Taxing the Unresponsive: The Micro-Macro Puzzle and the Elasticity of Taxable Income

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We estimate the elasticity of taxable income (ETI) in Denmark from 1980 to 2022 using a consistent bunching design. Leveraging six distinct tax regimes, we document that behavioral responses depend crucially on employment status and the tax base definition. While employees exhibit negligible responsiveness (ETI ≈ 0.01) across all regimes, the self-employed show larger, variable elasticities (0.05–0.45) that track opportunities for income shifting. For job changers and by the composition of capital income, we show that small employee elasticities reflect institutional constraints on reported income rather than infrequent adjustment, explaining why aggregate bunching elasticities are smaller than macro estimates.

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The behavioral response to income taxation is a central parameter in public economics, serving as a sufficient statistic for the efficiency cost of taxation and the optimal design of redistributive policy. Since the seminal contributions of Feldstein (1995) and Gruber and Saez (2002), a vast empirical literature has sought to estimate the elasticity of taxable income (ETI). Despite these efforts, a consensus on the magnitude of this parameter remains elusive. Estimates vary significantly across countries, time periods, and identification strategies, giving rise to a persistent "micro-macro" puzzle: while micro-econometric studies using local variation (such as bunching at kink points) often find small or negligible elasticities, macroeconomic analyses and studies of broad tax reforms frequently identify larger structural responses.

This divergence has profound policy implications. If the true structural elasticity is large but attenuated in the short run by optimization frictions, as argued by Chetty (2012), then tax policy should be designed with the higher long-run elasticity in mind. Conversely, if the low observed responsiveness reflects tight institutional constraints and third-party reporting, as suggested by Kleven et al. (2011), then the efficiency costs of taxation may be lower than previously thought, provided enforcement capacity remains high. Distinguishing between these mechanisms requires a setting in which responsiveness can be tracked consistently over a long horizon, while varying both the incentives and the institutional environment.

This paper addresses this challenge by estimating the ETI in Denmark over a long period, spanning more than four decades from 1980 to 2022. We leverage high-quality administrative register data and a consistent bunching design across six distinct tax regimes to provide a comprehensive analysis of tax responsiveness. By covering much of the modern history of the Danish income tax system, this long-run perspective allows us to distinguish between temporary optimization frictions and genuine preference parameters, offering new evidence on why micro and macro estimates systematically diverge.

Our setting offers two distinct advantages for identifying the ETI. First, the Danish tax system has undergone substantial structural changes over the last forty years, including major reforms in 1987, 1994, and 2010. These reforms altered not only marginal tax rates but also the definition of the tax base and the stringency of enforcement.[1] While the literature frequently relies on single reforms or short panels (e.g., Kleven and Schultz, 2014; Sigaard, 2023*a*), our 40-year variation allows us to test the long-run stability of behavioral parameters and disentangle transitory reform noise from structural institutional constraints. Second, the Danish administrative data provide precise, third-party reported information on income composition that remains consistently observable across all six regimes. While the statutory definitions of the tax bases evolved, the underly-

[1] Slemrod and Kopczuk (2002) explicitly develop the idea of an "optimal" ETI that is endogenous to policy, while Kopczuk (2005) and le Maire and Schjerning (2013) show empirically how reported income responses track the availability of shifting margins.

ing enforcement technology, specifically the strict separation of employer-reported labor income subject to withholding from self-reported business income, remained highly stable. This stability enables a granular, consistent analysis of heterogeneous responses based on reporting capabilities over a forty-year horizon.

Our analysis yields three main sets of findings. First, we document a striking and persistent dichotomy in tax responsiveness based on employment status. For standard wage earners, who constitute the vast majority of the top tax payers, the estimated ETI is negligible (≈ 0.01) and statistically indistinguishable from zero across all six tax regimes. By contrast, the self-employed exhibit substantial responsiveness, with estimated elasticities ranging from 0.05 to 0.45 that tightly track the evolving statutory opportunities for income shifting between personal and corporate tax bases.

Second, we isolate the precise mechanism driving employees' near-zero responsiveness by analyzing the behavior of "job changers." Because workers who switch employers within the tax year incur negligible re-optimization costs, traditional optimization friction models predict they should exhibit significant bunching at the top tax kink. We find that their elasticity remains close to zero, definitively ruling out temporary adjustment frictions and demonstrating that employee unresponsiveness is driven by the strict institutional constraints of third-party reporting and standardized wage contracts.

Third, the paper contributes to explaining the persistent "micro-macro puzzle" in the empirical public finance literature, whereby estimates of the ETI that rely on distinct sources of information and methodologies can differ by an order of magnitude (Kleven et al., 2025; Sigaard, 2023*b*). We demonstrate that the divergence between micro-bunching and macro-IV estimates does not stem from a uniform short-run attenuation of a universal structural parameter. Crucially, the divergence between our local estimates and broader macro estimates confirms that these methodologies capture fundamentally different margins of adjustment. While local bunching designs precisely identify the binding institutional reporting constraints imposed on standard employees at the intensive margin, macro-IV estimates capture global responses, long-term occupational sorting, and extensive-margin transitions into self-employment. Ultimately, our findings suggest the micro-macro puzzle is not a contradiction to be solved, but a reflection of a rigid, institutionally constrained regime for standard wage earners operating alongside a highly flexible regime for those with complex capital and business income.

It is important to explicitly bound the scope of this comparison. Because our empirical strategy relies on local bunching, our elasticity estimates strictly capture responses at the intensive margin and localized tax-base shifting. Therefore, while our local design cannot exhaustively account for every source of the micro-macro divergence, it conclusively explains its rigid lower bound: the persistent, near-zero responsiveness of employees definitively rules out that macro estimates are driven by standard wage earners optimizing at the intensive margin. Instead, large aggregate elasticities must reflect the global, unconstrained behavioral shifts of business owners and complex income earners.

Denmark has featured prominently in prior empirical work on taxable income responses, and it is useful to situate our contribution within this existing evidence. A first set of studies for Denmark and other Nordic countries exploit bunching at kink points to estimate the ETI, typically finding negligible behavioral responses for wage earners but substantially larger elasticities for the self-employed.[2] For instance, le Maire and Schjerning (2013) use Danish data on the self-employed and document pronounced bunching driven to a large extent by intertemporal income shifting, implying that naive bunching-based ETI estimates would be substantially upward-biased absent a careful treatment of shifting margins. These findings already point to the importance of heterogeneity by employment status and the role of institutional features, such as third-party reporting and the possibility of intertemporal income shifting, in shaping measured elasticities.[3]

More recent contributions exploit Danish administrative data and reform-based identification to probe mechanisms behind small elasticities for employees. A leading explanation for low bunching estimates is the presence of optimization frictions or adjustment costs,[4] which could attenuate short-run responses even if the underlying structural elasticity is sizeable. Recent work by Kleven et al. (2025) shows that dynamic returns to effort can magnify short-run labor supply responses, leading to a micro-macro divergence as occupational trajectories adjust over the long run. However, in the context of the elasticity of taxable income, Danish IV studies that zoom in on groups with plausibly lower adjustment costs, such as job changers or workers whose contracts are more easily renegotiated, still tend to find modest ETIs for employees (Chetty et al., 2011; Kreiner, Leth-Petersen and Skov, 2016; Labanca and Pozzoli, 2022). This pattern points to institutional constraints, including rigid third-party reported labor contracts and limited scope for individual bargaining around statutory thresholds, as central to understanding the low responsiveness of employees, consistent with the broader Danish evidence on the disciplining role of third-party reporting for both evasion and legal income shifting (Kleven et al., 2011; Kleven, 2014; Chetty et al., 2011).

The present paper extends this Danish evidence base along several dimensions that are particularly relevant for public finance. First, rather than centering on specific reforms or short time windows, we provide a unified bunching-based analysis covering multiple tax regimes over more than four decades, allowing us to distinguish transitory reform responses from longer-run shifts in behavior, labor-market structure, and policy design.[5] Second, we systematically document how

[2]Saez (2010); Kleven (2016) present the general bunching methodology and surveys of the field. Chetty et al. (2011); le Maire and Schjerning (2013) are the earliest applications of bunching estimators to the Danish ETI.

[3]Slemrod and Kopczuk (2002); Kopczuk (2005); Saez (2010); Chetty et al. (2011) provide broader discussions of how institutional and contractual features shape ETI estimates.

[4]Chetty (2012) provides a general framework and, in related tax settings, Kleven and Waseem (2013); Mavrokonstantis and Seibold (2022); Gelber, Jones and Sacks (2020).

[5]On the importance of reform-driven and regime-level variation for tax analysis, see Saez (2010); Chetty et al. (2011); Saez (2003*a*); Borella et al. (2022).

ETI varies not only by employment status but also by education and gender, thereby connecting the earlier Danish evidence on heterogeneous responses to a richer set of demographic dimensions and to recent work explicitly linking ETI and labor-supply elasticities.[6] Finally, by combining this long-run perspective with a focus on a top-tax kink that systematically targets the upper-middle part of the income distribution, our analysis offers evidence that is directly informative for the design of progressive income taxation in advanced economies and contributes to ongoing debates in the literature on the efficiency costs of high marginal tax rates in settings with strong enforcement and extensive third-party reporting.[7]

Our findings contribute to several strands of the literature on taxation and labor supply. We build directly on the bunching methodology developed by Saez (2010) and Chetty et al. (2011), extending their static frameworks to a dynamic, multi-regime setting. Our results reconcile the conflicting evidence in the literature by showing that the "micro-macro" puzzle arises in part due to a composition effect. In macroeconomic data, where the variation is often driven by high-income individuals with control over their compensation (similar to our self-employed group), the estimated elasticity appears large. In micro-data dominated by wage earners, the elasticity appears small. By decomposing these effects over forty years, we show that the findings are consistent with a model in which reporting constraints, rather than preferences, dictate the observed response.

Furthermore, our results complement the work of Kleven et al. (2011) on the role of third-party reporting in tax compliance. We show that third-party reporting does not merely reduce evasion; it effectively eliminates the responsiveness of compliant wage earners to marginal tax rates. This lack of response implies that, for most of the population, the efficiency cost of income taxation on labor allocation is low, provided that the tax system maintains a broad base and a strict separation between labor and capital income.

The remainder of the paper is organized as follows. Section I describes the institutional background of the Danish tax system, the major reforms over the last four decades, and our administrative data. Section II outlines the conceptual framework and the bunching estimation strategy. Section III presents the main empirical results, distinguishing between the stable inelasticity of employees and the variable responsiveness of the self-employed. Section IV explores the mechanisms driving these results, focusing on job changers and income shifting. Section V concludes.

[6] See, for example, Sigaard (2023*b*,*a*) for Danish evidence on intensive-margin labor supply, and Saez, Slemrod and Giertz (2012); Neisser (2021) for broader discussions of heterogeneity in ETI estimates.

[7] See, among others, Gruber and Saez (2002); Saez (2003*b*); Doerrenberg, Peichl and Siegloch (2017); He, Peng and Wang (2021); Aronsson, Jenderny and Lanot (2022); Sigaard (2023*a*).

I. Data, Sample Construction, and Institutional Background

A. Data

We utilize comprehensive individual data from the Danish administrative tax registers spanning 1980 to 2022. From these registers, we extract measures of total taxable labor and capital income,[8] along with all necessary components to reconstruct the alternative tax bases described in Table 1. We focus on individuals who have completed high school or a college degree, excluding those with only compulsory schooling, as only a small proportion earn enough to approach the top tax bracket.[9] Furthermore, we restrict our sample to individuals aged 25 to 55. This age restriction is standard in the empirical labor supply literature, for example Keane (2011), and ensures our elasticity estimates are not confounded by transitions out of formal education or into early retirement programs. Reconstructing the specific tax bases for each component of the system enables the precise identification of individual earnings distributions around each respective tax kink.

Our primary focus is on the top income tax threshold, and we categorize the data by gender (Female/Male), marital status (Unmarried/Married), and broad education groups (High School/College). Within each stratum, we construct four sub-samples based on the share of labor income derived from self-employment. The first two include individuals with either exclusively employee income or a small positive share of self-employment income. The latter two consist of individuals whose labor income is either predominantly or exclusively derived from self-employment. This construction aligns with the methodology used in Chetty (2012), with summary statistics for these subsamples provided in Appendix Table B.1.

It is important to clarify our sample restriction by education. As Figure 1 makes clear, individuals with only compulsory schooling account for only a small proportion of top tax paid, and that share declines over time. For this group, the top bracket is therefore empirically of limited relevance, both because relatively few individuals reach the threshold and because their representation among top taxpayers becomes progressively smaller across tax regimes. Excluding them sharpens the focus of the analysis on the population for whom the top-kink incentives are economically meaningful, while preserving comparability over time in the groups that generate the identifying variation in our bunching estimates. We therefore restrict the estimation sample to individuals with at least a high school or college education.

[8]Capital income for Danish tax purposes includes interest income from bank deposits and bonds, investment returns from securities not classified as shares, and interest expenses (as deductions), while dividends and capital gains from stocks, ETFs, and investment funds are taxed separately as share income.

[9]The school leaving age in Denmark is 16, and the last three years of high school are optional. Empirically, excluding those with only compulsory schooling excludes 10% of top-tax-bracket income and does not disproportionately alter the composition of the self-employed subsample.

Figure 2 illustrates the evolution of employment status. Importantly, over the period, the proportion of self-employed only taxpayers has halved (from less than 10% to slightly above 4%). The proportion of taxpayers reporting mainly self-employment income has declined. In contrast, the proportion of taxpayers reporting some self-employment income (mainly employment) has risen, so that the two categories have exchanged positions. Hence, while taxpayers who reported some self-employment income amounted to about 15% of all income taxpayers in 1980, by 2022 it represents less than 10%.

