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

Francesco Alosa†

Job Market Paper

November 14th, 2023
Link to the latest version
Preliminary version - do not circulate

Abstract

Turnover is a key indicator of economic activity, but we know little about how much entrepreneurs adjust it as a response to taxation. This paper exploits a discontinuity in the Italian tax schedule of solo self-employed to study turnover responses to taxation. I consider the notch created by the eligibility cut-off of the preferential turnover tax scheme. I find substantial and significant bunching by solo self-employed below the turnover threshold. The effects of the tax scheme on bunching are heterogeneous across sectors, with professionals, business intermediaries and retailers having the largest observed responses. I estimate the turnover tax elasticity in these three sectors by focusing on the marginal buncher. To do so, I build on Kleven and Waseem (2013) to develop a theoretical framework that fits the institutional set-up and rationalises the observed responses to it. Professionals have the largest turnover elasticity (0.066). Difference in compliance costs across regimes explains less than half of the observed responses, therefore highlighting the key role of low taxation for the observed bunching behaviour.

JEL classification: H24, H25, H30.

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

*I wish to thank my supervisor, Matthew Wakefield, for his thoughtful suggestions. This project benefited from comments during presentations at the Institute for Fiscal Studies, Royal Economic Society 2023 PhD conference, 2022 Public Economics PhD course in Helsinki. For their valuable comments, I wish to thank Stuart Adam, Francesca Barigozzi, Spencer Bastani, Jonathan Cribb, Jarkko Harju, Tuomas Matikka, Helen Miller, Håkan Selin, Vincenzo Scrutinio, Giulio Zanella. For this project, I use data from the Italian National Statistics agency (Laboratorio ADELE-ISTAT). Results and opinions expressed in the paper are my own and do not represent official statistics from the agency. This paper was awarded the 2023 SIEP prize.

†Department of Economics, University of Bologna, Italy; Uppsala Center for Fiscal Studies (UCFS); email: francesco.alosa2@unibo.it

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 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 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, self-employed could choose between the ordinary

[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.

tax regime and a scheme with potentially preferential tax-rates and simplified compliance procedures. The ordinary tax regime is moderately progressive and includes personal income-tax, social security contributions and VAT. The preferential tax regime would exempt self-employed from VAT, and replace the progressive personal income tax schedule with a proportional levy on taxable income ("a flat tax"). 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 357% 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, the most responsive groups are Professionals and Business intermediaries with estimated structural elasticities of 0.066 and 0.047 respectively.

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. (2022) 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

[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 and Bosch (2023) 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.

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 costs related to the tax system. Indeed, I find that the financial incentive of the tax system is still the main driver of turnover responses. Finally, while Aghion et al. (2022) stress the importance of tax simplicity and evasion responses, my findings might be evidence that real responses play a role as bunching remains large after excluding self-employed with reported turnover being multiple of one thousand (round-number bunching).

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 this 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 that is faced by the marginal buncher.

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/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

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

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 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 1), social security contributions (table 2), and 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] Thus, solo self-employed only had one alternative option to the ordinary regime in each year. 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. I now provide further details of the turnover scheme (F-regime from now on).

Table 1: 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%

[8] Italy has two reduced VAT rates: 4% for food and agricultural products; 10% 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.

Table 2: 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. Slightly different contribution rates apply for members of professional associations.

Preferential turnover tax scheme: F-regime

From 2016, the F-regime is the main preferential tax scheme for solo self-employed in Italy.[10] Table 3 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 $T-1$. The largest group of taxpayers – including lawyers, doctors, professors, architects and other professionals – faces the €30,000 threshold in 2016-2018. From 2019, the cut-offs are equalised to €65,000 across sectors.

The new scheme exempts taxpayers from VAT and replaces the income tax schedule with a proportional tax rate (15%).[11] Moreover, it grants a 35% reduction in SSCs for artisan enterprises and shopkeepers, that 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 3). 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 effective preferential tax rate on turnover is therefore given by the social security contribution rate plus the statutory tax rate multiplied by the share of taxable turnover (net of social security contributions).

As the F and the ordinary regimes have different tax bases, the incentives at the threshold will be heterogeneous across agents. Given the statutory tax rates in the F and ordinary regime, the incentive to bunch will depend on the difference between the notional profits (tax base in the F-regime) and the actual profits (tax base in the

[10] Before 2016, another preferential tax regime was available for solo self-employed. See Appendix G.
[11] The tax rate reduces to 5% if the business is less than 5 years old.

Table 3: F-regime rules by sector in 2016-2018 (2019)

Sector	Turnover cut-off (thousands €)	% of Taxable Turnover	Tax rate (%)
Real estate	25 (65)	86	15
Business Intermediaries	25 (65)	62	15
Professionals	30 (65)	78	15
"Other activities"	30 (65)	67	15
Food & beverage	45 (65)	40	15
Retail & accommodation	50 (65)	40	15

Note: the tax rate drops to 5% if the business is less than 5 years old. Turnover cut-offs in 2019 are in parentheses.

ordinary regime). 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. This implies that the F-regime threshold is a notch without a clear dominated region.[12]

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 data contain information on annual revenues from sales, net of VAT, costs for intermediate inputs of production (like goods and services), personnel expenditures, and profits. 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 SSCs in the F-regime. For the purpose of this project, I restrict the sample to self-employed without collaborators and employees, as these are the individuals that can qualify for preferential tax schemes in Italy by complying with the (turnover) eligibility threshold. Table 4 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 industries.[13] Then, I also consider self-employed with collaborators and firms with employees for placebo tests.

[12] Another mechanism, which was analysed by Harju et al. (2019) and Liu et al. (2021), involves VAT. Conditioning on the level of turnover, the incentive (to bunch) generated by the VAT exemption will be stronger for agents with higher value added. However, this is relevant only if VAT incidence is split between consumers and the providers of goods or services with pass-through of VAT on to prices. For most sectors, this mechanism seems less important. The only exception is Retail and Accommodation, which is discussed further in appendix E.

[13] For the preferential turnover 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.

Table 4: 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 sample includes self-employed with turnover between €40,000 and €100,000. Taxpayers are categorized by Statistics Italy's industrial classification (ATECO 2007).

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

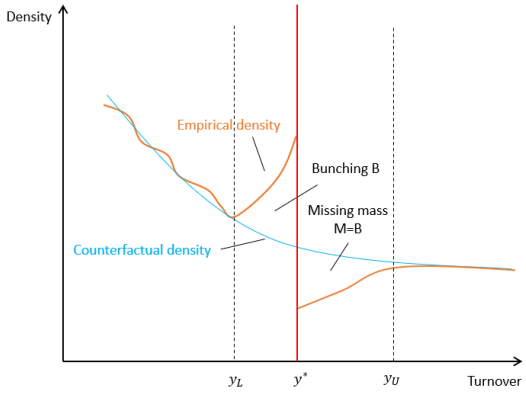
The bunching method requires the estimation of the counterfactual distribution that would have existed in the absence of the notch which will be compared to the empirical distribution. In this section, I describe two procedures to estimate the counterfactual distributions. The first one is the standard 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 1, 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 $(y^* - s, y^*]$.

Figure 1: Estimating the Counterfactual Distribution of Turnover

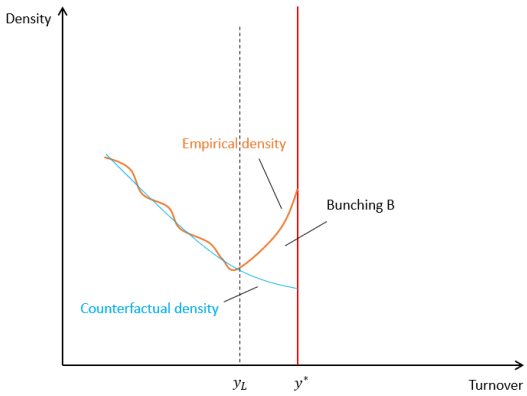
Panel A - Standard Method

(a) All taxpayers

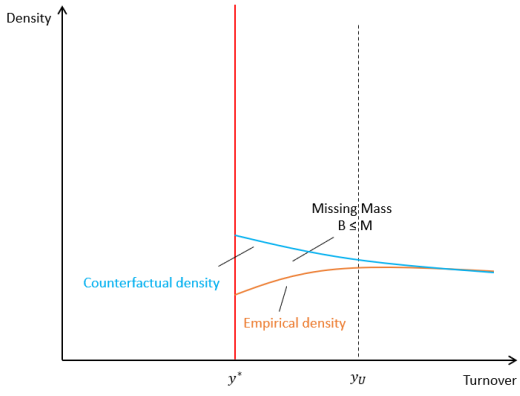


Panel B - Alternative Method

(b) F-regime taxpayers



(c) Ordinary regime taxpayers



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. In view of round-number bunching, I omit taxpayers declaring revenues that are multiples of €1K for the benchmark estimation.[14] 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 $\hat{M} = \sum_{j>y^*}^{y_U} (\hat{c}_j - c_j)$.

