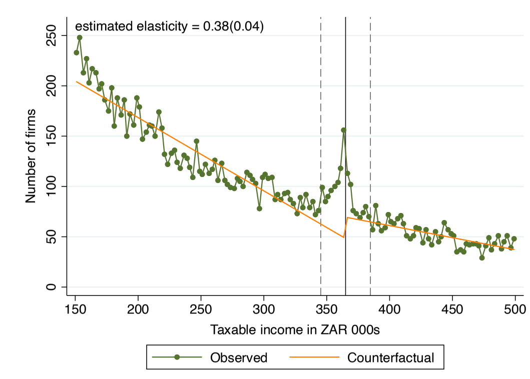
Figure 9: Heterogeneity By Director Salary

This figure shows the observed distribution (dotted line) and the counterfactual distribution (solid line) of taxable income across SBCs between 2014 and 2018 at all three kinks in the SBC tax schedule split by firms who do not pay any director a salary (top row) and firms which pay at least one director a salary (bottom row). In the figures in the first column, the solid vertical line indicates the location of the kink point, the long dashed red vertical line indicates the dominated region, the left most short dashed vertical line, labelled Z_L indicates the lower bound of the bunching region while the right most short dashed vertical line, labelled Z_R indicates the upper bound of the bunching region. We also report the assumed elasticity and the estimated notch value. In the figures in the second and third columns, the solid vertical line indicates the location of the kink point while the dashed vertical lines indicate the excluded region. We also report the estimated elasticity in each panel. We include bootstrapped standard errors in parenthesis.

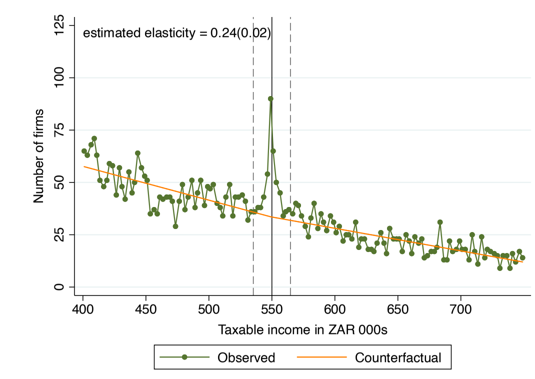
(a) Director does not receive salary, lower kink



(b) Director does not receive salary, middle kink

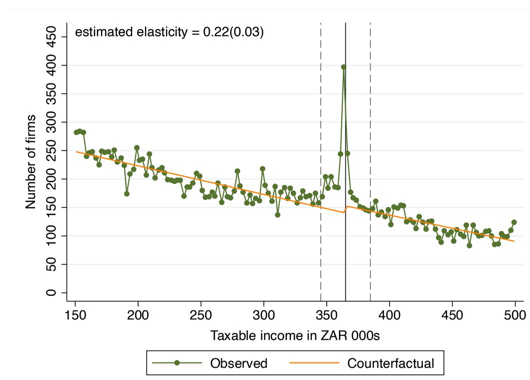


(c) Director does not receive salary, upper kink



(d) Director does receive salary, lower kink

(e) Director does receive salary, middle kink



(f) Director does receive salary, upper kink

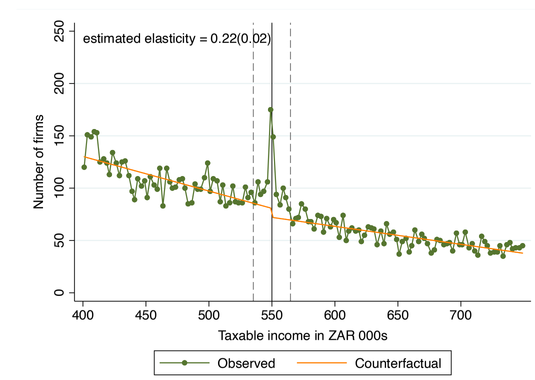
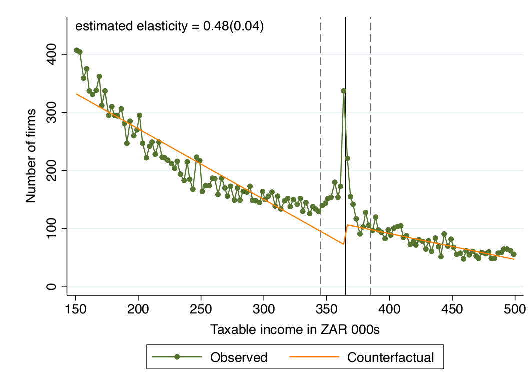