Within each subsample and stratum, for every year, our attention focuses on the distribution of taxable income around the top income tax threshold. Specifically, we focus on the tax base for the top income tax and select all observations within a narrow interval around the kink (no more than $50,000$ DKK on either side). We construct 344 distinct subsamples by interacting gender (2), marital status (2), broad education group (2), and tax year (43), to form datasets from which we estimate the ETI using the bunching approach.

B. *The Position of the Top Tax Threshold in the Distribution of Taxable Income*

Several tax bases characterize the income tax system, and for each tax base, the specific tax rates apply above and below a base-specific threshold.[10] Over the forty years of our study, the definitions of the tax bases have changed, and so have the relevant tax thresholds and base-specific tax rates. Table 1 describes the main changes that affect all parts of the income tax system. Our primary focus is on the top tax bracket, which concerns higher-income individuals.

Over time, as the tax system was reformed, the marginal tax rates that apply to different components of taxable income have evolved substantially. Figure 3 illustrates the changes to the marginal tax rate over time as they apply to labor income, positive capital income, and negative capital income across six tax regimes. This long-run variation is a central feature of our empirical setting, as major tax reforms, particularly in 1987, 1994, and 2010, altered not only the statutory rates but also the definitions of the underlying tax bases.

Crucially, Figure 3 highlights periods of pronounced differential taxation, such as the diverging rates applied to positive versus negative capital income introduced during the 1990s, followed by their subsequent realignment. It also captures broader structural shifts, such as the 2010 reform that completely abolished the middle tax bracket and lowered the overall marginal tax ceiling. Documenting these specific rate trajectories is essential for our analysis, as the differential treatment of income components changes over time provides the underlying variation needed to observe how statutory opportunities for tax arbitrage and income shifting evolve. By mapping these varying incentives, the figure outlines the shifting opportunity set that taxpayers face across different regimes.

[10] Historical income tax rates and thresholds are collated in Christensen (2003) and Skatteministeriet (2023).

In the distribution of income, the position of the threshold of the top tax bracket varies over time and with the taxpayer's specific characteristics. Figure 4 shows these positions in detail. Gender, education, and marital status are important determinants of the proportion of taxpayers who are subject to the tax. At one extreme, women who are only high school educated are the least likely to be liable to the tax at any given time, while at the other extreme, college-educated married men are the most likely to be liable to the tax. The gender divide is clear here: men make up a larger proportion of the top taxpayers, whether employed or self-employed, regardless of education or marital status.

The earlier reform (1987) sharply increased the number of top rate taxpayers, while the latest reform in our sample (2009) significantly reduced this number (corresponding to the abolition of the middle tax bracket). Between these two dates, the number of top tax rate payers generally increases, except among college-educated employed men, who remain relatively stable. Since 2010, there has been no clear trend in the proportion of top taxpayers across groups.

C. The Population and Sample Composition Near the Top Tax Threshold.

Figures 5 and 6 summarise how the composition of taxpayers in our estimation sample, and the composition of those very near the top-kink, evolves across the six tax regimes. We report proportions for the full sample (blue bars), for observations used in estimation because they lie within 50,000 DKK of the kink (light bars), and for observations very close to the kink (within 7,000 DKK, green bars).

Figure 5 shows three broad demographic shifts. First, the share of married workers in the full sample declines from 0.66 in the first regime to 0.52 in the last, but the share of married workers among those within 7,000 DKK of the kink is consistently higher. The gap is typically 0.02 and rises to 0.05 in the final regime, indicating that even as marriage becomes less common overall, married individuals are increasingly over-represented among taxpayers closest to the top threshold.

Second, the share of males falls in the full sample from 0.60 to 0.50, while the share of males near the kink falls from 0.76 to 0.60, so men remain more likely than women to be close to the kink, but the male over-representation diminishes over time. Third, the share with a college degree rises in the full sample from 0.48 to 0.55. Still, the relative concentration of college graduates near the kink declines, from 20 percent higher than the population in the first regime to 10 percent higher in the last regime.

Figure 6 reports analogous patterns by employment status. Over time, the proportion of the workforce that is self-employed decreases toward the pure employment case. Mechanically, this secular trend causes the absolute number of pure employees near the top tax kink to grow over our 43-year panel. However, relative to their shrinking baseline population share, the self-employed remain over-represented in the immediate 7,000 DKK vicinity of the threshold. In fact, this relative local concentration of the self-employed intensifies over time. This divergence between the overall workforce composition and local tax-kink concentration provides early descriptive evidence of distinct capacities to adjust taxable income. Because the underlying elasticities systematically differ across these shifting demographic and employment groups, our empirical strategy estimates the ETI separately for each fully interacted stratum.

Taken together, these shifts imply substantial heterogeneity in the behavior of those exposed to the top-kink incentives across regimes, and therefore in whose behavior informs our bunching-based ETI estimates. For this reason, we estimate the ETI separately by fully interacting demographics and employment-status groups year by year, rather than imposing common responses across changing sample composition. Since the relevant marginal tax rates around the kink also vary across years and municipalities,[11] this approach exploits across-regime variation in incentives while maintaining a consistent local bunching design.

II. Conceptual Framework and Empirical Strategy

We estimate the ETI using the bunching design developed by Saez (2010) and Chetty et al. (2011). This approach infers structural behavioral parameters from the local accumulation of probability mass at discontinuities (kinks) in the marginal tax rate schedule.

A. The Bunching Design

Consider a static model where agents maximize quasilinear utility $u(c, z) = c - h(z; n)$, where c is consumption, z is taxable income, and n captures heterogeneity in ability and preferences. While the quasilinear specification abstracts from income effects, a standard assumption in the local bunching literature Saez (2010), it isolates the compensated elasticity of taxable income driven by marginal rate changes. Agents face a piecewise linear budget set $c = z - T(z)$ with a convex kink at income level K, where the marginal tax rate increases from τ_0 to τ_1.

Crucially, the standard bunching estimator relies on the assumption that gross wages are invariant to the local tax change. If firms respond to the tax schedule by altering wage offers or match formation (labor demand responses), the observed bunching will confound worker preferences with firm optimization. To address this confounding, we formalize the labor market equilibrium using a matching framework in Appendix B. We demonstrate that as long as the idiosyncratic matching between a worker's demographic characteristics (c) and a firm's unobserved productivity (μ) is locally invariant to the tax schedule (T), the wage

[11] Local income taxes are set at the municipal level and affect the marginal tax rates around the top tax threshold. A national tax rate ceiling is binding for most municipalities (59 out of 98 in 2009, and 72 in 2010, after removal of the middle tax band). Hence, local taxation affects the difference in tax rates around the top tax threshold for most municipalities. Because local tax rates vary year-to-year, these differences provide valuable spatial cross-sectional variation in total marginal tax rates around the top tax threshold, independent of national statutory reforms. Given the broad nature of the tax base and the substantial friction associated with geographic mobility for established workers, we treat this municipal-level variation as exogenous to intensive-margin reporting decisions.

response is neutralized. This condition holds in the Danish context, where standard wage-setting institutions prevent firms from tailoring gross compensation to an individual's specific location around the tax kink, thereby validating our use of the local bunching estimator to recover the worker's behavioral elasticity.

In the absence of the kink, an individual maximizes utility by equating the marginal rate of substitution to the net-of-tax rate, $1 - \tau_0$. With the introduction of the kink, individuals whose optimal income z^* would otherwise fall within the range $[K, K + \Delta z^*]$ bunch at the threshold K. For a convex kink, the width of this bunching segment is approximately proportional to the compensated elasticity of taxable income (Saez, 2010):

$$\varepsilon \simeq \frac{\Delta z^*}{K \ln\left(\frac{1-\tau_0}{1-\tau_1}\right)} \tag{1}$$

The bunching method thus identifies ε by comparing the observed mass of taxpayers at K against a counterfactual distribution that would exist in the absence of the tax jump (as formally defined in Section II.C).[12]

B. Optimization Frictions and Heterogeneity

A central finding in the recent literature is that observed bunching responses are often attenuated by optimization frictions, such as adjustment costs, information rigidity, or institutional constraints on reported income (Chetty, 2012; Kleven and Waseem, 2013). If agents face a fixed utility cost ϕ of adjusting their taxable income to the optimal bunching point, they will only bunch if the utility gain from doing so exceeds ϕ.[13] Consequently, the *observed* bunching mass identifies an attenuated elasticity $\hat{\varepsilon}$, which is a function of both the structural parameter ε and the friction ϕ.

This distinction is crucial for our analysis of heterogeneous responses across employment statuses. Employees typically incur high adjustment costs due to fixed-hour contracts and rigid third-party reporting requirements. These restrictions imply a prohibitively high ϕ and low observed bunching ($\hat{\varepsilon} \approx 0$), even if their structural preference parameters (ε) are large. In contrast, the self-employed face lower adjustment costs and exercise direct control over their "reporting technology", defined here as the institutional capacity to adjust reported income independently of real labor supply shifts, e.g., via legal income shifting or deduction management. This autonomy implies a near-zero ϕ, allowing their observed $\hat{\varepsilon}$ to closely track ε. We interpret differences in bunching magnitudes across groups as reflecting this variation in reporting constraints rather than differences in labor

[12] We assume that gross wages are invariant to the local tax change, a condition we formalise in Appendix B using a matching framework.

[13] While we assume a fixed cost ϕ for expositional clarity, modeling frictions as a distribution of adjustment costs (e.g., Chetty, 2012) yields the same qualitative predictions for the subgroup and job-changer comparisons tested in our empirical strategy.

supply preferences.

Crucially, this friction framework yields a testable prediction: if a high ϕ is the binding constraint for employees, then employees who experience a job change, thereby resetting their contractual constraints at a near-zero renegotiation cost ($\phi \approx 0$), should exhibit significant bunching. We exploit this dynamic to directly test for structural preferences among wage earners in Section IV.

C. *Estimation Strategy*

To implement the bunching estimator, we construct the counterfactual income distribution locally around the kink using the polynomial refinement method (Chetty et al., 2011; Mavrokonstantis and Seibold, 2022). We group taxpayers into income bins of width δ (set to $1,000$ DKK) and estimate the parameters of the following model:

$$C_j = \sum_{i=0}^{p} \beta_i (z_j)^i + \sum_{k \in \mathcal{R}} \gamma_k \mathbb{1}[z_j = k] + \nu_j, \tag{2}$$

where C_j is the number of individuals in bin j, z_j is the income level of the bin, and p is the order of the polynomial. We use $p = 7$ in our baseline, consistent with standard practice in settings with sharp bunching, though our results are robust to alternative specifications.[14] The set $\mathcal{R}$ denotes the excluded region of size $2q$ around the kink[15], $[K - q, K + q]$, with $0 < q < K$, where the bunching behavior distorts the distribution. The counterfactual density is predicted as $\hat{C}_j = \sum_{i=0}^{p} \hat{\beta}_i (z_j)^i$, ignoring the dummy variables for the excluded region.

Excess bunching, $\hat{B}$, is calculated as the difference between the observed and counterfactual counts in the excluded region: $\hat{B} = \sum_{k \in \mathcal{R}} (C_k - \hat{C}_k)$. We define the normalized excess mass b as the excess mass relative to the average height of the counterfactual density at the kink:

$$b = \frac{\hat{B}}{\sum_{j \in R} \hat{C}_j / N_{bins}} \tag{3}$$

where N_{bins} is the number of bins in the excluded region. Economically, b measures the excess mass as a multiple of the counterfactual density; for instance, $b = 1$ implies that the observed mass of taxpayers exactly at the kink is twice what would be expected in the absence of the tax discontinuity.

Finally, we convert the estimated excess mass b into an elasticity using the sample-weighted average of the marginal tax rates. Because local municipal taxes cause the exact size of the tax jump to vary across taxpayers within the same

[14] Mortenson and Whitten (2020) show that ETI estimates remain highly stable across polynomial degrees when bunching is visually sharp.

[15] The parameters γ_k in Equation 2 take the values C_j for all bin j in the set $\mathcal{R}$.

demographic and year stratum, we calculate the log net-of-tax rate ratio for each individual and take the sample average over all individuals within that specific stratum. Following the standard approach applied in similar Nordic contexts (le Maire and Schjerning, 2013; Bastani and Selin, 2014), the empirical elasticity is given by:

$$\hat{\varepsilon} = \frac{b \times \delta}{K \times \ln\left(\frac{1-\tau_0}{1-\tau_1}\right)} \tag{4}$$

This estimator relies on the fundamental identification assumption that the counterfactual density of taxable income would be smooth around the threshold K in the absence of the tax discontinuity. Because we estimate the counterfactual polynomial locally within each specific year and regime, our method seamlessly handles the statutory redefinitions of the tax base over our 40-year panel, isolating the localized behavioral response to the active kink. Standard errors for the excess mass and corresponding elasticities are calculated using a residual-based bootstrap procedure to account for uncertainty in the polynomial estimation.

III. Empirical Results

In this section, we present the core empirical findings of the paper. We proceed in four steps. First, we provide graphical evidence of bunching responses, establishing a stark contrast between the sharp behavioral responses of the self-employed and the near-total unresponsiveness of employees. Second, we convert these visual patterns into meaningful structural ETI estimates and track their evolution across the six distinct tax regimes spanning 1980 to 2022. Third, we demonstrate the robustness of our results by re-estimating the elasticities using a parametric Maximum Likelihood approach. Fourth, we interrogate the mechanisms driving these results by analyzing heterogeneity, specifically focusing on job changers and the composition of capital income, to disentangle structural labor supply preferences from institutional reporting constraints.

