Who understands the French Income Tax ? Bunching where Tax Liabilities start*

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Abstract

This paper deals with behavioral responses and informational barriers at the earnings level where French income tax liabilities start. Complexity of the tax system induces an ambiguity between three potential thresholds. I highlight a significant bunching in the taxable income distribution of maintenance obligation recipients for two of them: the tax collection notch, which is the true point of entry in the tax system, and a false taxation kink located below, which is salient but has no economic nor legal existence. The resulting ETI is equal to 0.15 when accounting for the 80% optimization frictions estimated. Bunching at the false threshold might be rationalized as a cautious behavior in an uncertain environment, since optimizing households favor this location when the local marginal tax rate just above increases. Finally, I show that a better access to information through online reporting steps up reactions at the point of entry in the income tax.

JEL classification codes: D83, H24, H31, K34.

Keywords: Income tax, bunching, information, rationality, optimization frictions.

*This paper does not reflect the position of Insee but only its author's view.

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1 Introduction

The taxable income threshold where French income tax liabilities start is a major issue for policy design. First, many households are concerned (Figure 8). Close to the mode of the taxable income distribution, it nearly cuts the population into two halves: in 2012, 21.0M tax households are taxable while 15.7M are not.[1] Second, this entry point gathers incentive issues through potentially high marginal tax rates[2] resulting from the loss of social welfare benefits and from rising taxes.[3] Third, for single taxpayers, this income level is very close to the full-time minimum wage, due to long-term political considerations.[4] However, there is a major ambiguity about the location of this threshold, which is not in line with the lower bound of the first income tax bracket, making it hard for households to determine at which point they will start paying taxes.

In this paper, I focus on potential behavioral responses and informational barriers at the entry point in the French income tax system. Facing disincentives in the form of locally high marginal tax rates, households are theoretically expected to reduce their taxable income in order to avoid these high rates. However, to display such reactions, they should be able both to manipulate their (real and/or declared) income and to understand the tax system. While declarative responses are possible, informational optimization frictions happen to prevent taxpayers from locating at the optimal taxable income level.

Real earnings adjustments through the intensive labor supply are implausible as the French income tax parameters are voted at the end of the income year. Yet, many deductions are available, allowing taxpayers to manipulate their taxable income. I especially highlight behavioral reactions among maintenance obligation recipients, in the form of a significant bunching in the taxable income distribution at the tax collection notch where income tax liabilities start. Relying on the bunching theory, I estimate an elasticity of taxable income with respect to the net-of-marginal tax rate (ETI) of 0.15 when accounting for optimization frictions.

[1] Annuaire statistique de la Direction générale des Finances publiques.

[2] Chanchole and Lalanne [2011] compute the effective marginal tax rate as a function of living standards for different household structures (p.82-85).

[3] Income taxes, but also local housing and property taxes as well as social contributions (CSG) as the taxable income exceeds exemption limits.

[4] "La décote a été introduite par la loi de finances pour 1982 [...]. Elle se substituait à l'époque à un dispositif d'abattement visant à exonérer d'impôt les salariés rémunérés au SMIC disposant d'une part de quotient familial." (Examen de la première partie du PLF 2016, Assemblée Nationale).

Complexity of the French income tax system induces an ambiguity between three potential thresholds, each of which may be interpreted as a point of entry in the tax system. In particular, I show that maintenance obligation recipients display behavioral responses for two of them: the true tax collection notch and a false taxation kink below.[5] Among those bunching households, 25% to 50% locate around the false taxation kink. Ignoring optimization frictions, their ETI is 0.05, which is consistent with the reduced-form elasticity estimated at the tax collection notch when including in the computation of the elasticity at the kink the 80% optimization frictions I estimate at the notch.

The choice to locate at this false taxation kink might be rationalized as a cautious behavior in an uncertain environment. In 2012, bunching at this threshold grew as a consequence of a rise in the marginal tax rate, which did not impact the tax collection notch. Using the panel dimension of the tax files, I show that this evolution is mainly due to households jumping from the true entry point to this false taxation threshold. Unsure about the tax system and facing potentially stronger disincentives, households minimize their risks choosing the lowest threshold. To the contrary, taxpayers did not react to an effective but non-salient 7 percentage point increase in the marginal tax rate in 2014. In this context, search for information is efficient. Compared to households reporting their earnings on hard copy, online filers locate much more at the true tax collection notch, equally at the false taxation kink and display less optimization frictions.

Classic bunching estimation relies on polynomial approximation of a counterfactual density excluding an area near by the point of discontinuity. In the present case, to override the issue of a large excluded region around the two discontinuities, I build on difference-in-bunching estimation and use taxable income distributions for the other years as a counterfactual. The rise in the marginal tax rate at the false taxation kink allows identification of bunching estimates.

The rest of the paper is organized as follows. Section 2 introduces the paper within the literature on bunching estimation of the ETI. Section 3 sheds light on some specific characteristics of the French income tax schedule at the point where tax liabilities start. Section 4 analyzes bunching among maintenance obligation recipients within the framework of the classic bunching theory. Section 5 develops the difference-in-bunching estimation strategy. Section 6 presents the main results and discusses their implications as regards to taxpayers' rationality.