Figure 10: Heterogeneity By Employment

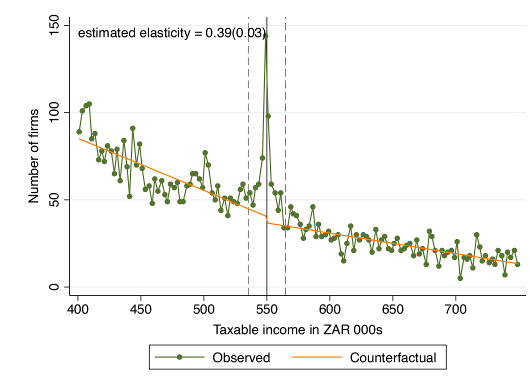
This figure shows the observed distribution (line with point markers) and the counterfactual distribution (solid line) of taxable income across SBCs between 2014 and 2018 at all three kinks in the SBC tax schedule split by firms without salaried employees (top row) and firms which report having salaried employees (bottom row). In the figures in the first column, the solid vertical line indicates the location of the kink point, the long dashed red vertical line indicates the dominated region, the left most short dashed vertical line, labelled Z_L indicates the lower bound of the bunching region while the right most short dashed vertical line, labelled Z_R indicates the upper bound of the bunching region. We also report the assumed elasticity and the estimated notch value. In the figures in the second and third columns, the solid vertical line indicates the location of the kink point while the dashed vertical lines indicate the excluded region. We also report the estimated elasticity in each panel. We include bootstrapped standard errors in parenthesis.

(a) Firm does not have employees, lower kink

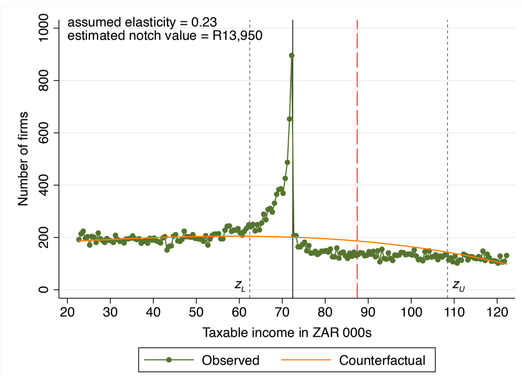
(b) Firm does not have employees, middle kink



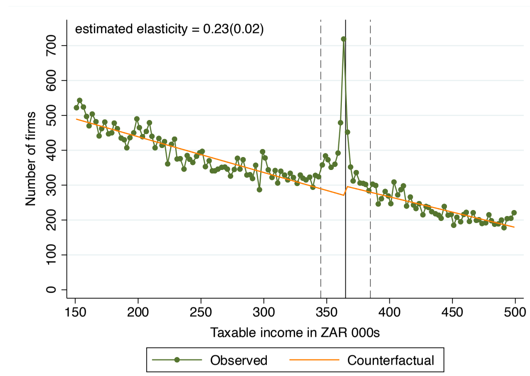
(c) Firm does not have employees, upper kink



(d) Firm has employees, lower kink



(e) Firm has employees, middle kink



(f) Firm has employees, upper kink

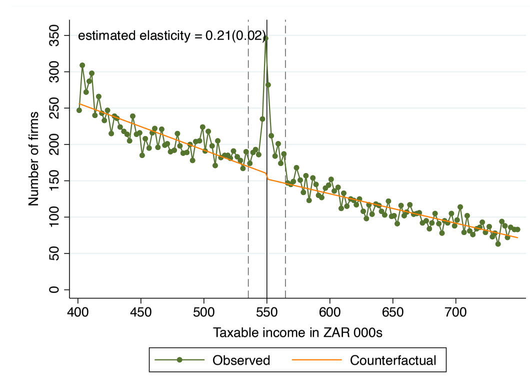


Table 1: Small Business Corporation Tax Schedule for 2010-2018

This table indicates the small business corporation (SBC) graduated income tax system for the tax years 2010 - 2018. Tax years run from 1 April to 31 March.

Tax Year	Taxable income (R)	Marginal tax rate
2010	0 - 54,200	0%
	54,200 - 300,000	10%
	Above 300,000	28%
2011	0 - 57,000	0%
	57,000 - 300,000	10%
	Above 300,000	28%
2012	0 - 59,570	0%
	59,570 - 300,000	10%
	Above 300,000	28%
2013	0 - 63,556	0%
	63,556 - 350,000	7%
	Above 350,000	28%
2014	0 - 67,111	0%
	67,111 - 365,000	7%
	365,001 - 550,000	21%
	Above 550,000	28%
2015	0 - 70,700	0%
	70,700 - 365,000	7%
	365,001 - 550,000	21%
	Above 550,000	28%
2016	0 - 73,650	0%
	73,651 - 365,000	7%
	365,001 - 550,000	21%
	Above 550,000	28%
2017	0 - 75,000	0%
	75,001 - 365,000	7%
	365,001 - 550,000	21%
	Above 550,000	28%
2018	0 - 75,750	0%
	75,751 - 365,000	7%
	365,001 - 550,000	21%
	Above 550,000	28%

Table 2: Summary statistics for 2010 - 2018

This table reports summary statistics for corporate income tax returns in South Africa between 2010 and 2018 grouped SBCs and non-SBCs. Standard deviations are shown in parentheses.

