Estimating the Elasticity of Turnover from Bunching: Preferential Tax Regimes for Solo Self-employed in Italy

Francesco Alosa*

April 2025

Abstract

To stimulate entrepreneurship, several countries adopt size-dependent regimes that tax businesses on the basis of turnover rather than profits. This paper investigates to what extent such regimes can affect sales turnover by exploiting a discontinuity in the tax schedule of Italian solo self-employed. I consider the notch created by the eligibility cut-off of the preferential turnover tax scheme. I find substantial and significant bunching below the turnover threshold, as some solo self-employed choose the turnover tax scheme over the profit-based tax regime. The effects of the turnover tax scheme on bunching are heterogeneous across sectors, with professionals, business intermediaries and retailers having the largest observed responses. For these three sectors, I estimate the turnover tax elasticity by exploiting a new theoretical framework that fits the institutional set-up and rationalises the observed responses to it. The baseline estimates for the two most productive sectors, professionals and business intermediaries, are 0.071 and 0.058 respectively. Lower compliance costs in the turnover tax regime explain less than half of these responses, therefore highlighting the key role of low taxation for bunching behaviour in high-value-added sectors.

JEL classification: H24, H25, H32, J22.

Keywords: turnover tax elasticity, preferential tax regimes, solo self-employed, bunching.

*Department of Economics, University Paris Dauphine - PSL, Pl. du Maréchal de Lattre de Tassigny, 75016 Paris, France; Uppsala Center for Fiscal Studies (UCFS). Email: francesco.alosa@dauphine.psl.eu. I am grateful to my former supervisor Matthew Wakefield for his guidance and support. I also wish to thank Stuart Adam, Martin Andresen, Francesca Barigozzi, Spencer Bastani, Antoine Bozio, Jonathan Cribb, Jarkko Harju, Tuomas Matikka, Helen Miller, Håkan Selin, Vincenzo Scrutinio, Giulio Zanella, Claudio Zoli for insightful comments, as well as participants to ZEW public finance 2024 conference, 23rd Louis-André Gérard-Varet conference, 80th IIPF annual congress, Royal Economic Society 2024 conference, Royal Economic Society 2023 PhD conference, and seminar attendees at Institute for Fiscal Studies, University of Bologna, University of Helsinki, ISEG–University of Lisbon, University of Oslo, University of Verona. This paper uses administrative data ("*Frame SBS-sistema integrato di dati amministrativi e dati di indagine per la stima degli aggregati economici sulle unità giuridiche*") from the Italian National Statistics agency (ISTAT). The analyses were conducted at the "*Laboratorio per l'Analisi dei Dati ELEmentari-ISTAT*" following the regulations on statistical confidentiality and personal data protection. Results and opinions expressed in this paper are my own and do not represent official statistics from the agency. This paper circulated previously with the title "Estimating the Elasticity of Turnover from Bunching: Preferential Tax Regimes for Solo Self-employed in Italy".

1 Introduction

Stimulating entrepreneurship is key to generate economic growth. In several developing and advanced economies, policy makers attempt to foster business activity by setting up preferential size-dependent tax regimes for certain categories of workers, like self-employed, and small-medium enterprises. The idea behind this policy is that simpler tax regimes with a lower tax burden would attract entrepreneurs, encouraging them to grow their businesses within the formal sector. These simplified schemes often feature some form of taxation of gross reported revenues, such as turnover taxation, as opposed to the standard profit-based tax regimes for businesses and corporations.[1]

The seminal paper by Diamond and Mirrlees (1971) advises against turnover taxation as it violates production efficiency. However, policy makers often deviate from this theoretical benchmark as turnover taxation makes compliance easier for small businesses and is more difficult to evade. Moreover, when there is incomplete tax enforcement and evasion is possible, Best et al. (2015) argue that production-inefficient tax regimes might actually enhance welfare as efficiency losses are more than outweighed by higher revenue efficiency due to increasing compliance. As turnover taxation receives more attention as a policy tool, its effects on behaviour are worth-exploring. Even though turnover is a key indicator of economic activity, we still know little about how much firms in different sectors actually adjust it as a response to taxation.

This paper contributes to fill this gap by investigating how solo self-employed adjust sales turnover in presence of a preferential tax regime.[2] To do so, I exploit the notch created by the eligibility cut-off of the preferential turnover tax regime for solo self-employed in Italy. Then, I use a new theoretical framework to estimate the turnover tax elasticity in three sectors: Professionals, Retail & Accommodation, Business Intermediaries. Since turnover is strictly related to output, after accounting for prices, analysing such responses is extremely important for both academic research and policy-makers.

The Italian tax system provides a suitable framework to address this question as tax liabilities for solo self-employed in preferential regimes depend on the level of turnover. If turnover is below a certain threshold, Italian solo self-employed can opt out of the ordinary tax regime and choose to be taxed at a preferential rate. In addition to tax advantages, the preferential regimes also have simplified compliance procedures. Conversely, if turnover is above the cut-off, higher average tax rates might apply as the ordinary tax regime remains the only option. This type of discontinuity in the tax schedule is a "notch", which can be exploited to estimate turnover responses to taxation.

I use administrative data from ISTAT on all self-employed operating in Italy between 2012 and 2019.[3] In this period, solo self-employed could choose between the ordinary tax regime and a scheme with potentially preferential tax-rates and simplified compliance procedures. Besides

[1] Such schemes, also called presumptive regimes, have been adopted in several developed countries, including Austria, France, Italy, Spain (Bucci, 2020), as well as in developing countries, including Brazil, Mexico, Pakistan and Zambia (Best et al., 2015).

[2] Solo self-employed are self-employed individuals who work without collaborators or employees. The share of solo self-employed in self-employment is increasing in many OECD countries (Boeri et al. 2020).

[3] ISTAT is the National Statistics Agency in Italy.

VAT, the ordinary tax regime is moderately progressive and includes personal income-tax and social security contributions. The preferential tax regime would replace the progressive personal income tax schedule with a proportional levy on taxable income ("a flat tax"), and exempt self-employed from VAT. The turnover tax regime is one example of the preferential schemes being introduced in Italy, with the tax base being its distinguishing feature. While the ordinary regime taxes profits, the turnover regime defines the tax base as a sector-specific share of turnover, resulting in different tax incentives across sectors.

The main analysis of this paper exploits the notch in the tax schedule generated by the eligibility threshold (€65,000) of the preferential turnover regime in 2019. First, I use bunching techniques (Chetty et al., 2011; Kleven and Waseem, 2013) to estimate the turnover responses. The excess mass below the threshold is about 337% of the counterfactual frequency at the threshold. The sector-specific analysis shows that professionals, business intermediaries and retailers have the largest observed turnover responses. Second, for these three sectors, I use a new theoretical framework that matches the institutional set-up of Italy to estimate the structural elasticity of turnover. After accounting for the additional hassle costs due to VAT filing in the ordinary regime, I find that the two most productive sectors – professionals and business intermediaries – have estimated elasticities of 0.071 and 0.058 respectively. The results for these two categories of self-employed are shown to be robust when using a control-group method to estimate the counterfactual distribution of turnover (Coles et al., 2022).

This paper makes three main contributions to the literature. First, while the existing evidence of bunching largely focuses on taxable income adjustments,[4] this paper focuses on responses to taxation of sales turnover; turnover is a specific component of taxable income for self employed and a key indicator of economic activity. I show that individual entrepreneurs in Italy adjust the level of revenues as a response to financial incentives of the tax system. Solo self-employed bunch below the turnover threshold, set by the tax code, to qualify for a preferential tax scheme.

Turnover responses to taxation are studied by Harju et al. (2019) and Liu et al. (2021) in the context of VAT registration thresholds, and by Aghion et al. (2025) with regard to the preferential regimes for self-employed in France. The first two studies show that businesses bunch below the VAT registration threshold.[5] Harju et al. (2019) find that compliance costs due to VAT tax filing explain most of the observed bunching of small firms in Finland, so that the estimated elasticity of value added is quite low.[6] Then, Liu et al. (2021) find that bunching is more likely when corporations have lower inputs-sales ratio, higher proportion of business-to-consumer sales, and lower mark-ups. Differently from Harju et al. (2019), and Liu et al. (2021), this paper investigates the responses at the threshold where there is an overall change of the taxation of solo self-employment income including, but not limited to, VAT. This seems to be a more suitable case to study how turnover responds to tax incentives, aside from compliance

[4] Saez (2010) for the US, Chetty et al. (2011) for Denmark, Kleven and Waseem (2013) for Pakistan, Bastani and Selin (2014) for Sweden, Adam et al. (2021) for the UK, Massenz (2025) for corporations in the Netherlands.

[5] They assume the VAT incidence falls, at least partly, on entrepreneurs.

[6] This is motivated by the low VAT threshold in Finland (€8,500), so that the estimated compliance costs (€1,300) are relatively more important than the incentives generated by the VAT rate.

costs related to the tax system. Indeed, I find that for high-value-added sectors the financial incentive of the tax system is still the main driver of turnover responses. Finally, while Aghion et al. (2025) stress the importance of tax simplicity and evasion responses, my findings provide some evidence that real responses can still play an important role as those individuals that who would most benefit from bunching by evading taxes seem to choose the ordinary regime.

Second, building on Kleven and Waseem (2013), I develop a new theoretical framework that describes the behaviour of agents choosing between a profit-based tax regime and a turnover tax scheme if they are located below a certain eligibility (turnover) threshold. The type of discontinuity in the tax schedule that is modeled is a non-standard notch. In the theory of notches by Kleven and Waseem (2013), the elasticity is estimated by solving the indifference condition of the "marginal buncher" who faces the same average tax rate above the threshold as every other agent.[7] That is because the cut-off and the tax base are both expressed in the same terms: taxable income. In my case, exceeding the cut-off of the preferential turnover scheme involves a joint change of tax rate and tax liability, but also a change in the tax base. Above the turnover threshold, agents are taxed on actual profits, so that tax incentives vary across individuals with equal turnover. The theoretical framework developed in this paper fits the empirical evidence in Italy and allows to isolate the specific tax incentive faced by the marginal buncher in each sector.

Third, I use the new theoretical framework to estimate the elasticity of turnover in three different sectors of the economy: Professional services, Retail & Accommodation, Business Intermediaries. While previous papers have shown that self-employed are more responsive to discontinuities in the tax schedule than employees (Chetty et al., 2011; Bastani and Selin, 2014; Adam et al., 2021), this paper also documents that there is heterogeneity in responses and elasticities across different types of self-employed individuals. To the best of my knowledge, this paper provides the first example of sector-specific estimation of the tax elasticity of turnover.

This paper also relates to the policy discussion regarding the opportunity of taxing different types of income differently by setting up preferential tax regimes for certain taxpayers. Adam and Miller (2021) discuss the different tax rules applying to wage-earners, self employed and business owners' income in the UK, and argue that preferential tax regimes could create inefficiency, unfairness, complexity and revenue losses for the government. This paper shows that this might also be the case in Italy: many solo self-employed declare revenues up to the eligibility thresholds for the preferential tax regime. If that is due to tax planning or evasion, then the preferential tax regime is eroding the tax base and therefore causing revenue losses for the Treasury. If bunching is due to self-employed limiting their growth in sales, then the tax system is also encouraging businesses to remain small, which is potentially detrimental to economic growth.

The rest of the paper is organised as follows. Section 2 outlines the institutional background and the data being used. Section 3 presents the evidence of bunching on turnover, including the sector-specific analysis. Section 4 describes the theoretical framework that is used to estimate the turnover elasticity. Section 5 provides structural estimates of the turnover elasticity in the

[7] The marginal buncher is the individual who is just indifferent between bunching and not bunching.

different sectors. Section 6 concludes.

2 Institutional Background and Data

2.1 Tax Regimes for Solo Self-employed

In Italy, self-employed have two options for income taxation: i) the ordinary tax regime; ii) one of the existing preferential tax regimes. The first one includes the personal income tax schedule (table I), social security contributions (table II), along with VAT. The income tax schedule is piece-wise linear with five brackets. Social security contributions include a fixed component that applies below the basic threshold, and a variable component that applies between the basic and top threshold. In addition, the contribution rate of the variable component rises by 1 p.p. between the middle and top threshold. No contributions are due on the part of income exceeding the top threshold. Sellers charge VAT on their sales, remit it to the tax authorities every three months, and claim back the VAT paid on inputs of production. The standard VAT rate was 21% in 2012-2013, 22% from 2014 onwards, and it applies to most goods and services.[8]

In the 2010's, two preferential tax schemes were introduced, allowing solo self-employed to choose whether or not to access a regime with a simplified tax schedule and easier compliance procedures.[9] These schemes provide lower income tax rates and/or a different tax base on which reduced rates apply. Moreover, these schemes also provide exemption from VAT, meaning that the turnover cut-off to access them coincides with the VAT registration threshold. Except for the year 2015, solo self-employed only had one alternative option to the ordinary regime in each year. I now provide further details of the turnover tax scheme.

[Table I]

[Table II]

Preferential turnover tax scheme: F-regime

From 2016, the turnover tax scheme (F-regime from now on) is the main preferential tax scheme for solo self-employed in Italy.[10] Table III shows the sector-specific turnover cut-offs that solo self-employed could not exceed if they wanted to choose this regime. Eligibility for the preferential scheme in year T requires sales turnover to be below the threshold in year $T-1$.[11] The largest group of taxpayers – including lawyers, doctors, professors, architects and other professionals – faces the €30,000 threshold in 2016-2018. In the autumn 2018, Law no. 145/2018 reformed the regime by equalising the cut-offs to €65,000 across sectors from 2019 onwards.

[8] Italy has three reduced VAT rates: 4% for food and agricultural products; 5% for social and healthcare services; 10% for the accommodation sector and restaurants, as well as for energy and gas used by households.

[9] These include an exemption from filing VAT reports and bookkeeping for income tax purposes. However, entrepreneurs must keep all documents they receive and produce for their transactions.

[10] Before 2016, another preferential tax regime was available for solo self-employed. More details in the appendix (section E).

[11] Eligibility also requires costs for collaborators to be lower than €5000, and the total costs of capital goods including depreciation to be lower than €20,000. However, these additional requirements play a secondary role as the vast majority of self-employed individuals are solo self-employed (without collaborators) who have their own labour as their primary input.

Moreover, the new law prohibits access to the regime to those whose major activity in the last year was to work for their previous employers. This is meant to limit the income-shifting opportunities for those who intend to re-label their income from employment as self-employment income with the specific purpose of taking advantage of the preferential regime.

[Table III]

The new scheme replaces the income tax schedule with a proportional tax rate (15%), and exempts taxpayers from VAT.[12] Taxpayers in this regime face the same social security contribution rate that applies in the ordinary regime. However, the F-regime grants a 35% reduction in social security contributions for artisan enterprises and shopkeepers, which are mostly part of the Retail & Accommodation sector.

Differently from the ordinary regime, the tax base is a pre-determined share of turnover set by the tax code (see table III). This serves as a notional measure of profits on which tax rates apply, meaning that the tax liability does not depend on actual profits. The proportional tax rate t_B on turnover is therefore given by the following expression

$$t_B = \gamma\, t_S + \gamma\, t_R \cdot (1 - \gamma\, t_S),$$

where t_S is the social security contribution rate, γ is the sector specific share of taxable turnover, and t_R is the statutory turnover tax rate that applies to the share of taxable turnover, net of social security contributions $\gamma\, t_S$. By adding also the non-deductible VAT payments on inputs, given by the product between the VAT rate and the cost-output ratio $t_V \cdot (\frac{c}{y})$, we obtain the effective turnover tax rate $t_P = t_B + t_V \cdot (\frac{c}{y})$.

As the F and the ordinary regimes have different tax bases, the incentives around the threshold will be heterogeneous across agents. For those agents who are located already below the threshold, and have therefore the possibility to choose between the available tax regimes without any response on the turnover margin, the optimal decision is to choose the tax-minimising scheme, which will depend mainly on the difference between the notional profits (tax base in the F-regime) and actual profits (tax base in the ordinary regime). For example, consider a solo self-employed individual in the sector of professionals with annual turnover of €60,000. If the profit-output ratio is 90% the effective tax rate in the F-regime is lower than the corresponding rate in the ordinary regime as a fraction of turnover (about 34% against 40%). However, if the profit-output ratio is 50%, the F-regime tax liability is higher than the corresponding one in the ordinary regime (about 30% versus 17% as a fraction of turnover).

Then, for those agents who are located above the threshold, the incentive to bunch will depend both on their profitability and their preferences. Even if the statutory tax rate in the F-regime is quite low, compared to the ordinary regime, it's not certain any agent is better-off bunching: an entrepreneur with relatively low (actual) profits might pay less in the ordinary regime, and given her preferences, non-bunching might turn out to be optimal. Similarly, a

[12] The tax rate reduces to 5% if the business is less than 5 years old.

more productive individual might prefer to work more to enjoy a higher level of consumption. This implies that the F-regime threshold is a notch without a clear dominated region.

2.2 Data

This paper uses administrative data from the Italian National Institute of Statistics. The dataset includes the universe of businesses operating in Italy in the period 2012-2019. The annual cross-sectional data contain information on revenues from sales, net of VAT, costs for intermediate inputs of production (like goods and services), personnel expenditures, and profits.[13] The dataset also includes the number of people employed, the specific sector in which the entrepreneur operates, and whether the business is qualified as "artisan", and therefore eligible for the reduction in social security contributions in the F-regime. For the purpose of this paper, I restrict the sample to self-employed without employees, as these are the individuals that can qualify for preferential tax schemes in Italy by complying with the (turnover) eligibility threshold. In view of round-number bunching, I exclude individuals with turnover being a multiple of €1,000. While the structure of the data does not allow the explore the time dimension related to the individual decision to bunch, it is possible to analyse separately the taxpayers in the different tax regimes.