[5] Respectively *Seuil de mise en recouvrement* and *Seuil d'imposition* in French.

2 Bibliography

The elasticity of taxable income (ETI) with respect to the net-of-marginal tax rate is a crucial parameter for welfare analysis and policy design, capturing individual behavioral reactions to a local change in the marginal tax rate. Theoretically, it is a sufficient statistic for welfare analysis and optimal marginal tax rates, as it captures the deadweight loss from reaction to taxation (Saez [2001]). The ETI takes into account all types of reaction to taxation: labor supply responses, income shifting, tax avoidance, carrier concerns, itemized deductions or timing responses (Saez et al. [2012]), thus build up as a relevant measure of the marginal efficiency cost of taxation (Slemrod [1998]).

Empirical estimates of the ETI face major identification issues. A simultaneity bias between taxable income and marginal tax rates arises from the difficulty to disentangle tax-related variations in taxable income from other sources of variation. Tax reforms require the identification of a control group unaffected and that the control and treatment groups are not able to circumvent this policy through income shifting, which is likely especially if the reform impacts the tax base (Kopczuk [2005]). Panel data estimations require heavy corrections as they are subject to mean reversion and trends in income inequalities over time. Saez et al. [2012] conclude that estimated elasticities are very sensitive to the reform and the control group considered. Feldstein [1995] originally estimated an ETI between 1 and 3 on average, but close to zero among low-income taxpayers. Slemrod [1998] and Saez et al. [2012] report ETI averages of 0.3 to 1 in the literature and confirm low values at the bottom of the taxable incomes distribution, for real responses and for tax bases without deductions. Using tax reforms with panel data, Gruber and Saez [2002] find an ETI equal to 0.4 on average, but to 0.18 for poor households. Kopczuk [2005] obtains an elasticity of 0.12 for married filers with no deductions. On French data, Cabannes et al. [2014] measure an average ETI of 0.02 and as high as 0.31 among the 10% of the richest taxpayers.

Bunching methods appear as a more intuitive approach to estimate the ETI. Facing a discontinuity in the tax schedule, taxpayers have an incentive to adjust their earnings in order to locate around this threshold. Aggregation of such behaviors gives rise to a bunching in the taxable income distribution, which can be related to an average shift in taxable income resulting from a local change in the marginal tax rate. Saez [2010] developed this approach in the case of a discontinuity in the marginal tax rate ("kink")

and Kleven and Waseem [2013] for a discontinuity in the average tax rate ("notch"). The main limit is that bunching methods can only track small income variations within a bunching window (Kosonen and Matikka [2015]) and do not immediately catch long-term adjustments to policy changes (Chetty et al. [2011], Brown [2013]). As a result, they provide a lower bound for the ETI.

Bunching approaches reveal mostly declarative behavioral responses, as opposed to real labor supply adjustments. Saez [2010] estimates an ETI equal to 0.25 at the first kink point of the Earned Income Tax Credit (EITC), purely due to tax evasion among self-employed workers, and equal to 0.2 at the lower bound of the first income-tax bracket where tax liability starts, partly due to itemized deductions. Kleven and Waseem [2013] estimate structural elasticities around 0.12 for self-employed workers and below 0.05 for wage earners on notches in the Pakistani Tax system, correcting for optimization frictions. Bastani and Selin [2014] find no bunching among wage earners at the entry point in the Swedish income tax schedule, but measure an ETI of 0.05 among purely self-employed workers and conclude that taxpayers display small short-run behavioral responses to variations in marginal tax rates.[6] Further details about theoretical and empirical aspects of bunching methods might be found in Kleven [2016].

A substantial part of the recent bunching literature focused on the way optimization frictions could explain dampened reactions to tax incentives and generate a gap between observed and structural elasticities. Kleven and Waseem [2013] develop a general method to estimate those and show that 90% of wage earners and 50 to 80% of self-employed workers are impacted by such frictions. Two types are generally considered. First, real frictions are related to labor supply constraints (hours constraints, adjustment and search costs, fixed contracts,...). Chetty [2012] discusses theoretically the way they might affect observed labor supply elasticities. Chetty et al. [2011] highlight that an estimated elasticity depends on labor market frictions, adjustment costs, and is an increasing function of the size of the kink, the utility cost of ignoring it being a decreasing function of its size. In a frictionless model, they estimate an elasticity of 0.02.

Second, informational frictions are related to a weak understanding of the tax system, as a result from either taxpayers' imperfect rationality (inattention, errors, lack of knowledge,...) or from the tax system complexity (salience of taxes, overlapping

[6]Interestingly, they show through simulations that income effects do not impair elasticity estimates, discarding this hypothesis as a potential explanation for small elasticity values.

taxes,...). Optimization errors would partially explain sub-optimal choices among students (Kosonen and Matikka [2015]). In an uncertain environment, taxpayers behave in line with rational inattention and adjust to changes in tax salience when they search for information using online resources (Hoopes et al. [2015]). For the same final price, sales taxes printed next to product prices reduce demand (Chetty et al. [2009]). As a result of these informational frictions, bunching increases progressively over time following a tax reform (Mortensen and Whitten [2015]). Learning the tax system is a costly and slow process which might be affected by peers or by the environment. Chetty et al. [2013] show that taxpayers moving to a region characterized by high-level of tax bunching tend to optimize more and to report a taxable income closer to relevant thresholds. They conclude that bunching is positively related to local knowledge about the tax system.