	SBC		Non-SBC	
	Mean	Median	Mean	Median
Revenues	R2,430,553	R973,857	R17,136,938	R569,596
Expenses	R941,047	R367,996	R5,110,241	R37,207
Wages	R321,936	R102,165	R3,533,603	R130,800
Director wages	R198,525	R96,000	R370,735	R0
Tax liability	R23,532	R0	R306,176	R0
Number of employees	3.80	0	15.39	0
Observations	851,513		2,159,692	

Table 3: Probit regression of firm characteristics on bunching

This table reports the results from a probit regression where the dependent variable in all regressions is whether a firm is present in the bunching region which we define as the region of table income between R62,442 and the lower kink at R72,442. Column (1) includes the full sample of firms in the region of the lower kink, with incomes between R22,442 and R122,442, representing firms within R50,000 of the lower kink. Column (2) only includes firms in with a taxable income between R62,442 and R82,442, representing firms within R10,000 of the lower kink. We report standard errors in parenthesis. $*$, $**$, $***$ indicate statistical significance at the 10%, 5% and 1% confidence levels, respectively.

	(1)	(2)
Tax practitioner == 1	0.1077***	0.1265***
	(0.007)	(0.008)
New firm == 1	0.0753***	0.0896***
	(0.009)	(0.010)
No employees == 1	0.0345***	0.0394***
	(0.008)	(0.009)
Sector: Activities of households	0.0905	0.0847
	(0.059)	(0.063)
Sector: Administrative activities	-0.0050	0.0367
	(0.022)	(0.024)
Sector: Agriculture, forestry and fishing	0.1783***	0.2071***
	(0.023)	(0.025)
Sector: Arts and entertainment	0.0452*	0.0726**
	(0.027)	(0.029)
Sector: Construction	0.0391**	0.0409**
	(0.016)	(0.017)
Sector: Education	0.0264	0.0541*
	(0.026)	(0.028)
Sector: Electricity and gas	-0.0279	-0.0312
	(0.038)	(0.040)
Sector: Finance and insurance	0.0606***	0.1022***
	(0.023)	(0.025)
Sector: Health and social work	0.0568	0.0988***
	(0.029)	(0.032)
Sector: Information and communication	0.0048	0.0464*
	(0.023)	(0.025)
Sector: Manufacturing	0.0630***	0.0706***
	(0.018)	(0.020)
Sector: Mining and quarrying	0.1970***	0.2657***
	(0.051)	(0.056)
Sector: Other service activities	-0.0016	0.0050
	(0.016)	(0.017)
Sector: Scientific activities	0.0727***	0.1297***
	(0.020)	(0.021)
Sector: Public administration	-0.0374	-0.0377
	(0.094)	(0.100)
Sector: Real estate	-0.0146	0.0220
	(0.025)	(0.027)
Sector: Transportation and storage	0.0449**	0.0596***
	(0.020)	(0.022)
Sector: Water and sanitation	-0.0071	0.0142
	(0.048)	(0.052)
Sector: Wholesale and retail trade	-0.0376**	-0.0148
	(0.015)	(0.016)
Sector: Extraterritorial organizations	0.0028	0.0987
	(0.156)	(0.168)
Gross income quartile 2	0.1573***	0.1960***
	(0.011)	(0.011)
Gross income quartile 3	0.1753***	0.2843***
	(0.012)	(0.013)
Gross income quartile 4	0.2160***	0.3649***
	(0.014)	(0.015)
Employee salary quartile 2	-0.0275***	-0.0784***
	(0.010)	(0.011)
Employee salary quartile 3	0.0151	-0.0114
	(0.011)	(0.011)
Employee salary quartile 4	-0.0394***	-0.0573***
	(0.012)	(0.013)
Total costs quartile 2	0.1578***	0.5325***
	(0.011)	(0.012)
Total costs quartile 3	0.1320***	0.4468***
	(0.015)	(0.016)
Total costs quartile 4	0.1008***	0.3810***
	(0.017)	(0.019)
Province: Free State	0.0921***	0.0797***
	(0.024)	(0.026)
Province: Gauteng	0.0323**	-0.0058
	(0.016)	(0.017)
Province: KwaZulu-Natal	0.0725***	0.0590***
	(0.018)	(0.019)
Province: Limpopo	0.0457*	0.0418
	(0.025)	(0.027)
Province: Mpumalanga	0.0239	0.0260
	(0.025)	(0.027)
Province: No Information	0.1788***	0.2120***
	(0.022)	(0.023)
Province: North West	0.1325***	0.1085***
	(0.025)	(0.027)
Province: Northern Cape	0.1167***	0.1459***
	(0.031)	(0.034)
Province: Western Cape	0.0537***	0.0693***
	(0.017)	(0.019)
Director salary quartile 3	0.0676***	0.0737***
	(0.011)	(0.012)
Director salary quartile 4	0.0052	0.0320***
	(0.010)	(0.011)
Total assets quartile 2	0.0209	-0.1588***
	(0.020)	(0.021)
Total assets quartile 3	0.1949***	0.0881***
	(0.020)	(0.021)
Total assets quartile 4	0.1659***	0.1413***
	(0.021)	(0.022)
Constant	-1.5156***	-1.5545***
	(0.030)	(0.031)
Tax year	✓	✓
Observations	204,995	160,235
Pseduo-R:	0.0114	0.0366