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.[15] These individuals have moved below the turnover threshold and opted out from the ordinary regime. Hence, we should be able to observe the missing mass above the threshold 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 strategy is that the excess bunching of F-regime taxpayers below the eligibility threshold should be lower than or equal to the missing mass in the turnover distribution of ordinary-regime-taxpayers above the threshold (Figure 1 Panel B). The counterfactual density is estimated 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.[16]

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.

[14] Including these observations would require to add round-number fixed effects to the regression for the counterfactual estimation.

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

[16] For the counterfactual turnover distribution of ordinary regime taxpayers above the €65K threshold, I use the distributions in the period 2013-2017 when €65K was not the F-regime eligibility threshold.

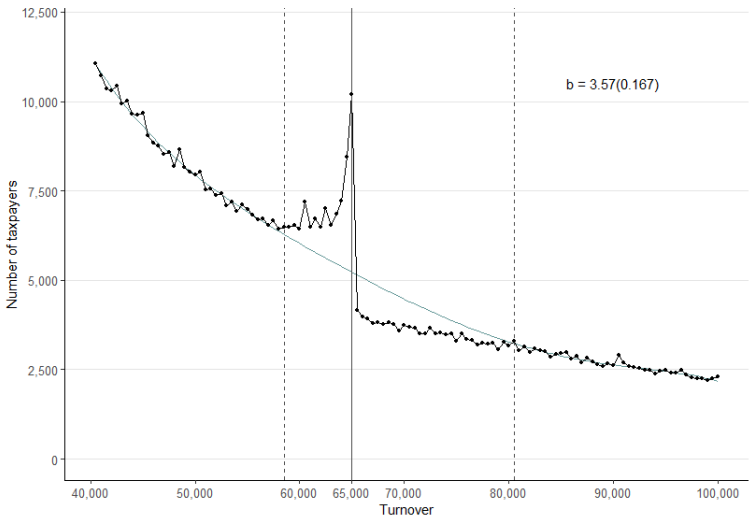
3.2 Evidence of Turnover Responses

Figure 2 shows the turnover distribution 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 2 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 3.57, meaning that the excess mass of individuals below the €65,000 cut-off is equal to 357% of the estimated counterfactual frequency at the threshold. As a placebo test, I plot the same section of the turnover distribution for each year before 2018 in Figure H1, when €65,000 was not the eligibility threshold of the F-regime, and I do not find bunching. Hence, we can safely attribute the observed bunching in Figure 2 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 D1 in the appendix.

Then, I apply the alternative method (described in section 3.1) to estimate bunching in Figure B1, in which I consider only the samples of F-regime taxpayers below the €65,000 threshold. As described in section 3.1, the excess mass estimated among F-regime taxpayers below the threshold should be lower or equal than the missing mass estimated above it among ordinary regime taxpayers. This is because self-employed individuals have opted out from the ordinary regime and bunched below the threshold to access the F-regime.

Figure 2: Bunching in 2019 at the €65,000 F-regime threshold

(a) Standard Method: all taxpayers



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.

3.3 Heterogeneity in Bunching: Sector-specific Analysis

Figure 3 shows the distributions of turnover of all taxpayers (both ordinary and F-regime) of the different sectors. The corresponding excess bunching coefficients b are reported in Figure 4, where the excess bunching coefficient is defined as the ratio between the excess mass of taxpayers to the left of the threshold and the value of 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 D2 in the appendix.

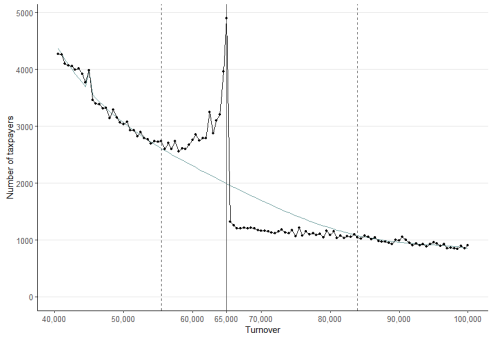
Self employed in different sectors have different incentives to bunch for two reasons: i) some sectors are on average more profitable than others, meaning that self employed in higher value added industries have a larger tax burden in the ordinary regime than lower value added ones, conditional on turnover; 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 preferential turnover regime. To find whether this is actually the case, we 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. We observe more bunching in those sectors in which larger shares of taxpayers would have a larger tax base in the ordinary regime (See Appendix F).

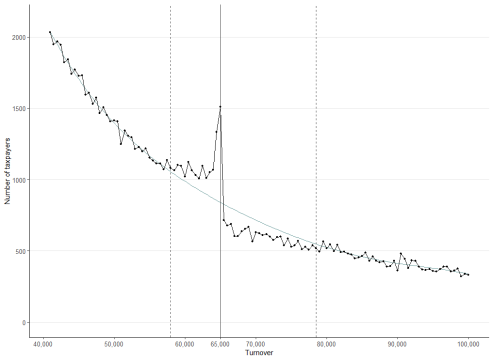
In some of my analyses I consider the sub-sample of solo self-employed that includes only F-regime taxpayers (sections 5.2-5.3). Figure B2 shows bunching below the F-regime threshold for this sub-sample. Professionals, Business intermediaries and Retail & Accommodation are the sectors with the largest observed bunching coefficients. Then, as argued in section 3.1, the distribution of ordinary regime taxpayers above the threshold is also affected. This is because the self-employed individuals that are bunching below the threshold have moved from above and opted out from the ordinary tax regime. Hence, using years before the €65,000 threshold applied to provide the counterfactual, it must be the case that the distribution of ordinary regime-taxpayers has missing mass above the threshold in 2019. Figure B3 provides evidence supporting this prediction. In all sectors, 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.

Figure 3: Bunching at the €65,000 threshold in 2019 to access the preferential turnover regime.

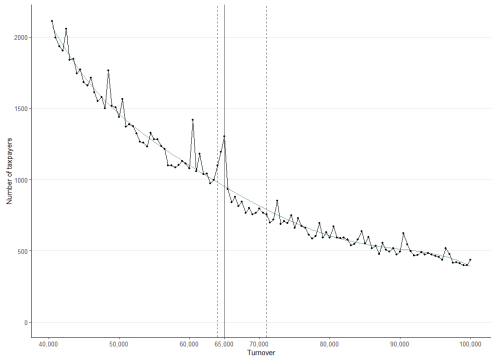
(a) Professionals



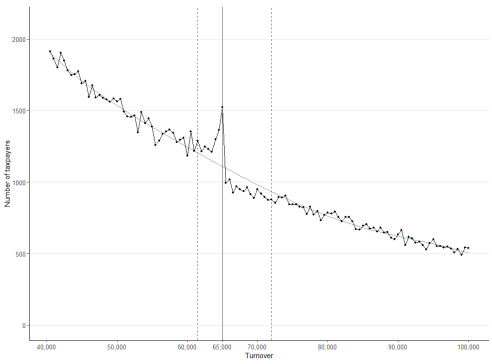
(b) Other Activities



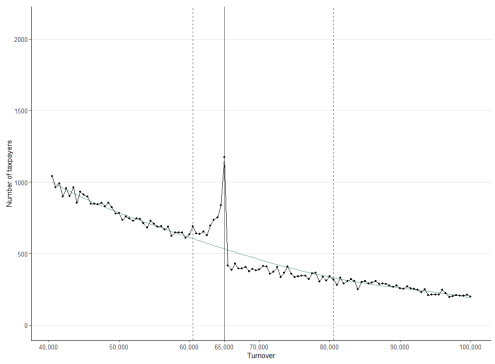
(c) Construction & Real Estate



(d) Retail & Accommodation

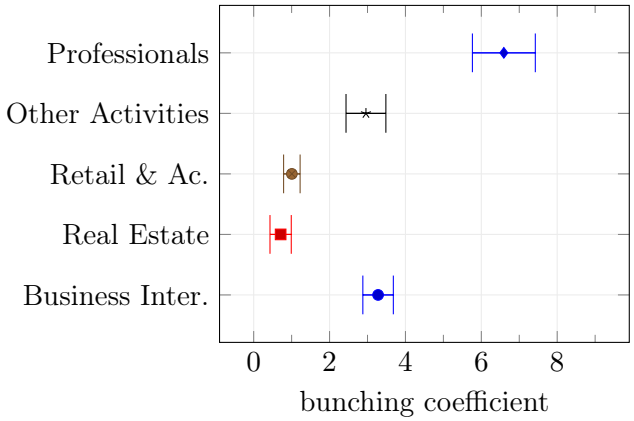


(e) Business Intermediaries



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 using the standard method described in section 3.1 with a polynomial of order 5.