A. Visual Evidence of Bunching

The validity of the bunching design rests on the visual identification of excess mass at the kink point. Figure 7 illustrates this evidence, showing the histograms of the observed distribution of taxable income for both the Self-Employed Only and the Employees Only subsamples in a central year across two selected consecutive tax regimes. As the figure shows, the Self-Employed subsample exhibits a sharp spike in the mass of taxpayers at the kink. The observed mass at the threshold forms a distinct peak relative to the adjacent income bins, implying a substantial behavioral elasticity. The excess mass is strictly localized, with the distribution returning to its smooth underlying trend within a narrow window on either side of the threshold. This localized bunching provides clear visual evidence of a behavioral response to marginal incentives.

By contrast, the distribution for employees in Figure 7 is much smoother around the threshold, showing negligible visual evidence of excess mass. This stark graphical dichotomy confirms the critical role of reporting technology: agents with control over reporting (the self-employed) respond, whereas those subject to strict third-party reporting (employees) do not (Kleven et al., 2011).

To demonstrate the stability of these patterns over time, Appendix Figures B1 and B2 present a set of histograms for all six tax regimes for the self-employed and employees, respectively. These appendix figures confirm that the sharp divergence in bunching behavior, localized excess mass among the self-employed, and limited responsiveness among employees persists robustly across the entire sample period.

B. The Evolution of Elasticities over Time

We next translate these visual excess masses into structural elasticity parameters (ε). The bunching estimation requires specifying the polynomial degree, the bandwidth used to estimate the counterfactual density, and the excluded region (proximity to the kink). We estimate the ETI iteratively across combinations of four employment groups, two broad education groups, gender, and marital status for all years. To ensure that our conclusions are not driven by arbitrary parameter choices, we systematically vary the bandwidth range (from 30,000 to 50,000 DKK) and the proximity window (from 5,000 to 7,000 DKK). This procedure generates 3,096 distinct ETI estimates for each employment group.

The elasticity estimates produced by this procedure vary for two distinct reasons: genuine heterogeneity in *behavioral responses* (across demographics, tax regimes, and employment categories) and variation in *estimation parameters*. To systematically separate these sources of variation, we regress the estimated elasticities on the observable characteristics of the subsample and the design parameters of the bunching estimator. Because the dependent variable is an estimated parameter, we use a Weighted Least Squares (WLS) estimator, weighting each observation by the inverse of the estimated variance from the first-stage bunching estimation. This approach is efficient under heteroskedasticity of known form and ensures that more precisely estimated elasticities receive greater weight. Furthermore, to account for any residual heteroskedasticity introduced by the generated dependent variable, we rely on robust standard errors. Crucially, all right-hand-side explanatory variables are observed demographic characteristics or researcher-chosen, non-stochastic design parameters, avoiding the bias associated with estimated regressors.

Table 2 presents three types of parameter estimates from this regression: demographics, dummy variables characterizing the bunching estimation design, and sample size controls. Regarding demographics, men generally exhibit lower elasticities than women, and married individuals have lower elasticities than unmarried individuals. Interestingly, while college-educated employees have lower elasticities than those with only a high school diploma, the reverse is true for the self-employed, where college education is associated with the highest structural responsiveness.

A notable feature of these results is that the coefficients on the estimation design parameters frequently exceed those on demographic characteristics. While this might initially suggest fragility, it reflects a well-known mechanical property of the bunching estimator in the presence of diffuse behavioral responses (Saez, 2010; Kleven, 2016): expanding the estimation bandwidth inherently captures more diffuse shifting behavior that occurs further from the threshold, mechanically increasing the measured excess mass. Conversely, expanding the excluded proximity window implies a larger counterfactual hole, thereby reducing the residual elasticity. Importantly, while these design parameters shift the absolute level of the estimates, they do so uniformly; holding the design parameters fixed at our baseline specification does not alter the fundamental economic ordering between employees and the self-employed, nor does it change the trajectory of responses across tax regimes.

Within employment status groups, the greater the sample size (Obs. in Range), the larger the elasticity. A greater proportion of observations near (but not exactly at) the kink increases the ETI. These observations are excluded from the analysis in the sense that they neither contribute to estimating the bunching polynomial nor do they count towards the estimate of excess bunching. Hence, this proportion reflects the weight of observations omitted, and the associated coefficients show a positive bias: the larger the excluded region around the kink, the higher the estimated elasticities.

The ordered differences in R^2 across employment groups are consistent with the degree of genuine behavioral heterogeneity we attribute to each group. Where the ETI is institutionally constrained and stable over time, as for employees, the covariates explain modest differences between demographic groups and design parameters around a near-zero base, producing an R^2 of 0.456, while within-group variation over time is limited. When the ETI is responsive and regime-sensitive, as for the self-employed, the covariates simultaneously explain variation across demographic groups, tax regimes, and income composition, yielding a substantially higher R^2 of 0.849. The intermediate groups, employees mainly and self-employed mainly, fall in between at 0.567 and 0.767 respectively, ordered exactly as the hypothesis predicts. The significance of the parameter estimates across all four regressions reinforces this interpretation; the covariates recover systematic relationships between observable characteristics and behavioral responses that are consistent with the broader literature on labor market attachment and income composition.

C. Employees and the Self-Employed

In Figure 8, we show how the "mean" estimate of the ETI varies over time.[16] Figure B3, in the Appendix, shows the mean estimate for each of the four employment groups. It is striking that the ETI estimates are broadly ordered. The estimated ETI is consistently the smallest among taxpayers with a strong attachment to employment (employees only or employees mainly). In that case, the ETI is less than 0.05. The estimated ETI is generally larger when self-employment accounts for the majority of taxable income. For self-employed taxpayers only, the ETI is estimated at 0.05-0.50, while for the mainly self-employed, the ETI is estimated at 0.05-0.20.

It is in 1998 that the estimated ETI for the mainly or only self-employed reaches its peak. This spike anticipates the 1999 reform, which eliminated the preferential tax treatment of negative capital income (initially introduced in 1994). Because the 1999 reform was announced in advance, self-employed taxpayers engaged in extensive intertemporal income shifting in 1998 to capitalize on the expiring deductions. Following the implementation of the reform in 1999, the ETI among mainly or only self-employed taxpayers stabilized at approximately 0.10. These estimates are large, and in the case of self-employment, it is likely that a large part of this measured response arises because of income shifting between capital and labor income to optimise a self-employed tax position and does not necessarily represent a variation in work effort.[17]

The main finding from Figure 8 is the definitive null result: the elasticity of taxable income for pure employees is effectively zero. Point estimates typically range between 0.00 and 0.02. Because our administrative data covers the universe of Danish taxpayers, these estimates are highly precise; in our baseline specification for employees, the upper bound of the 95 percent confidence interval rarely exceeds an elasticity of 0.03 across the entire panel. This precision allows us to formally bound the structural responsiveness of wage earners to a precisely estimated, economically negligible magnitude. This result is notable for its stability.

As shown visually in the lower series of Figure B3, the employee elasticity remains flat and unresponsive across the structural breaks of the 1987, 1994, and 2010 reforms. Despite significant variation in top marginal rates and the definition of the tax base, the lack of response persists. This unresponsiveness suggests that the zero result is not due to a lack of incentives (which were often large) or to specific temporary frictions, but rather to a structural feature of the employment contract in Denmark. The combination of third-party reporting and standardised salary contracts appears to eliminate the scope for the fine-tuning of taxable income among employees with no self-employment income.

The upper line of Figure 8 reveals a fundamentally different pattern for the self-employed. Their elasticities are consistently positive, ranging from 0.05 to 0.45,

[16] We construct this "mean" estimate as the mean forecast of the descriptive regression model presented in Table 2.
[17] See le Maire and Schjerning (2013) for an in-depth discussion.

and are highly sensitive to the tax regime. We observe significant volatility in the estimated elasticities that correlates with changes in the tax base definition. Specifically, Figure 8 reveals that elasticities peak in regimes where the definition of taxable income was broadest or allowed for the most deduction shifting (e.g., prior to the 1999 reform). Conversely, in regimes where the tax base was narrowed to exclude certain capital components, the observed elasticity drops. This finding suggests that the observed elasticity is not a fixed "preference" parameter but a function of the tax code's complexity and the opportunities it affords for income shifting.

D. Robustness

We use the Chetty et al. (2011) bunching method based on estimating a polynomial model as our baseline because it consistently produces estimates even in the absence of visible bunching. In Appendix C, we further demonstrate the robustness of our results by re-estimating the elasticity using a parametric Maximum Likelihood approach on the same data, whenever this estimation yields informative results. Since the alternative Maximum Likelihood (ML) approach fails to converge in the absence of clear bunching, the polynomial method is the only viable tool for systematically evaluating populations with near-zero responsiveness.

While Chetty et al.'s 2011 estimator exhibits a slight downward bias relative to ML, its absolute magnitude is economically negligible, see Table C.1. For the employee-only group, the bias is approximately -0.0145. Using the mean ML estimate of 0.017, the elasticity remains effectively zero. Similarly, the highest ML estimate for the employee-mainly group reaches only 0.036. Crucially, this bias remains remarkably small, even among highly responsive self-employed populations, with values of 0.0077 for the self-employed-only group and 0.0036 for the self-employed-mainly group. Ultimately, this bias does not alter our core conclusion: standard wage earners are largely unresponsive to marginal tax changes, whereas the self-employed exhibit substantial responsiveness.

E. Mechanisms: Testing for Frictions

To investigate whether the zero result for employees is driven primarily by institutional reporting constraints, we examine specific margins of adjustment where these frictions might be relaxed.

Job Changers and Institutional Rigidity

A potential explanation for zero employee bunching is the friction of existing contracts: employees may wish to bunch, but cannot renegotiate hours with their current employer. If this were the binding constraint, we would expect to see significant bunching among employees who switch jobs, as the hiring moment offers a low-cost opportunity to optimize the salary package. However, we find a precise null result: across all specifications, job changers exhibit the same negligible elasticities as stayers.

In their study, Kleven et al. (2025) invest significant effort in identifying job changers using matched employer-employee data. We adapt their approach by following unique occupations and workplaces from 1991 to 2022 to capture individuals' job transitions.[18] Based on this data, in Tables B.2 and B.3, we focus on taxpayers who transition to a different workplace, change occupation, or experience a promotion from one year to the next.[19] For the purpose of testing the friction hypothesis, this margin is economically relevant: a year-to-year transition disrupts the default annual reporting frictions that would otherwise bind a worker to a suboptimal interior point.

Before turning to promotions, Table B.2 considers taxpayers who change workplace or occupation between years as a direct test of whether employee responses are suppressed mainly by the lack of renegotiation opportunities. If such frictions were the dominant explanation, one would expect larger ETI estimates precisely for these groups, since job and occupation changes are natural occasions for revising compensation. Table B.2 does not support that prediction. Across employee groups, the estimated elasticities remain quantitatively modest and do not display the sharp increase that a pure renegotiation-based account would imply. The stability of the demographic associations likewise suggests that the basic structure of responsiveness is unchanged during these transitions. Taken together, the table points to a deeper institutional explanation: even when workers move, the combination of standardized wage setting and third-party reported labor income continues to limit fine-tuned adjustment around the top kink.

Next, we examine the estimated elasticities for taxpayers who experience a promotion or a job change in Table B.3. The results largely mirror the patterns found in the general population. The estimated ETI for those who are promoted or change jobs remains quantitatively small and statistically indistinguishable from that for those who do not experience such transitions. For instance, the descriptive regressions in Table B.3 show that the association between demographic characteristics and the ETI is stable across these groups. Crucially, we do not observe the sharp increase in responsiveness that one might expect if renegotiation opportunities were the primary constraint on bunching behavior. Whether defined by earnings jumps (promotion) or occupation codes (job change), the behavioral response at the top tax kink appears uniformly muted for employees, suggesting that the "lumpiness" of labor supply adjustments does not mechanically translate into large bunching responses even in years where adjustments occur.

[18] Statistics Denmark introduced the Danish adaptation of the ISCO coding frame in 1991, based on employer reports. Workplaces and occupations are assigned to individuals based on the attachment that generates the most earnings in a year.

[19] Following Kleven et al. (2025), we define a promotion as an occupation change yielding a 10 percent higher median occupational earnings. Our findings are robust to defining promotions as transitions between occupations with median earnings 5 or 20 percent higher.

We illustrate the predictions over time of the regression model splitting the sample by job transitions in Figures 9 and 10. On average, the estimated ETI value is constant and small across the sample period for both groups. The movers do not appear to be more responsive than the stayers. Our results indicate that the low elasticity of taxable income among employees is a structural feature of the Danish labor market that persists even during career transitions. The fact that workplace movers and job changers, who presumably face lower friction in optimising their compensation package, exhibit the same negligible bunching as stayers suggests that the constraints are not merely about the timing of renegotiation. Instead, they likely stem from the institutional rigidity of third-party reported income components, which limits the scope for precise manipulation of taxable income at the margin, regardless of employment mobility. Consequently, while the dynamic framework of Kleven et al. (2025) highlights important long-run responses, our evidence cautions that these do not manifest as short-run bunching, even among the subgroup of workers theoretically best positioned to respond.

The Role of Capital Income Composition

Finally, we investigate the role of capital income. Unlike labor income, capital income is often more malleable and can be adjusted via last-minute portfolio decisions or intertemporal shifting. Table B.4, in the Apprendix, disaggregates the elasticity estimates by the share and type of capital income in the total tax base, and Figure 11 displays these trends over time.[20]

In Table B.4, we split the total estimation sample by negative (columns 1-2) or positive capital income (columns 3-4), and further split at the median into those with the most negative (column 1) and positive capital income (column 4). We find a clear gradient in responsiveness linked to the amount of capital income held by the taxpayer. The estimated elasticity is highest for the group with the largest positive capital income (column 4), with an average ETI of approximately 0.045. In contrast, estimates for those with smaller positive capital income (column 3) or negative capital income (columns 1 and 2) are substantially lower, clustering between 0.01 and 0.02. This cross-sectional pattern indicates that the behavioural response at the top kink is disproportionately concentrated among taxpayers with substantial capital income, suggesting that the complexity of their income composition provides greater scope for bunching than is available to those relying primarily on labor earnings.