Table IV shows some descriptive statistics for selected taxpayers with turnover between €40,000 and €100,000. This is the sample used in the main bunching analysis around the turnover threshold (€65,000) of the F-regime. We can observe heterogeneous average profit rates across sectors, with the highest average profits for professionals and the lowest in the retail & accommodation sectors.[14] Then, I also consider self-employed with collaborators and firms with employees for a placebo test.

[Table IV]

3 Bunching Estimation and Evidence

In this section, I present the methodology and the evidence of turnover responses. First, section 3.1 presents the bunching techniques that are used to estimate the counterfactual distributions of turnover. Then, I provide evidence of bunching at the eligibility threshold of the F-regime (€65,000 in 2019) for the whole sample (section 3.2) and in each sector (section 3.3). Finally, section 3.4 provides evidence of optimisation frictions affecting the choice of tax regimes.

3.1 Estimating the Counterfactual Distributions

The bunching method requires the estimation of the counterfactual distribution that would have existed in the absence of the notch which will be compared to the empirical distribution. In this

[13] Info on inputs costs, and therefore profits, is not available for individuals in the F-regime as they are not required to supply these details for tax purposes.

[14] For the F-regime, profit rate heterogeneity across sectors explains why different taxable shares of turnover were chosen for different sectors as the notional profit levels that form the tax base.

section, I describe the procedures to estimate the counterfactual distributions. The first one is the standard method of Chetty et al. (2011) and Kleven and Waseem (2013). The second one is an adaptation of the standard method that is used to estimate the counterfactual distribution when we consider only F-regime-taxpayers located below the threshold.

The standard method entails fitting the observed distribution with a flexible polynomial, excluding an area around the threshold y^*, such that the estimated bunching mass below the threshold equates the missing mass above it (Figure I, Panel A). Observations are grouped in bins denoted by j of size s in such a way that the the upper bound y_j of bin $(y_j - s, y_j]$ at the turnover threshold y^* coincides with the threshold itself. Hence, all taxpayers bunching at the threshold y^* will be part of bin $(y^* - s, y^*]$.

I run the following regression excluding the region $[y_L, y_U]$ around the threshold,

$$c_j = \sum_{i=0}^{p} \beta_i \cdot (y_j)^i + \sum_{i=y_L}^{y_U} \gamma_i \cdot \mathbf{1}[y_j = i] + \nu_j \tag{1}$$

where c_j is the number of taxpayers grouped in bin j, and y_j is the turnover level in bin j.[15] Then, I extrapolate the fitted distribution to the cut-off using the fitted values of the regression $\hat{c}_j = \sum_{i=0}^{p} \hat{\beta}_i \cdot (y_j)^i$ for $[y_L, y_U]$. Excess bunching is defined as the difference between the observed and counterfactual density to the left of the threshold in $[y_L, y^*]$, that is $\hat{B} = \sum_{j=y_L}^{y^*} (c_j - \hat{c}_j)$. The lower bound of the excluded area y_L is chosen at the point where the turnover distribution begins to increase, i.e. when bunching behaviour starts. Then, the upper bound is chosen such that the estimated excess bunching to the left of the threshold $\hat{B}$ equals the estimated missing mass to the right of the threshold in $[y^*, y_U]$, that is $\hat{M} = \sum_{j>y^*}^{y_U} (\hat{c}_j - c_j)$.

[Figure I]

An alternative approach is necessary when we restrict our sample to F-regime-taxpayers only, as we cannot exploit the part of the empirical turnover distribution above the threshold. This is because nearly all self-employed in the F-regime are located below the threshold, as that is the main requirement to access the preferential regime.[16] If these individuals have moved below the turnover threshold from above and opted out from the ordinary regime, we should be able to observe a missing mass above the threshold among taxpayers in the ordinary regime. We can check that by plotting the turnover distribution of ordinary-regime taxpayers for the years before and after 2018, when the eligibility threshold was raised to €65,000. The key idea behind this approach is that the bunching mass of F-regime taxpayers B_f below the eligibility threshold should be lower than, or equal to, the missing mass M in the turnover distribution of ordinary-regime-taxpayers above the threshold (Figure I Panel B). The inequality $B_f < M$ can arise if some individuals have not yet selected the F-regime after bunching below the threshold, and therefore still count as taxpayers in the ordinary regime.

[15] Regression (1) does not include round-number fixed effects as the turnover distributions appear smooth after dropping individuals who have revenues multiples of €1,000.

[16] Few taxpayers are located above the threshold and will exit the regime in the following year.

To compute B_f, I estimate the counterfactual density using (1) by exploiting only the region of the empirical density below the threshold that is not affected by bunching. Hence, the upper bound of the excluded area coincides with the threshold itself: $y_U = y^*$. The difference between the empirical and counterfactual density below the threshold will provide the estimate of excess bunching B_f. Then, for the missing mass M among ordinary regime taxpayers above the €65K threshold, I exploit the pre-reform distributions to construct the counterfactual, therefore avoiding any specific parametric assumptions on its shape above the threshold. More specifically, I use a weighted average of the distributions in the period 2013-2017 when €65K was not the F-regime eligibility threshold, based on the numerosity of taxpayers in each year.

Finally, in line with the bunching literature, I use a residual-based bootstrap procedure to estimate the confidence intervals. A large number of turnover distributions are estimated by random resampling of residuals in (1), with which new estimates of the counterfactual distribution are obtained. Then, the 95% confidence interval is obtained from the distribution of the estimates of the parameter of interest.

3.2 Evidence of Turnover Responses

Figure IIa shows the turnover distribution for all taxpayers in 2019. We can see that self-employed bunch below €65,000, which is the turnover cut-off for the preferential turnover (F) regime in 2019. Figure IIa uses the standard bunching technique of Chetty et al. (2011) and Kleven and Waseem (2013) described in section 3.1. The estimated bunching coefficient is 3.373, meaning that the excess mass of individuals below the €65,000 cut-off is about 337% of the estimated counterfactual frequency at the threshold. As a placebo test, I plot the same section of the turnover distribution for each pre-reform year (figure F1 of the appendix), when €65,000 was not the eligibility threshold of the F-regime, and I do not find bunching.[17] Hence, we can safely attribute the observed bunching in Figure II to the new F-regime threshold in 2019. The result is robust to adjusting the order of the polynomial for the counterfactual estimation - see table C1 in the appendix.

Then, I estimate bunching for the sample of F-regime taxpayers below the €65,000 threshold (figure IIb) and compare it to the missing mass observed among ordinary taxpayers above the threshold (figure IIc). We can observe that the excess mass estimated among F-regime taxpayers below the threshold is lower than the missing mass above it.

[Figure II]

3.3 Heterogeneity in Bunching: Sector-specific Analysis

Figure III shows the distribution of turnover of all taxpayers (both ordinary and F-regime) of each sector and the corresponding excess bunching coefficient b. This coefficient is defined as the ratio between the excess mass of taxpayers to the left of the threshold and the value of

[17] The tax reform enacting the €65,000 threshold was announced and passed at the end of 2018, meaning 2018 is a transition year. Evidence of individuals anticipating the policy change is presented in the section H of the appendix.

the counterfactual frequency at the threshold, and serves as a measure of how strong bunching is. We can see there are heterogeneous responses across sectors, with professionals showing the highest bunching coefficient. The pattern is robust to adjusting the order of the polynomial for the counterfactual estimation - see table C2 in the appendix.

[Figure III]

Self employed in different sectors have different incentives to bunch for two reasons: i) some sectors are on average more profitable than others, meaning that self employed in higher value added industries have a larger tax burden in the ordinary regime than lower value added ones, conditional on turnover; ii) the taxable share of turnover, that is the tax base in the preferential regime, is sector-specific. The incentive to bunch will therefore depend on the gap between actual profitability, which determines the tax burden in the ordinary regime, and the notional profits in the turnover regime.

The theoretical prediction is that bunching should be stronger in those sectors in which actual profits tend to be consistently higher than notional profits, as there would be more people that would potentially benefit from a lower tax base in the F-regime. To find whether this is actually the case, we can compare the bunching coefficient of the different sectors with the difference between actual profit and notional profits for the median agent in the profit distribution. This theoretical prediction is supported by the data: there is a positive relationship between the extent of bunching and the difference in tax bases across regimes for the median profitability level.[18] We observe more bunching in those sectors in which larger shares of taxpayers would have a larger tax base in the ordinary regime – more details in the section D of the appendix.

The estimation in figure III provides the upper bound of the bunching region that will be assumed to coincide with the position of the marginal buncher. In reality, this might overestimate the distance of the marginal buncher from the threshold if some self-employed located above the threshold reduce their turnover from their pre-notch level. As I will argue in section 4.2, this assumption contributes to make the estimated elasticity a lower bound estimate.

Then, I consider the sub-sample of solo self-employed in the F-regime. The analysis on this sub-sample provides the observed turnover responses that will be used to estimate the sector-specific turnover elasticities (sections 5.2-5.3). Figure IV shows bunching below the F-regime threshold, and the corresponding missing masses among ordinary taxpayers above it, for the sectors of professionals, business intermediaries and retail & accommodation. These are the sectors with the largest observed bunching coefficients within the sample of F-regime taxpayers.[19]

To check that the bunching masses are not larger than the corresponding missing masses above the the threshold, we can consider the distributions of ordinary regime taxpayers above the threshold. These distributions will be affected if the individuals who have opted out from

[18] More specifically, the Pearson correlation coefficient is $r = 0.668$.

[19] Evidence for the other two sectors, real estate & construction and other activities, is available in figure A1 of the appendix.

the ordinary tax regime have indeed bunched from above the threshold. Using the pre-reform years to provide the counterfactual (before the €65,000 threshold applied) for 2019, figure IV provides evidence supporting this prediction. In each sector, the empirical frequency of ordinary regime taxpayers in 2019 tends to be lower than the counterfactual in an interval above the F-regime turnover threshold. More specifically, for each of the three sectors involved in the elasticity estimation (professionals, retail & accommodation, and business intermediaries) the estimated bunching mass is lower than the missing mass.

[Figure IV]

3.4 Choice of Tax-regime: Evidence Below the Threshold

The self-employed who are located below the €65,000 turnover threshold can choose between the ordinary (profit-based) regime and the (turnover-based) F-regime. In this section, I provide evidence on the types of self-employed who opt for the preferential turnover regime. The individuals who would most benefit from the F-regime are those with the highest profits, namely those who would have a larger tax base in the ordinary (profit-based) regime. While I find some evidence supporting this, I also find that many taxpayers are located in regions of dominated choice.

Figure V plots the distributions of the profit rate (profit as a share of turnover) for individuals in the sectors of professionals, retail & accommodation, business intermediaries, with turnover just below the F-regime eligibility threshold (€60,000-65,000). For relatively high levels of the profit rate, the densities in 2019 tend to be lower than in 2017, used as counterfactual, meaning that higher-profit individuals have opted out from the ordinary regime in 2019. However, not all of them have done so. In the case of professionals, for example, anyone with a profit rate above 77% would be strictly better-off in the F-regime (above 74% if we account for additional compliance costs of the ordinary regime).[20] Hence, figure V documents that about 69% of those professionals who would benefit from the F-regime make a dominated choice.[21] This is interpreted as evidence of optimisation frictions, and it is used in the structural estimation of the turnover elasticity. Thus, the estimated share of agents making a dominated choice is used as a measure of unresponsiveness to tax incentives due to frictions in the different sectors. I find that the sectors retail & accommodation and business intermediaries are characterised by higher optimisation frictions than professionals.[22]

[Figure V]

[20] The threshold level of the profit rate is the value that equalises the tax liability in the preferential and ordinary regimes at the threshold. For the additional compliance costs of the ordinary regime, the estimate (€1300) provided by Harju et al. (2019) is used.

[21] More precisely, 68.7% when assuming equal compliance costs across the two tax regimes, and 68.9% with a €1300 difference in compliance costs.

[22] Evidence for the other sectors (real estate & construction; other activities) is provided in figure A3 of the appendix.

4 Theory

4.1 The Model

This section describes the theoretical framework that will be used to estimate the elasticity of turnover with respect to net-of-turnover-tax rate. Building on Kleven and Waseem (2013), I develop a model describing agent's behaviour around the turnover threshold of the preferential turnover tax (F) regime, in line with the institutional set-up described in section 2. Below (above) the threshold, agents are taxed on turnover (profits). This creates a non-standard notch in the tax schedule with a change of tax rate, tax base and tax liabilities, such that there is no clear dominated region above the threshold.

Following the bunching literature (Kleven, 2016), preferences are represented by a quasi-linear utility function (exp. 2). Turnover y generates disutility $\phi(y, n)$, that is increasing in turnover, but decreasing in the agent's ability n. The elasticity of turnover with respect to net-of-tax rate is denoted by e. The production costs of generating turnover y are given by c_i, and can be heterogeneous across agents. Each agent-type i is therefore identified by their ability and their cost function: $\theta_i = \{n_i, c_i\}$. Ability n governs how much an agent is willing to work. Thus, ability governs where in the turnover distribution the agent will be.[23] Then, individual production costs c_i determine where in the profit distribution an agent is located, conditional on generating a certain level of turnover.

$$U = C - \phi(y, n) \tag{2}$$

$$\phi(y, n) = \frac{n}{1 + \frac{1}{e}} \left(\frac{y}{n}\right)^{1+\frac{1}{e}} \tag{3}$$

Agents maximise utility U by choosing how much to work, namely the level of turnover y, and face an upward notch at y^*. Below the cut-off y^*, agents have access to the preferential tax regime in which turnover is taxed proportionally at rate t_B. While entrepreneurs don't charge VAT to customers, they also cannot deduct VAT payments on inputs ($c_i\, t_V$). The effective tax on turnover in the F-regime is therefore $t_P = t_B + t_V\, \frac{c_i}{y}$. The cost of compliance procedures of the F-regime is a_B. Above the threshold, agents are taxed on their profits Π, and a different tax schedule applies: $t_A(\Pi)$ is the implicit average turnover tax rate (IATTR), that is the equivalent proportional tax on turnover that the agent would pay, given the actual profit tax schedule $T(\Pi)$ for self-employed, i.e. $t_A(\Pi) = \frac{T(\Pi)}{y}$. The cost due to compliance procedures is a_A, which is larger than in the F-regime, i.e. $a_A > a_B$.

$$C = \begin{cases} y\,(1 - t_B) - c_i(1 + t_V) - a_B & \text{if } y \leq y^* \\ y\,(1 - t_A(\Pi)) - c_i - a_A & \text{if } y > y^* \end{cases}$$

[23] There in an implicit assumption that the self-employed agent could always sell (earn) more if desired.

I make the following assumptions: 1) smooth distributions of ability (n), turnover (y) and profits (Π); 2) turnover can be changed by changing output (prices are fixed); 3) people change their real behaviour, not their tax reporting; 4) constant returns to scale, meaning that the ratio between costs and output is not affected by the decision to bunch; 5) no extensive margin responses.[24]

Agent's optimisation

For an agent optimising to the left of the turnover cut-off ($y \leq y^*$), the FOC is given by $y^* = n\left[(1 - t_P) - c'(y)\right]^e$ where t_P is the preferential turnover tax rate. With constant returns to scale, marginal costs are given by $c'(y) = k$, and the FOC reads

$$y^* = n\left[1 - t_P - k\right]^e. \tag{4}$$

Then, to the right of the cut-off, ($y > y^*$), utility maximisation yields the following FOC

$$\underbrace{1 - t_A(\Pi) - c'(y)}_{\text{Direct effect of changing } y} \underbrace{- y \cdot \frac{\partial t_A(\Pi)}{\partial y}}_{\text{Indirect effect}} = \left(\frac{y}{n}\right)^{\frac{1}{e}}$$

Utility is raised by the net-of tax and net-of-marginal-costs part of additional turnover (direct effect). Then, changing turnover also varies profit Π, and this affects tax liabilities, and therefore utility (indirect effect). The sign of the indirect effect depends on whether changing turnover at the margin increases or decreases profits. If profits go up (down), then the tax base is larger (smaller) and the tax liability increases (decreases), so that the indirect effect is negative (positive). With individual marginal costs given by $c'(y) = k$, the FOC simplifies to

$$\left[1 - t_A - k - \pi \cdot T'(\Pi)\right] = \left(\frac{y}{n}\right)^{\frac{1}{e}} \tag{5}$$

where $\pi = \frac{(y - c(y))}{y} = 1 - k$ is the profit rate. Condition (5) implies that if two agents have equal turnover y at the optimum, but different profits, then the agent with higher profits (lower k) must also have lower elasticity e and/or lower ability. By allowing an imperfect correlation between ability n_i and the individual cost function c_i – therefore keeping n_i and c_i distinct – the model can account for heterogeneity in elasticities as well as in profitability across agents, conditional on a certain level of turnover.

4.2 Indifference Condition

To estimate the elasticity of turnover, I derive the indifference condition (6), using the FOCs (4)-(5).[25] This condition exploits the fact that one agent – the marginal buncher – is indifferent

[24] Assumption 5 is discussed more in depth in section 5.5. Additional evidence is provided in the section G of the appendix.

[25] The derivation of the indifference condition is provided in the appendix J.

between: (i) bunching at the turnover threshold to access the F-regime; or, (ii) remaining in the ordinary regime at the best interior point above the threshold. The indifferent condition reads as follows

$$\frac{1}{1+\Delta y^*/y^*}\left[1-\frac{k\cdot\Delta y_I-\Delta a}{(1-t_P)y^*}\right]-\frac{e}{e+1}\left(\frac{1}{1+\Delta y^*/y^*}\right)^{1+1/e}\cdot\frac{1-t_P-k}{1-t_P}$$

$$-\left(\frac{1}{1-t_P}\right)\cdot\left[\frac{1-t_A-k-\pi\cdot T'(\Pi)}{1-t_P-k}\right]^e\left[(1-t_A)-\frac{e}{e+1}\cdot(1-t_A-k-\pi\cdot T'(\Pi))\right]=0 \qquad (6)$$

where $T'(\Pi)=\frac{\partial T(\Pi)}{\partial\Pi}\big|_{\Pi=\Pi_I}$, $\Delta y_I=y^*-y_I$ is the distance of the marginal buncher from the threshold, and $\Delta a=a_A-a_B$ is the difference in compliance costs between the two tax regimes around the threshold. Expression 6 characterises the relationship between the behavioural response of the marginal buncher $\Delta y^*/y^*$, the average net-of-tax-rate in the two regimes $1-t_A$ and $1-t_P$, and the elasticity e. Moreover, the elasticity is negatively related to the distance of the marginal buncher from the threshold Δy_I, and to the difference between compliance costs across regimes Δa, all else being equal.