Figure 4: Bunching coefficients for observed turnover responses to the €65,000 threshold in 2019.



Note: this figure reports the bunching coefficients of the graphs in Figure 3. The bunching coefficient is defined as the ratio between the total excess mass below the turnover threshold and the counterfactual density at the threshold. The 95% bootstrap confidence intervals are reported in parenthesis and are computed by estimating a large number of turnover distributions (500 samples).

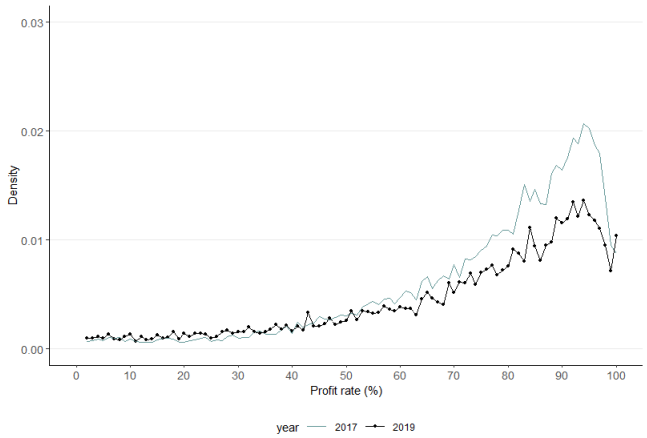
3.4 Choice of Tax-regime Below the Threshold: Evidence

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 5 plots the distributions of the profit rate (profit as a share of turnover) for professionals with turnover just below the F-regime eligibility threshold. For relatively high levels of the profit rate, the density in 2019 is 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 with turnover between €60,000 and €65,000, anyone with a profit rate above 72% would be strictly better-off in the F-regime. Hence, figure 5 documents that 69% of professionals in this section of the turnover distribution make a dominated choice. I interpret this as evidence of optimisation frictions, and we use this information 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.[17]

[17] Evidence for the other sectors is provided in Figure B4.

Figure 5: Profit rate distribution for Professionals in the ordinary regime located below the €65K threshold.



Note: the graph shows the distribution of the profit rate – given by the ratio between profits and turnover – for professionals 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.

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.

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.[18] Then, individual production costs c_i determine where in the profit distribution an agent is located, conditional on generating a certain level of turnover.

[18] I implicitly assume that the agent could always sell (earn) more if desired.

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

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

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 preferential tax regime is therefore $t_P = t_B + t_V\, (c_i/y)$. The cost of compliance procedures of the preferential 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. $t_A(\Pi) = T(\Pi)/y$.[19] The cost due to compliance procedures is a_A, which is larger than in the preferential regime, i.e. $a_A > a_B$.

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

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.

Agent's optimisation

For an agent optimising to the left of the turnover cut-off ($y \leq y^*$), the FOC is given by $y^* = n\,[(1 - t_P) - c'(y)]^e$ 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

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

[19] The two regimes might also imply a differential incidence of taxes on the entrepreneur's side. For instance, if VAT is not fully passed on to selling prices, revenues would be scaled down by $1 + \alpha\, t_V$ where α captures the split of the tax incidence between consumers and sellers. $\alpha = 0$ means VAT is fully passed on to consumers, so that changes in VAT are irrelevant for the entrepreneur. The opposite case is $\alpha = 1$, when entrepreneurs bear the whole VAT burden.

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

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

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 marginal costs given by $c'(y) = k$, the FOC simplifies to

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

where $\pi = (y - c(y))/y = 1 - k$ 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 and the individual cost function c_i – therefore keeping n_i and c_i distinct – the model accounts 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). This condition exploits the fact that one agent – the marginal buncher – is indifferent between: (i) bunching at the turnover threshold to access the turnover regime; or, (ii) remaining in the ordinary regime at the best interior point above the threshold. The indifferent condition reads as follows

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

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

where $T'(\Pi) = \frac{\partial T(\Pi)}{\partial \Pi}\big|_{\Pi = \Pi_I}$, and $\Delta a = a_A - a_B$ is the difference between compliance costs in the 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. However,

differently from 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.

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 6 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).

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 and therefore faces a larger implicit turnover tax rate $t_A(\Pi)$ than agent M. 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. 6b), 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 simply driven by heterogeneous profitability across agents. In the absence of frictions, all agents with profits above a certain threshold level $\overline{\pi}$ will bunch. The (last) 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

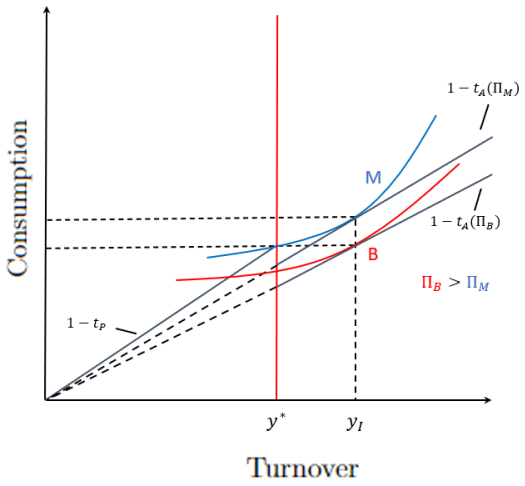
$$B = \int_{y^*}^{y^*+\Delta y^*} \int_{\bar{\pi}}^{1} h_0(\pi) d\pi dy \approx (1-\zeta) h_0\left(y^*\right) \Delta y^* \tag{7}$$

where ζ is the share of taxpayers who do not choose to bunch because they have very low profits (lower than π_L) and therefore very low tax liabilities in the ordinary (profit-based) regime above the threshold y^*. The approximation assumes that the counterfactual

Figure 6: Bunching with multiple notched budget sets - theoretical predictions

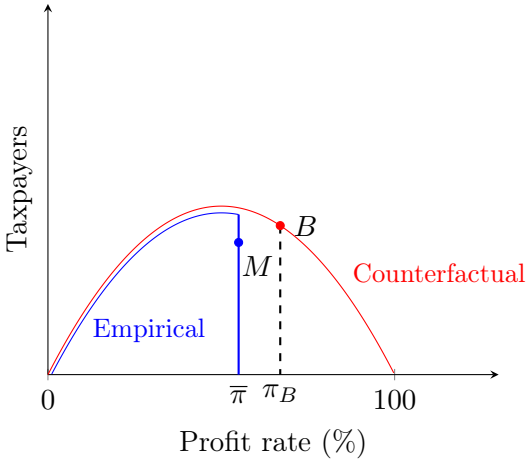
Panel A - Budget sets

(a) Baseline

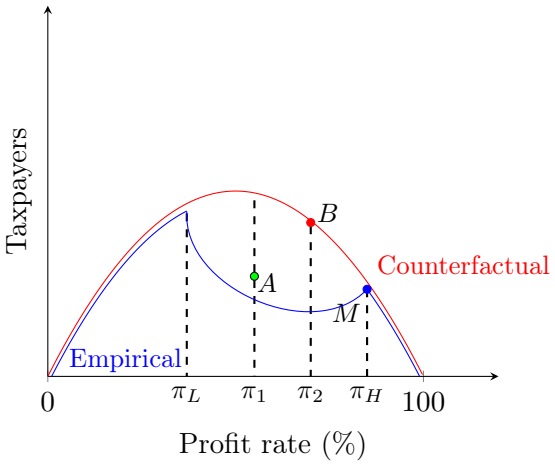


Panel B - (Stylized) profit distributions at turnover $y_I > y^*$

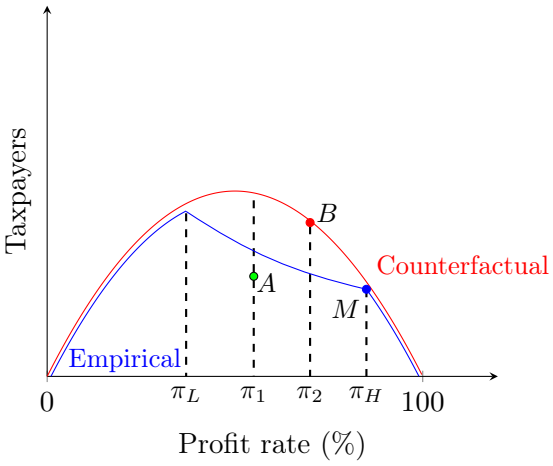
(b) Baseline



(c) Heterogeneous Elasticities



(d) Heterogeneous Elasticities + Frictions



density $h_0(y)$ and the share of non-bunchers ζ is roughly constant for $y \in (y^*, y^* + \Delta y^*)$. Reworking (8) 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 6c-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 below π_L, as these agents are paying relatively little in the profit-based ordinary regime. Thus, these agents prefer not to bunch and remain at their best interior point. Then, agents with a profit rate higher then 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. Moreover, 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 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 distribution (with profit rate between π_L and π_H). These agents are taxed more than low profit-individuals in the ordinary (profit-based) regime, but at the same time do not consume as much as the higher profit-types because they are less productive. For these agents, reducing turnover by bunching at the threshold can be beneficial.[20] 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

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

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.[21] The term $(1-\beta)\,\mathbb{E}[\Delta y_e^*]$ is

[20] 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. 6 d).