Figure 11 plots the predicted elasticities from the descriptive regression model from 1987, when the capital income tax base was introduced, until 2022. We find that the magnitude of the behavioral response is consistently highest among taxpayers with large positive capital income. For this group, the ETI peaks at approximately 10 percent around 1998, then stabilizes at 2 to 4 percent from 1999.

[20]Throughout our study, the outcome of interest is total taxable (non-share) income. In this subsection, we focus on the capital income components of the tax base by contrasting individuals with different amounts of positive and negative capital income.

This trajectory closely mirrors the pattern observed for the self-employed in our baseline analysis (Figure 8), albeit at a lower overall scale. Notably, the spike in responsiveness during the 1990s coincides with the period when differential taxation of capital income components was most pronounced, reinforcing the interpretation that these larger elasticities reflect income shifting and portfolio adjustments rather than broad labor supply responses.

F. Summary and Macro Comparison

Our micro-based estimates for the general population (dominated by employees) are substantially lower than macro-based ETI estimates for Denmark found in the literature (e.g., Kleven et al., 2025). This divergence is consistent with the distinction between local and global responses. Bunching designs capture *local* responsiveness to marginal rates and are heavily attenuated by the optimization frictions and reporting constraints we have documented. Research designs focusing on the response of taxable income growth to tax reforms, by contrast, capture *global* responses over longer horizons.

Pooling over all years, our model predicted elasticities range from 0.005 for employees to 0.195 for the self-employed.[21] Weighting these predictions by the amount of top tax paid, we calculate a grand mean elasticity of 0.019. The purple line in Figure 8 shows the evolution of the mean elasticity over time, with a marked fall in 1999, corresponding to changes in capital income taxation introduced by the fourth tax regime. The difference between our estimates and those from the recent literature confirms the fundamental distinction between local responses at the top tax threshold and broader behavioral adjustments. While the short-run, intensive-margin elasticity for the majority of workers is effectively zero due to standardized wage contracts and third-party reporting, we do not rule out extensive-margin responses to large-scale tax reforms, which may be captured by IV designs.

IV. Discussion

Our empirical analysis establishes two central facts: employees exhibit an elasticity of taxable income consistently close to zero, whereas the self-employed display substantial yet highly volatile responsiveness.

A. Regime-by-Regime Interpretation

The cross-regime pattern in our ETI estimates is best understood as the interaction between changing tax bases and the scope for income recharacterization, i.e., the legal shifting of income between the labor and corporate tax bases. The

[21] These elasticities are for those without other sources of income from employment. For the sample with primarily employee income but some self-employment income, the elasticity is 0.030. For those with primarily self-employment income and some employee income, the elasticity is 0.121.

six regimes in Table 1 provide a coherent explanation for why responses are persistently small for employees but sometimes sizable for the self-employed. Across regimes, the estimated ETI for employees remains close to zero because their taxable earnings near the top kink are primarily shaped by third-party reporting, withholding, and wage-setting institutions that limit the ability to adjust to a marginal tax incentive. This interpretation aligns with our main empirical finding that employee responses generally stay below 0.03 despite large changes in statutory rates and thresholds over time.

By contrast, the self-employed repeatedly face a broader choice set that includes timing, deductions, and, especially, the composition of income between labor and capital. Reforms that alter which components enter the top-bracket base mechanically create or remove high-return adjustment margins, thereby generating the much larger elasticities of 0.05 to 0.45 that we estimate for this group.

The regimes in Table 1 differ most consequentially in whether the top bracket is defined over broad taxable income (early regimes) versus a personal income plus selected capital income concept with explicit capital-income thresholds. The 1987 and 1994 reforms introduced and then lowered the thresholds for capital income to enter the base relevant to the top bracket. The differential treatment of positive versus negative capital income during 1994 to 1998 particularly incentivized debt-financed investments among higher earners, a strategy primarily available to the self-employed rather than employees (le Maire and Schjerning, 2013). During this period, elasticities for the self-employed peaked at 0.45.

When this differential treatment disappeared in the 1999 reform, we observe a corresponding sharp decline in estimated elasticities for the self-employed to approximately 0.10, confirming that much of the behavioral response during the mid-1990s represented income shifting rather than real economic adjustments. Our analysis by level of capital income provides exact quantitative support for this mechanism: taxpayers with the most positive capital income exhibited elasticities from 0.08 to 0.10 before the 1999 reform, but only 0.02 to 0.04 afterward. Similarly, taxpayers with the most negative capital income showed elasticities as high as 0.04 during 1994 to 1998, but these fell to near zero after 1999.

The 2010 reform, which removed the middle bracket and lowered the overall marginal tax rate, further reduced both complexity and the marginal payoff to precise income positioning at the top kink. We therefore interpret the post-2010 period not as a decline in taxpayers' underlying preferences for avoidance, but as a policy environment in which the remaining feasible margins generate limited bunching as a marginal response to income taxation.

B. Demographic Heterogeneity

The demographic heterogeneity we document, with women exhibiting higher elasticities than men, married individuals showing lower elasticities than unmarried, and college-educated employees demonstrating lower elasticities than those with only a high school education, remains remarkably consistent across all six tax regimes. Because these demographic gradients persist regardless of the prevailing tax base or marginal rate, they likely reflect deep-rooted differences in labor market attachment, intra-household optimization, and occupational sorting rather than responses to specific tax rules. For instance, the greater responsiveness among women and unmarried individuals is consistent with standard models of secondary earners and single-household budget constraints, in which the relative value of non-market time and the lack of intra-household income insurance make labor supply (or evasion margins) more sensitive to net-of-tax rates (see, e.g., Blundell and MaCurdy, 1999; Meghir and Phillips, 2011).

C. Policy Implications

Our findings have immediate implications for tax policy design. When the tax system treats different income sources differently at the margin, particularly distinguishing between labor income and various forms of capital income, taxpayers with control over income composition will exploit these differences. This generates large measured elasticities that reflect shifting rather than real behavioral change.

However, the consistently small elasticities we estimate for standard employees across all six regimes indicate that, for the vast majority of the population, progressive rate adjustments generate minimal distortion to labor supply decisions at the top tax threshold. For advanced economies with high enforcement capacity, this pattern suggests that high top marginal tax rates can coexist with relatively small local efficiency costs, provided the tax base is kept broad, third-party reporting is strict, and the scope for preferential reclassification of income is tightly limited.

V. Conclusion

We investigate how behavioral responses to income taxation have evolved in Denmark over more than four decades. By leveraging administrative microdata from 1980 to 2022 and a consistent bunching design around the top-bracket kink, we move beyond single-reform evaluations to document how estimated elasticities vary systematically over time, across taxpayer types, and by income composition.

Three main conclusions emerge. First, the elasticity of taxable income for standard employees is consistently near zero. Across all six regimes, employee ETIs rarely exceed 0.03, even in periods with large changes in statutory rates. This stability proves that, in a setting with extensive third-party reporting and rigid wage-setting institutions, local responses at the top kink are tightly constrained. The much larger elasticities we estimate for the self-employed (ranging from 0.05 to 0.45) reflect their access to a richer set of adjustment margins, particularly those involving the timing and composition of income between labor and capital. These responses are highly sensitive to the contemporaneous tax base and fall sharply when reforms narrow profitable shifting opportunities. The evolution of aggregate ETIs over time is driven more by compositional change and institutional design than by shifts in underlying preferences: as the share of pure wage earners has risen and the tax base has broadened, the scope for large aggregate responses in taxable income has mechanically diminished.

Second, we use the behavior of job changers to identify the mechanism underlying employees' lack of responsiveness. If temporary adjustment frictions were the primary barrier, individuals switching firms during the tax year, who face virtually no costs to re-optimize, ought to exhibit substantial bunching at the top marginal tax threshold. By contrast, we show that these transitioning workers remain unresponsive to marginal tax rates. Because their elasticity remains effectively zero, we can decisively reject friction-based explanations; rather, it is the institutional rigidity of third-party reporting and standardized wage agreements that binds employee behavior.

Third, our analysis addresses the broader micro-macro debate regarding the ETI. Bunching-based evidence at the top kink captures fine-tuned, short-run intensive-margin adjustments and thus naturally yields lower estimates than IV strategies that allow for extensive-margin changes, career dynamics, and intertemporal substitution. The Danish experience indicates that both perspectives are informative but answer fundamentally different questions. IV estimates are best interpreted as bounding the global, long-run impact of major reforms in environments with rich avoidance margins, whereas bunching-based estimates accurately capture the local efficiency cost of higher-rate taxes in systems where reporting constraints are binding.

Because bunching designs are inherently local, future work should integrate them with complementary, broader designs that separately identify real extensive-margin responses from shifting across income components. Doing so will further clarify how much of the observed aggregate ETI reflects genuine labor-supply behavior, and how much is an artifact of the institutional opportunity set created by the tax code.

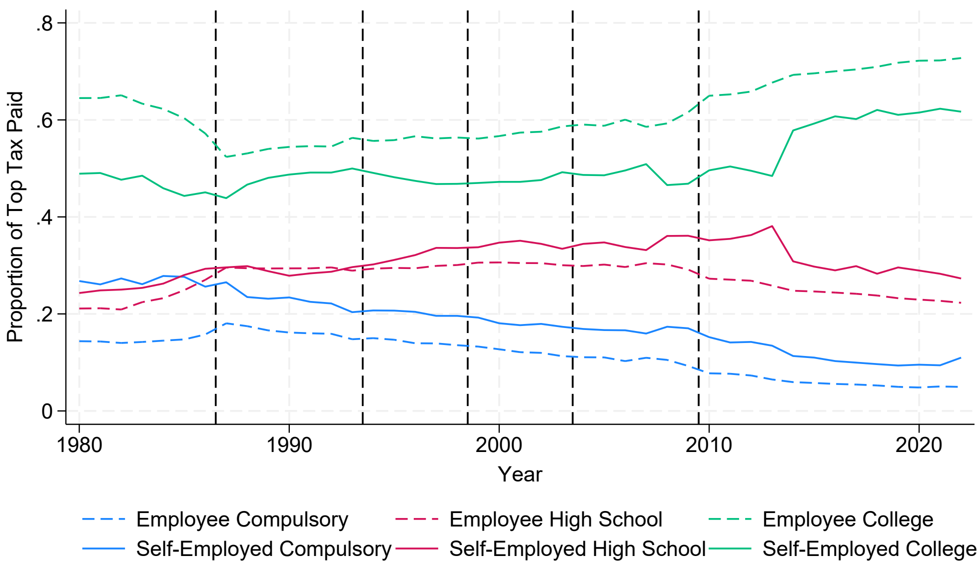

Figure 1. : Top Tax Paid by Education and Employment Status

Note: For each year and employment status cell, we split the pool of top income tax paid by schooling. Dashed (solid) lines indicate the population of exclusively employees (exclusively self-employed). Blue lines indicate compulsory schooling income proportions; red lines indicate high school, and green lines indicate college graduates. The vertical dashed lines delineate the six tax regimes.

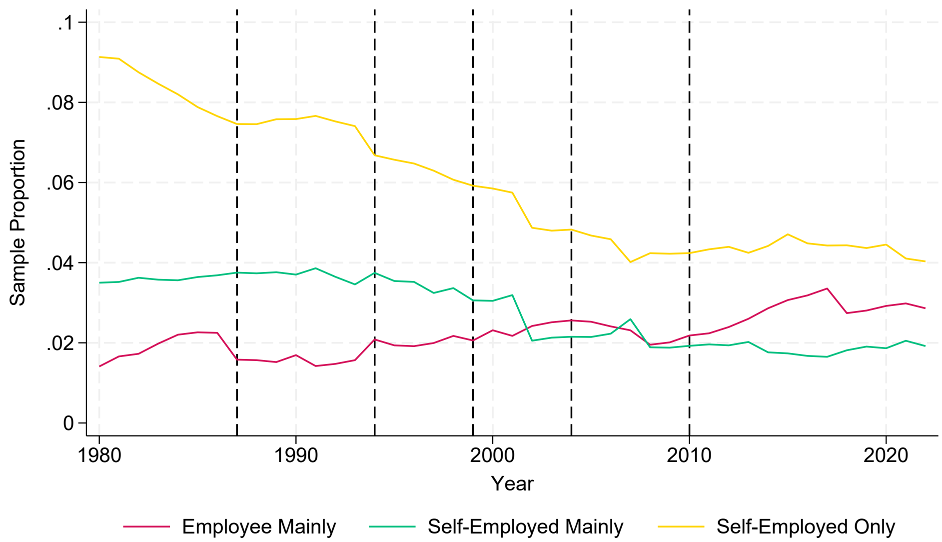

Figure 2. : Employment Status over Time

Note: The figure presents the variations over time of the proportions of the employment status, mainly employed, mainly self-employed, and self-employed only, which describe the sources of taxable income. The proportion of employed-only cases is not shown, as it would dominate the figure. The vertical dashed lines delineate the six tax regimes.