Differently from the indifference condition derived by Kleven and Waseem (2013), agents face two alternative regimes that have different tax bases around the turnover threshold. Agents are taxed on turnover below the threshold, and on profits if they are above it. Thus, expression 6 also includes the effect that changing turnover has on tax liabilities above the threshold via changes in profits. Finally, similarly to Harju et al, 2019, individuals also take into account the difference in compliance costs between the two tax regimes when deciding whether or not to bunch at the threshold.

4.3 Theoretical Predictions: Which Agents Bunch?

Since earnings taxation above the threshold depends on profits, agents with equal turnover but different profits (costs) have different incentives to bunch at the threshold. In this section, I describe the predictions of the model regarding the types of agent who bunch. This framework gives the theoretical foundation to identify the tax incentive of the marginal buncher that is used to estimate the turnover elasticity. Figure VI illustrates the turnover tax regime notch in a budget set diagram (Panel A) and the implications of the model for the profit distributions for a certain level of turnover above the F-regime threshold (Panel B).

[Figure VI]

First, let's consider the baseline scenario, with homogeneous elasticity and no optimisation frictions. Panel A shows that agents M and B have equal turnover but different profits, that is why they have different budget sets. Agent B has larger profits ($\Pi_B > \Pi_M$) and therefore faces a larger implicit turnover tax rate $t_A(\Pi)$ than agent M. However, since agent B is more productive than agent M (cost-output ratio $k_B < k_M$), agent B's consumption level will be higher than agent M's. Given their preferences, agent B is going to bunch to get a higher

payoff, while agent M is just indifferent between bunching and remaining at the interior point y_I (marginal buncher). Any other agent with turnover y_I, but with profits lower than agent M is not going to bunch at the notch point y^*. Panel B shows the (stylized) counterfactual and empirical profit distributions for turnover bin $y_I > y^*$ above the threshold, that are drawn in red and blue respectively. In the baseline scenario (Fig. VIb), agent M is the highest profit-type agent that remains at the interior level of turnover y_I. Any agent with higher profits, like agent B, bunches at the threshold, therefore leaving this turnover bin and the corresponding profit distribution. Hence, in the case of homogeneous elasticity, bunching is solely driven by heterogeneous profitability across agents. In the absence of frictions, all agents with profits above a certain threshold level $\overline{\pi}$ will bunch. In this case, the marginal buncher is the agent with the highest profits among those who remained at their best interior point.

The proportional turnover response $\Delta y^*/y^*$, driven by structural elasticity e, can therefore be estimated using

$$B = \int_{y^*}^{y^*+\Delta y^*} \int_{\bar{\pi}}^{1} h_0(\pi) d\pi dy \approx (1-\zeta) h_0\left(y^*\right) \Delta y^* \tag{7}$$

where ζ is the share of taxpayers who do not choose to bunch because they have very low profits (lower than $\overline{\pi}$) and therefore very low tax liabilities in the ordinary (profit-based) regime above the threshold y^*. The approximation assumes that the counterfactual density $h_0(y)$ and the share of non-bunchers ζ is roughly constant for $y \in (y^*, y^* + \Delta y^*)$. Reworking (7) yields the structural response that accounts for the share of taxpayers ζ who do not have a financial incentive to bunch:

$$\Delta y^*/y^* = \frac{B}{h_0^F(y^*) y^*}.$$

where $h_0^F(y^*) = (1-\zeta) h_0(y^*)$ is the value of the counterfactual density that includes only those taxpayers that have a financial incentive to bunch and select the F-regime.

Second, I examine the theoretical prediction for bunching in the case of heterogeneity in elasticities (Figure VIc-d). The empirical profit distribution deviates from the counterfactual only in an interval $[\pi_L, \pi_H]$, meaning only some profit-types of agent are affected by bunching. The incentive to bunch is relatively weak for individuals with a profit rate $\pi < \pi_L$. This is either because these agents are already paying relatively little in the profit-based ordinary regime or because they need to work more to support their consumption level due to their low profitability in the first place. Thus, these agents prefer not to bunch and remain at their best interior point. Then, agents with a profit rate higher than π_H will also prefer not to bunch. While these individuals face a relatively high tax rate because of their large tax base (profits), they are also the most productive individuals who can enjoy the highest consumption. It follows that bunching is less attractive for these agents because reducing turnover implies a relatively large reduction in consumption. If ability n is positively correlated with profitability, the higher profit-types will also have low utility costs of generating a certain level of turnover (high ability n) and/or lower elasticity, such that the decision not to bunch will be optimal for them.

Hence, bunching will be beneficial only for individuals in the middle of the profit distri-

bution (with profit rate between π_L and π_H). While these agents are taxed more than low profit-individuals in the ordinary (profit-based) regime, bunching would not decrease consumption as much as it would for the higher profit-types as they are relatively less productive. It follows that, for these agents, reducing turnover by bunching at the threshold can be beneficial.[26] In the case of heterogeneous elasticities, agent M is the last marginal buncher, that is the agent with the lowest elasticity that is just indifferent between bunching and remaining at the interior point. With optimisation frictions, excess bunching B is defined as

$$B = \int_e \int_{y^*}^{y^*+\Delta y_e^*} \int_{\pi_L}^{\pi_H} (1-\beta(\pi,y,e))h_0(\pi,e)d\pi dy de \approx (1-\beta)(1-\zeta)h_0\left(y^*\right)\mathbb{E}[\Delta y_e^*] \quad (8)$$

where the approximation assumes that the counterfactual density $h_0(y)$ and the shares of non-bunchers β and ζ, due to frictions and low tax incentives respectively, are roughly constant for $y \in (y^*, y^* + \Delta y_e^*)$ and all elasticity values e.[27] The term $(1-\beta)\,\mathbb{E}[\Delta y_e^*]$ is defined as the average (observed) turnover response attenuated by optimisation frictions. Reworking (8) yields the average structural response

$$\mathbb{E}[\Delta y_e^*]/y^* = \frac{B}{(1-\beta)h_0^F(y^*)y^*} \quad (9)$$

where y^* is expressed in binwidth units, and $h_0^F(y^*) = (1-\zeta)h_0(y^*)$ is the value of the counterfactual density that includes only the taxpayers that have a financial incentive to bunch and select the F-regime.

5 Elasticity Estimation

Using the tax parameters and behavioural responses to the turnover regime's 65K threshold in 2019, I solve the indifference condition (6) to estimate the turnover elasticity for three sectors: professionals, retail & accommodation, business intermediaries.

5.1 Identification

In order to apply the indifference condition and estimate the turnover elasticity in each sector, it is necessary to identify two parameters: 1) the tax rate t_A that is faced by the marginal buncher in the ordinary regime above the threshold; 2) the share of unresponsive agents β who do not bunch because of frictions. These two issues are tackled here.

First, using the framework developed in section 4.3, we can find the tax incentive of the marginal buncher by considering the distributions of profit of taxpayers that are located in the region of the turnover distribution of interest. The key idea behind this strategy is that the missing mass of taxpayers above the eligibility threshold of the turnover regime should be

[26] Some agents might still remain in this part of the distribution, if they have sufficiently high ability n. More agents (like A) will be located here if there are also optimisation frictions (Fig. VId).

[27] Kleven and Waseem (2013) only consider the share of unresponsive due to frictions β. In our set-up, since the tax regimes around the threshold have different tax bases, we also account for the share of taxpayers ζ that are unresponsive because of weaker tax incentives.

matched by a corresponding missing mass in the profit distribution, conditional on the levels of turnover being considered. Then, we can infer which profit types have bunched and which have not by comparing the empirical profit distribution with an appropriate counterfactual.[28] By doing so for the specific region of the turnover distribution where the marginal buncher is estimated to be located we can find the marginal buncher and isolate its profitability and tax incentive to bunch.

Figure VII plots the profit rate distributions for the three sectors of interest. They include all self-employed located in a region of the turnover distribution where the marginal buncher is estimated to be located. In each sector, the empirical distribution deviates from the counterfactual in a certain interval, which is marked by the grey dashed vertical lines. The evidence from figure VII is in line with the theoretical prediction of bunching in the case of heterogeneous elasticities presented in section 4.3. Therefore, the upper bounds of the marked intervals identify the marginal buncher and its tax incentive in each sector. The corresponding tax parameters that will be used in the baseline elasticity estimation are provided in table V.

[Figure VII]

[Table V]

The second parameter of interest is the share of unresponsive agents β who don't bunch at the threshold due to frictions. Unlike Kleven and Waseem (2013), the notch of the turnover regime does not produce a clear dominated region above the eligibility threshold. In section 3.4, an alternative strategy was presented, in which the observed choices of the tax regime were exploited to infer to share of unresponsive agents.

Individuals that are located below the €65,000 threshold choose between the ordinary profit regime and the F-regime. For an agent located below the threshold, the optimal strategy is to choose the regime that maximises consumption or, equivalently, minimises the tax liability. This identifies a clear dominated region in the profit distributions, conditional on turnover. In section 3.4, I showed that many individuals are located in regions of dominated choice, meaning they do not opt for the F-regime even though it would be advantageous for them to do so. This evidence is therefore exploited to estimate the share of unresponsive taxpayers, that is assumed to be constant above the threshold. The estimated shares of unresponsive β are 68.7%, 79.5%, 97.7% (68.9%, 78.5%, 92.9% when accounting for compliance costs) for the sectors of professionals, business intermediaries and retail & accommodation respectively.

One possible threat to this identification strategy is that some individuals who are below the 65K threshold in 2019, and in the dominated profit region, might actually be there to access the F-regime in the following year. If that was the case we should observe taxpayers in the ordinary regime bunching below the 65K threshold as this would signal possible F-regime taxpayers. However, I do not find strong evidence this is the case: bunching in 2019 is very limited for people in the ordinary regime (figure A2 of the appendix), suggesting that most

[28] The distributions in the period 2013-2017 are used to reconstruct the counterfactual, as €65,000 was not a discontinuity in the tax schedule before 2018.

people who wanted to access the F-regime have already done so, and that the number of new possible F-regime-taxpayers is small enough not to invalidate this strategy.

5.2 Behavioural Responses

To estimate the behavioural responses, I focus on the subsample of individuals who are in the F-regime in 2019. This means the sample is composed of individuals who stayed below the threshold for at least two consecutive years and therefore presumably felt they had a clear financial incentive to opt for the preferential turnover regime.[29] Hence, the proportional (average) behavioural response is computed for each sector using (9) with the counterfactual density $h_0^F(y) = (1-\zeta)h_0(y)$ estimated in figure IV, the share of non-bunchers due to optimisation frictions β estimated in section 3.4, and the distance from the threshold for the marginal buncher in each sector Δy_I in figure III. Table VI reports the estimates of excess bunching, observed and structural turnover responses for the three sectors of interest.

[Table VI]

5.3 Structural Elasticities - Baseline Results

Table VII presents the estimates of the tax elasticity in the different sectors, given the tax parameters shown in table V. The first column shows the baseline estimates that are obtained under the assumption that the two tax regimes have equal compliance costs ($\Delta a = 0$). Then, the second column shows the estimates when we account for differential compliance costs. For that, I use the estimate of Harju et al. (2019). As the main simplifications of F-regime is the exemption from VAT filing, as in Harju et al. (2019), this estimate is a also good reference for the additional hassle costs of the ordinary tax regime in Italy. In all sectors, the estimated elasticities are lower than in the equal-compliance-costs scenario ($\Delta a = 0$) as behavioural responses are now partly explained by the additional hassle costs in the ordinary regime. Including these costs reduce the elasticity by less than half for professionals and business intermediaries, meaning that the financial incentive given by the preferential tax regime is the main driver of these responses. Conversely, in the case of retail & accommodation, accounting for compliance costs reduces the elasticity estimate by about two thirds, due to the effect that compliance costs have on the share of unresponsive agents in this specific sector.[30]

[Table VII]

5.4 Alternative Estimation: Control-group Bunching Method

The baseline results presented in section 5.3 are obtained on the basis of the standard bunching techniques of estimating the counterfactual distributions (Chetty et al., 2011; Kleven and

[29] Being in the F-regime in year T requires to locate below the threshold in year T-1. By considering this subsample, we are more likely to target individuals that stay consistently below the threshold and do not transfer income from one tax year to another.

[30] In the sector retail & accommodation, the share of unresponsive agents decreases by about 5 percentage points after including the difference in compliance costs between the two tax regimes, while it remains relatively stable for the other two sectors.

Waseem, 2013) that were described in section 3.1. Blomquist et al. (2021) and Bertanha et al. (2023) have criticised this method by arguing that it poses restrictive assumptions on the shape of the counterfactual distributions around the threshold.

This section presents alternative estimates of the turnover elasticities using the *control-group bunching method*, following the examples of Devereux et al. (2014), Hamilton (2019), Gelber et al. (2020), Coles et al. (2022), Bukovina et al. (forthcoming). The key idea behind this method is to exploit appropriately chosen control taxpayers, who were not affected by the eligibility threshold of the preferential tax regime, to reconstruct the counterfactual distribution of interest. I consider those taxpayers who were not affected by the turnover threshold, and rescale the turnover distributions of the chosen control group to match the number of taxpayers around the threshold in the year of interest.[31] As the €65,000 threshold of the preferential turnover regime was effective since 2019, after the 2018 reform, taxpayers in the pre-reform years (2013-2017) can be used as a control group.[32]

Table VIII presents the estimates of the turnover tax elasticity based on the *control-group bunching method*. For the categories of professionals and business intermediaries, the estimates are consistent with the baseline results presented in table VII, as the number of bunchers, observed and structural responses are shown to be robust across the two methods (see table I1 in the appendix). Conversely, in the case of retail & accommodation, the baseline method tends to overestimate the excess mass and turnover responses relative to the *control-group bunching method*.

[Table VIII]

5.5 Discussion

The evidence on turnover responses shows that some solo self-employed adjust their turnover to locate themselves below the eligibility cut-off for the preferential regime. After accounting for the tax incentives in different sectors and compliance costs, I find that the two most productive sectors – professionals and business intermediaries – have estimated elasticities of 0.071 and 0.058 respectively. The results for these two categories of self-employed are shown to be robust when using the *control-group bunching method*.

The turnover elasticities are estimated by exploiting a model-based condition that stems from an individual labour supply decision in the presence of two alternative tax regimes around the threshold. If bunching were partly due to evasion, the elasticity estimates would need to be interpreted as linear combinations of the real and evasion elasticities. While it is not possible to exclude the hypothesis that evasion might explain part of the adjustments in turnover,[33] the empirical evidence provided in this paper can be rationalised by the proposed model based on

[31] Additional details of this procedure are provided in the section I of the appendix.

[32] I do not consider 2018 as a pre-reform year, as that is a transition year and some self-employed seem to be anticipating the policy change – see section H of the appendix.

[33] In the context of Italy, Di Marzio et al. (2024) use the fraction of self-employed individuals who manipulate their turnover to select one of the preferential regimes as a market-level proxy for tax evasion to study unfair competition due to non-tax compliance.

real responses. For instance, I showed in section 5.1 that the most profitable individuals among professionals and business intermediaries who are located above the turnover threshold tend not to bunch. If evasion was a viable option, these individuals would benefit greatly from bunching by under-reporting revenues, as they would gain from higher consumption due to both evasion and lower taxes. Coherently with the theoretical framework of the model, bunching by reducing output and revenues is not attractive for the most productive individuals as that would imply a substantial reduction in consumption. Finally, it is also reassuring that responses remain large even after omitting observations that report turnover as a multiple of 1000, which has been argued to be the simplest evasion strategy.

The estimated turnover elasticities are larger than the estimate by Harju et al. (2019), 0.016, which is obtained by exploiting bunching responses to the VAT registration threshold in Finland. The difference of the estimates might be explained by the fact that, differently from Harju et al. (2019), Italian solo self-employed respond to an overall change in earnings taxation that includes, but is not limited to, VAT. Moreover, compliance costs seem to play a secondary role for the turnover responses in the two most productive sectors (professionals and business intermediaries) as their inclusion explains less than half of behavioural responses.[34] The difference in the relative importance of compliance costs for VAT, is due to the fact that the firms that are bunching in the Italian context are rather larger in terms of turnover, than the firms that respond to the Finnish VAT threshold. The costs of VAT filing are therefore a lower proportion of turnover for individuals around the €65,000 threshold. Hence, the results show the importance of financial incentives for bunching behaviour of larger and higher-value-added sole-owner businesses.

Another estimation of the turnover elasticity is provided by Aghion et al. (2025) who exploit the responses of self-employed workers to the turnover eligibility thresholds of two simplified tax regimes in France. They find a negligible real elasticity, and a sizable evasion elasticity equal to 1.3.[35] There are two methodological differences between their paper and mine. The first difference concerns how to deal with the fact that production costs are not observable in the data for the workers in the preferential regime.[36] While Aghion et al. (2025) choose the cost level that equalises the tax liability between the preferential and the ordinary regime at the threshold, I deduce the profitability type of the marginal buncher, and therefore its production cost, from the missing mass in the profit-rate distributions. This allows me to identify the tax incentive of the marginal buncher within my theoretical framework, and compute elasticities in each sector. Secondly, Aghion et al. (2025) estimate that the difference in compliance costs between the so-called "simplified regime", which is comparable to the F-regime in Italy, and

[34] Harju et al. (2019) show that omitting compliance costs would produce an estimated elasticity of 0.55, versus 0.016 when those costs are included. Hence, they argue that compliance costs are key to explain bunching responses in their case.