[21] 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.

defined as the average (observed) turnover response attenuated by optimisation frictions. Reworking (8) yields the average structural response

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

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, Business Intermediaries, Retail and Accommodation.

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.

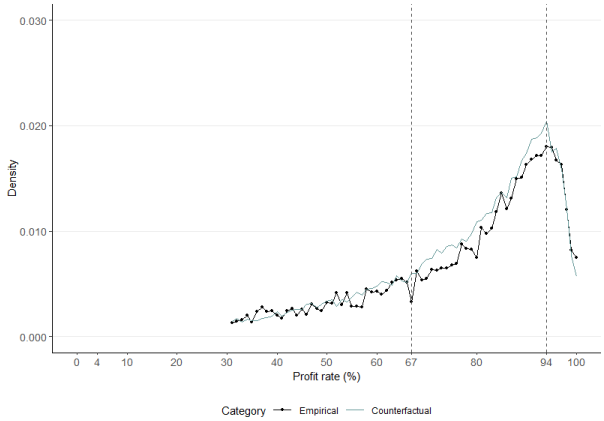
First, using the framework developed in section 4.3, we can find the tax incentive of the marginal buncher by considering the distributions of profit of taxpayers that are located in the region of the turnover distribution of interest. The key idea behind this strategy is that the missing mass of taxpayers above the eligibility threshold of the turnover regime should be 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.[22] 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 7 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 is in line with the theoretical prediction of bunching in the case of heterogeneous elasticities and optimisation frictions presented in section 4.3. Therefore, the upper bounds of the marked intervals identify the marginal buncher and its tax incentive in each sector.

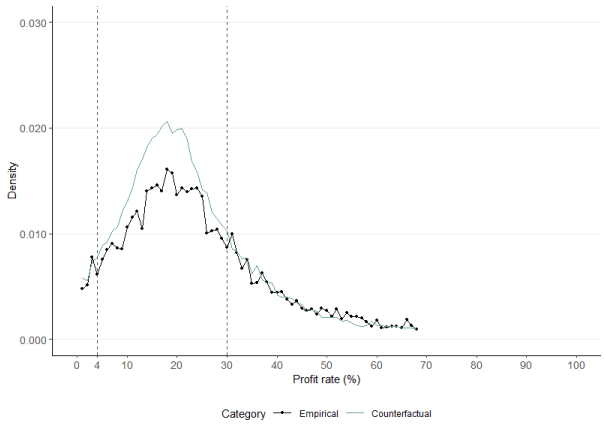
[22] The distributions in the period 2013-2017 are used as counterfactual, as €65,000 was not a discontinuity in the tax schedule before 2018.

Figure 7: Profit Rate Distributions in 2019 and counterfactuals: Finding the Tax Incentive of the marginal buncher.

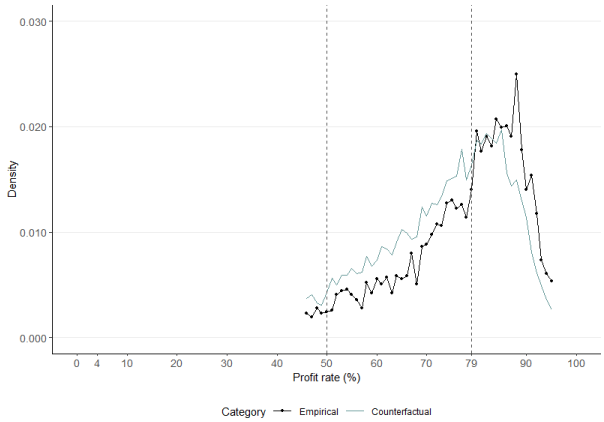
(a) Professionals



(b) Retail & Accommodation



(c) Business intermediaries



Note: These graphs plot the profit rate distributions for the region of the turnover distribution where the marginal buncher is estimated to be located in each sector. 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.

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 preferential turnover scheme. 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 69%, 78%, 92% 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 B5), suggesting that most 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.

Table 5: Observed excess bunching and turnover responses

Sector	Excess Bunching	Observed Turnover response	Structural response
Professionals	7137 [6039; 8279]	0.042 [0.033; 0.051]	0.134 [0.107; 0.163]
Retail & Accommodation	743 [586; 840]	0.034 [0.024; 0.041]	0.422 [0.311; 0.534]
Business Intermediaries	1012 [828; 1106]	0.035 [0.026; 0.040]	0.158 [0.119; 0.183]

Note: Excess bunching is estimated in fig. B2. Structural responses are computed using (9). The 95% confidence intervals are reported in brackets and are estimated with the bootstrap method described in section 3.1.

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.[23] 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 B2, and the share of non-bunchers due to optimisation frictions β estimated in section 3.4. Table 5 reports the estimates of excess bunching, observed and structural turnover responses for the three sectors of interest.

5.3 Structural Elasticities - Results

Table presents the estimates of the tax elasticity in the different sectors. 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.[24] For that, I use the estimate of Harju et al. (2019). As the main simplifications of the preferential 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 baseline scenario as behavioural responses are now partly explained by the additional hassle costs in the ordinary regime. However, for professionals and business intermediaries, the elasticities remain significantly higher than zero, and the financial incentive is still the main driver of turnover responses. The largest elasticity is estimated in the sector of professionals (0.066).

Table 6: Turnover tax elasticity estimates.

Sector	Turnover tax elasticity e	
Professionals	0.106 [0.073; 0.130]	0.066 [0.038; 0.088]
Retail & Accommodation	0.043 [−0.037; 0.096]	0.028 [−0.079; 0.094]
Business intermediaries	0.073 [0.041; 0.098]	0.047 [0.018; 0.069]
Δ Compliance costs	0	€1300

Note: To obtain these estimates, I solve condition (6) by using the structural responses estimated by (9), the observed values for $t_A, t_B, t_V, T'(\Pi), \beta, k, \pi$ 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).

[23] For being in the F-regime in year T, they had 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.

[24] The elasticity estimates for Retail & Accommodation are obtained with the additional assumption of full VAT incidence on the entrepreneur side. This assumption rationalises observed behaviour in this sector. For more details, please see Appendix E.

5.4 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, the largest responses come from professionals and business intermediaries with estimated elasticities of 0.066 and 0.047 respectively. Differently from Harju et al. (2019), compliance costs seem to play a secondary role for the turnover responses as their inclusion explains less than half of behavioural responses. Hence, the results show the importance of financial incentives for bunching behaviour of larger sole-owner businesses. This is because the costs related to VAT filing, estimated by Harju et al. (2019), are a relatively low proportion of turnover for individuals around the €65,000 threshold. Since the main simplification of the F-regime is the exemption from VAT filing, this estimate is a good reference for the value of easier compliance procedures in the preferential regime in Italy.

Responses could reflect changes in productive effort (labour supply), but at this stage it is not possible to exclude the hypothesis that evasion might explain part of the adjustments in turnover.[25] Other authors (e.g. Aghion et al, 2022) have argued that the simplest evasion strategies would involve reporting turnover as a round number at, or very close to, the eligibility threshold. The facts that in my data bunching is often quite dispersed below the threshold, and that responses remain large even after omitting observations that report turnover as a multiple of 1000, would therefore be consistent with real responses.

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

[25] In that case, our estimate for the elasticity would be a linear combination of the real and evasion elasticities.

elasticity. To do so, I adapt 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.

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. First, the desirability of preferential tax regimes should be thoroughly studied. 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. Moreover, individuals opting for preferential tax regimes usually have easier compliance procedures that require less information to be communicated to the tax authority. This is possibly concerning as it can weaken the ability of the tax authority to verify individual tax behaviour and identify frauds.

Second, it would be useful to know the extent to which the observed reductions of turnover are driven by real behaviour or evasion. While these two cases have equal financial implications for the Treasury, the individual welfare implications are different. If responses represent real choices, then the policy is distorting downwards the labour-supply decisions of individuals around the threshold and fails to stimulate growth for businesses. In the case of tax planning/evasion, the policy is solely eroding the tax base and reducing revenues, while the individual benefits from higher consumption thanks to their activity in the informal sector.