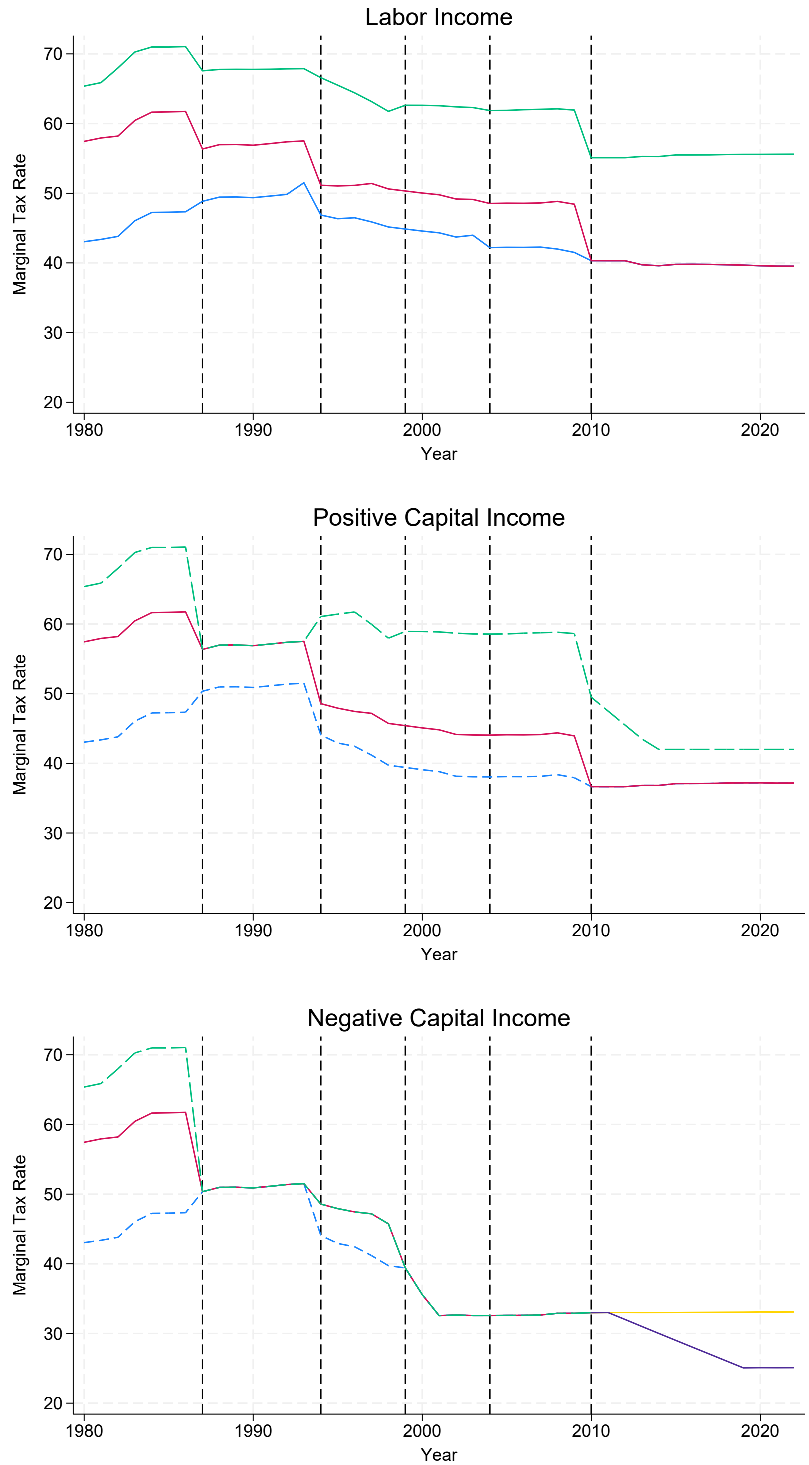

Figure 3. : Income Tax Marginal Tax Rates

Note: The figure presents the marginal tax rates for different income concepts over time (from top to bottom: Labour income, positive capital income, negative capital income). Each line represents the marginal tax rate for a different tax bracket; the more income, the higher the marginal tax rate. The vertical dashed lines indicate when the main reforms of the tax system have taken place. The middle tax bracket disappears in 2010.

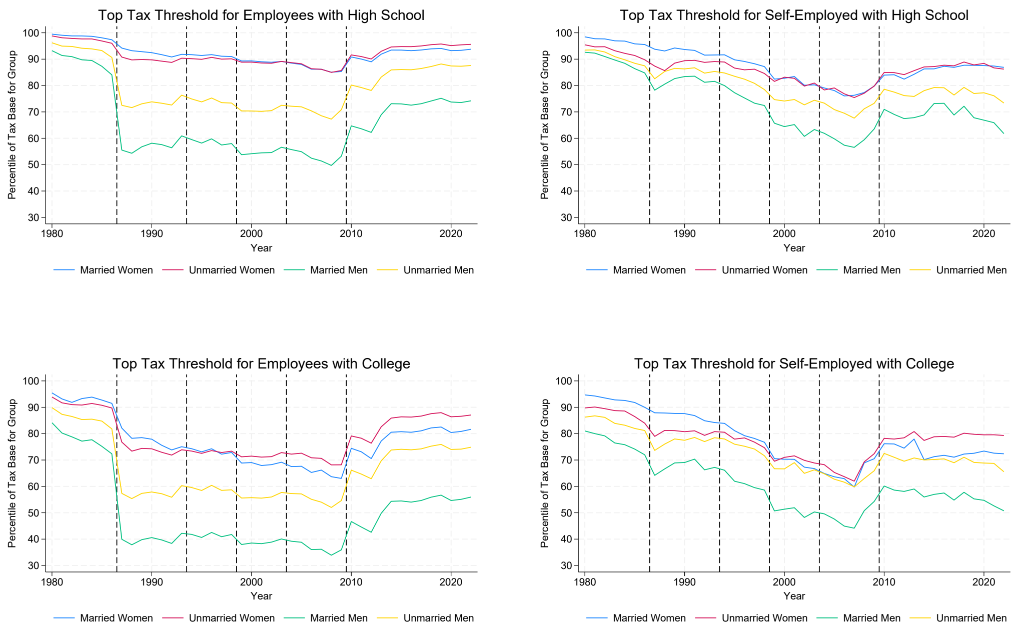

Figure 4. : Evolution of the Top Tax Threshold

Note: Location of the top tax threshold within the distribution of top tax base income for different subsamples. The upper panes are for those with a high school diploma; the bottom panes are for those with a college degree. The left panes are for employees; the right panes are for the self-employed. The solid coloured lines represent percentiles for different sex and marital status groups. The vertical dashed lines delineate the six tax regimes.

Figure 5. : Demographics by Tax Regime

Note: The figure presents the proportion of three groups that are married (upper left pane), male (upper right pane) or college graduates (lower left pane). The three groups are (1) the full *sample*, i.e., everyone aged 25-55 with a high school or college degree in the years in question; (2) individuals *used* in estimation because they are within 50,000 DKK of the top tax threshold; (3) individuals *near* the top tax threshold, i.e., withing 7,000 DKK.

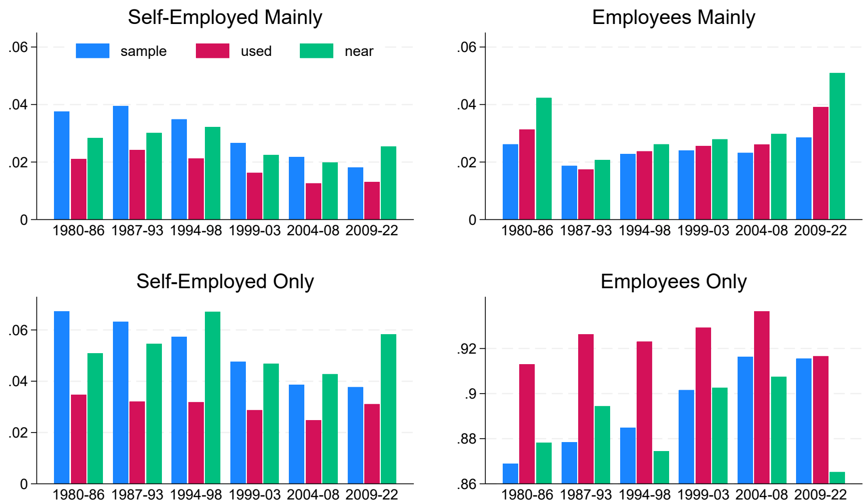

Figure 6. : Employment Status by Tax Regime

Note: The figure presents the proportion of three groups defined in Figure 6 by employment status according to amount of income as an employee and from self-employment. Note the distinct vertical scale for the pane dedicates to 'Employees Only'.

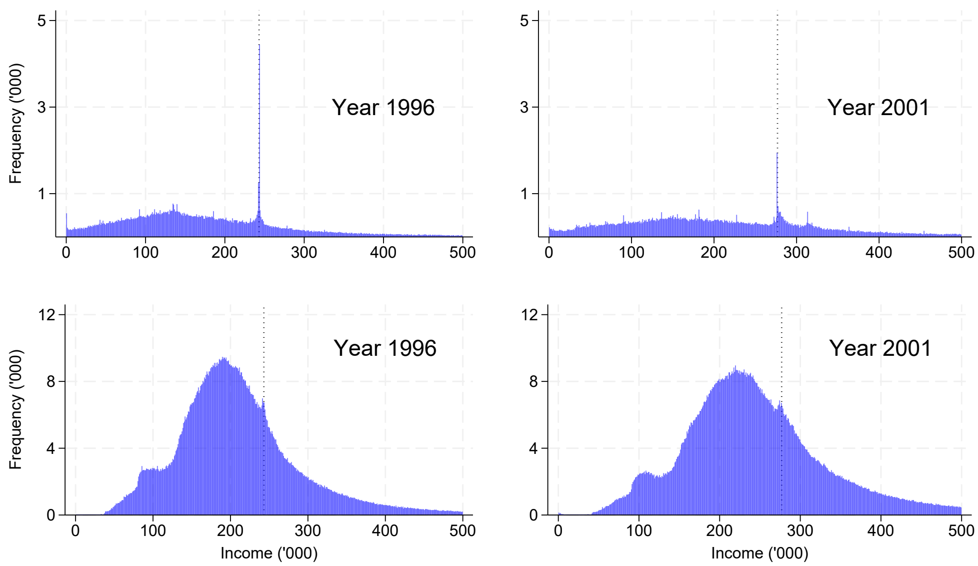

Figure 7. : Top Tax Base Income for the Self-Employed and Employees

Note: Histograms with 1000 DKK bins for a central year in two selected consecutive tax regimes. The upper (lower) panes are for individuals whose main source of income is self-employment (as an employee). The vertical dotted line indicates the location of the top tax threshold. The sample includes individuals with a high school diploma or a college degree. Figure B2 (B1) presents histograms for all six tax regimes for the self-employed (employees).

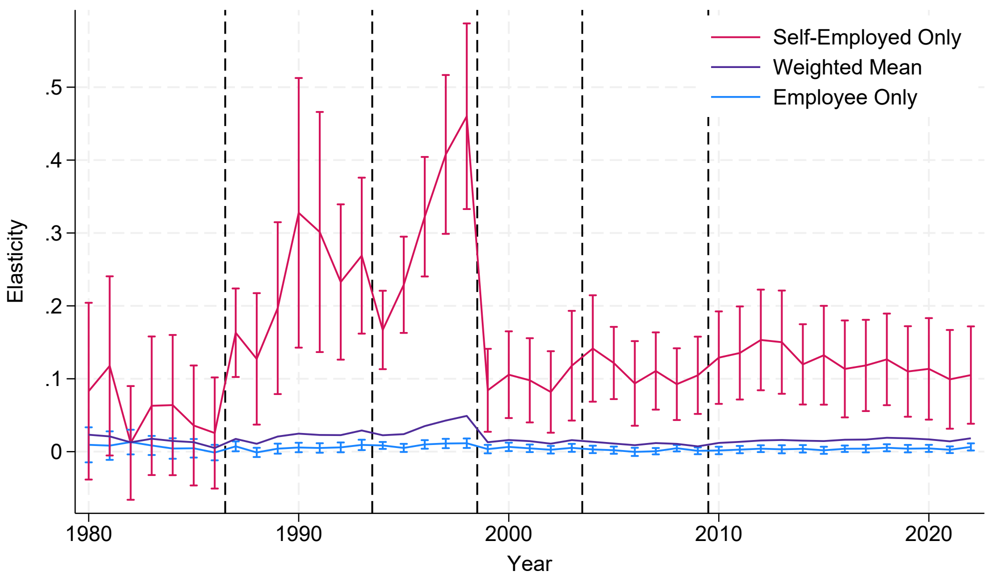

Figure 8. : ETI by Employment Status over Time

Note: ETI predictions from estimates presented in Table 2. Means and 95% confidence intervals by employment status and year. The weighted mean of predictions across employment status uses the sums of top taxes paid as weights. The vertical dashed lines separate different tax regimes.

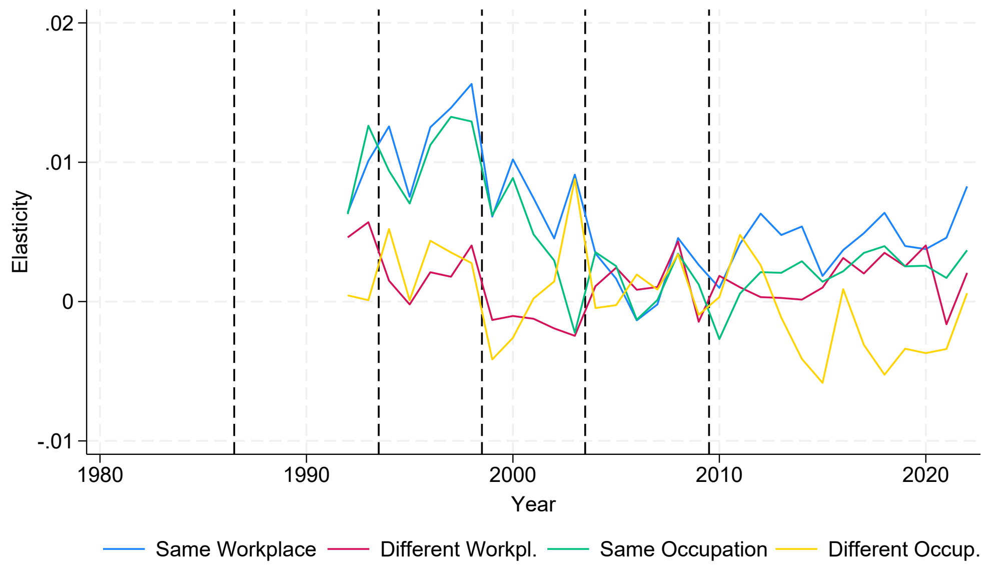

Figure 9. : ETI by Workplace and Occupation Change

Note: The figure presents predicted average ETI from the regressions presented in Table B.2 for each sub-sample of transitions (same workplace, different workplace, same occupation and different occupation).The vertical dashed lines indicate when the main reforms of the tax system have taken place.