3 The French income tax system

3.1 Main features

The timing of income tax collection sets clear bounds on behavioral responses. Parameters of the French tax system are voted by public authorities at the end of income year n and taxpayers report their earnings in the middle of year $n+1$.[7] As a consequence, real (labor supply) responses to local discontinuities are very unlikely.

Each person living or working most of the time in France, or whose major economic interests are in France (investment, firm, main professional earnings,...) should report his taxable income,[8] regardless of his income level. Low-income earners have strong incentives to report their income even if they expect not to pay any taxes, as the income tax return is necessary for many administrative procedures and in order to benefit from social and tax advantages (employment bonus, property/housing/television tax exemptions or tax reliefs,...).

Table 1 summarizes the main parameters of the French income tax schedule and their evolution between 2009 and 2014: the lower bound of each tax bracket, the corresponding tax rates and a tax reduction threshold S called the "décote" developed infra. In 2009, the French income tax system is made of five brackets with marginal tax rates increasing

[7] The Finance Law is voted the 29^{th} of December.

[8] The only exceptions are: diplomats, members of the International Committee of the Red Cross (CICR) and, before 2014, people whose earnings were below the guaranteed minimum or low-income retired households.

Table 1: Lower bound of tax brackets defined by their marginal tax rates

Bracket marg. tax rate	2009	2010/11[a]	2012[b]	2013	2014[c]
5.5[c]	5,875	5,963	5,963	6,011	-
14	11,720	11,896	11,896	11,991	9,690
30	26,030	26,420	26,420	26,631	26,764
40/41[a]	69,783	70,830	70,830	71,397	71,764
45[b]	-	-	150,000	151,200	151,956
"Décote"[c] : S	866	878	960	1016	1135/1870

Note: a : Tax brackets and marginal tax rates remain unchanged in 2010 and 2011, and the marginal tax rate of the last bracket is raised from 40 to 41%. b : In 2012, a new bracket is introduced, such that the share of taxable income above 150,000 € is subject to a 45% tax rate. c : In 2014, the first tax bracket is suppressed, so that a single taxpayer faces a 14% marginal rate when his taxable income exceeds 9,690 €. The "décote" for a single taxpayer is 1135 € and a deduction for couples of 1870 € is introduced.

from 0% to 40%. In 2012, a sixth bracket is created and in 2014, the first tax bracket is suppressed. Except between 2010 and 2012, brackets' bounds are pegged to inflation in order to prevent bracket creep.

3.2 From gross income to income taxes

Gross earnings to be declared are: *(i)* wages and salary, *(ii)* retirement pensions, superannuation, *(iii)* income from securities, *(iv)* capital gains, *(v)* land incomes, *(vi)* agricultural profits, *(vii)* industrial and commercial profits and *(viii)* non-commercial profits. Other types of earnings are totally exempted (family benefits, saving account interests,...) or partially exempted (wages of apprentices, students' income from short contracts,...) from income taxes. Employees' social contributions are not taxable.[9] The *net taxable income* is the sum of these reported earnings net of tax allowance (10% for itemized professional expenses,...), deductible charges (intra-household transfer, pension plan contributions, social security contributions,...), special deductions (for elderly or disabled persons) and previous deficits. [10]

Theoretical income taxes T are then computed applying the tax schedule of Table 1 to the taxable income.[11] However, the taxable income level where tax liabilities start is

[9]For instance, the full-time taxable minimum wage, reported on the following figures, is computed as the net minimum wage augmented by social contributions, taking into account deductions for professional expenses and deductible social contributions.

[10]The French legislation also defines a *reference tax revenue* ("revenu fiscal de référence"), integrating some tax allowances, exempted earnings, deductible charges compared to the taxable income. This notion is used to determine the access to social benefits and tax reductions or exemptions.

[11]This operation is realized according to the family quotient, which I will not develop here since I

not equal to the lower bound of the first bracket due to two mechanisms: a tax reduction called "décote" and a tax collection minimum.

First, the "décote" raises the point of entry in the income tax as well as the marginal tax rate just above. This mechanism is characterized by a tax level S such that taxpayers are exempted from taxes as long as $T \leq S/3$, that the marginal tax rate they face is multiplied by 1.5 if $S/3 < T \leq S$ and that they are not impacted if $T \geq S$. For instance, for a single taxpayer and between 2009 and 2013, the marginal tax rate at the low end of the second tax bracket is officially 14% but is in fact equal to 21% due to this "décote" mechanism. The value of S and its evolution between 2009 and 2014 are displayed in Table 1.[12] As evidenced by Pacifico and Trannoy [2015], this "décote" mechanism creates a new hidden tax bracket breaking the monotonicity of marginal tax rates and is thus part of the complexity and opacity of the French income tax schedule.