[35] Aghion et al. (2025) motivate this with the finding that earnings responses are comparable between different periods and across activities and regimes, despite changes in tax rates. Hence, they argue that bunching is unlikely to stem from real responses.

[36] This would be a key information to have as the profit level of the individuals who bunch could be used to compute their hypothetical tax liability in the ordinary profit-based regime. This would, in turn, identify the tax incentive to bunch under the assumption of constant returns to scale.

the ordinary regime ranges between 49 and 70 euros. While this parameter is exogenous in my estimation, I use the estimate provided by Harju et al. (2019) (1300 euros) which is substantially larger than the upper bound estimated by Aghion et al. (2025). This allows me to obtain a conservative measure of the turnover elasticity.

One possible cause of concern is that the €65,000 threshold of the preferential regime in 2019 might have generated extensive margin responses that would not be accounted for by the bunching-based elasticity estimates. This issue arises as the estimation of the elasticity, based on the indifference condition, relies on the assumption that the whole excess mass below the threshold is only due to intensive margin responses. In section G of the appendix, I provide *prima facie* evidence suggesting that the 2018 reform of the preferential turnover regime, which raised and equalised the sector-specific eligibility thresholds to €65,000 from 2019 onwards, induced mostly intensive margin responses. In particular, I find that the 2018 tax reform affected the shape of the turnover distribution, as taxpayers would face different incentives due to changes of the eligibility thresholds. However, the total number of self-employed reporting revenues between €10,000 and €100,000 is slightly lower in 2019 than in the pre-reform years, suggesting that the impact of the reform was mostly on the intensive margin.

Another issue is whether the introduction of the preferential turnover regime reduces tax revenues for the government. Answering this question would require us to know the following: i) how much do self-employed adjust turnover, i.e. how large bunching is; ii) how large is the inflow from the ordinary to the preferential regime for those taxpayers that are already below the preferential regime threshold; iii) are there any extensive margin responses. The first two channels would have a negative impact on tax revenues, while the third one would have a positive effect as new economic activity generates additional tax revenues. This paper provides evidence mainly on the first point.

6 Concluding Remarks

This paper investigates to what extent solo self-employed adjust sales turnover due to the incentives of the tax system. I study the turnover responses to the notch created by the eligibility cut-off of the preferential turnover regime for solo self-employed in Italy. I find that solo self-employed bunch below the €65,000 cut-off, set by the tax code, to qualify for the preferential turnover tax scheme. Professionals, business intermediaries, and retail & accommodation are the sectors with the largest observed responses. For each these three sectors, I use the bunching responses to estimate the turnover tax elasticity. To do so, I build on the model of Kleven and Waseem (2013) and exploit a modified indifference condition for the marginal buncher that fits the institutional set-up and the empirical evidence.

Most of the literature investigating behavioural responses to taxation has underlined the higher responsiveness of self-employed compared to employees in adjusting taxable income. This paper documents that preferential tax regimes can generate substantial responses of a specific component of taxable income — sales turnover – which vary across different types of self-employed individuals. The estimated turnover elasticities are small but larger than zero.

Moreover, the behavioural responses cannot be solely explained by the simpler compliance procedures of the preferential regime. This shows that financial incentives play a key role for the decisions to bunch of large sole-owner businesses, especially those in high-value-added sectors.

Policy-makers usually set up preferential regimes for certain businesses to stimulate entrepreneurship and growth. However, since these regimes usually apply only to certain individuals on the basis of their turnover, some of those who are located just above the eligibility threshold will have an incentive to downsize their businesses rather than grow it. This paper shows this is the case for the preferential turnover regime in Italy, where individuals with relatively high profits are more likely to decrease their turnover.

Finally, there are two related topics for future research, concerning the desirability of preferential tax regimes to begin with. First, the individual financial advantages from preferential tax regimes, and the corresponding effect on the government's budget, should be weighed against the effects on the economic performance of those who apply for them. For example, it would be interesting to assess to what extent tax revenue losses due to bunching can be offset by additional revenues from people increasing their labour supply while benefiting from the low-tax regime. Secondly, individuals opting for preferential tax regimes usually have easier compliance procedures that require less information to be communicated to the tax authority. While this is an advantage for the entrepreneur, it is possibly concerning as it can weaken the ability of the tax authority to verify the individual tax behaviour and identify frauds.

TABLES

Table I: Ordinary regime: Income tax rates 2012-2019.

	Personal Income Tax Rates				
	Starting	Basic	Middle	Higher	Top
Thresholds (€)	0	15,000	28,000	55,000	75,000
Tax rates	23%	27%	38%	41%	43%

Notes: this table presents the statutory income tax rates that apply in each income bracket in the period 2012-2019.

Table II: Social security contributions.

	Contributions		Thresholds		
Year	Variable	Fixed	Basic	Middle	Top
2012	21.4%	€3,200	€14,930	€44,204	€96,149
2013	21.8%	€3,360	€15,357	€45,531	€99,034
2014	22.3%	€3,460	€15,516	€46,031	€100,123
2015	22.7%	€3,540	€15,548	€46,123	€100,324
2016	23.2%	€3,610	€15,548	€46,123	€100,324
2017	23.6%	€3,680	€15,548	€46,123	€100,324
2018	24%	€3,790	€15,710	€46,630	€101,427
2019	24%	€3,830	€15,878	€47,143	€102,543

Notes: These rates apply to the sector of commerce that includes wholesale, retail trade and other self-employed. The contribution rate applies between the basic and middle threshold, and then rises by 1 p.p. for any profit between the middle and top threshold. No contributions are due on profits exceeding the top threshold.

Table III: F-regime rules by sector in 2019 (2016-2018).

Sector	Turnover cut-off (thousands €)	% of Taxable Turnover	Statutory Turnover Tax rate (%)
Professionals	65 (30)	78	15
Retail & Accommodation	65 (50)	40	15
Business Intermediaries	65 (25)	62	15
Real Estate & Construction	65 (25)	86	15
Other Activities	65 (30)	67	15
Food & Beverage	65 (45)	40	15

Note: this table presents the F-regime rules by sector. The first column shows the eligibility turnover cut-off in each sector (the cut-offs applying in 2016-2018 are shown in parentheses). The second column reports the sector-specific share of taxable turnover. The third column reports the statutory turnover tax rate, 15%, which drops to 5% if the business is less than 5 years old.

Table IV: Descriptive statistics, 2012 – 2019.

	Self-employed statistics ($n = 4,808,990$)			
	Turnover	Inputs	Profits	Profit rate
Mean	62,018	23,142	34,503	0.565
Median	58,575	16,526	33,208	0.605
sd	16,498	32,703	19,611	0.279

	Sector profit rate and shares of taxpayers					
	Professionals	Other Actvities	Real Estate	Retail & Accom.	Business Intermediaries	Food & Beverage
Mean	0.757	0.506	0.523	0.265	0.704	0.260
Median	0.800	0.484	0.506	0.223	0.739	0.234
sd	0.199	0.258	0.226	0.183	0.166	0.148
Sector shares	0.375	0.196	0.169	0.166	0.082	0.012

Note: The table shows descriptive statistics on the sample of solo self-employed with turnover between €40,000 and €100,000. Taxpayers are categorized by Statistics Italy's industrial classification (ATECO 2007).

Table V: Tax parameters of the F-regime and ordinary regime used in the baseline elasticity estimation.

Sector	t_P	$t_A(\Pi) = \frac{T(\Pi)}{y_I}$
Professionals	0.290	0.461
Retail & Accommodation	0.189	0.086
Business Intermediaries	0.274	0.365

This table reports the tax parameters used for the baseline elasticity estimations. For the F-regime, the effective turnover tax rate is used: $t_P = t_B + t_V \cdot \frac{c}{y}$. For VAT rate t_V, I use the standard rate (22%) for professionals and business intermediaries, and the intermediate rate (10%) for retail & accommodation as several inputs for this category are subject to either the intermediate rate (10%) or the reduced rate (4%) in Italy. For the ordinary regime, I use the implicit average turnover tax rate $t_A(\Pi)$, given by the ratio between the tax liability of the profit tax schedule $T(\Pi)$ and the level of turnover of the marginal buncher y_I in each sector. For the profit tax schedule $T(\Pi)$, I use a third degree polynomial as a function of profit that allows to obtain a smooth version of the actual tax schedule. Additional details are available in the section B of the appendix.

Table VI: Observed excess bunching and turnover responses

Sector	Excess Bunching	Observed response	Structural response ($\Delta a = 0$)	Structural response ($\Delta a = 1300$)
Professionals	7240 [6217; 8302]	0.043 [0.035; 0.052]	0.139 [0.112; 0.166]	0.140 [0.113; 0.168]
Retail & Accommodation	619 [527; 710]	0.026 [0.020; 0.032]	1.154 [0.895; 1.420]	0.368 [0.285; 0.453]
Business Intermediaries	997 [836; 1103]	0.034 [0.027; 0.041]	0.167 [0.130; 0.197]	0.159 [0.124; 0.188]

Note: this table reports the estimates of excess bunching, observed and structural responses based on figure IV. Structural responses are computed using (9) under two scenarios: (i) no difference in compliance costs across F-regime and ordinary regime ($\Delta a = 0$); (ii) difference in compliance costs of $\Delta a = 1300$ euro between the two tax regimes. The 95% confidence intervals are reported in brackets and are estimated with the bootstrap method described in section 3.1.

Table VII: Turnover tax elasticity estimates - baseline estimation.

Sector	Turnover tax elasticity e	
Professionals	0.106 [0.080; 0.134]	0.071 [0.047; 0.096]
Retail & Accommodation	0.458 [0.374; 0.542]	0.132 [0.092; 0.173]
Business intermediaries	0.094 [0.060; 0.122]	0.058 [0.029; 0.082]
Δ Compliance costs	0	€1300

Note: the turnover elasticity estimates are obtained by solving condition (6) and using the structural responses estimated by (9), the observed values for $t_A, t_P, T'(\Pi), \beta, k, \pi, \Delta y_I$ for the €65K threshold of the F-regime in 2019. The bootstrapped 95% confidence intervals are reported in parentheses: these are computed following the procedure described in 3.1 by estimating a large number (500) of turnover responses. For the difference in compliance costs Δa in the two tax regimes, I use the estimate (€1300) of Harju et al. (2019).

Table VIII: Turnover tax elasticity estimates - control-group bunching method.

Sector	Turnover tax elasticity e	
Professionals	0.093 [0.060; 0.127]	0.061 [0.031; 0.091]
Retail & Accommodation	0.289 [0.169; 0.365]	0.044 [−0.018; 0.085]
Business intermediaries	0.085 [0.065; 0.103]	0.050 [0.034; 0.065]
Δ Compliance costs	0	€1300

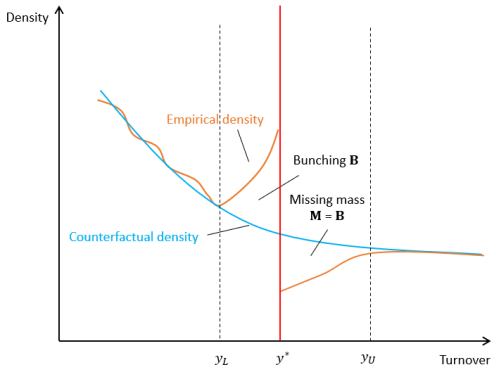
Note: this table contains the turnover elasticity estimates based on the structural responses obtained through the control-group bunching method. To obtain the elasticity estimates, condition (6) is solved by using the structural responses estimated by (9), the observed values for $t_A, t_P, T'(\Pi), \beta, k, \pi, \Delta y_I$ for the €65K threshold of the F-regime in 2019. The bootstrapped 95% confidence intervals are reported in parentheses: these are computed following the procedure described in the section I of the appendix, which requires estimating a large number (500) of turnover responses. For the difference in compliance costs Δa in the two tax regimes, I use the estimate (€1300) of Harju et al. (2019).

FIGURES

Figure I: Estimating the Counterfactual Distribution of Turnover

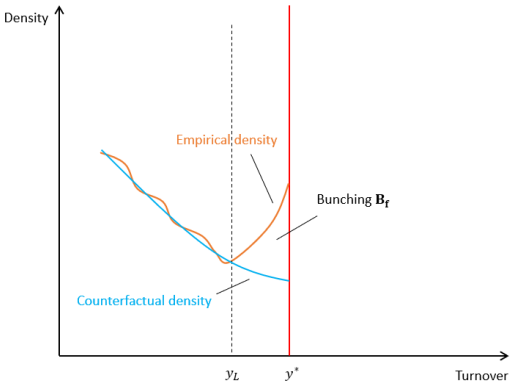
Panel A - Standard Method

(a) All taxpayers



Panel B - Adapted Method

(b) F-regime taxpayers below €65K



(c) Ordinary regime taxpayers above €65K

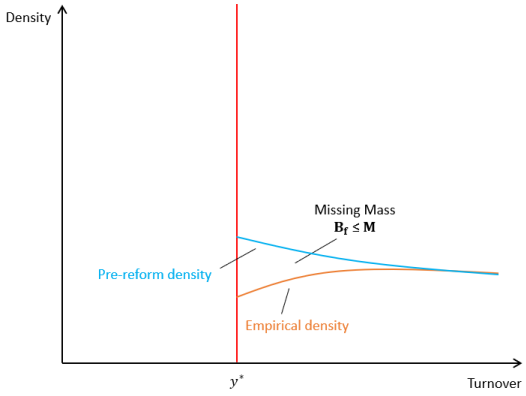
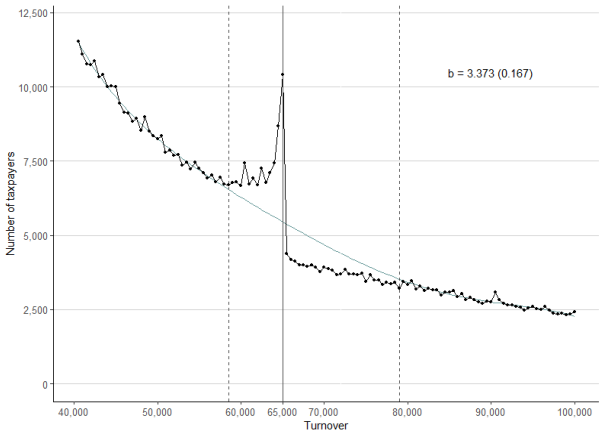
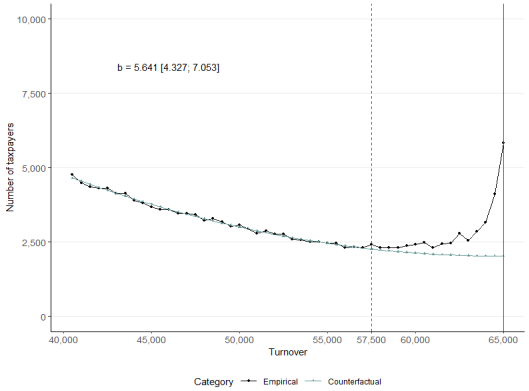


Figure II: Bunching in 2019 at the €65,000 F-regime threshold

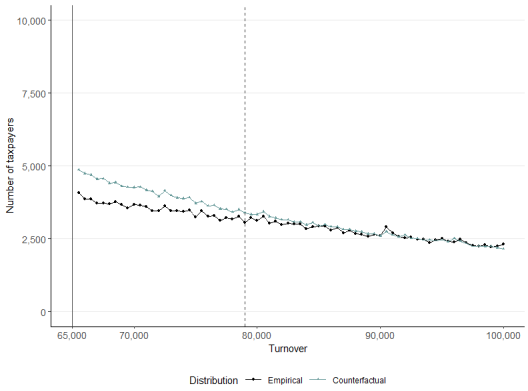
(a) Standard Method: all taxpayers



(b) F-regime taxpayers below €65K



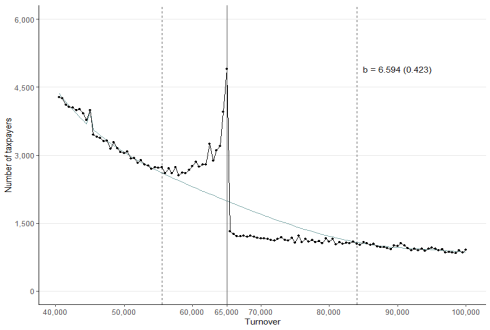
(c) Ordinary regime taxpayers above €65K



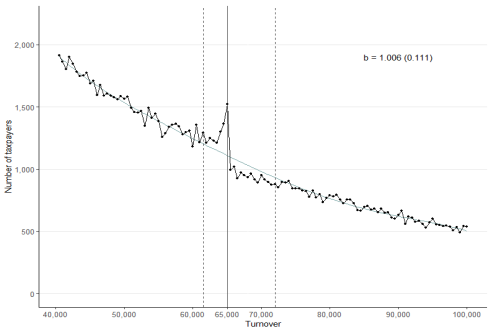
Note: graph (a) reports the distribution of turnover for all taxpayers around the €65,000 threshold (vertical grey line). The vertical dashed grey lines mark the excluded region of the distribution that is affected by bunching. The counterfactual distribution is estimated using the standard method described in section 3.1 with a polynomial of order 5. The bunching coefficient b is defined as the ratio between the estimated excess mass and the counterfactual frequency at the threshold. Graph (b) reports the distribution of turnover for the sample of F-regime taxpayers below the €65,000 threshold (vertical grey line). The vertical dashed grey line marks the beginning of the excluded region that is affected by bunching. The counterfactual distribution is estimated using the adapted method described in section 3.1 with a polynomial of order 2. The estimated bunching mass is $B_f = 11455$. The 95% confidence interval is reported in brackets and is estimated with the bootstrap method as detailed in section 3.1. Graph (c) reports the empirical (2019) and counterfactual distribution of turnover for the sample of ordinary regime taxpayers above the €65,000 threshold. The counterfactual distribution for 2019 is obtained with a weighted average of the pre-reform (2013-2017) distributions, based on the numerosity of taxpayers in each year, as €65,000 was not a discontinuity in the tax schedule before 2018. The estimated missing mass is $M = 15218$.