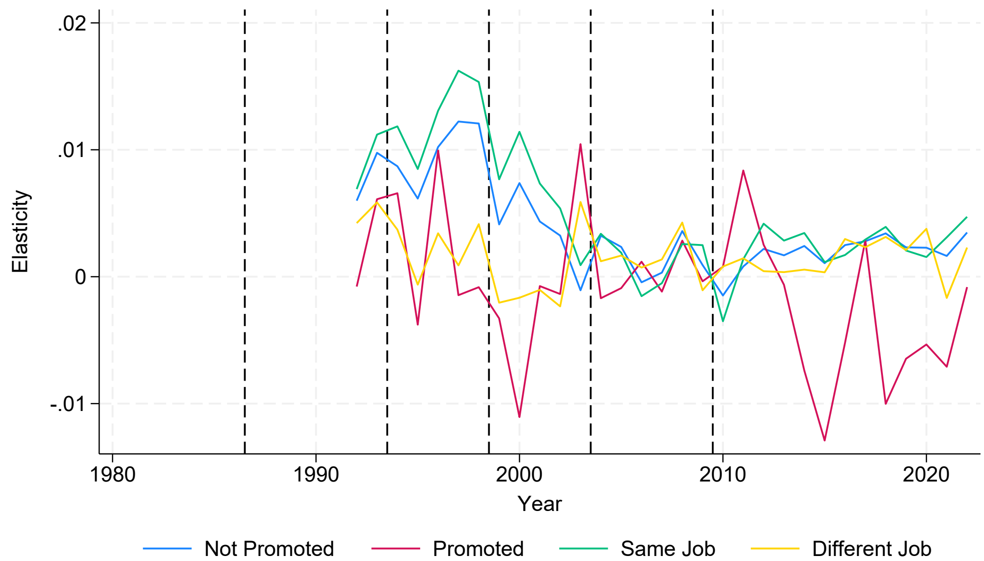

Figure 10. : ETI by Promotion and Job Change

Note: The figure presents predicted average ETI from the regressions presented in Table B.3 for each sub-sample of transitions (not promoted, promoted, same job and different jobs).The vertical dashed lines indicate when the main reforms of the tax system have taken place.

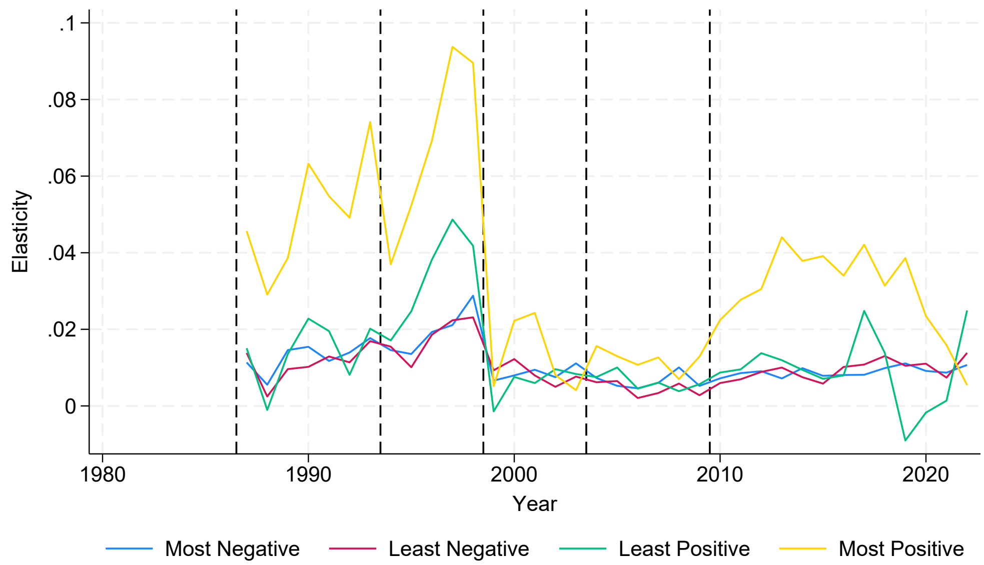

Figure 11. : Mean ETI by Capital Income

Note: Predicted mean ETI over time from the regressions presented in Table B.4 based on samples with varying restrictions on income from capital. Among those with negative capital income, the sample is split at the median (of negative capital income). Those with positive capital income are split in a similar fashion. The vertical dashed lines indicate tax reforms.

Table 1—: Tax Regimes: Bases and Rates over Time

Year	Element	Local	Bottom	Middle	Top	Ceiling
1980	Base	TI	TI	TI	TI	TI
	Rate	24.4	14.4	14.4	10.8	66.67
1987	Base	TI	TI	TI+ [CI $>$ thresh2]	TI+[CI>thresh]	PI/TI/CI
	Rate	28.2	22	6	12	68
1994	Base	TI	TI	PI+CI	PI+[CI>thresh]	PI/TI/CI
	Rate	29.5	14.5	4.5 — 5 (6)	12.5	65
1999	Base	TI	PI+CI-D	PI+[CI>0]	PI+[CI>0]	PI/TI/CI
	Rate	31.9	7.5	6	15	59
2004	Base	TI	PI+[CI>0]-D	PI+[CI>0]	PI+[CI>0]	PI/TI/CI
	Rate	32.6	5.48	6	15	59
2010	Base	TI	PI+[CI>0]-D	-	PI+[CI>thresh]	PI/TI/CI
	Rate	24.9	3.67	-	15	51.5

Notes: Elements of the tax base are labor income (LI), personal income (PI), capital income (CI), and deductions (D). Taxable income (TI) was defined as PI+CI+SI-D 1980-1986 and PI+CI-D from 1987. Rates are in percentages. The threshold for the top tax bracket for capital income was 60,000 DKK in 1987, 20,000 DKK in 1994, and 40,000 DKK in 2010. Local taxation includes municipal and county taxes. Church tax is payable only by members of the church, with rates that vary by year and municipality, averaging one percent.

Table 2—: Explaining ETI Estimates by Employment Status

	Employee		**Self-Employed**	
	Only	Mainly	Mainly	Only
College	-0.00247***	-0.00223**	0.00603***	0.00831***
	(0.000266)	(0.000802)	(0.00119)	(0.00124)
Male	-0.00391***	-0.0103***	-0.0270***	-0.0528***
	(0.000230)	(0.00116)	(0.00340)	(0.00384)
Married	-0.000502*	-0.00693***	-0.00765***	-0.00689***
	(0.000233)	(0.00117)	(0.00172)	(0.00208)
Range $\leq$ 40KDKK.	0.0141***	0.0375***	0.0593***	0.0793***
	(0.000507)	(0.00155)	(0.00225)	(0.00278)
Range $\leq$ 50KDKK.	0.0232***	0.0615***	0.104***	0.143***
	(0.000730)	(0.00207)	(0.00280)	(0.00377)
Proximity $\leq$ 7KDKK.	-0.0199***	-0.0531***	-0.0652***	-0.0715***
	(0.000725)	(0.00180)	(0.00249)	(0.00268)
Proximity $\leq$ 10KDKK.	-0.0509***	-0.134***	-0.182***	-0.189***
	(0.00168)	(0.00362)	(0.00420)	(0.00445)
R$\leq$ 40KDKK, P$\leq$ 7KDKK.	0.00502***	0.0117***	0.0143***	0.0155***
	(0.000493)	(0.00185)	(0.00306)	(0.00332)
R$\leq$ 40KDKK, P$\leq$ 10KDKK.	0.0124***	0.0271***	0.0360***	0.0347***
	(0.000771)	(0.00263)	(0.00402)	(0.00408)
R$\leq$ 50KDKK, P$\leq$ 7KDKK.	0.00826***	0.0203***	0.0265***	0.0288***
	(0.000510)	(0.00178)	(0.00297)	(0.00332)
R$\leq$ 50KDKK, P$\leq$ 10KDKK.	0.0210***	0.0497***	0.0718***	0.0738***
	(0.000871)	(0.00256)	(0.00385)	(0.00409)
$1/\sqrt{\text{Obs. in Range}}$	-0.148	-0.616***	-1.323***	-1.949***
	(0.105)	(0.0973)	(0.115)	(0.158)
Proportion near kink	0.313***	0.791***	1.109***	1.289***
	(0.00983)	(0.0195)	(0.0210)	(0.0252)
No. ETI Estimates	3,096	3,096	3,096	3,096
Obs. Proximity $\leq$ 7KDKK.	2,389,743	85,653	71,713	145,351
Obs. Range $\leq$ 50KDKK.	16,169,198	466,138	321,531	535,595
Obs. $\forall$ Income	47,251,355	1,299,711	1,448,316	2,588,891
R^2	0.456	0.567	0.767	0.849
F	46.36	72.37	182.1	310.8

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Coefficients from four separate OLS regressions explaining ETI estimates with characteristics of the sample behind the estimates and the parameters of the bunching estimator. Reference categories are high school educated, unmarried, and female. Range denotes the amount on either side of the tax threshold used to define the sample for which ETI is estimated, with a reference range of 30KDKK. Proximity refers to the amount on either side of the threshold that defines the sample excluded from the bunching polynomial estimation, with a reference proximity of 5KDKK. The proportion near the kink is the ratio of the number of observations in proximity divided by the number in range (both excluding observations within 1KDKK. of the kink). Coefficients for year dummies are not shown. The inverse of the estimated variance from the bunching estimation step is used to weight each ETI estimate. Standard errors are shown in parentheses.

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Appendix A. Taxation, firm-worker matching, and the identification of the ETI

We develop a simple theoretical framework to isolate the conditions under which observed earnings responses to taxation reflect only worker behaviour, rather than firm responses. A key concern is that firms may themselves react to changes in the tax system, not only by altering wages directly, but also by adjusting who they hire. Specifically, firms may screen workers more carefully on observable characteristics in order to control the marginal productivity of their workforce. If this occurs, a tax reform would change the composition of worker-firm matches, and the observed earnings response would conflate this compositional shift with the true behavioral elasticity.

To fix ideas, consider a worker with characteristics $\mathbf{c} \equiv (\eta, \boldsymbol{x})$, where $\boldsymbol{x}$ are observable (such as demographics and education) and η is unobserved (such as the disutility of effort). Given and tax system T and a wage w, this worker supplies effort to generate earnings $e^*(\mathbf{c}, w, T)$. On the firm side, a worker with characteristics $\mathbf{c}$ earning e generates productivity value $\pi(e, \mathbf{c}, \psi)$, where $\psi \in [\underline{\psi}, \bar{\psi}]$ captures unobserved firm-side factors. Maintaining a job carries a fixed cost κ per unit of labor. Crucially, we assume that the tax system affects productivity only insofar as it affects earnings and we rule out direct fiscal effects on firm organisation.

We assume furthermore that workers with characteristics $\mathbf{c}$ match to firms with productivity characteristics ψ according to some general random matching process which can be summarised by the function $\mathrm{M}(\psi, \mathbf{c}, T)$. $\mathrm{M}(\psi, \mathbf{c}, T)$ describes the conditional distribution in the labor market of matches involving firms of type ψ to workers of type $\mathbf{c}$ when the tax system is T.