Second, income taxes are not collected as long as they are less than 61€, which further increases the point of entry in the tax schedule and gives rise to a locally infinite marginal tax rate. The final amount of taxes is obtained subtracting tax reductions and tax credits.[13]

3.3 Who is taxable ?

A *taxable household* has to pay positive income taxes before tax reductions and tax credits took place. For a given number of tax units, tax liabilities start when the taxable income exceeds the tax collection threshold. However, from the perspective of the household, there is an ambiguity between three salient thresholds:

"Theoretical threshold": Theoretically, a household should start paying taxes when its taxable income exceeds the lower bound of the first income tax bracket (Table 1).

focus on single taxpayers.

[12] This "décote" mechanism was created in 1981 in order to exempt from income taxes tax households of 1 or 1.5 units with an income level close to the full-time minimum wage. The aforementioned formula changed over time. The income tax burden accounting for the "décote" was $2T - \frac{S}{2}$ from 1981 to 1999 and in 2014, $\frac{3}{2}T - \frac{S}{2}$ between 2000 and 2013 and $\frac{7}{4}T - \frac{S}{2}$ in 2015. The threshold S is adjusted each year. In 2012, it was raised so as to offset the impact of the bracket creep leading many households to pay taxes. Some years, S also depends on the structure of the household. Tax Code, Article 197, I, 4.

[13] Tax deductions cannot lead to positive transfers to households while tax credit can. Main activities leading to tax reductions are charitable givings, employment of a salaried worker by a private individual, investment in small businesses, rental investment, home care services,...while tax credits concern students' loans interests, union dues, expenses for the environmental quality of the main dwelling,...Taxpayers benefiting from tax reductions also face the 61€ minimum after these reductions have been subtracted from their taxes, whereas for tax credits the tax collection minimum is 12€.

In 2013, for a single taxpayer, this threshold is equal to 6,011 €.

"Taxation threshold": Due to the "décote" mechanism previously mentioned, low-income households whose taxable income belong to the first tax bracket are exempt from income taxes. In 2013, for a single taxpayer, this threshold is equal to 12,067 €.

"Tax collection threshold": Households do pay income taxes only when they exceed 61 €.[14] In 2013, for a single taxpayer, this threshold is equal to 12,353 €. Below, households are legally not taxable. Above this threshold, some specific households loose some tax deductions or exemptions.[15]

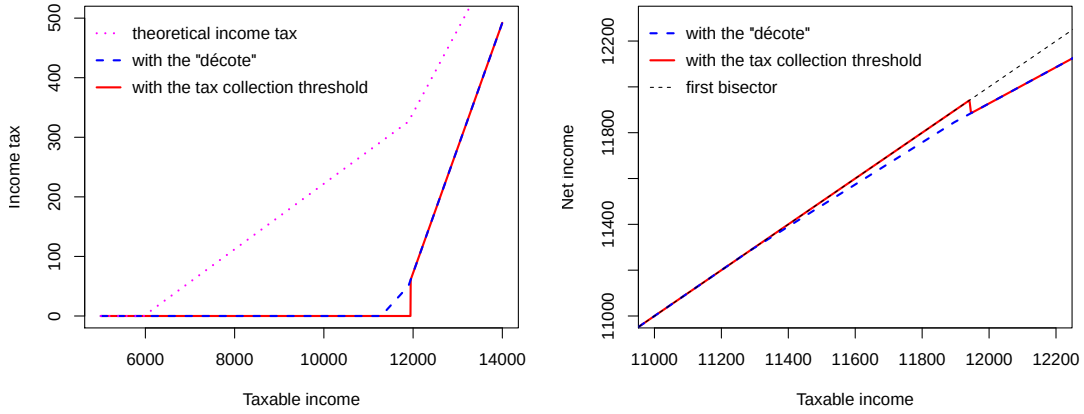
The last two threshold are salient. An explanatory file (*Brochure pratique*) available on the website of the public finances services (DGFip) explicitly mention them and provides a table detailing income taxes as a function of taxable income by 100€ bins. An income tax simulator is also openly available on this website. Therefore, tax households are expected to be aware of these thresholds, no matter how hard it is to compute them from the legislation. Table 8 in Appendix displays these taxation and tax collection thresholds over the period 2009-2014, as a function of the number of tax units and of the family structure for 2014.

The left panel of Figure 1 depicts income tax revenue as a function of taxable income for a single taxpayer in 2010 and 2011. The dashed line shows the income tax defined by the brackets. The dotted line takes into account the "décote" mechanism. The plain line further includes the tax collection threshold. Therefore, the intersection of each one of these three curves with the x-axis corresponds to each one of the aforementioned thresholds. The "décote" threshold S raises the minimum taxable income level above which households start paying taxes and generates an implicit marginal tax rate of 21%. If the entry point in the income tax were the taxation threshold, it would be characterized by a kink, defined as a change in the marginal tax rate. However, this entry point is the tax collection threshold and is characterized by a notch, defined as a change in the

[14] Tax Code, Article 1657, 1bis.

[15] The tax collection threshold is a condition for unemployment benefits, retirement and invalidity pensions holders to benefit from a lower rate of social contributions (CSG), for retirement pensions holders to benefit from a tax exemption (CASA) and for taxpayers over 65 to have a contribution deduction (for public services broadcasting). Other social benefits or tax exemptions depend either on a specific level of reference tax revenue (employment bonus, social contribution exemptions, housing and property tax exemptions, tax credits, scholarships, lower nursery and school canteens tariffs,...) or on the net taxable income level (family, housing and minimum social benefits,...). A detailed list of social advantages and tax reductions or exemptions might be found in Lefebvre and Auvigne [2014] (Fiche 1, Annexe 6, p49-51).