Figure III: Bunching at the €65,000 threshold in 2019 to access the preferential turnover regime.

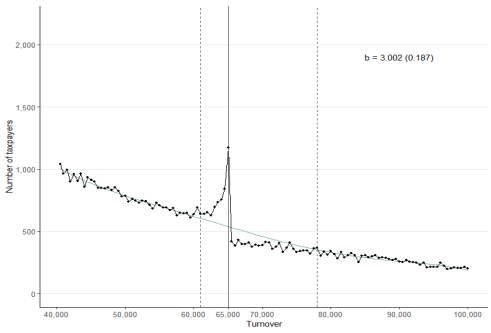
(a) Professionals



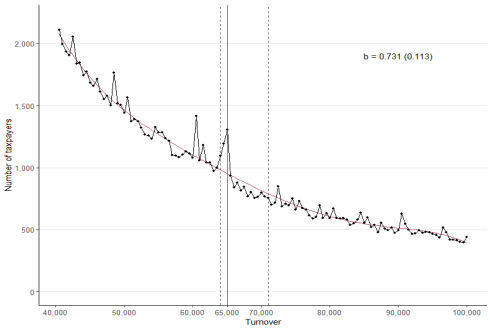
(b) Retail & Accommodation



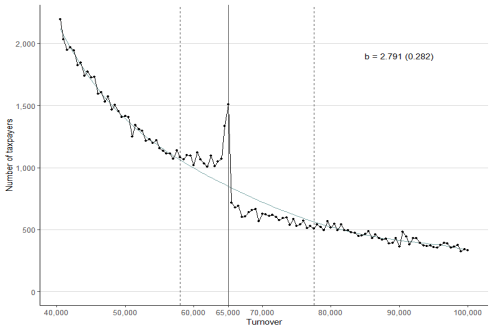
(c) Business Intermediaries



(d) Construction & Real Estate



(e) Other Activities

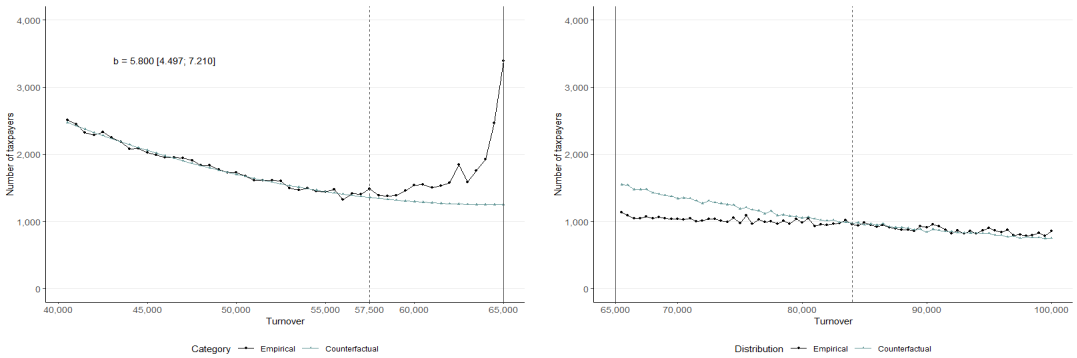


Note: these graphs report the distribution of turnover in each sector for the whole sample of taxpayers around the €65,000 threshold. The vertical dashed grey lines mark the excluded region of the distribution that is affected by bunching. The counterfactual distribution is estimated with regression (1) using the standard method described in section 3.1 with a polynomial of order 5. In the case of professionals, regression (1) is estimated with an additional fixed effects term for bin [€44,500; €45,000] that is affected by bunching due to a rule of a pre-existing preferential regime (M-regime): additional info is available in the section E of the appendix. The graphs report also the bunching coefficient b that is defined as the ratio between the total excess mass below the turnover threshold and the counterfactual density at the threshold. The 95% bootstrap-based standard errors are reported in parentheses and are computed by estimating a large number of turnover distributions (500 samples).

Figure IV: Taxpayers in the F-regime and ordinary regime around the €65,000 threshold.

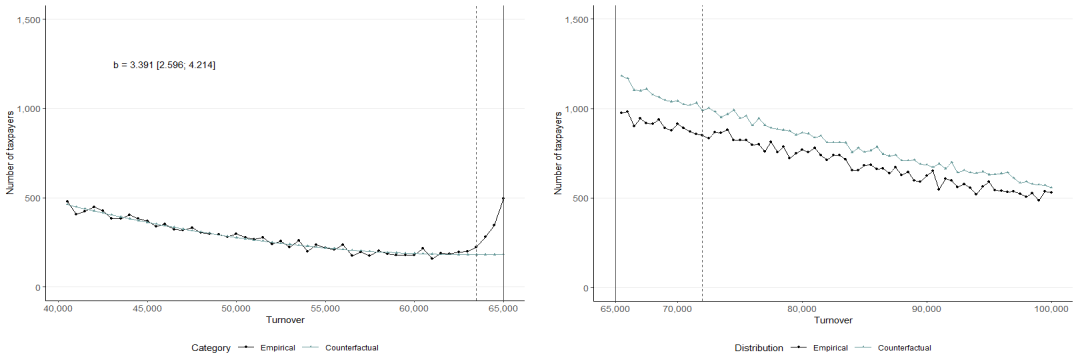
Panel A - Professionals

(a) F-regime taxpayers below €65,000 **(b)** Ordinary regime taxpayers above €65,000



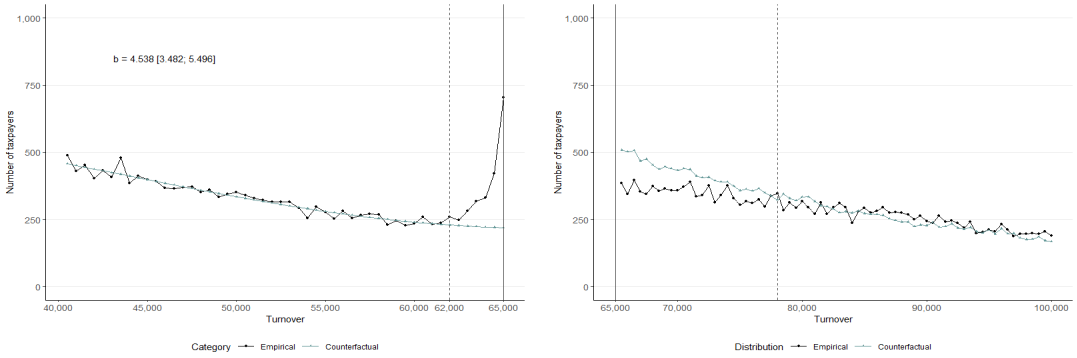
Panel B - Retail & Accommodation

(c) F-regime taxpayers below €65,000 **(d)** Ordinary regime taxpayers above €65,000



Panel C - Business intermediaries

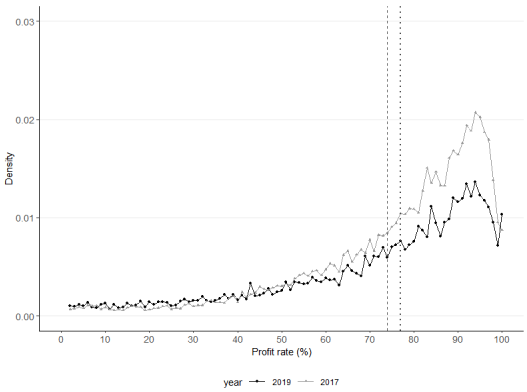
(e) F-regime taxpayers below €65,000 **(f)** Ordinary regime taxpayers above €65,000



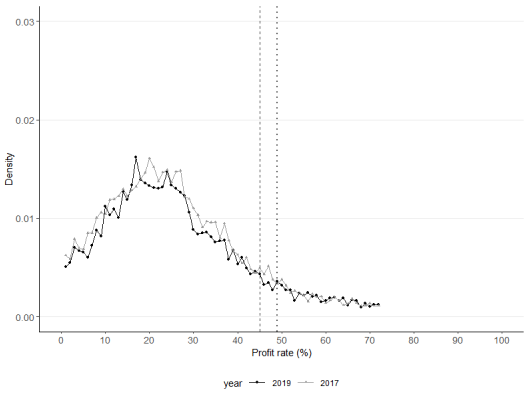
Note: graphs (a)-(c)-(e) report the distributions of turnover in the different sectors for the sample of F-regime taxpayers below the €65,000 threshold (vertical grey line). The vertical dashed grey line marks the beginning of the excluded region that is affected by bunching. The counterfactual distribution is estimated using the adapted method described in section 3.1. The bunching coefficient b that is defined as the ratio between the estimated excess mass and the value of the counterfactual density at the threshold. The 95% confidence intervals are reported in brackets and are estimated with the bootstrap method as detailed in section 3.1. Graphs (b)-(d)-(f) report the corresponding empirical (2019) and counterfactual distribution of turnover for the sample of ordinary regime taxpayers above the €65,000 threshold. The vertical dashed line represents the upper bound of the bunching region that was estimated for the full sample of taxpayers in III. The counterfactual distribution for 2019 is obtained with a weighted average of the pre-reform (2013-2017) distributions, based on the numerosity of taxpayers in each year.

Figure V: Profit rate distribution in the ordinary regime located below the €65K threshold.

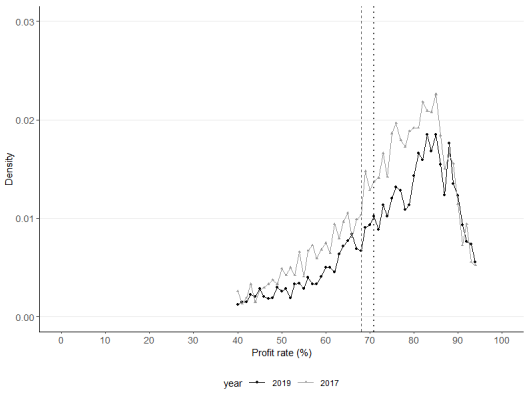
(a) Professionals



(b) Retail & Accommodation



(c) Business intermediaries

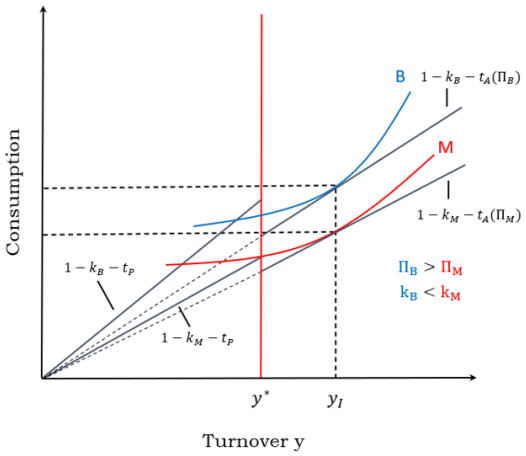


Note: each graph shows the sector-specific distribution of the profit rate – given by the ratio between profits and turnover – for individuals with turnover between €60,000 and €65,000. The distribution in 2017 is used as counterfactual for 2019, as €65,000 was not a discontinuity in the tax schedule before 2018. The vertical dotted and dashed lines mark the profit rate levels above which the preferential turnover regime has a lower tax burden than the ordinary regime under the two following respective assumptions: i) compliance costs are equal across regimes (dotted line); ii) additional compliance costs in the ordinary regime equal to €1300 (dashed line). Omitted data points represent less than 10 observations per bin.

Figure VI: Bunching with multiple notched budget sets - theoretical predictions

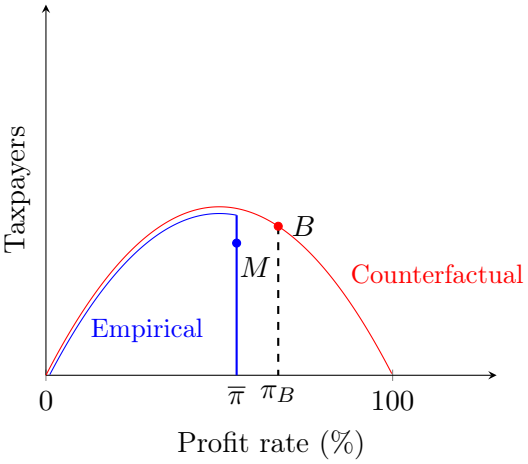
Panel A - Budget sets

(a) Baseline

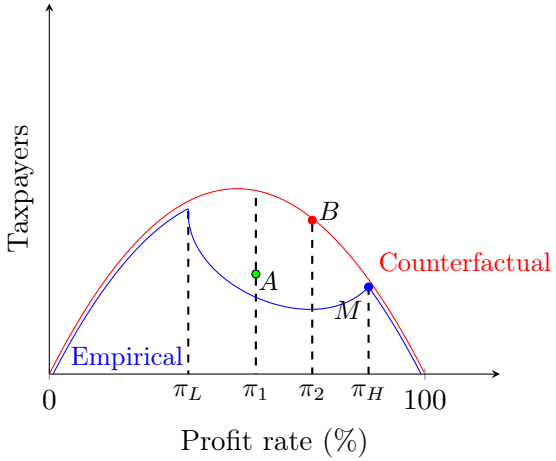


Panel B - (Stylized) profit distributions at turnover $y_I > y^*$

(b) Baseline



(c) Heterogeneous Elasticities



(d) Heterogeneous Elasticities + Frictions

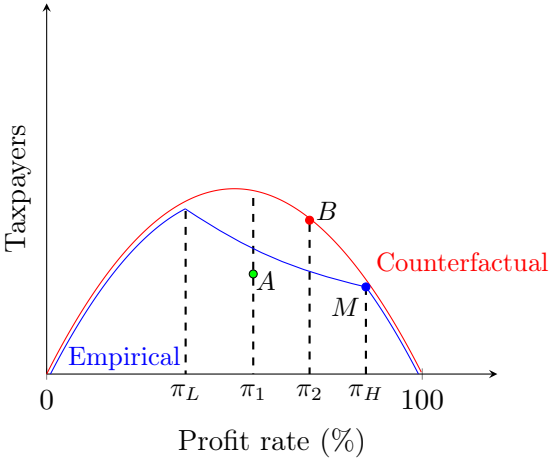
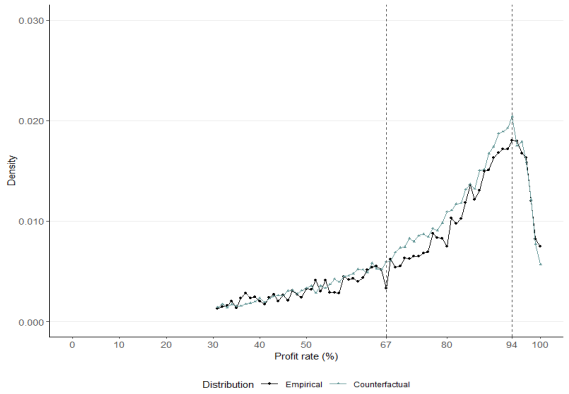
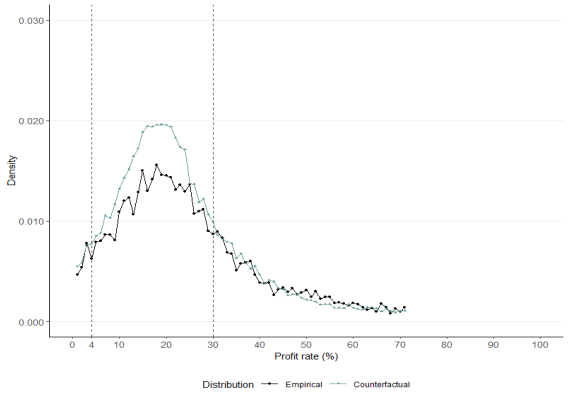


Figure VII: Profit Rate Distributions in 2019 and counterfactuals: Finding the Tax Incentive of the marginal buncher.

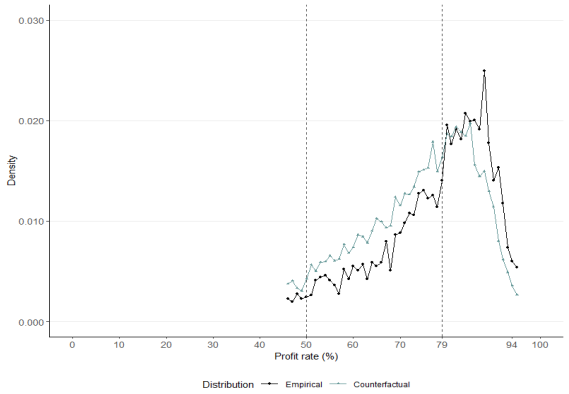
(a) Professionals



(b) Retail & Accommodation



(c) Business intermediaries



Note: These graphs plot the profit rate distributions for the regions of the turnover distribution where the marginal buncher is estimated to be located in each sector: [80,000; 84,000] for professionals, [68,000; 72,000] for retail & accommodation, and [73,000; 78,000] for business intermediaries. The counterfactual distribution is obtained with a weighted average of the 2013-2017 distributions, when €65,000 was not a discontinuity in the tax schedule, based on the numerosity of taxpayers in each year. The grey dashed vertical lines mark the interval of the profit rate distribution where the empirical (2019) distribution deviates from the counterfactual. Omitted data points represent less than 10 observations per bin.

References

[1] Adam, S., & Miller, H. (2021). Taxing work and investment across legal forms: pathways to well-designed taxes. IFS Report.