We state the (general) equations which determine earnings and the equilibrium on the labor market for a worker with characteristics $\mathbf{c}$ when the wage is w and the tax system in T. The model we described at the start of section II can be summarised as:

$$e^* \equiv e^*(\mathbf{c}, w, T). \tag{A.1}$$

The taxation of earnings affects the behaviour of workers and possibly the matching between workers and firms, so that the wage that is paid to workers with characteristics $\mathbf{c}$ matched to firms with characteristics ψ depends on the tax system, $T(e, \boldsymbol{x})$. We assume that jobs offered to workers with characteristics $\mathbf{c}$ in the presence of a tax $T(e, \boldsymbol{x})$, yield zero expected profits at the margin, so that the wage $w^*(\mathbf{c}, T)$ is defined by:

$$\mathop{\mathbb{E}}_{\mathbf{c},\mathrm{M}(\Psi,\mathbf{c},T)} \Big[\pi\big(e^*(\mathbf{c}, w^*(\mathbf{c}, T), T), \mathbf{c}, \Psi\big) - \kappa - w^*(\mathbf{c}, T)\Big] = 0. \tag{A.2}$$

The symbol $\mathbb{E}_{\mathbf{c},\mathrm{M}(\Psi,\mathbf{c},T)}$ indicates that the firm productivity Ψ is the random variable over which the expectation is taken given the characteristics $\mathbf{c}$ of the worker and the tax system $T(e, \boldsymbol{x})$. We can rewrite this last expression as a condition that determines implicitly the wage of a worker with characteristics $\mathbf{c}$ facing the tax system $T(e, \boldsymbol{x})$:

$$\text{(A.3)} \qquad w^*(\mathbf{c}, T) = \underset{\mathbf{c}, \mathrm{M}(\Psi, \mathbf{c}, T)}{\mathbb{E}} \Big[\pi\big(e^*(\mathbf{c}, w^*(\mathbf{c}, T), T), \mathbf{c}, \Psi\big)\Big] - \kappa + \xi_{\mathbf{c}},$$

where $\xi_{\mathbf{c}}$ describes the randomness in the wage given $\mathbf{c}$, the observed characteristics of the worker and given the matching between workers and firms. $\xi_{\mathbf{c}}$ reflects for example idiosyncratic bargaining outcomes or match-specific wage premia [22]. Equation (A.1) implies that the elasticity of earnings to a marginal increase in the net-of-tax rate at the margin can be expressed as:

$$\text{(A.4)} \qquad \frac{\mathrm{d} \log e^*}{\mathrm{d} \log \tau^c} = \frac{\partial \log e^*}{\partial \log \tau^c}\bigg|_{w^*} + \frac{\partial \log e^*}{\partial \log w}\bigg|_{T} \frac{\mathrm{d} \log w^*(\mathbf{c}, T)}{\mathrm{d} \log \tau^c},$$

that is, in general the earnings response to an increase to the marginal net-of-tax rate involves two terms: first a behavioural "direct tax response", and second a "wage-mediated response". We use equation (A.3) to describe the response of individual optimal earnings to an increase to the marginal net-of- tax, τ^c. We first discuss the effect of a marginal increase in the net-of-tax rate on the matching process ignoring the potential response of the productivity to the marginal net-of-tax rate. In that case, the expectation expression:

$$\underset{\mathbf{c}, \mathrm{M}(\Psi, \mathbf{c}, T)}{\mathbb{E}} \Big[g(\mathbf{c}, \Psi)\Big],$$

for some differentiable function $g(\mathbf{c}, \Psi)$ can be written as:

$$\text{(A.5)} \qquad \underset{\mathbf{c}, \mathrm{M}(\Psi, \mathbf{c}, T)}{\mathbb{E}} \Big[g(\mathbf{c}, \Psi)\Big] = \int_{\underline{\psi}}^{\bar{\psi}} g(\mathbf{c}, \psi) m(\psi, \mathbf{c}, T) \mathrm{d}\psi,$$

where $\underline{\psi}$ and $\bar{\psi}$ are constant, and $m(\mathbf{c}, \psi, T)$ is the density of the probability distribution function $\mathrm{M}(\mathbf{c}, \Psi, T)$. Hence we can describe the effect of a marginal

[22] The assumption that $\xi_{\mathbf{c}}$ is independent of the tax system is a simplification. We could imagine that its distribution depends on the tax system T as well.

increase in the net-of-tax rate on the matching as modifying the expectation as:

$$
\begin{aligned}
\frac{\mathrm{d}\,\mathbb{E}_{\mathbf{c},\mathrm{M}(\Psi,\mathbf{c},T)}\left[g(\mathbf{c},\Psi)\right]}{\mathrm{d}\log\tau^c} &= \int_{\underline{\psi}}^{\bar{\psi}} g(\mathbf{c},\psi)\frac{\mathrm{d}m(\psi,\mathbf{c},T)}{\mathrm{d}\log\tau^c}\mathrm{d}\psi \\
&= \int_{\underline{\psi}}^{\bar{\psi}} g(\mathbf{c},\psi)\frac{\mathrm{d}\log m(\mathbf{c},\psi,T)}{\mathrm{d}\log\tau^c}m(\psi,\mathbf{c},T)\mathrm{d}\psi \\
&= \mathop{\mathbb{E}}_{\mathbf{c},\mathrm{M}(\Psi,\mathbf{c},T)}\left[g(\mathbf{c},\Psi)\frac{\mathrm{d}\log m(\Psi,\mathbf{c},T)}{\mathrm{d}\log\tau^c}\right],
\end{aligned} \tag{A.6}
$$

where we rewrite the derivative in log form to isolate the proportional change in the density of the matching distribution, $m(\psi,\mathbf{c},T)$.

To complete the calculation, we differentiate the wage equation A.3 with respect to $\log\tau^c$ and we use both the matching-derivative result given in equation A.6 and the earlier description of the response of optimal earnings to a change to the marginal net-of-tax rate given in equation A.4, to obtain the following three-term expression for the total effect on the wage $w^*(\mathbf{c},T)$ of a marginal increase in the net-of-tax rate:

$$
\begin{aligned}
\frac{\mathrm{d}\log w^*(\mathbf{c},T)}{\mathrm{d}\log\tau^c} = &\mathop{\mathbb{E}}_{\mathbf{c},\mathrm{M}(\Psi,\mathbf{c},T)}\left[\frac{\pi(e^*,\mathbf{c},\Psi)}{w^*(\mathbf{c},T)}\frac{\mathrm{d}\log m(\Psi,\mathbf{c},T)}{\mathrm{d}\log\tau^c}\right]+ \\
&\mathop{\mathbb{E}}_{\mathbf{c},\mathrm{M}(\Psi,\mathbf{c},T)}\left[\frac{\pi(e^*,\mathbf{c},\Psi)}{w^*(\mathbf{c},T)}\frac{\mathrm{d}\log\pi(e^*,\mathbf{c},\Psi)}{\mathrm{d}\log e}\frac{\partial\log e^*}{\partial\log\tau^c}\right]+ \\
&\mathop{\mathbb{E}}_{\mathbf{c},\mathrm{M}(\Psi,\mathbf{c},T)}\left[\frac{\pi(e^*,\mathbf{c},\Psi)}{w^*(\mathbf{c},T)}\frac{\mathrm{d}\log\pi(e^*,\mathbf{c},\Psi)}{\mathrm{d}\log e}\frac{\partial\log e^*}{\partial\log w}\frac{\mathrm{d}\log w^*(\mathbf{c},T)}{\mathrm{d}\log\tau^c}\right],
\end{aligned} \tag{A.7}
$$

where to simplify the expressions we set $\pi(e^*,\mathbf{c},\Psi)\equiv\pi\big(e^*(\mathbf{c},w^*(\mathbf{c},T),T),\mathbf{c},\Psi\big)$. Note that since w^* is determined implicitly by equation A.3, applying the implicit function theorem causes $\frac{\mathrm{d}\log w^*(\mathbf{c},T)}{\mathrm{d}\log\tau^c}$ to appear on both sides of equation A.7.

Equation A.7 determines the total wage response as a function of the structural primitives of the model and isolates three distinct components: the first captures the matching composition effect, the second measures the direct behavioral earnings response which feeds into productivity, and the third is the indirect, wage-mediated, earnings response which feeds into productivity.

First, taxation may shift the composition of firm-worker matches, for instance, if firms respond to higher taxes by screening more carefully on worker characteristics that predict productivity, changing who gets matched with whom. Next, even holding the match distribution fixed, a tax change alters earnings both directly (the pure behavioral ETI response) and indirectly through its effect on the equilibrium wage, with the sensitivity of earnings to the wage governing the strength of this indirect channel. Finally, the extent to which productivity itself responds to earnings, either through efficiency wage mechanisms or on-the-job human capital accumulation, determines how strongly wage-induced changes in earnings feed back into the firm's surplus.

In this context, it is now easy to determine sufficient conditions so that the total observed elasticity of earnings with respect to the marginal tax rate collapses to the pure behavioral response $\frac{\partial \log e^*}{\partial \log \tau^c}\Big|_{w^*}$ which is the quantity that the ETI estimation aims to recover. Specifically, we require that the elasticity of the wage relative to the net of tax rate is zero for any of the worker's characteristics $\mathbf{c}$, that is $\frac{\mathrm{d} \log w^*(\mathbf{c},T)}{\mathrm{d} \log \tau^c} = 0,$ for all $\mathbf{c}$. This is guaranteed if the following two conditions hold simultaneously: *i*) the tax system has no effect on the matching between firms and workers:

$$\frac{\mathrm{d} \log m(\mathbf{c}, \psi, T)}{\mathrm{d} \log \tau^c} = 0,$$

and, if *ii*) productivity does not respond to optimal earnings

$$\frac{\mathrm{d} \log \pi(e^*, \mathbf{c}, \psi)}{\mathrm{d} \log e} = 0,$$

for all values of ψ in $[\underline{\psi}, \bar{\psi}]$ given $\mathbf{c}$.

Appendix B. Additional Figures and Tables

B1. Histogram, Employees Only

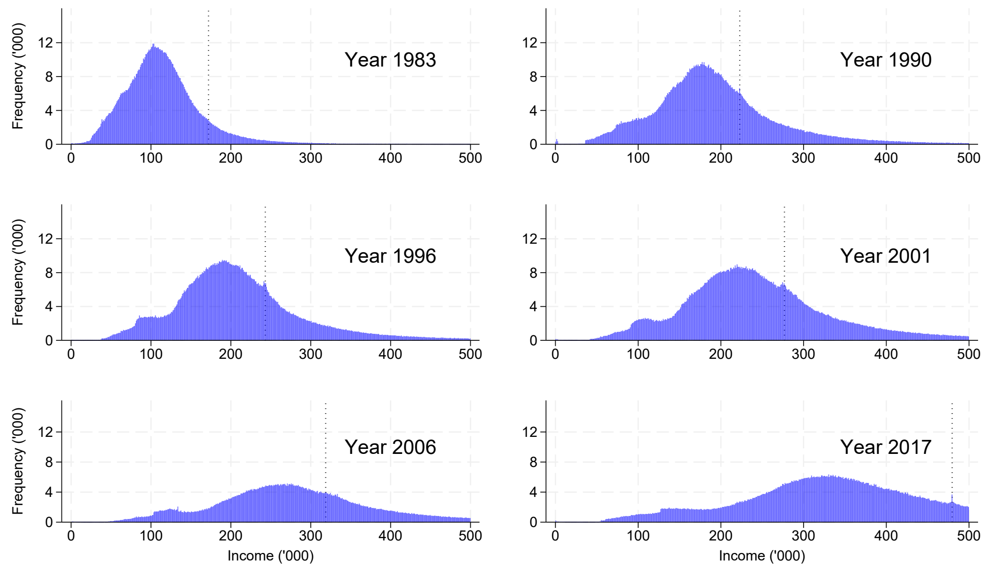

Figure B1. : Top Tax Base Income for Employees

Note: Histograms with 1000 DKK bins for a central year in each tax regime. The vertical dotted line indicates the location of the top tax threshold. The sample includes individuals with a high school diploma or a college degree, with the main source of income as an employee. Figure B2 presents corresponding histograms for the self-employed.

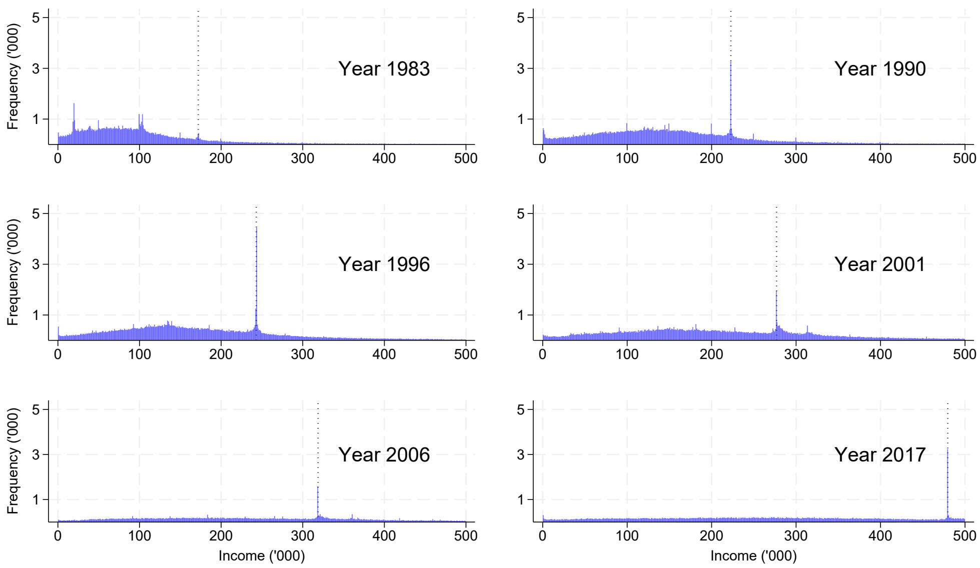

Figure B2. : Top Tax Base Income for the Self-Employed

Note: Histograms with 1000 DKK bins for a central year in each tax regime. The vertical dotted line indicates the location of the top tax threshold. The sample includes those with a high school diploma or a college degree, with the main source of income from self-employment. Appendix Figure B1 presents corresponding histograms for employees.

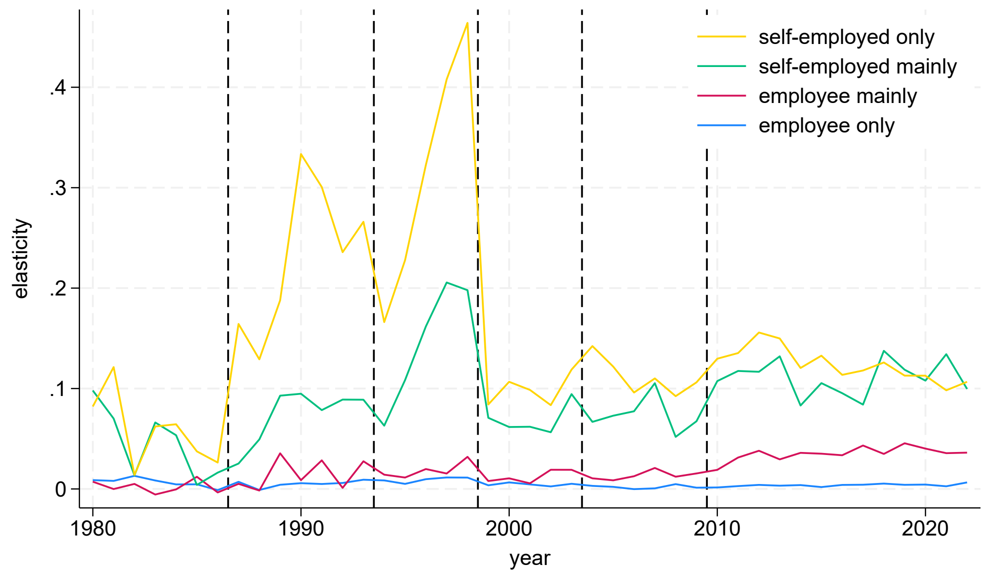

Figure B3. : ETI by Employment Status over Time

Note: ETI predictions from estimates presented in Table 2. Means by employment status and year. The vertical dashed lines separate different tax regimes.