Figure 1: Income tax thresholds (2010 & 2011)



Note: Theoretical tax schedule for a single tax filer in 2010 and 2011. The dotted line shows the first two brackets of the income tax schedule. The dashed line represents income taxes once the "décote" mechanism is taken into account. The plain line presents true income taxes after accounting for the tax collection threshold.

average tax rate. Indeed, as depicted by the right panel of Figure 1, a small increase in the taxable income around the tax collection threshold triggers a local drop in the net income.

3.4 Income tax files and descriptive statistics

I analyze exhaustive administrative data from the French income tax system, from 2009 to 2014. Afterwards, the year mentioned always refers to the income year, whereas taxes are collected the following year. Each observation corresponds to a tax return filed by a tax household. In 2013, approximately 36.7 million households filed a tax form. These data-sets gather information from the 2042, 2042-C and 2042-C PRO forms. Each citizen fills the 2042 form. Self-employed fill the 2042-C PRO form to provide information about their turnover, profits, status (commercial or non-commercial profits, self-employed or not) and potential tax reductions/credits. The 2042-C form is mainly filled by households who benefit from tax reductions or tax credits, and also by capital gains or stock options earners.

Some households characteristics are available: birth date, sex, marital status, date of marriage, of separation, of death, number of children, of dependents (as well as their

potential specific situations: infirmity, older age,...). The composition of gross income is quite detailed according to the aforementioned categories. Finally, information about the employment status is collected when relevant, for instance to benefit from the employment bonus. Thus we know about the long-term unemployment status (> 1 year), earnings from overtime during the previous year, full-time or part-time job and, in the latter case, the number of working hours during the year.

Table 2: Descriptive statistics around the tax collection threshold

Income range	All	]-200; 0]	]0; 200]	]-200; 0]	]0; 200]
Number of tax units	All	1	1	2	2
Avg. number of tax units	1.8	-	-	-	-
Age	41.1	33.9	34.2	44.5	44.5
Women (%)	33.3	46.8	45.8	41.4	41.0
Avg. gross reported income	29,517	14,973	15,081	22,022	22,298
Avg. net taxable income	25,582	12,256	12,456	18,823	19,022
Single (%)	53.6	87.3	87.0	43.6	43.0
Married (%)	28.2	-	-	30.9	31.1
Civil union (%)	3.6	-	-	3.2	3.3
Divorced (%)	13.9	12.2	12.5	22.2	22.4
Widowed (%)	0.7	0.4	0.5	0.1	0.2
Wage earners (%)	86.2	95.3	95.5	95.1	95.2
Self-employed (%)	1.2	0.6	0.5	1.1	1.2
Agricultural profits (%)	1.5	0.7	0.7	1.5	1.7
Manuf. & commercial profits (%)	5.0	2.1	2.0	4.6	4.7
Non-commercial profits (%)	3.4	1.3	1.3	1.6	1.8
Investment income (%)	43.5	29.2	29.4	41.5	42.1
Unemployment > 1 year (%)	1.8	3.9	3.2	1.8	1.9
RSA complement (%)	6.1	4.6	4.1	5.1	4.8
PPE (%)	23.2	48.7	53.6	50.2	50.6
Intra-household tr. recipients (%)	4.2	7.8	3.9	12.7	12,5
Observations	23,341,276	108,765	105,891	18,371	17,922

Note: All tax households reporting a positive net taxable income, except those whom lead registrant earns retirement pensions. The income range is the difference between net taxable income and the tax collection threshold. A household with two tax unit might be composed of a couple or a single parent with his/her child. The shares of income types include each household reporting a strictly positive amount for the corresponding income type. Tax files POTE 2013.

Retirement pensioners benefit from specific tax allowances, reductions, credits, especially when their taxable income exceed the tax collection threshold. In order to prevent these features from interfering with ETI estimates, I exclude retirement pensions holders from the analysis. I also exclude tax households living in overseas departments, who

benefit from another tax allowance,[16] and discuss the case of unemployment benefits recipients in Section 6.

Table 2 displays some features of the population of interest. In 2013, 23.3 million tax households report a positive taxable income. On average, they earn a gross income of 29,517€ corresponding to a net taxable income of 25,582€. Half of them are single, one third are in a couple. One third of the lead registrants are women. A large majority are wage earners. Tax households whose taxable income lies within a 400€ interval around the tax collection threshold are poorer, rely more frequently on the employment bonus or intra-household transfers. This group is 5 times more densely populated among single taxpayers than among households with two tax units.

Finally, given a number of tax units, two groups are compared. On the one hand, tax households whose taxable income lies within a 200 € interval below the tax collection threshold, on the other hand, those whom taxable income lies within a 200 € interval above the tax collection threshold. In nearly all the dimensions we can explore, Table 2 shows that these two populations have the same composition. The only exception is the share of single tax filers benefiting from intra-household transfers, which is two time higher in the first group.