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., Akcigit, U., Gravoueille, M., Lequien, M., & Stantcheva, S. (2022). 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] 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.

[6] 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.

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

[8] 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.

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

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

[11] 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.

[12] 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.

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

[14] 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.

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

[16] 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.

[17] Massenz, G, & Bosch, N. (2023). The anatomy of tax responsiveness: Evidence from Dutch closely held corporations. Manuscript.

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

A Derivation of the Indifference condition

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

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

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

$$U_{y_I} = \left(\frac{1 - t(\Pi_I)}{1 + \alpha\, t_V}\right) y_I - c(y_I) - \frac{n}{1 + \frac{1}{e}} \left(\frac{y_I}{n}\right)^{1+\frac{1}{e}}$$

Using the FOC, $\left(\frac{1}{1+\alpha t_V}\right)[1 - c'(y) - \pi \cdot T'(\Pi)] = \left(\frac{y}{n_i}\right)^{\frac{1}{e}}$, we can rewrite U_{y_I} as

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

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

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

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

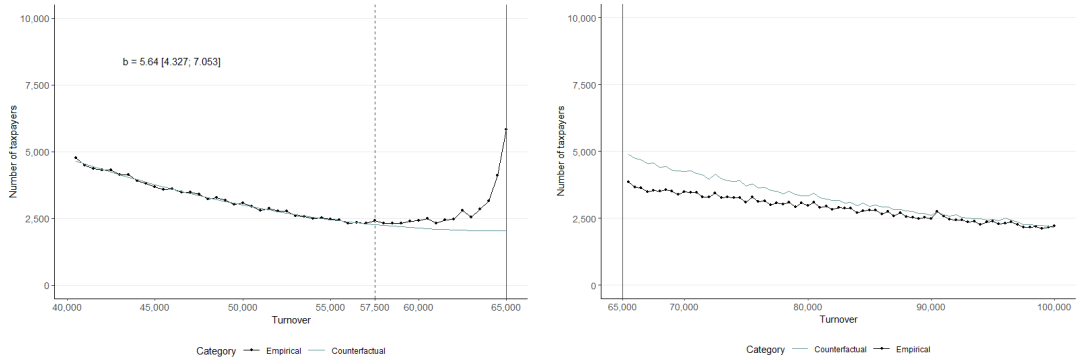
$$\frac{1}{1 + \Delta y^*/y^*} \left[1 - \frac{c(y^*) - c(y_I)}{(1 - t_P)y^*}\right] - \frac{e}{e + 1} \left(\frac{1}{1 + \Delta y^*/y^*}\right)^{1+1/e} \frac{1 - t_P - c'(y)}{1 - t_P}$$

$$- \left[\frac{1 - t_A}{1 + \alpha\, t_V}\right]^{1+e} \cdot \frac{1}{(1 - t_P)[1 - t_P - c'(y)]^e} \left(\frac{1 - c'(y) - \pi \cdot T'(\Pi)}{1 - t_A}\right)^e \left[1 - \frac{e}{e + 1} \cdot \frac{1 - c'(y) - \pi \cdot T'(\Pi)}{1 - t_A}\right] = 0.$$

B Additional Graphs

Figure B1: Excess Mass and Missing Mass around the €65,000 threshold in 2019: alternative method.

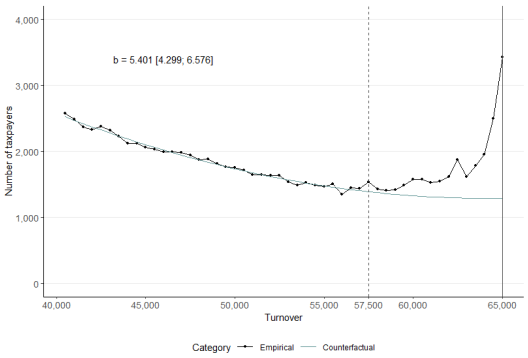
(a) F-regime taxpayers below €65K **(b)** Ordinary regime taxpayers above €65K



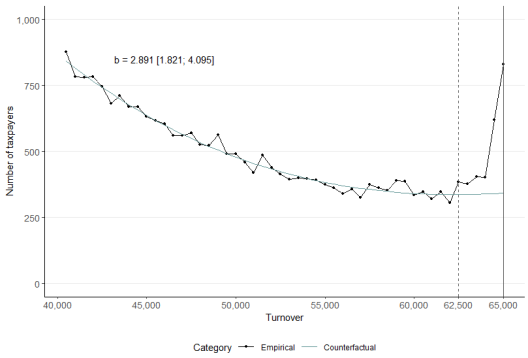
Note: graph (a) reports the distribution of turnover for the sample of F-regime taxpayers below the €65,000 threshold (vertical grey line). The vertical dashed grey line marks the beginning of the excluded region that is affected by bunching. The counterfactual distribution is estimated using the alternative method described in section 3.1. The bunching coefficient b is defined as the ratio between the estimated excess mass and the value of the counterfactual density at the threshold. The 95% confidence interval is reported in brackets and are estimated with the bootstrap method as detailed in section 3.1. Graph (b) reports the empirical (2019) and counterfactual distribution of turnover for the sample of ordinary regime taxpayers above the €65,000 threshold. The average distribution of turnover in 2013-2017 is used as counterfactual for 2019, as €65,000 was not a discontinuity in the tax schedule before 2018.

Figure B2: Taxpayers in the F-regime bunching at the €65,000 threshold in 2019.

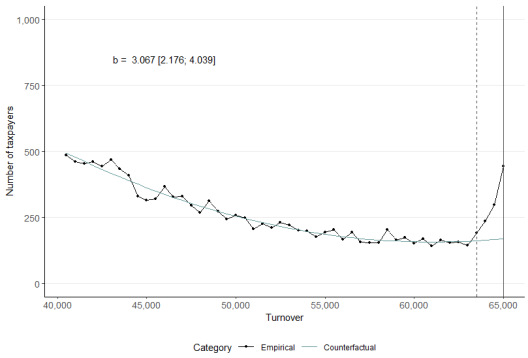
(a) Professionals



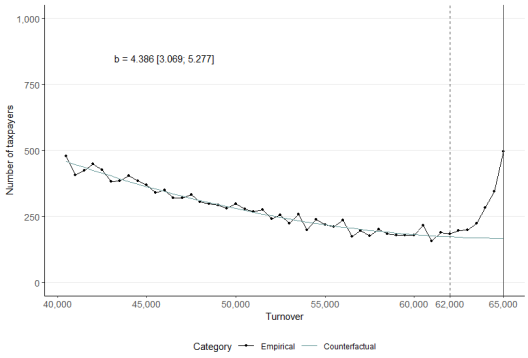
(b) Other Activities



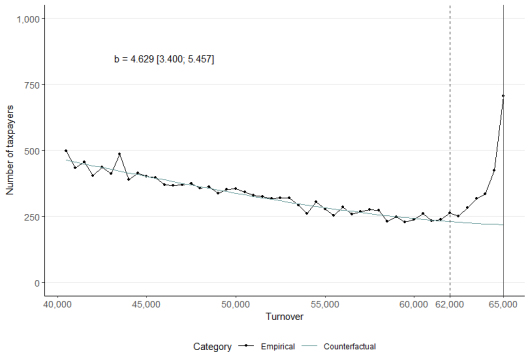
(c) Construction & Real Estate



(d) Retail & Accommodation



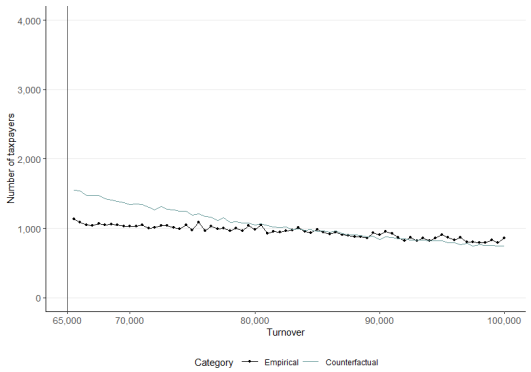
(e) Business intermediaries



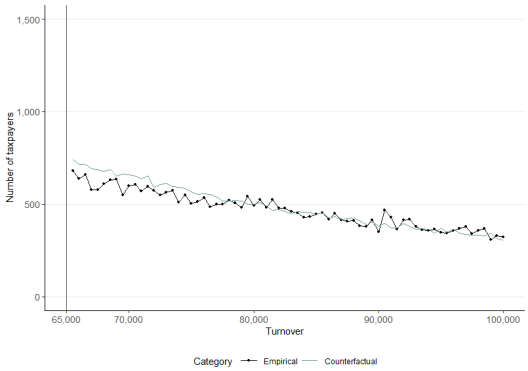
Note: the graphs report the distributions of turnover in the different sectors for the sample of F-regime taxpayers below the €65,000 threshold (vertical grey line). The vertical dashed grey line marks the beginning of the excluded region that is affected by bunching. The counterfactual distribution is estimated using the alternative 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 interval is reported in brackets and are estimated with the bootstrap method as detailed in section 3.1.