[2] Adam, S., Browne J., Phillips, D., & Roantree, B., (2021). Frictions and taxpayer responses: evidence from bunching at personal tax thresholds. *International Tax and Public Finance*. 28, 612–653.

[3] Aghion, P., Gravoueille, M., Lequien, M., & Stantcheva, S. (2025). Tax Simplicity or Simplicity of Evasion? Evidence from Self-Employment Taxes in France. Working paper.

[4] Bastani, S., & Selin, H. (2014). Bunching and non-bunching at kink points of the Swedish tax schedule. *Journal of Public Economics*, 109, 36–49.

[5] Bertanha, M., McCallum, A. H., & Seegert, N. (2023). Better bunching, nicer notching. Journal of Econometrics, 237(2), 105512.

[6] Best, M., Brockmeyer, A., Kleven, H., Spinnewijn, J., & Waseem, M. (2015). Production versus revenue efficiency with limited tax capacity: Theory and evidence from Pakistan. *Journal of Political Economy*, 123, 1311–1355.

[7] Bukovina, J., Lichard, T., Palguta, J., & Žúdel, B. Corporate Minimum Tax and the Elasticity of Taxable Income: Evidence From Administrative Tax Records. *American Economic Journal: Economic Policy*, forthcoming.

[8] Blomquist, S., Newey, W. K., Kumar, A., & Liang, C. Y. (2021). On bunching and identification of the taxable income elasticity. Journal of Political Economy, 129(8), 2320-2343.

[9] Boeri, T., Giupponi, G., Krueger, A. B., & Machin, S. (2020). Solo Self-Employment and Alternative Work Arrangements: A Cross-Country Perspective on the Changing Composition of Jobs. *Journal of Economic Perspectives*, 34(1), 170–195.

[10] Bucci, V. (2020). Presumptive taxation methods: A review of the empirical literature. *Journal of Economic Surveys*, 34(2), 372-397.

[11] Chetty, R., Friedman, J. N., Olsen, T., & Pistaferri, L. (2011). Adjustment Costs, Firm Responses, and Micro vs. Macro Labor Supply Elasticities: Evidence from Danish Tax Records. *Quarterly Journal of Economics*, 126, 749–804.

[12] Coles, J. L., Patel, E., Seegert, N., & Smith, M. (2022). How do firms respond to corporate taxes?. *Journal of Accounting Research*, 60(3), 965-1006.

[13] Devereux, M. P., Liu, L., & Loretz, S. (2014). The elasticity of corporate taxable income: New evidence from UK tax records. *American Economic Journal: Economic Policy*, 6(2), 19-53.

[14] Diamond, P. A., & Mirrlees, J. A. (1971). Optimal Taxation and Public Production. I: Production Efficiency. *American Economic Review*. 61(March), 8–27.

[15] Di Marzio, I., Mocetti, S., & Rubolino, E. (2024). Market Externalities of Tax Evasion. Available at SSRN 4892683.

[16] Di Nicola, F., Boschi, M., & Mongelli, G. (2017). Effective marginal and average tax rates in the 2017 Italian tax-benefit system. *Economia pubblica*: XLIV, 3, 2017, 67-90.

[17] Gelber, A. M., Jones, D., & Sacks, D. W. (2020). Estimating adjustment frictions using nonlinear budget sets: Method and evidence from the earnings test. *American Economic Journal: Applied Economics*, 12(1), 1-31.

[18] Kleven, H., (2016). Bunching. *Annual Review of Economics*, 8, 435–464.

[19] Kleven, H., & Waseem, M. (2013). Using Notches to Uncover Optimization Frictions and Structural Elasticities: Theory and Evidence from Pakistan. *Quarterly Journal of Economics*, 128, 669–723.

[20] Harju, J., & Matikka, T. (2016). The elasticity of taxable income and income-shifting: what is "real" and what is not?. *International Tax and Public Finance*, 23, 640–669.

[21] Harju, J., Kosonen, T., & Nordström-Skans, O., (2018). Firm types, price-setting strategies, and consumption-tax incidence. *Journal of Public Economics*, 165, 48–72.

[22] Harju, J., Matikka, T., & Rauhanen, T., (2019). Compliance costs vs. tax incentives: Why do entrepreneurs respond to size-based regulations?. *Journal of Public Economics*, 173, 139-164.

[23] le Maire, D., & Schjerning, B. (2013). Tax bunching, income shifting and self-employment. *Journal of Public Economics*, 107, 1–18.

[24] Liu, L., Lockwood, B., Almunia, M., & Tam, E. H. F. (2021). VAT Notches, Voluntary Registration, and Bunching: Theory and UK Evidence. *The Review of Economics and Statistics*, 103(1), 151–164.

[25] Massenz, G. (2025). Heterogeneity and persistence in tax responsiveness: Evidence from owner-managed companies. Working Paper.

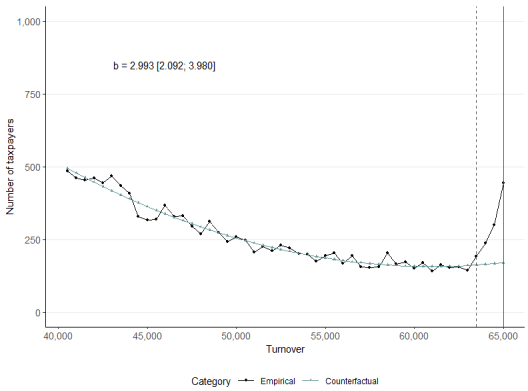
[26] Saez, E., (2010). Do taxpayers bunch at kink points? *American Economic Journal: Economic Policy*, 2(3), 180–212.

Appendix A Additional Graphs

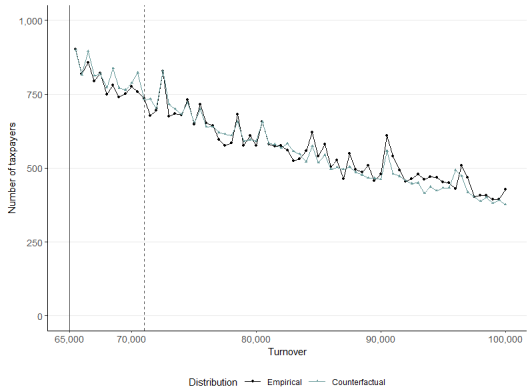
Figure A1: Bunching and missing masses around the €65,000 threshold.

Construction & Real Estate

(a) F-regime taxpayers below €65,000

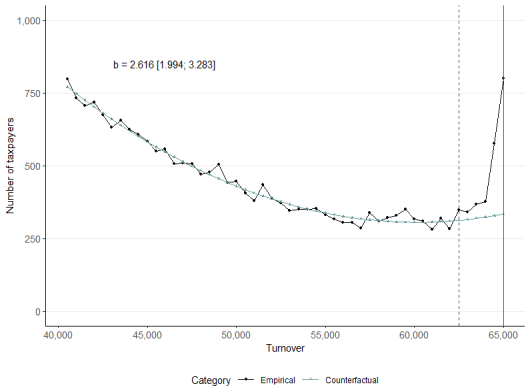


(b) Ordinary regime taxpayers above €65,000

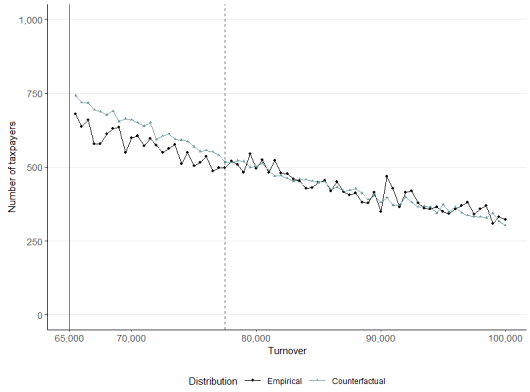


Other activities

(c) F-regime taxpayers below €65,000

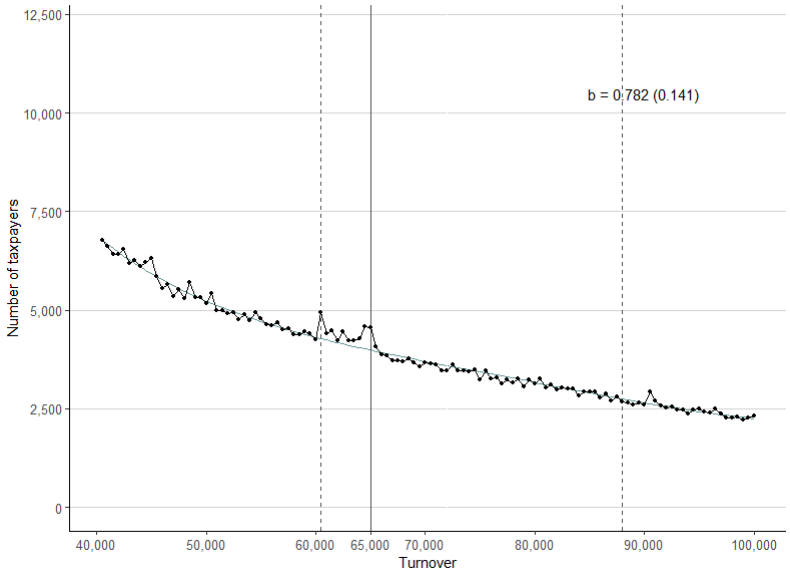


(d) Ordinary regime taxpayers above €65,000



Note: graphs (a)-(c) report the distributions of turnover in the different sectors for the sample of F-regime taxpayers below the €65,000 threshold (vertical grey line). The vertical dashed grey line marks the beginning of the excluded region that is affected by bunching. The counterfactual distribution is estimated using the adapted version of the standard method described in section 3.1. The bunching coefficient b that is defined as the ratio between the estimated excess mass and the value of the counterfactual density at the threshold. The 95% confidence intervals are reported in brackets and are estimated with the bootstrap method as detailed in section 3.1. Graphs (b)-(d) report the empirical (2019) and counterfactual distribution of turnover for the sample of ordinary regime taxpayers above the €65,000 threshold (vertical fill grey line). The vertical dashed line represents the upper bound of the bunching region that was estimated for the full sample of taxpayers in fig. III. The counterfactual distribution for 2019 is obtained with a weighted average of the pre-reform (2013-2017) distributions, based on the numerosity of taxpayers in each year, as €65,000 was not a discontinuity in the tax schedule before 2018.

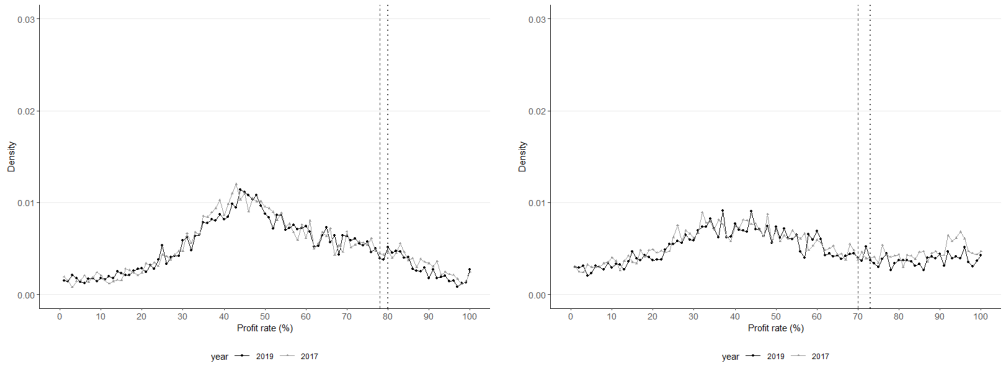
Figure A2: Bunching in 2019 at the €65,000 F-regime threshold - ordinary regime taxpayers only



Note: this graph reports the 2019 distribution of turnover for taxpayers in the ordinary regime around the €65,000 threshold (vertical grey line). The vertical dashed grey lines mark the excluded region of the distribution that is affected by bunching. The counterfactual distribution is estimated using the standard method described in section 3.1 with a polynomial of order 5. The bunching coefficient b is defined as the ratio between the estimated excess mass and the counterfactual frequency at the threshold. The 95% confidence interval is reported in brackets and is obtained with the bootstrap method by estimating a large number (500) of turnover distributions as detailed in section 3.1.

Figure A3: Profit rate distribution in the ordinary regime located below the €65K threshold

(a) Construction & Real Estate **(b)** Other Activities

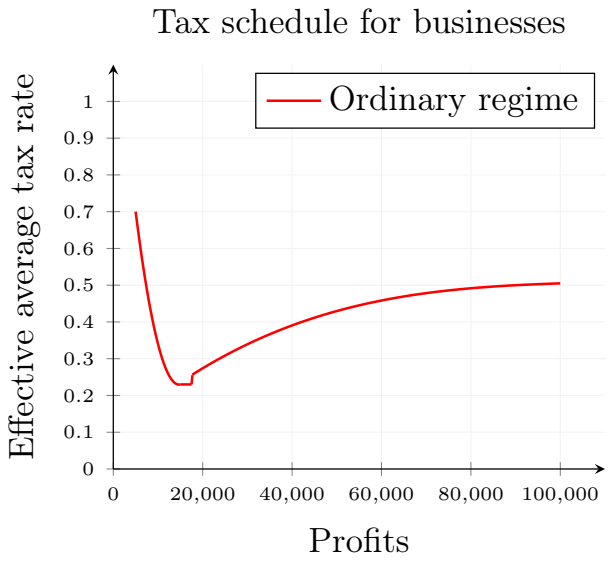


Note: the graphs show the distribution of the profit rate — given by the ratio between profits and turnover — for self-employed individuals with turnover between €60,000 and €65,000 in the sectors of Construction & Real Estate, and Other Activities. The distribution in 2017 is used as counterfactual for 2019, as €65,000 was not a discontinuity in the tax schedule before 2018. The vertical dotted and dashed lines mark the profit rate levels above which the preferential turnover regime has a lower tax burden than the ordinary regime under the two following respective assumptions: i) compliance costs are equal across regimes (dotted line); ii) additional compliance costs in the ordinary regime equal to €1300 (dashed line).

Appendix B Ordinary Tax Regime for Solo Self-employed

The ordinary tax regime includes the progressive personal income tax (called IRPEF) schedule, social security contributions (SSCs), and VAT. As documented by Di Nicola et al. (2017), the Italian tax system is fragmented due to the presence of income type-related deductions, family-related deductions, local surtax, bonuses and family allowances, on top of statutory tax rates. For the purpose of our analysis, we consider the tax schedule shown in figure B1, which represents a smoother version of the tax schedule for self-employed documented by Di Nicola et al. (2017). The increasing part of the tax schedule in figure B1, which is the only relevant part throughout the analysis of the paper, is obtained with a third order polynomial.

Figure B1: Smoothed version of the ordinary regime tax schedule, including income tax, social security contributions, deductions, based on Di Nicola et al. (2017).



Appendix C Sensitivity Analysis

Table C1: Sensitivity analysis of the bunching coefficient and the upper bound of the excluded region z_U (in €) with respect to the order of the polynomial that is used to construct the counterfactual distribution of turnover in figure IIa (order 5 is the baseline). The bunching coefficient is defined as the ratio between the excess mass below the threshold and the value of the counterfactual frequency at the threshold. Standard errors for the bunching coefficient are reported in parenthesis.

Degree of Polynomial	Bunching coefficient	Upper bound excluded region z_U (€)
4	3.691 (0.183)	81,000
5	3.373 (0.167)	79,000
6	3.386 (0.221)	79,000
7	3.066 (0.250)	77,500
8	3.130 (0.341)	78,500
9	3.066 (0.436)	77,500

Table C2: Sensitivity analysis of the bunching coefficient and the upper bound of the excluded region z_U (in €) in each sector with respect to the order of the polynomial that is used to construct the counterfactual distribution of turnover in figure III (order 5 is the baseline). Each column represents one specific sector: (1) Professionals; (2) Retail & Accommodation; (3) Business Intermediaries; (4) Real Estate; (5) Other Activities. The bunching coefficient is defined as the ratio between the excess mass below the threshold and the value of the counterfactual frequency at the threshold. Standard errors for the bunching coefficient are reported in parenthesis.

Degree of	Bunching coefficient				
Polynomial	(1)	(2)	(3)	(4)	(5)
4	7.167 (0.470)	1.073 (0.102)	3.239 (0.186)	0.790 (0.117)	3.177 (0.246)
5	6.594 (0.423)	1.006 (0.111)	3.002 (0.187)	0.731 (0.113)	2.778 (0.259)
6	6.862 (0.626)	1.023 (0.121)	3.085 (0.250)	0.738 (0.117)	2.770 (0.309)
7	5.335 (0.661)	0.975 (0.131)	2.794 (0.250)	0.704 (0.114)	2.830 (0.400)
8	5.567 (0.750)	0.966 (0.133)	2.782 (0.256)	0.705 (0.114)	2.800 (0.461)
9	7.392 (2.383)	0.947 (0.163)	2.563 (0.276)	0.684 (0.116)	2.516 (0.605)

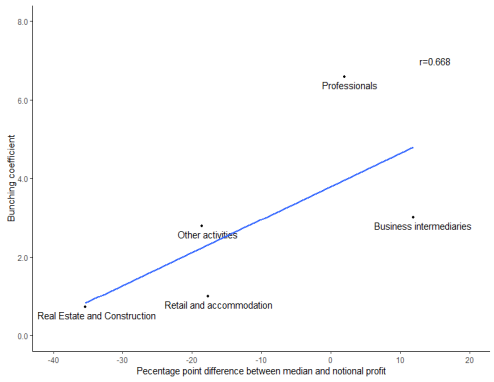
Degree of	Upper bound excluded region z_U (€)				
Polynomial	(1)	(2)	(3)	(4)	(5)
4	85,000	73,000	78,000	73,500	78,500
5	84,000	72,000	78,000	71,000	77,000
6	81,500	74,500	79,000	71,000	77,500
7	77,500	71,500	79,000	70,500	78,000
8	78,500	72,000	75,500	70,500	77,500
9	84,000	71,500	72,500	69,000	76,000

Appendix D Bunching Responses and Tax Incentives

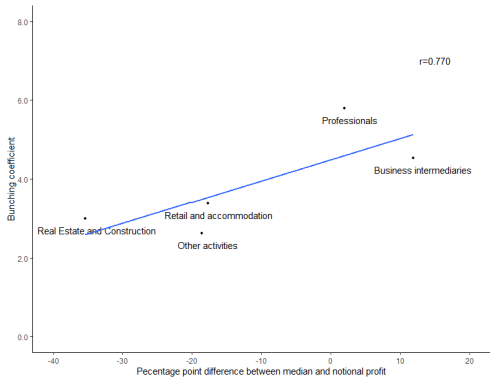
We compare the bunching coefficient of the different sectors from Figure III with the difference between actual profit and notional profits for the median agent in the profit distribution. The theoretical prediction is that bunching should be stronger in those sectors in which actual profits tend to be consistently higher than notional profits, as there would be more people that would potentially benefit from a lower tax base in the preferential turnover regime. Figure D1 shows that our theoretical prediction is supported by the data: there is a positive relationship between the extent of bunching and the difference in tax bases across regimes for the median profitability level. We observe more bunching in those sectors in which larger shares of taxpayers would have a larger tax base in the ordinary regime.