4 Bunching at the income tax entry point

Without prejudice about which one of the three aforementioned thresholds tax households should perceive as the true entry point in the income tax, I now consider potential bunching at each one of these three points. Faced with a discontinuity in the tax system, such as a locally higher marginal tax rate, households have an incentive to adjust their taxable income in order to locate just below this point, which should by aggregation result in a local bunching in the taxable income distribution around the corresponding threshold.

As shown by Figures 10 to 12 in Appendix, in most cases, there is no bunching at the tax collection threshold (neither as the taxation threshold, which is between 600 and 300 € below the tax collection threshold). Single maintenance obligation recipients are the main exception, as they are able to adjust more easily their taxable income. In the next sections, I focus on this sub-population.

[16] Their income taxes are reduced by 30 to 40%. Tax Code, Article 197, I, 3.

4.1 Maintenance obligation recipients

Legislation. Bunching at the income level where tax liabilities start is particularly large among maintenance obligation recipients, who can more effectively adjust their reported income. Maintenance obligation is an intra-family transfer toward low income relatives (children, parents, grand-parents or step-parents). The donor is allowed to deduct the amount he is giving as long as the recipient: *(i)* reports the exact same amount in his taxable income and *(ii)* is not part of the donor's tax household.[17] Apart from these two conditions, legislation is quite flexible. The amount of deductible transfer is not fixed, the law only mentions that it should depend on the needs of the recipient and on the resources of the giver, the only precision being an upper bound when the recipient is an adult child. Moreover, the donor should only be able to provide evidence about this transfer, and the corresponding box in the tax form is never prefilled. Appendix 8.1 provides more details about the legislation of the maintenance obligation.[18]

This tax allowance provides an incentive for family members to support their relatives. The State subsidizes stronger intra-family insurance through a reduction of income tax progressiveness - and as a consequence of the total tax burden - at the family level. In a perfectly progressive income tax system, rich relatives would always have an interest to declare the maximum transfer until all family members reach the same tax bracket. However, in the current tax system, due to the small notch at the tax collection threshold, some intra-household transfer recipients have no interest in taking the maximal transfer, as the cost of becoming taxable would excess the benefit of the deduction for the provider. Appendix 8.2 develops a small theoretical model to provide intuitions about bunching at the entry point of the income tax system in this case.

Maintenance obligation should be distinguished from alimony, which mainly concerns divorce cases and whose amount is often the result of a judicial decision (in which case the deductible amount is bounded by the decision of the judge). Table 3 shows an over-representation of divorced women among intra-household transfers recipients of two tax units, which is consistent with an alimony earned after a divorce. In contrast, single

[17] In particular, parents of 25 year-old students can choose between including their child as a member of their tax household or declaring the maintenance obligation they are paying him.

[18] Maintenance obligation transfers are not parts of earnings and are thus not taken into account to compute the amount of employment bonus *Prime pour l'empoi*. However, they increase the reference tax revenue, which might then exceed an upper bound, making the tax household no eligible for the employment bonus.

Table 3: Intra-household transfers recipients

Number of tax units	1	2
Age	29.1	43.2
Women (%)	50.7	94.8
Avg gross income	10,141	23,316
Avg net taxable income	8,685	20,162
Single (%)	91.0	39.0
Married (%)	-	1.4
Civil union (%)	-	0.5
Divorced (%)	8.2	59.0
Widowed (%)	0.8	0.0
RSA complement (%)	5.6	13.4
PPE (%)	24.5	42.4
Observations	416,450	242,683

Note: Single taxpayers reporting a positive net taxable income, metropolitan France, except retirement pensions holders. Tax files POTE 2013.