Figure B3: Taxpayers in the ordinary regime above the €65,000 threshold.

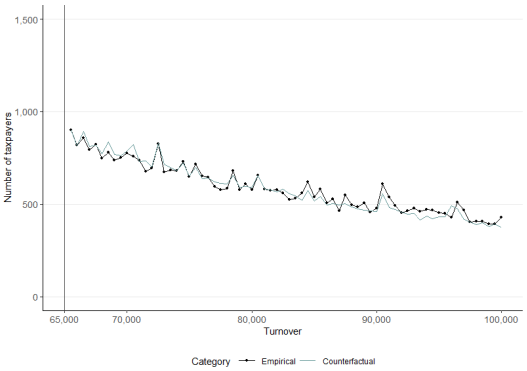
(a) Professionals



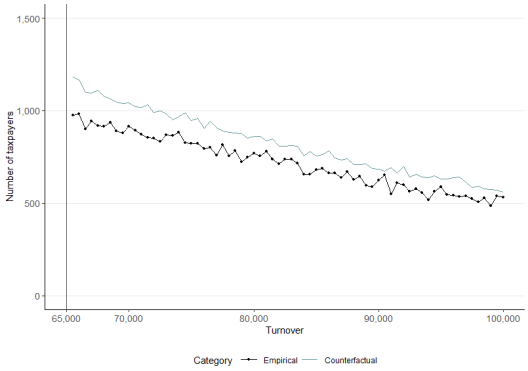
(b) Other Activities



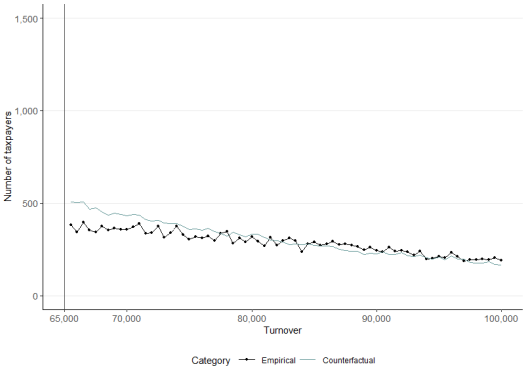
(c) Construction & Real Estate



(d) Retail & Accommodation



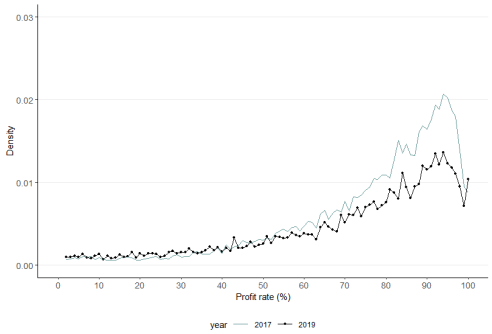
(e) Business intermediaries



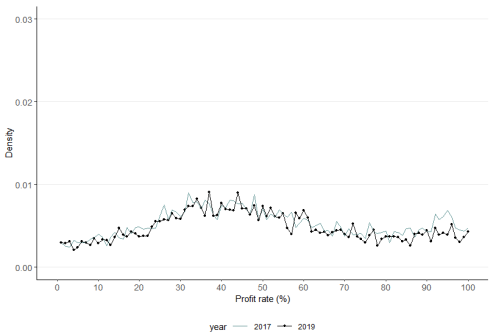
Note: the graphs report the empirical (2019) and counterfactual distribution of turnover for the sample of ordinary regime taxpayers above the €65,000 threshold (vertical grey line). The distributions of turnover in 2013-2017 are used as counterfactual for 2019, as €65,000 was not a discontinuity in the tax schedule before 2018.

Figure B4: Profit rate distribution in the ordinary regime located below the €65K threshold

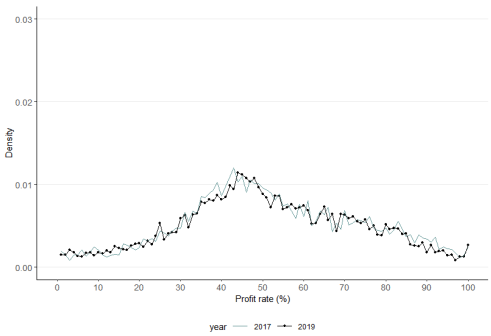
(a) Professionals



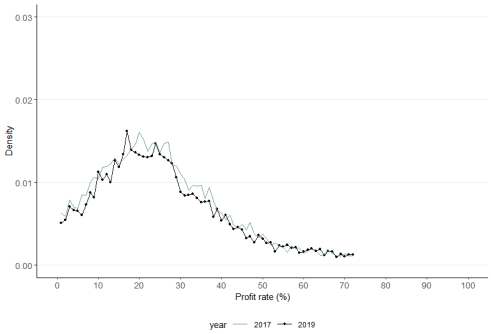
(b) Other Activities



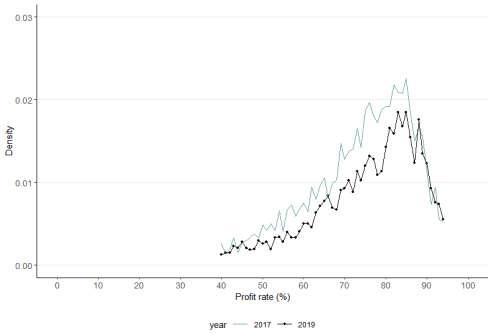
(c) Construction & Real Estate



(d) Retail & Accommodation

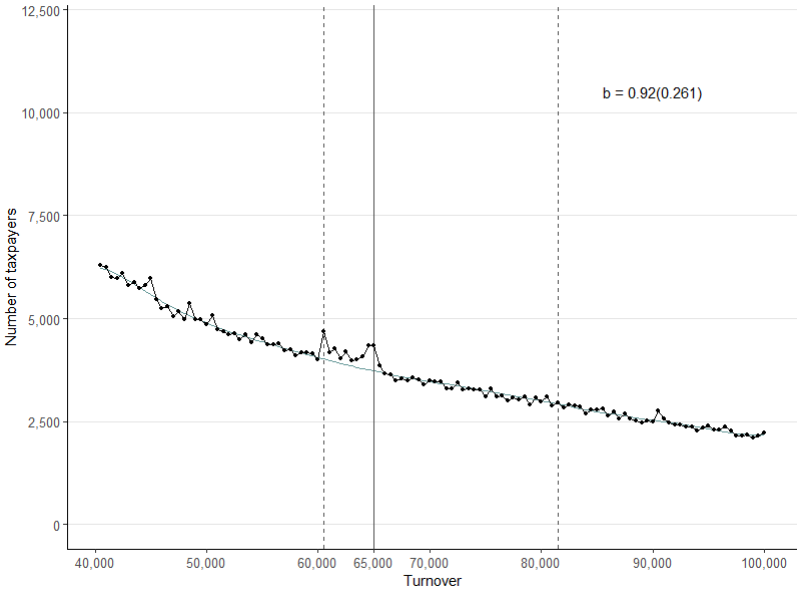


(e) Business Intermediaries



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 each sector. The distribution in 2017 is used as counterfactual for 2019, as €65,000 was not a discontinuity in the tax schedule before 2018. Omitted data points represent less than 10 observations per bin.

Figure B5: Bunching in 2019 at the €65,000 F-regime threshold - ordinary regime taxpayers only



Note: this graph reports the 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.

C Ordinary tax regime

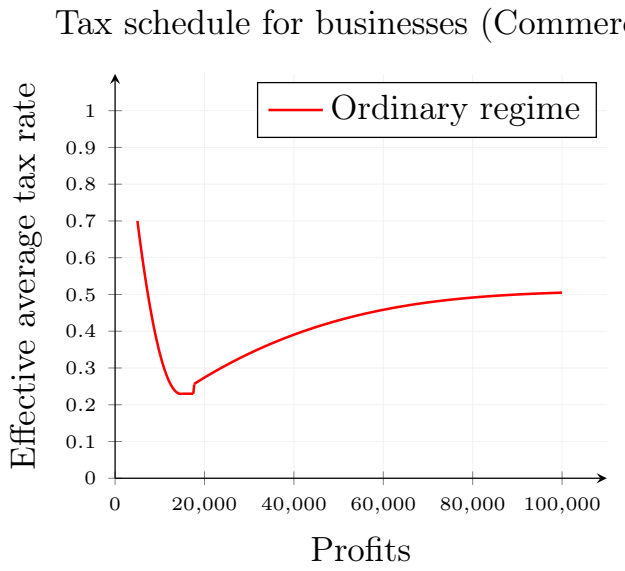
The ordinary tax regime includes the progressive personal income tax (IRPEF) schedule, social security contributions (SSCs), and VAT.