Figure D1: Heterogeneous responses and tax incentives

(a) All taxpayers



(b) F-regime taxpayers only



Note: these graphs reports the sector-specific bunching coefficient on the y-axis and the percentage point difference between the within sector median profit and the notional profit for the preferential regime, as a share of turnover, on the x-axis. Graph (a) refers to whole sample of taxpayers, while graph (b) refers to the sample of F-regime taxpayers. FOr each sector, the median profit as share of turnover is taken from the distribution of taxpayers with turnover between €40K and €100K. The Pearson correlation coefficient "r" are also reported.

Appendix E Preferential Profit Tax Scheme: M-regime

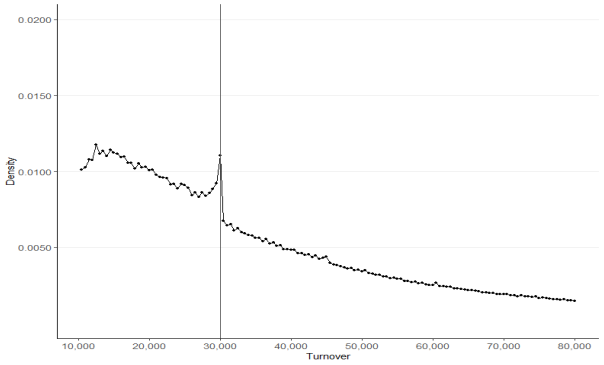
Between 2012 and 2015, solo self-employed with turnover below €30,000 could opt out of the ordinary regime and choose the M-regime. This scheme exempts entrepreneurs from VAT registration, annual VAT declaration to the tax authority, as well as record-keeping on clients, suppliers, purchases and payments. Then, the progressive income tax schedule is replaced by a proportional 5% tax rate on profits. Access to this scheme was limited to new businesses (no more than five years old) and entrepreneurs below 35 years old. Exit from this regime also depends on the level of turnover. If turnover is higher than €45,000 (over 50% larger than the threshold) the individual exits the system in the current tax year. If turnover is less than €45,000, exit from the M-regime will occur in the following tax year. Hence, taxpayers in the M-regime that violate the revenue requirement in a given year are incentivised to bunch at €45,0000 to keep the preferential tax treatment in the year in which the violation occurs.

Although the M-regime has no tax credits, the lower statutory profit tax rate, compared to the ordinary regime, is enough to make this scheme advantageous for most taxpayers. Hence, it is safe to assume that any taxpayer meeting the entry criteria would be better off in the M-regime. As the turnover threshold of €30,000 is not related to any other tax policy in 2012-2014, any excess mass of taxpayers below that threshold can be safely explained by the tax incentive of this scheme. While the scheme was abolished in 2015, people already in and satisfying its requirements could keep it.

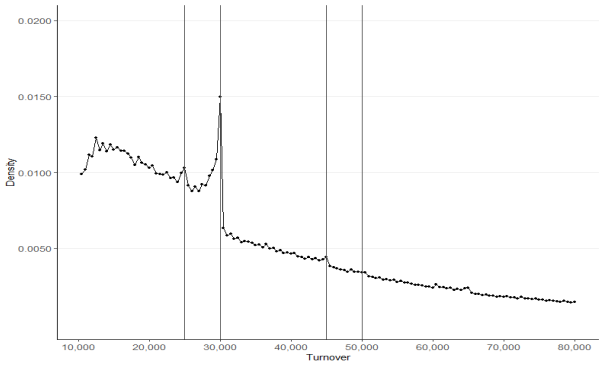
Figure E1 shows the distributions of turnover in the three periods under study. In the top graph, between 2012 and 2014, we observe bunching just below €30,000, that is the threshold to qualify for the M-regime, and limited bunching at €45,000 (threshold related to the exit from the M-regime). Then, the middle graph shows the turnover distribution in the period 2016-2018. Bunching is particularly strong at €30,000. This can be partly explained by the fact that €30,000 is not just that the cut-off the M-regime (until 2015) but also the cut-off for professional services and other economic activities in the F-regime. Although the M-regime was abolished in 2015, people already in the scheme could keep the advantages if the relevant requirement were satisfied. Hence, some individual still had an incentive to bunch at €30,000 because of the M-regime. For the same reason, we can still see bunching at €30K in 2019 (bottom graph of figure E1). However, most bunching is observable below the new threshold of the turnover (F) regime at €65,000 that is valid for all sectors.

Figure E1: Bunching in the different periods.

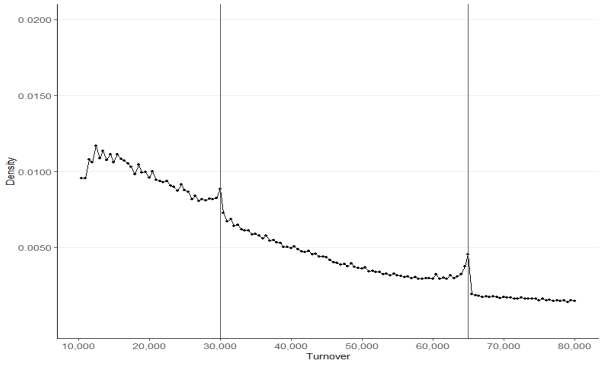
(a) 2012-2014: M regime (30K threshold)



(b) 2016-2018: M & F regime (25K,30K,45K,50K thresholds)



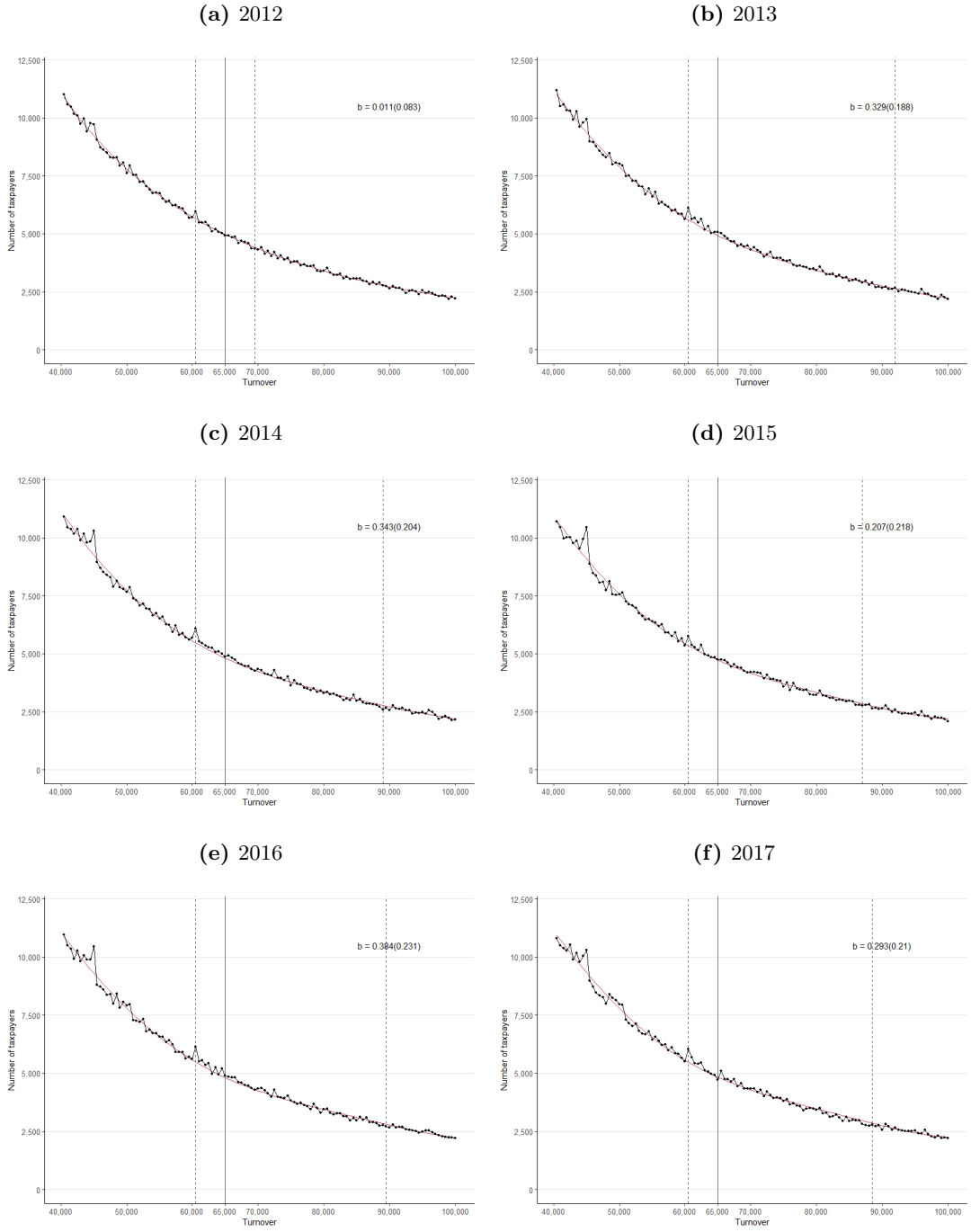
(c) 2019: M regime (30K threshold) & F regime (65K threshold)



Note: these graphs report the distribution of turnover in three different periods: (a) 2012-2014; (b) 2015-2018; (c) 2019. In each period, different thresholds for the preferential regimes, marked by vertical dashed grey lines, applied.

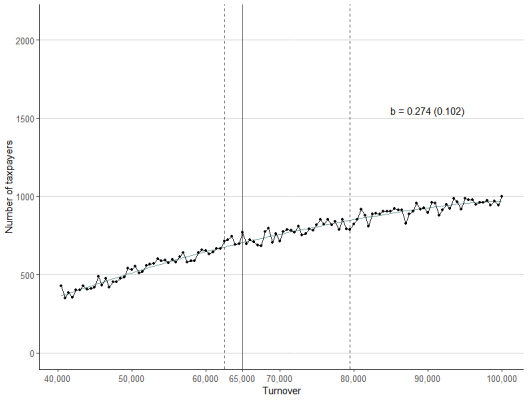
Appendix F Placebo Tests

Figure F1: Placebo Test: (no) bunching below €65,000 before it became the eligibility threshold of the F-regime (before 2018).



Note: these graphs report the distribution of turnover in each year before the 2018 reform that made €65,000 the eligibility threshold of the F-regime for all sectors. The vertical dashed grey lines mark the excluded region of the distribution that is affected by bunching. The counterfactual distribution is estimated using the standard method described in section 3.1.

Figure F2: Placebo Test: (no) bunching below €65,000 for firms and self-employed with collaborators.



Note: this graph reports the distribution of turnover in 2019 for firms and self-employed with personnel expenditure (collaborators) larger than €20,000, for whom the preferential turnover regime does not apply.

Appendix G Extensive and Intensive Margin Responses

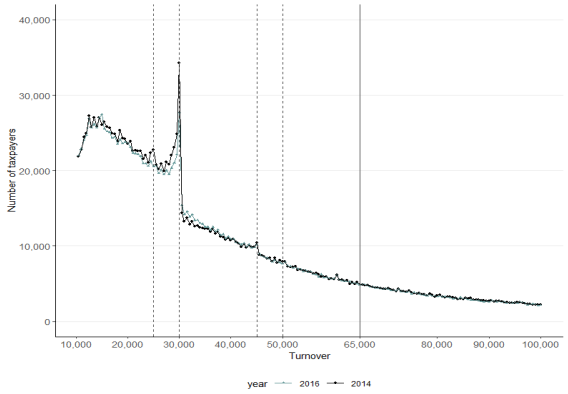
This section explores the extensive and intensive margin responses due to the introduction of the turnover regime in 2015 and the subsequent reform in 2018 that raised and equalised the sector-specific eligibility thresholds to €65,000 from 2019 onwards.

Figure G1 reports the turnover distributions in 2016 and 2017, panel (a)-(b) respectively, compared to 2014 that serves as a counterfactual. In both panels, the additional taxpayers below the new regime thresholds at €25,000 and €30,000, compared to 2014, form an excess mass that is larger than the missing mass above the €30,000 threshold. This suggests that the introduction of the turnover regime generated some extensive margin responses, in the form of new self-employed and/or people changing organisational forms of their businesses located below the threshold(s), in addition to those who reduced turnover (intensive margin responses). Indeed, the number of self-employed with turnover between €10,000 and €100,000 increases in the period 2016-2018 (see figure G3).

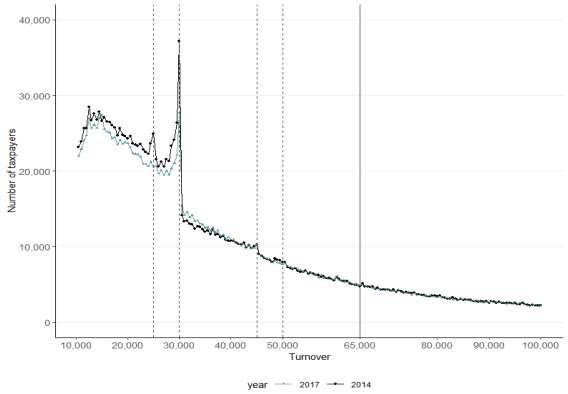
Figure G2 reports the turnover distribution in 2019, compared to 2016 (panel a) and 2017 (panel b) that serve as two alternative counterfactuals. It is possible to note that a larger number of taxpayers is now located between €30,000 – one of the thresholds in the period 2016-2018 – and €65,000 that is the eligibility cut-off for all sectors in 2019 after the 2018 reform. The total number of self-employed in 2019 reporting revenues between €10,000 and €100,000 is slightly lower than in the previous years. This provides a *prima facie* evidence that the new (higher) threshold at €65,000 in 2019 did not generate extensive margin responses. Hence, figure G2 suggests that the 2018 reform mostly induced intensive margin responses by incentivising people to either reduce turnover to locate below the €65,000 threshold, or increase turnover from an old threshold but not beyond the new threshold, and so benefiting from low taxation in the turnover regime.

Figure G1: Extensive Margin Responses after the introduction of the F-regime

(a) Turnover distributions: 2016 vs 2014



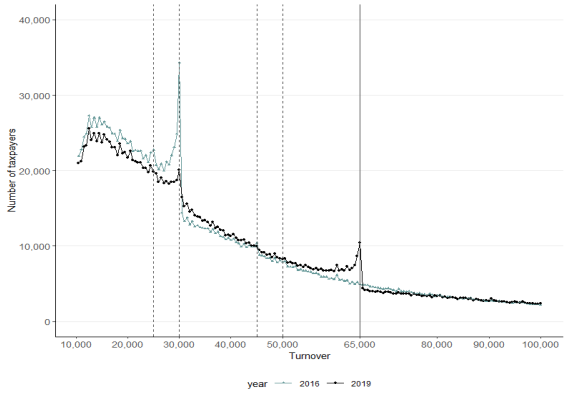
(b) Turnover distributions: 2017 vs 2014



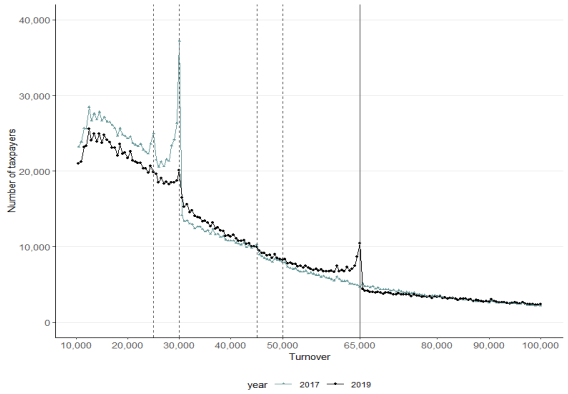
Note: these graphs report the distributions of turnover in 2016 (panel a) and 2017 (panel b) relative to 2014, which is used as a counterfactual.

Figure G2: Intensive Margin Responses after the 2018 reform

(a) Turnover distributions: 2019 vs 2016



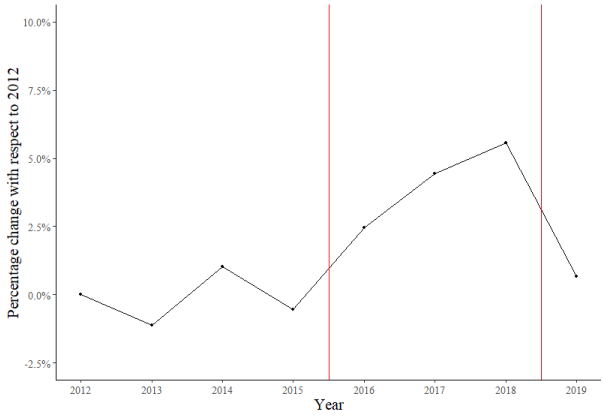
(b) Turnover distributions: 2019 vs 2017



Note: these graphs report the distributions of turnover in 2019 relative to 2016 (panel a) and 2017 (panel b), which are used as two alternative counterfactuals.