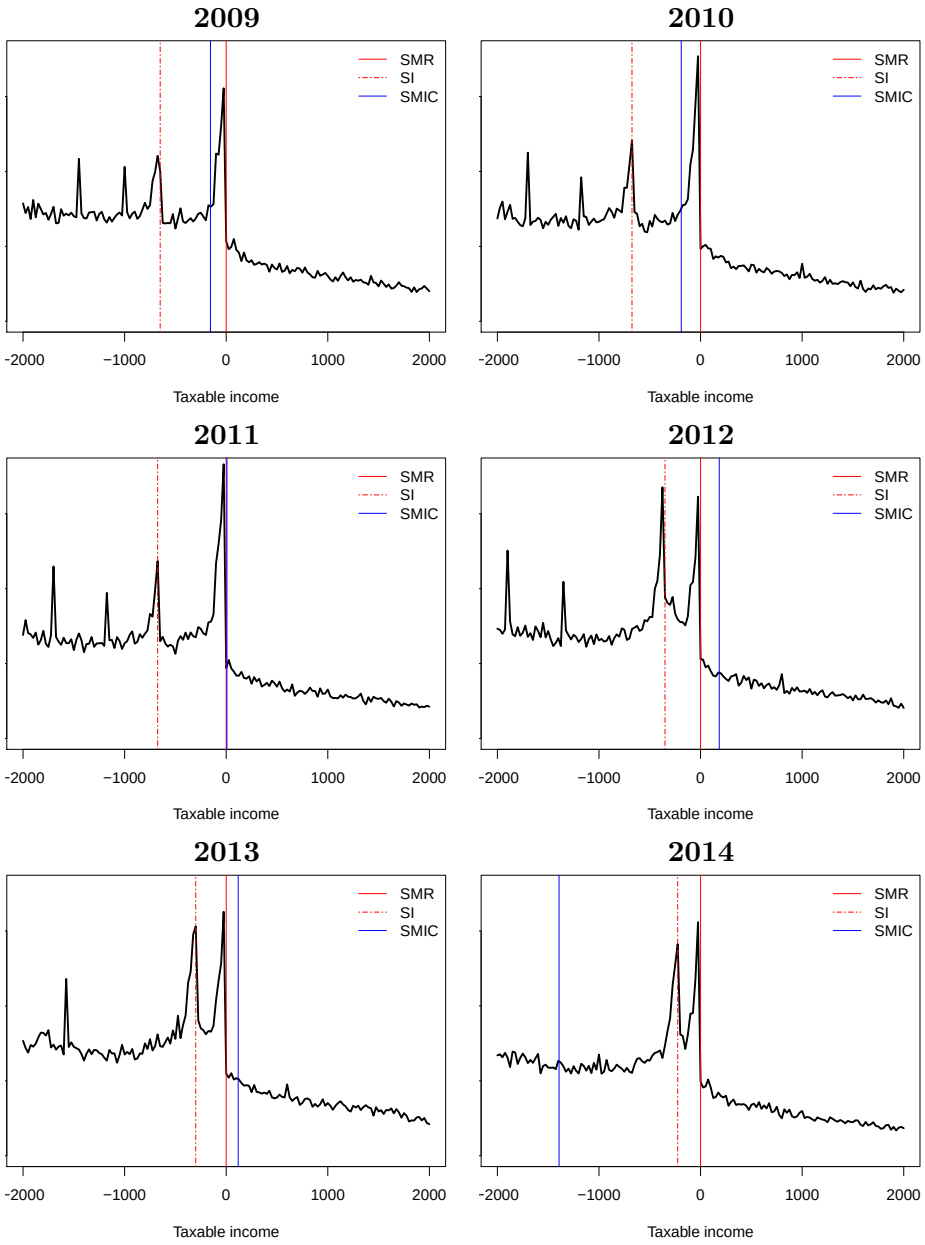
taxpayers are less divorced than the average and 50% of them are men, comforting the idea most of family transfers they earn are carried out under the status of the maintenance obligation. Figure 9 further shows that this population is young.

Misperception of the income tax system. Maintenance obligation recipients have an incentive to bunch at the tax collection notch in order to avoid paying income taxes. Furthermore, they are able to coordinate with richer members of their household in order to decide upon the optimal level of transfer. This behavior provides a rationale for the second major peak at the tax collection notch in the taxable income distribution and the following hole (Figure 2).

The first major peak of the taxable income distribution is harder to rationalize. Each year, this peak is located at the taxation threshold and its shape is clearly different from round-number bunching or from an accumulation of minimum-wage recipients, which favors the hypothesis of behavioral reactions. Moreover, this peak is quite small from 2009 to 2011 and bigger the following years. This might result from the position of the taxation threshold relative to the lower bound of the second tax bracket: below the first three years, above then.[19] From 2009 to 2011, those taxpayers were expecting to enter the first tax bracket and to be faced with a 8.25% marginal tax rate, while

[19]In 2012, the taxation threshold was only 100 € below the lower bound of the second tax bracket, which explains why taxpayers would expect to enter directly the second tax bracket.

Figure 2: Bunching at the tax collection threshold



Note: Single maintenance obligation recipients, metropolitan France, except retirement pensions holders. Distributions of taxable income are centered on the tax collection threshold (SMR, red line). The vertical red dotted line shows the taxation threshold (SI) and the blue line the minimum wage (SMIC). Tax files 2009-2014.

from 2012 to 2014 they expect to enter directly the second one and to deal with a 21% marginal tax rate. This bigger kink would generate more bunching as a consequence of stronger incentives. Yet, this taxation threshold should not be a real issue, since tax filers will not pay taxes as long as their taxable income does not exceeds the tax collection threshold. Tax filers might be uncertain about the entry point in the tax schedule. Online documentation makes these two thresholds salient but is ambiguous about which one really matters.

4.2 A model of income tax misperception

Utility is given by $u\left(z - T(z), z/n\right)$, increasing in net after-tax income $c = z - T(z)$ and decreasing in the cost of effort z/n, where z stand for total earnings, $T(z)$ for income taxes and n for abilities. Without discontinuities in the tax schedule, the earnings distribution $h_0(z)$ is assumed smooth. In line with the literature, I consider a quasi-linear utility function with an uncompensated elasticity of substitution ε.[20] With linear taxes and absent any discontinuity in the tax schedule, the optimal taxable income is $z = n\left(1-\tau\right)^{\varepsilon}$, with τ the marginal tax rate. Thus, ε might be interpreted as the ETI with respect to the net-of-marginal tax rate $1-\tau$. Thereafter, ε_K refers to the elasticity at the kink and ε_N to the elasticity at the notch.