B2. Additional Tables

Table B.1—: Descriptive Statistics

	Total	**Used**	**Near**
Employees only	0.899	0.924	0.888
Employees mainly	0.025	0.027	0.032
Self-employed mainly	0.028	0.018	0.027
Self-employed only	0.049	0.031	0.054
Married	0.588	0.602	0.621
Male	0.527	0.604	0.636
College	0.506	0.557	0.589
Observations	52,588,273	17,492,462	2,692,460

Note: The table presents proportions of observations in the categories defined by the row headers among samples defined by the column headers. Total indicates all observations in the age range 25-55 during 1980-2022 with high school or college; used indicates observations within 50,000 DKK of the top tax threshold; near indicates observations within 7,000 DKK.

Table B.2—: Explaining ETI by Workplace and Occupation Change

	Workplace		**Occupation**	
	Same	Different	Same	Different
College	-0.00535***	-0.000493	-0.00344***	-0.00104**
	(0.000361)	(0.000323)	(0.000338)	(0.000356)
Male	-0.00592***	-0.00177***	-0.00424***	-0.00297***
	(0.000289)	(0.000269)	(0.000247)	(0.000287)
Married	-0.00245***	-0.000397	-0.00116***	-0.00117***
	(0.000325)	(0.000241)	(0.000264)	(0.000287)
Range $\leq$ 40KDKK.	0.0195***	0.0148***	0.0174***	0.0181***
	(0.000572)	(0.000940)	(0.000580)	(0.000815)
Range $\leq$ 50KDKK.	0.0320***	0.0238***	0.0284***	0.0294***
	(0.000791)	(0.00144)	(0.000829)	(0.00119)
Proximity $\leq$ 7KDKK.	-0.0286***	-0.0208***	-0.0252***	-0.0274***
	(0.000805)	(0.00137)	(0.000830)	(0.00116)
Proximity $\leq$ 10KDKK.	-0.0728***	-0.0540***	-0.0645***	-0.0712***
	(0.00180)	(0.00330)	(0.00191)	(0.00271)
R$\leq$ 40KDKK, P$\leq$ 7KDKK.	0.00709***	0.00533***	0.00639***	0.00680***
	(0.000640)	(0.000652)	(0.000585)	(0.000760)
R$\leq$ 40KDKK, P$\leq$ 10KDKK.	0.0177***	0.0134***	0.0158***	0.0173***
	(0.000966)	(0.00114)	(0.000906)	(0.00120)
R$\leq$ 50KDKK, P$\leq$ 7KDKK.	0.0116***	0.00849***	0.0103***	0.0109***
	(0.000644)	(0.000747)	(0.000600)	(0.000791)
R$\leq$ 50KDKK, P$\leq$ 10KDKK.	0.0295***	0.0220***	0.0262***	0.0287***
	(0.00103)	(0.00148)	(0.00101)	(0.00138)
$1/\sqrt{N}$	-0.829***	0.0882	-0.434***	-0.211***
	(0.105)	(0.0761)	(0.0969)	(0.0485)
Prop. obs.	0.445***	0.321***	0.392***	0.415***
near kink	(0.0103)	(0.0200)	(0.0111)	(0.0160)
Estimates	2,232	2,232	2,232	2,232
Obs. Proximity $\leq$ 7KDKK.	1,103,063	612,589	1,281,925	338,965
Obs. Range $\leq$ 50KDKK.	6,975,908	4,097,928	8,266,556	2,217,544
Observations total	20,000,795	14,163,593	24,906,196	6,839,783
R^2	0.619	0.257	0.568	0.447
F	82.55	17.60	66.97	41.12

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Weighted Least Squares regressions explaining estimates of ETI split by workplace and occupation mobility for years 1992-2022. To estimate ETI in year t for workplace transitions (columns 1-2), we count the number of unique workplace identifiers at census points in week 49 of year t and year (t-1). Individuals with the same workplace have only one workplace; individuals with a different workplace have more. To estimate ETI using occupation transitions (columns 3-4), we count the number of unique occupation codes for each individual at the census points. Other details of the estimations are described in the note to Table 2.

Table B.3—: Explaining ETI Estimates by Job Changes

	Promotion		**Job Change**	
	No	Yes	No	Yes
College	-0.00291***	-0.00192***	-0.00513***	-0.000845**
	(0.000325)	(0.000453)	(0.000393)	(0.000300)
Male	-0.00397***	-0.00306***	-0.00579***	-0.00214***
	(0.000235)	(0.000376)	(0.000297)	(0.000238)
Married	-0.000860***	-0.00247***	-0.00205***	-0.000652**
	(0.000248)	(0.000395)	(0.000324)	(0.000229)
Range $\leq$ 40KDKK.	0.0170***	0.0196***	0.0190***	0.0160***
	(0.000566)	(0.000927)	(0.000594)	(0.000773)
Range $\leq$ 50KDKK.	0.0277***	0.0323***	0.0310***	0.0258***
	(0.000818)	(0.00128)	(0.000820)	(0.00117)
Proximity $\leq$ 7KDKK.	-0.0245***	-0.0306***	-0.0282***	-0.0228***
	(0.000818)	(0.00127)	(0.000837)	(0.00112)
Proximity $\leq$ 10KDKK.	-0.0629***	-0.0798***	-0.0718***	-0.0589***
	(0.00190)	(0.00282)	(0.00186)	(0.00268)
R$\leq$ 40KDKK, P$\leq$ 7KDKK.	0.00611***	0.00754***	0.00695***	0.00595***
	(0.000547)	(0.00104)	(0.000673)	(0.000598)
R$\leq$ 40KDKK, P$\leq$ 10KDKK.	0.0155***	0.0198***	0.0174***	0.0146***
	(0.000855)	(0.00157)	(0.00102)	(0.00100)
R$\leq$ 50KDKK, P$\leq$ 7KDKK.	0.0100***	0.0125***	0.0115***	0.00933***
	(0.000569)	(0.00104)	(0.000676)	(0.000658)
R$\leq$ 50KDKK, P$\leq$ 10KDKK.	0.0255***	0.0330***	0.0293***	0.0239***
	(0.000976)	(0.00166)	(0.00108)	(0.00125)
$1/\sqrt{N}$	-0.334***	-0.364***	-0.668***	0.00639
	(0.0992)	(0.0436)	(0.0958)	(0.0737)
Prop. obs.	0.382***	0.460***	0.437***	0.351***
near kink	(0.0111)	(0.0161)	(0.0106)	(0.0161)
Estimates	2,232	2,232	2,232	2,232
Obs. Proximity $\leq$ 7KDKK.	1,451,538	169,352	958,551	700,402
Obs. Range $\leq$ 50KDKK.	9,388,801	1,095,298	6,089,872	4,643,748
Observations total	28,261,294	3,484,684	17,273,050	15,644,931
R^2	0.558	0.499	0.615	0.345
F	64.16	50.72	81.18	26.82

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Coefficients from four separate OLS regressions explaining ETI estimates with characteristics of the sample behind the estimates and the parameters of the bunching estimator. The columns represent estimates based on samples split by job changes and promotions 1992-2022. For estimating ETI in year t for promotions, we calculate median annual earnings by occupation-year, assign each individual the occupation where they earn the most each year, and define a promotion as an occupation change with more than 10 percent higher median earnings in year t than in year (t-1). To estimate ETI by job change, we count the number of unique occupation codes and unique workplaces for each individual at annual census points in years t and (t-1). Job changers in year t have had more than one occupation or workplace. Other details are the same as noted for Table 2.

Table B.4—: Explaining ETI Estimates by Capital Income

	Negative Capital Income		**Positive Capital Income**	
	Most	Least	Least	Most
College	-0.00316***	-0.00340***	-0.0128***	-0.00720***
	(0.000278)	(0.000341)	(0.000793)	(0.000955)
Male	-0.00187***	-0.00250***	-0.00722***	0.00308*
	(0.000319)	(0.000349)	(0.000757)	(0.00135)
Married	0.000409	0.000268	-0.00437***	-0.00141
	(0.000275)	(0.000375)	(0.000702)	(0.000899)
Range $\leq$ 40KDKK.	0.0172***	0.0181***	0.0279***	0.0369***
	(0.000608)	(0.000610)	(0.00128)	(0.00168)
Range $\leq$ 50KDKK.	0.0281***	0.0299***	0.0469***	0.0618***
	(0.000872)	(0.000861)	(0.00164)	(0.00206)
Proximity $\leq$ 7KDKK.	-0.0238***	-0.0241***	-0.0441***	-0.0514***
	(0.000853)	(0.000844)	(0.00159)	(0.00198)
Proximity $\leq$ 10KDKK.	-0.0610***	-0.0624***	-0.112***	-0.136***
	(0.00196)	(0.00190)	(0.00324)	(0.00364)
R$\leq$ 40KDKK, P$\leq$ 7KDKK.	0.00609***	0.00599***	0.00977***	0.0105***
	(0.000599)	(0.000638)	(0.00167)	(0.00229)
R$\leq$ 40KDKK, P$\leq$ 10KDKK.	0.0149***	0.0151***	0.0239***	0.0292***
	(0.000919)	(0.000967)	(0.00241)	(0.00314)
R$\leq$ 50KDKK, P$\leq$ 7KDKK.	0.00958***	0.00997***	0.0170***	0.0198***
	(0.000611)	(0.000646)	(0.00162)	(0.00221)
R$\leq$ 50KDKK, P$\leq$ 10KDKK.	0.0244***	0.0257***	0.0446***	0.0565***
	(0.00102)	(0.00106)	(0.00238)	(0.00302)
$1/\sqrt{N}$	-0.136	0.0129	-0.680***	-0.644***
	(0.0991)	(0.0874)	(0.0544)	(0.0924)
Prop. obs.	0.372***	0.387***	0.648***	0.793***
near kink	(0.0115)	(0.0111)	(0.0173)	(0.0187)
Estimates	2,592	2,592	2,592	2,592
Obs. Proximity $\leq$ 7KDKK.	1,049,723	960,697	99,060	105,982
Obs. Range $\leq$ 50KDKK.	6,395,953	6,113,350	599,910	551,610
Observations total	18,004,090	18,004,512	1,651,356	1,651,784
R^2	0.580	0.602	0.568	0.765
F	73.21	80.21	69.54	172.6

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Coefficients from four separate OLS regressions explaining ETI estimates with characteristics of the sample behind the estimates and the parameters of the bunching estimator. The columns represent estimates based on samples with varying restrictions on income from capital. Among those with negative capital income, the sample is split at the median (of negative capital income). Those with positive capital income are split in a similar fashion. Other details are the same as noted for Table 2.

Appendix C. Polynomial vs. Maximum Likelihood comparison

The estimator based on the Chetty et al. (2011) method generates an elasticity for any income distribution around the kink, even for those where the bunching is not apparent. The Maximum Likelihood approach proposed by Aronsson, Jenderny and Lanot (2024) relies on the bunching to be large enough to ensure the identification of both the ETI and of the variance which characterizes the optimization friction. In the absence of clear evidence of bunching at the high tax threshold, neither parameter is identified in practice, and likelihood maximization based on the data fails to converge or yields estimates of the ETI and the variance associated with the friction that are large and exhibit large variances. This convergence pattern is a feature of an estimation approach based on maximum likelihood.

The 1376 raw histograms for each of our (education $\times$ age $\times$ marital status $\times$ year $\times$ employment status) groups around the relevant year-specific high tax thresholds exhibit cases where the bunching at the kink can be clearly observed and cases where it can not. Since ML methods yield meaningful estimates when bunching is informative, we can compare the ML estimates with those from the polynomial method of Chetty et al. (2011). This comparison allows us to characterize the likely bias that affects the polynomial estimator.

We present a summary of the comparison between the polynomial-based estimates and the ML estimates in our four main sub-samples in Table C.1. The first row shows the average value of the polynomial-based estimates. The second row presents the average value of the ML estimates when the bunching at the top tax threshold is sufficiently informative for convergence. The third row shows the average of the polynomial-based estimates for samples for which ML converged. The final row shows the average bias between the two methods for the overlapping samples.

Table C.1—: Comparison of Estimators

	Employee		**Self-Employed**		**All**
	Only	Mainly	Mainly	Only	
	(1)	(2)	(3)	(4)	(5)
Polynomial Estimator	0.0043	0.0229	0.0890	0.1377	0.0058
all observations	(0.0027)	(0.0151)	(0.0267)	(0.0317)	(0.0033)
ML estimator	0.0172	0.0369	0.0901	0.1318	0.0201
informative observations	(0.0037)	(0.0071)	(0.0110)	(0.0116)	(0.0041)
Polynomial Estimator	0.0027	0.0263	0.0937	0.1395	0.0055
informative observations	(0.0027)	(0.0146)	(0.0266)	(0.0311)	(0.0035)
Bias (Poly. - ML),	-0.0145	-0.0106	0.0036	0.0077	-0.0145
informative observations	(0.0064)	(0.0203)	(0.0313)	(0.0365)	(0.0076)

Note: The table compares mean ETI estimates from the Chetty et al. (2011) polynomial model and the Maximum Likelihood approach.