Table C1: Tax credits: 2012-2019

	Tax credits	
Type	Brackets (TP)	Amount
Self-employment	0 – €55,000	$\frac{55{,}000-TP}{50{,}200} \times$ €1,104
one child < (≥) 3 y.o		$\left(1-\frac{TP}{95{,}000}\right) \times$ €1220 (€950)[a]
two children < (≥) 3 y.o		$\left(1-\frac{TP}{110{,}000}\right) \times$ €1220 (€950)[a]
Non-working spouse	0 – €15,000	€800 – $\frac{(110 \times TP)}{15{,}000}$
	€15,001 – €40,000	€690
	€40,001 – €80,000	$\frac{(80{,}000-TP)}{40{,}000} \times$ €690

[a] In 2012, the per-child amount was lower: €800 (€900) for < (≥) 3 y.o. child.
TP: Taxable Profits = Profits − social security contributions

Figure C1: The ordinary regime includes income tax (IRPEF), social security contributions, deductions.



D Sensitivity Analysis

Table D1: Sensitivity analysis of the bunching coefficient with respect to the order of the polynomial that is used to construct the counterfactual distribution of turnover in figure 2. 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 are reported in parenthesis.

Degree of Polynomial	Bunching below €65,000, 2019
2	3.48 (0.139)
3	4.13 (0.133)
4	3.99 (0.155)
5	3.57 (0.167)
6	3.62 (0.188)
7	3.50 (0.237)
8	3.34 (0.226)
9	3.48 (0.348)

Table D2: Sensitivity analysis of the bunching coefficient in each sector with respect to the order of the polynomial that is used to construct the counterfactual distribution of turnover in figure 3. Each column represents one specific sector: (1) Professionals; (2) Other Activities; (3) Real Estate; (4) Retail & Accommodation; (5) Business Intermediaries. 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 are reported in parenthesis.

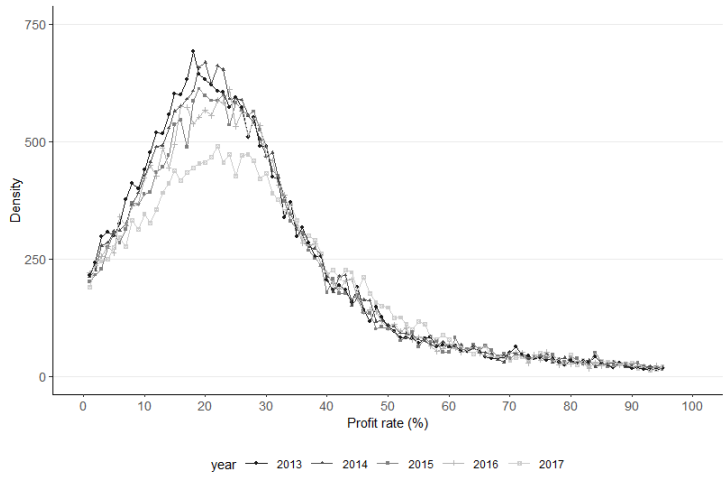
Degree of	Sector				
Polynomial	(1)	(2)	(3)	(4)	(5)
2	9.64 (0.362)	2.26 (0.195)	0.74 (0.148)	1.09 (0.093)	3.38 (0.145)
3	8.15 (0.314)	3.59 (0.237)	0.81 (0.147)	1.09 (0.095)	3.39 (0.149)
4	7.17 (0.47)	3.18 (0.299)	0.77 (0.149)	1.07 (0.102)	3.40 (0.201)
5	6.59 (0.423)	2.96 (0.268)	0.72 (0.143)	1.01 (0.111)	3.28 (0.205)
6	6.38 (0.521)	2.86 (0.325)	0.72 (0.147)	1.02 (0.121)	3.37 (0.305)
7	5.29 (0.495)	2.80 (0.438)	0.69 (0.147)	0.98 (0.131)	3.38 (0.324)
8	5.30 (0.511)	2.73 (0.489)	0.69 (0.148)	0.97 (0.133)	3.17 (0.448)
9	5.06 (0.543)	2.66 (0.778)	0.67 (0.146)	0.95 (0.163)	2.78 (0.358)

E Assumption: VAT incidence in Retail & Accommodation

In the sector of Retail & Accommodation, the majority of solo self-employed selecting the preferential tax regime are low-profit individuals, who would have a low tax burden in the ordinary profit regime. For instance, figure E1 shows the profit distributions for ordinary regime taxpayers with turnover between €45,000 and €50,000. Between 2015 and 2017, self-employed in this region of the turnover distribution could opt for the F-regime as the eligibility threshold was €50,000. The distribution in 2017 shows there are less taxpayers in the ordinary regime for profit rates between 10% and 30%, compared to previous years. This means that a large share of those opting for the F-regime are low-profit individuals.

There are two ways to rationalise this: 1) retailers have higher compliance costs than other types of self-employed in the ordinary regime so that the preferential regime is relatively more advantageous for them; 2) VAT is not neutral for individuals in this sector, so that the preferential F-regime increases their actual revenues by allowing them to sell VAT-exempt products and services. By investigating the choice of tax regimes of individuals with different profits, conditional on a given level of turnover, the observed behaviour can be rationalised either by extremely high compliance costs (up to 8 times as high as the estimate by Harju et al. (2019) or by full VAT incidence on entrepreneurs. In line with evidence showing full VAT incidence on small restaurants (Harju et al., 2018), I impose full VAT incidence on entrepreneurs in the sector of Retail & Accommodation. Therefore, the tax elasticity for Retail and Accommodation in Table 6 is estimated with this additional (VAT-incidence) assumption.

Figure E1: Profit rate distribution for ordinary regime tax-payers with turnover in the region [€45K,€50K]

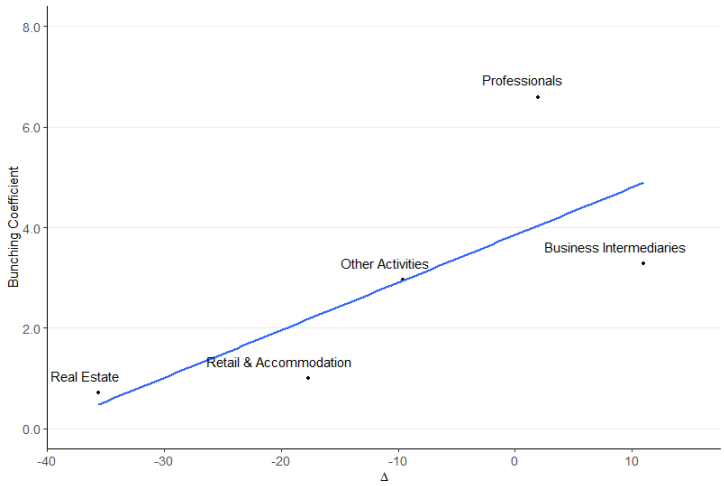


Note: the graph shows the distribution of the profit rate — given by the ratio between profits and turnover — for self-employed individuals with turnover between €45,000 and €50,000 in each sector. Omitted data points represent less than 10 observations per bin.

F Bunching Responses and Tax Incentives

We compare the bunching coefficient of the different sectors from Figure 9 with the difference between actual profit and notional profits for the median agent in the profit distribution (denoted by Δ). 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 F1 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 F1: Heterogeneous responses and tax incentives



Note: on the x-axis, Δ is defined as the percentage point difference between median profits and the notional profit for the preferential regime, as a share of turnover, for each sector. The median profit as share of turnover is taken from the distribution of taxpayers with turnover between €40K and €100K.

G Preferential profit tax scheme: M-regime

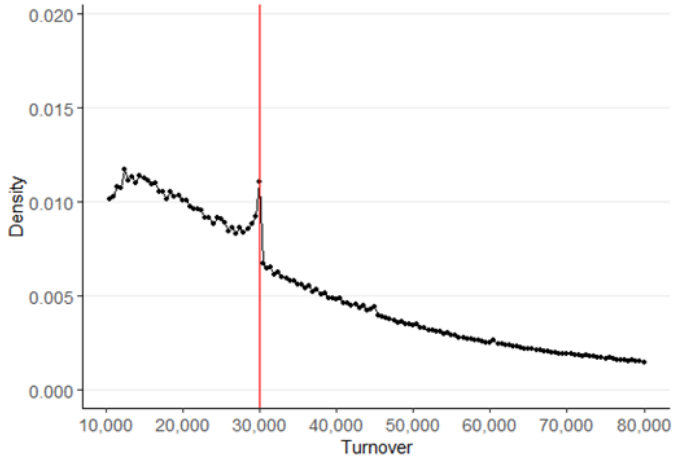
Between 2012 and 2015, solo self-employed with turnover below €30,000 could opt out of the ordinary regime and choose the M-regime. This scheme exempts entrepreneurs from VAT registration, annual VAT declaration to the tax authority, as well as record-keeping on clients, suppliers, purchases and payments. 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. While the scheme was abolished in 2015, people already in and satisfying its requirements could keep it.