Figure G3: Number of self-employed over time: percentage point changes relative to 2012

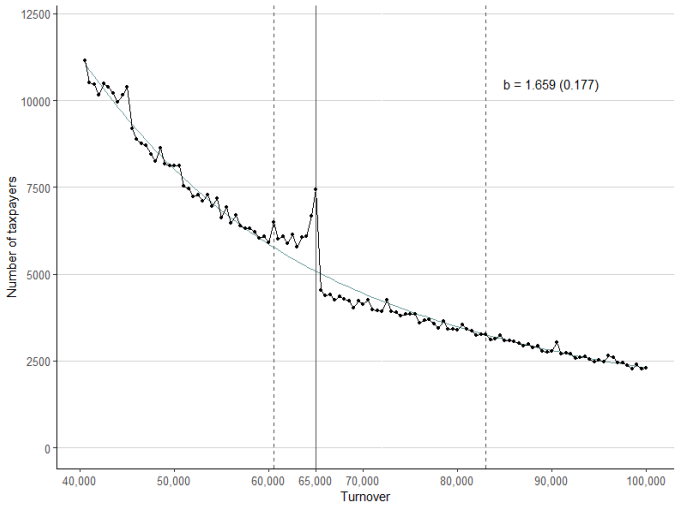
(a)



Appendix H Anticipation Effect

The tax reform enacting the €65,000 threshold or the preferential turnover regime (or simply F-regime) was announced and passed in the autumn 2018, and came into effect on January 1st 2019. One interesting question is whether or not individuals changed their behaviour in anticipation of the policy change. Figure H1 shows that some solo self-employed individuals responded to the new threshold in 2018 already by locating just below €65,000. The estimated bunching coefficient is 1.659, meaning that the excess mass of individuals below the €65,000 cut-off is about 166% of the estimated counterfactual frequency at the threshold. The institutional set-up provides a plausible explanation. While the new law took effect on January 1st 2019, access to the preferential regime required the new eligibility rule (turnover lower than €65,000) to be satisfied in the previous year. Hence, reporting turnover below €65,000 in 2018 allowed individuals to be eligible for the preferential turnover regime in 2019.

Figure H1: Bunching in 2018 at the new €65,000 F-regime threshold



Note: this graph reports the distribution of turnover for all taxpayers around the €65,000 threshold (vertical grey line). The vertical dashed grey lines mark the excluded region of the distribution that is affected by bunching. The counterfactual distribution is estimated using the standard method described in section 3.1 with a polynomial of order 5. The bunching coefficient b is defined as the ratio between the estimated excess mass and the counterfactual frequency at the threshold. The 95% confidence interval is reported in brackets and is obtained with the bootstrap method by estimating a large number (500) of turnover distributions as detailed in section 3.1.

Appendix I Robustness Test: Control-group Bunching Method

Given a finite interval $[y_{min}, y_{max}]$ of the distribution of turnover, let $c_{j,t_{before}}$ be the number of taxpayers grouped in bin j, in year t before the introduction of the eligibility threshold y^* for the preferential turnover regime. First, I compute the relative frequency $p_{j,t_{before}}$ of taxpayers in each bin for each pre-reform year

$$p_{j,t_{before}} = \frac{c_{j,t_{before}}}{\sum_{i=y_{min}}^{y_{max}} c_{i,t_{before}}}.$$

Then, the counterfactual frequency in each bin will defined as the weighted average of the relative frequency across n pre-reform years, normalised by the number of taxpayers in the post-reform empirical distribution of turnover, after the introduction of the new eligibility turnover threshold:

$$\hat{c}_j = \sum_{t_{before}} w_{t_{before}} p_{j,t_{before}} \cdot \sum_{i=y_{min}}^{y_{max}} c_{i,t_{after}}.$$

Excess bunching is defined in the same way as in section 3.1. Finally, 95 % confidence intervals are estimated with a bootstrap procedure with replacement using residuals outside the bunching region.[37] Then, after generating new turnover distributions, I re-estimate the bunching mass and turnover responses, as well as the elasticity by solving equation (6).

Table I1: Excess bunching and turnover responses: estimates from control-group bunching method (1) versus baseline (2)

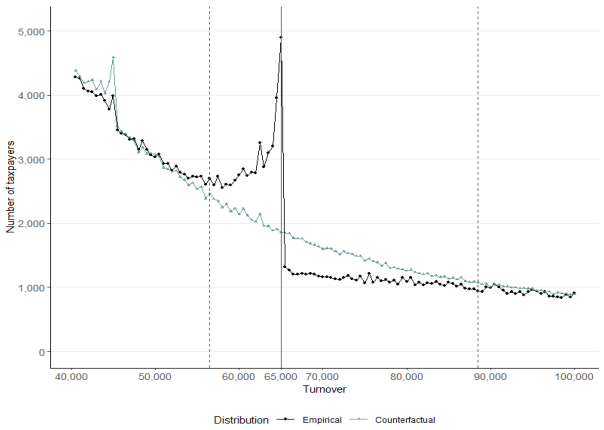
Sector	Excess bunching		Observed response		Structural response ($\Delta a = 1300$)	
	(1)	(2)	(1)	(2)	(1)	(2)
Professionals	6989 [5189; 8827]	7240 [6217; 8302]	0.042 [0.031; 0.053]	0.043 [0.035; 0.052]	0.136 [0.101; 0.172]	0.140 [0.113; 0.168]
Retail & Accommodation	478 [288; 602]	619 [527; 710]	0.017 [0.010; 0.022]	0.026 [0.020; 0.032]	0.240 [0.145; 0.302]	0.368 [0.285; 0.453]
Business Intermediaries	937 [795; 1039]	997 [836; 1103]	0.031 [0.027; 0.035]	0.034 [0.027; 0.041]	0.144 [0.124; 0.163]	0.159 [0.124; 0.188]

Note: Excess bunching is estimated in fig. I2. The structural responses shown here are computed using (9) taking into account compliance costs ($\Delta a = 1300$). The 95% confidence intervals are reported in brackets and are estimated with the bootstrap method.

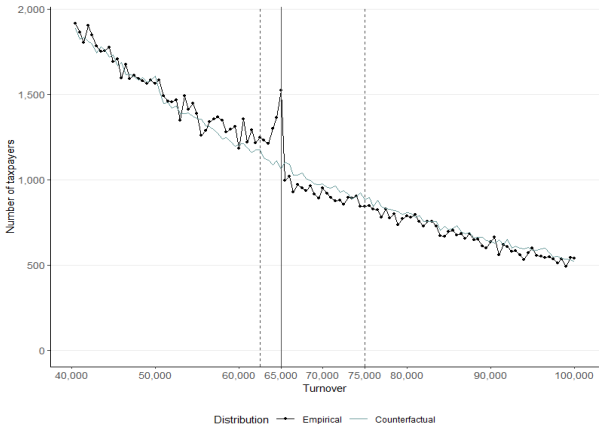
[37] In the case of F-regime taxpayers in the sectors of professionals and business intermediaries (figures I2a, I2c), where the residuals outside the bunching region are all negative, the opposites of these residuals are also considered to generate each bootstrap turnover distribution. This is to avoid that all generated distributions are consistently below the empirical one in each bootstrap.

Figure I1: Empirical and Counterfactual Distributions of Turnover

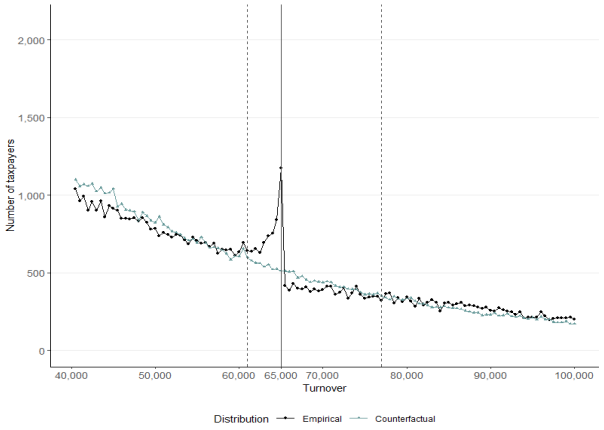
(a) Professionals



(b) Retail & Accommodation



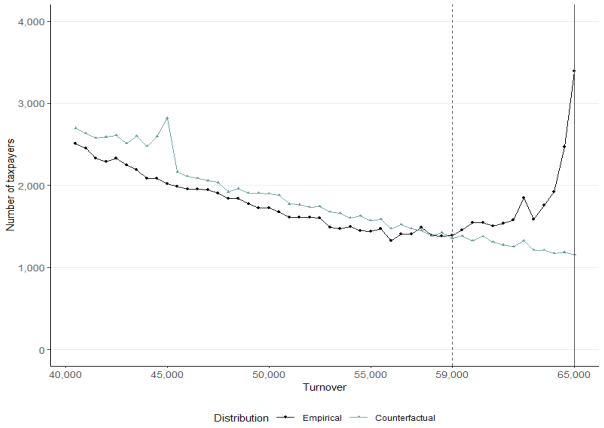
(c) Business intermediaries



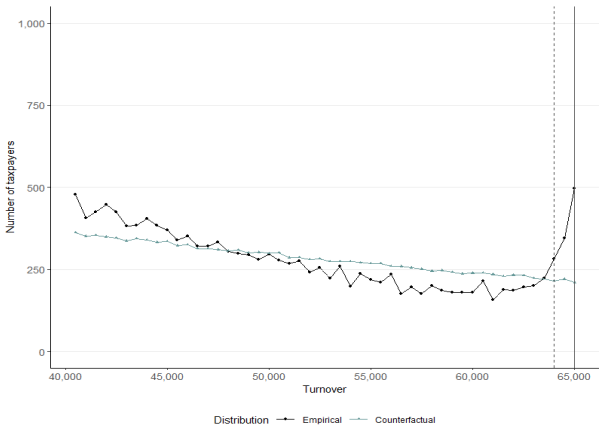
Note: these graphs represent the empirical distributions of turnover in 2019 (black) and the counterfactual (grey) constructed using the control-group bunching method. The counterfactual distribution is based on the pre-reform years (2013-2017).

Figure I2: Empirical and Counterfactual Distributions of Turnover

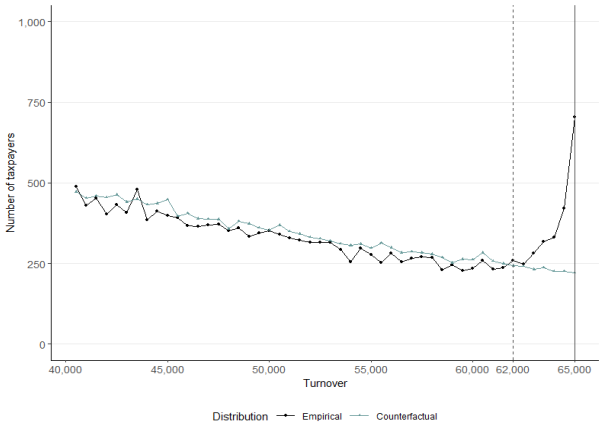
(a) Professionals



(b) Retail & Accommodation



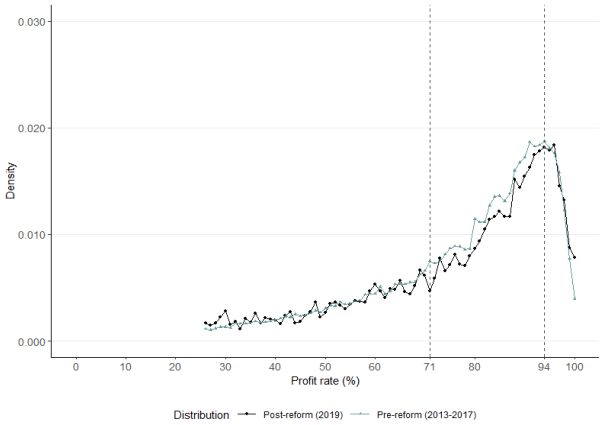
(c) Business intermediaries



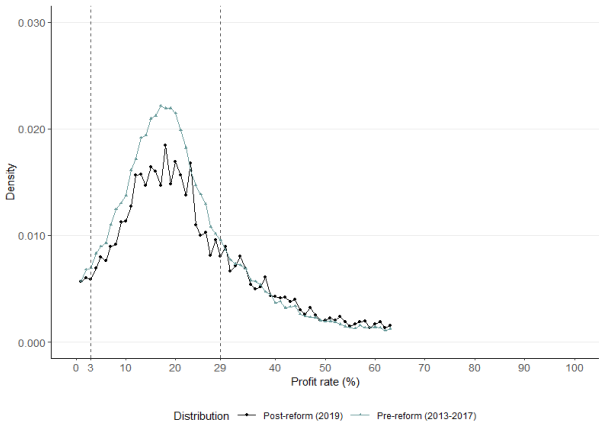
Note: these graphs represent the empirical distributions of turnover in 2019 for F-regime taxpayers only (black) and the counterfactual (grey) constructed using the control-group bunching method. The counterfactual distribution is based on the pre-reform years (2013-2017).

Figure I3: Profit Rate Distributions in 2019 and counterfactuals.

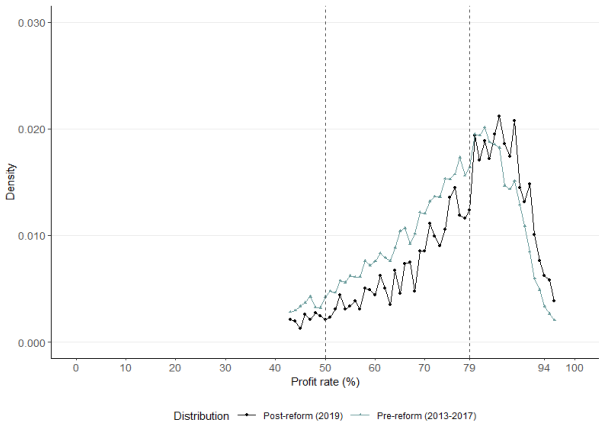
(a) Professionals



(b) Retail & Accommodation



(c) Business intermediaries



Note: These graphs plot the profit rate distributions for the regions of the turnover distribution where the marginal buncher is estimated to be located in each sector: [83,500; 88,500] for professionals, [70,000; 75,000] for retail and accommodation, and [71,000; 77,000] for business intermediaries.. The counterfactual distribution is obtained by averaging across distributions in the period 2013-2017 when €65,000 was not a discontinuity in the tax schedule. The grey dashed vertical lines mark the interval of the profit rate distribution where the empirical (2019) distribution deviates from the counterfactual. Omitted data points represent less than 10 observations per bin.

Appendix J Derivation of the Indifference Condition

For the marginal buncher M, utility from bunching at the threshold is

$$U_{y^*} = (1 - t_P)y^* - c(y^*) - \frac{n}{1 + \frac{1}{e}} \left(\frac{y^*}{n}\right)^{1+\frac{1}{e}} - a_B$$

Then, at the best interior point, y_I, with profits Π_I, the agent's utility reads

$$U_{y_I} = (1 - t_A(\Pi_I))\, y_I - c(y_I) - \frac{n}{1 + \frac{1}{e}} \left(\frac{y_I}{n}\right)^{1+\frac{1}{e}} - a_A.$$

Using the FOC for optimisation above the turnover threshold y^*, $[1 - t_A - c'(y) - \pi \cdot T'(\Pi)] = \left(\frac{y}{n_i}\right)^{\frac{1}{e}}$, we can rewrite U_{y_I} as

$$U_{y_I} = n\,(1 - t_A)\,(1 - t_A - c'(y) - \pi \cdot T'(\Pi))^e \left[1 - \frac{e}{1+e}\left(\frac{1 - t_A - c'(y) - \pi \cdot T'(\Pi)}{1 - t_A}\right)\right] - c(y_I) - a_A$$

Setting $U_y^* - U_{y_I} = 0$ gives

$$\begin{aligned}
&(1 - t_P)y^* - \frac{n}{1 + \frac{1}{e}} \left(\frac{y^*}{n}\right)^{1+\frac{1}{e}} + c(y_I) - c(y^*) + \Delta a \\
&-n\,(1 - t_A)\,[1 - t_A - c'(y) - \pi \cdot T'(\Pi)]^e \left[1 - \frac{e}{1+e}\left(\frac{1 - t_A - c'(y) - \pi \cdot T'(\Pi)}{1 - t_A}\right)\right] = 0
\end{aligned}$$

Divide all terms by n, and use the agent's FOC in absence of the threshold, $y^* + \Delta y^* = n(1 - t_P - c'(y))^e$. Finally, after pre-multiplying the condition by $1/(1 - t_P) \cdot (1 - t_P - c'(y))^e$ and collecting terms, we can rewrite the indifference condition as

$$\frac{1}{1 + \Delta y^*/y^*} \left[1 - \frac{k \cdot \Delta y_I - \Delta a}{(1 - t_P)y^*}\right] - \frac{e}{e+1} \left(\frac{1}{1 + \Delta y^*/y^*}\right)^{1+1/e} \frac{1 - t_P - k}{1 - t_P}$$

$$- (1 - t_A)^{1+e} \cdot \frac{1}{(1 - t_P)[1 - t_P - k]^e} \left(\frac{1 - t_A - k - \pi \cdot T'(\Pi)}{1 - t_A}\right)^e \left[1 - \frac{e}{e+1} \cdot \frac{1 - t_A - k - \pi \cdot T'(\Pi)}{1 - t_A}\right] = 0$$

where $c'(y) = k$ and $c(y^*) - c(y_I) = k \cdot \Delta y_I$. Reworking the terms of this expression gives condition 6.