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.

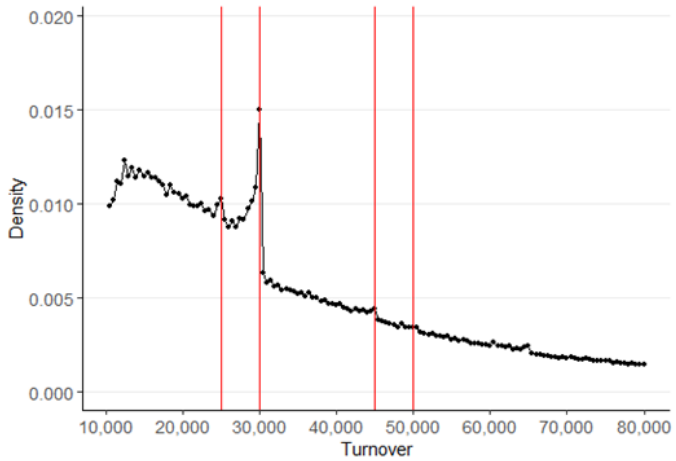
Figure G1 shows the distributions of turnover in the three periods under study. In the top graph, between 2012 and 2014, we observe bunching just below €30,000, that is the threshold to qualify for the M-regime. Then, the middle graph shows the turnover distribution in the period 2016-2018. Bunching 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 G1). However, most bunching is observable below the new threshold of the turnover (F) regime at €65,000 that is valid for all sectors.

Figure G1: Bunching in the different periods.

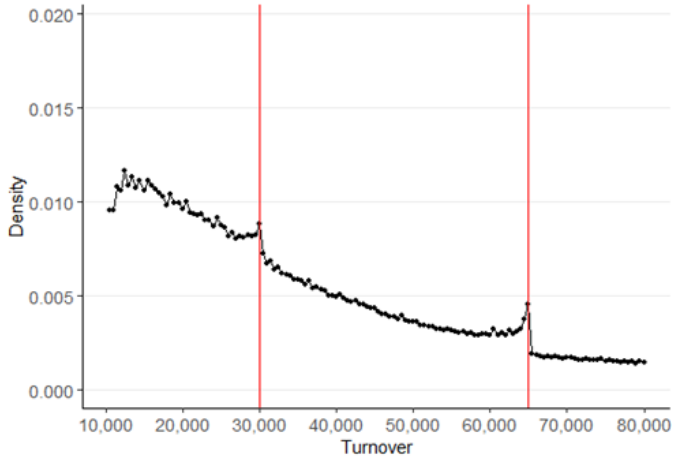
(a) 2012-2014: M regime (30K threshold)



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



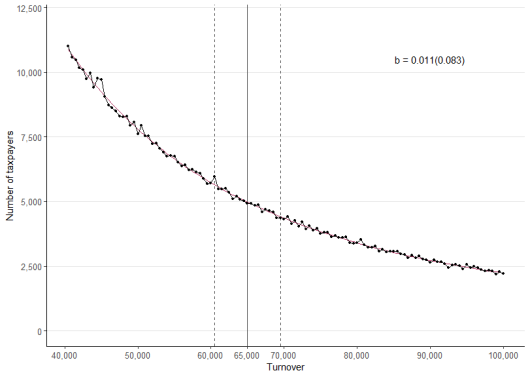
(c) 2019: M regime (30K threshold) & F regime (65K threshold)



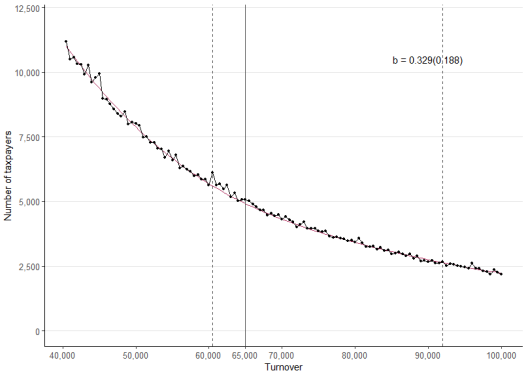
H Placebo Tests

Figure H1: Placebo Test: (no) bunching below €65,000 before it became the eligibility threshold of the F-regime (before 2018).

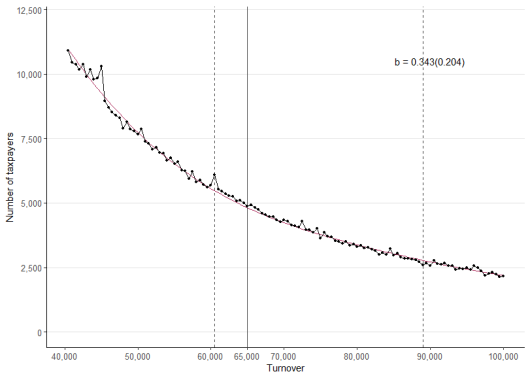
(a) 2012



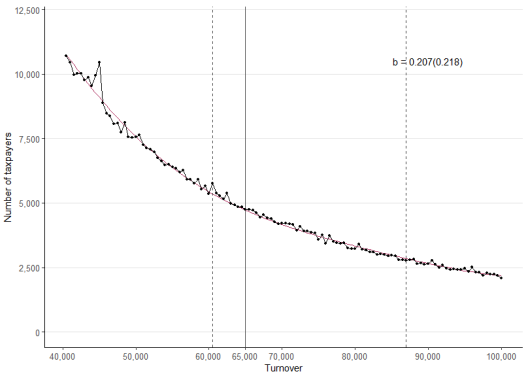
(b) 2013



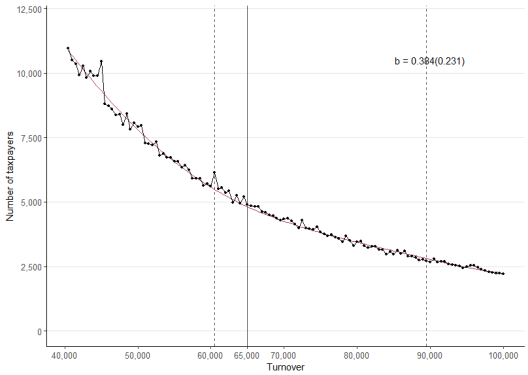
(c) 2014



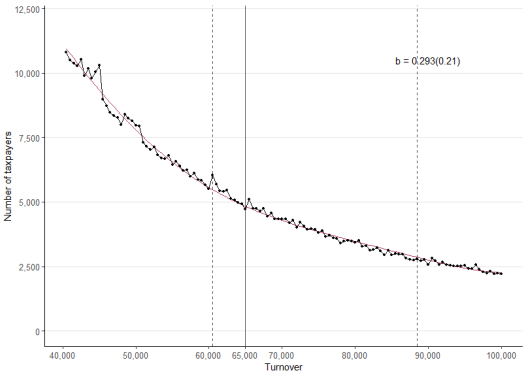
(d) 2015



(e) 2016

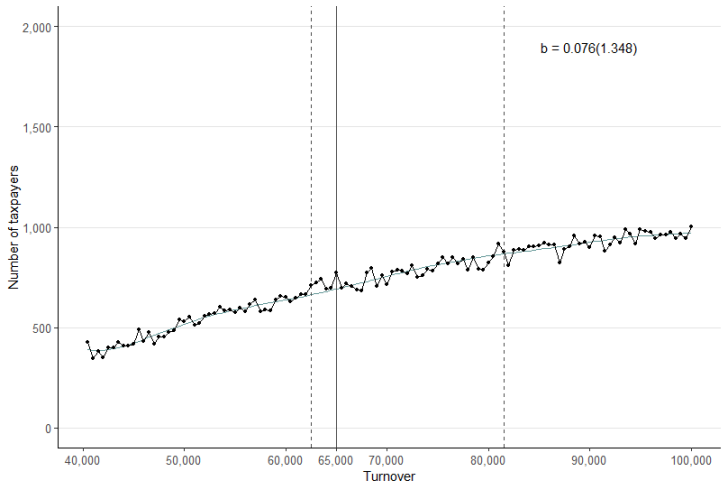


(f) 2017



Note: these graphs report the distribution of turnover in each year before 2018, that is the year in which €65,000 became the eligibility threshold of the F-regime. 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 H2: 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.