4.2.1 Kink at the taxation threshold

I first consider people who bunch at the false taxation threshold. They expect a kink at the taxation threshold z_K^* above which the marginal tax rate τ is raised by $\Delta\tau$, such that taxes are given by: $T_K(z) = \tau + \Delta\tau\left(z - z_K^*\right) \cdot \mathbb{I}\left(z > z_K^*\right)$. Saez [2010] demonstrates that earnings response Δz_K^* might be recovered from a comparison of the equilibria characterizing the marginal buncher who is, among people bunching at the kink, the taxpayer with the highest income level before the introduction of this kink (Figure 3a). Absent any income effects, the earnings response is related to the uncompensated elasticity ε_K through the formula:

$$\frac{\Delta z_K^*}{z_K^*} = \left(\frac{1-\tau}{1-\tau-\Delta\tau}\right)^{\varepsilon_K} - 1 \tag{1}$$

Here, $\tau = 0$ as we consider the entry point in the income tax system. Due to the "décote" mechanism, when their income exceeds the taxation kink, taxpayers are faced

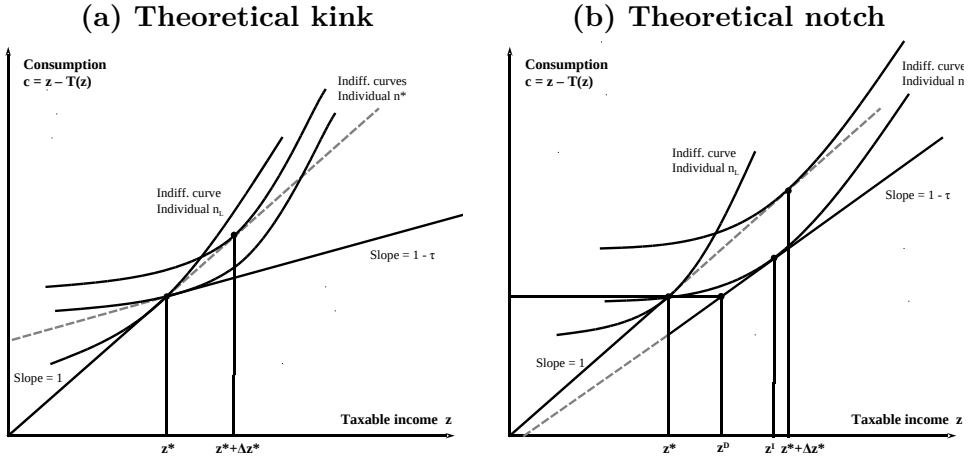
[20] In particular, this functional form assumes no income effects, which is not a huge approximation since income effect have a small impact on elasticity estimates, as shown by Bastani and Selin [2014].

with a marginal tax rate equal to $\Delta\tau = 8.25\%$, 21% or 28% in 2009-2011, 2012-2013 and 2014 respectively. In 2012, the taxation threshold moves really close to the lower bound of the second tax bracket, leading taxpayers to expect a 21% rather than a 8.25% tax rate. In 2014, the "décote" formula is Assuming that $h_0(.)$ is roughly constant around the taxation threshold, the total mass of individuals bunching at z_K^* is given by: $B_K = \int_{z_K^*}^{z_K^*+\Delta z_K^*} h_0(z)\ \mathrm{d}z \approx h_0(z_K^*)\Delta z_K^*$. If C_j denotes the number of individuals in bin j and $\widetilde{C}_j$ its counterfactual value, then an estimate of the total mass of bunchers might be given by: $\widetilde{B}_K = \sum_{j=-\delta}^{\delta} C_j - \widetilde{C}_j$, an estimate of the density at the threshold is given by: $\widetilde{h}(z_K^*) = \sum_{j=-\delta}^{\delta} \widetilde{C}_j / (2\delta + 1)$ and $\widetilde{b}_K = \widetilde{B}_K / \widetilde{h}_K(z_K^*)$ is often taken as a measure of the bunching because it is independent from the scale of the density. An estimate of the ETI is given by the following formula:

$$\widetilde{\varepsilon}_K = \frac{\widetilde{B}_K}{z_K^* \widetilde{h}(z_K^*) \log\left(\frac{1-\tau_0}{1-\tau_1}\right)} \tag{2}$$

Gelber et al. [2013] extend the kink analysis to the case where taxpayers face a fixed optimization cost. In this case, two bunching points are required in order to identify this cost: either different thresholds or a change in the size of the kink over time.

Figure 3: Bunching at the entree in the income tax schedule



Note: Kleven [2016].

4.2.2 Notch at the tax collection threshold

Second, I consider agents who understand that tax liabilities start at the tax collection threshold z_N^* and expect a notch at this income level, above which the marginal tax rate τ is increased by $\Delta\tau_N$ and the tax burden raised by T_0. Taxes are then given by: $T_N(z) = \tau + [\Delta\tau_N (z - z_N^*) + T_0] \cdot \mathbb{I}(z > z_N^*)$. Kleven and Waseem [2013] developed a general method to estimate the ETI in the case of a notch. As in the case of a kink, the identification strategy relies on the comparison of three equilibria characterizing a marginal buncher (Figure 3b). From *(i)* the optimal taxable income without discontinuity in the tax system $z_N^* + \Delta z_N^* = n^*(1-\tau)^{\varepsilon_N}$ and *(ii)* the equality between utilities in z^* and z^I, the following expression can be derived in order to characterize the ETI as a function of tax parameters, of z_N^* and of Δz_N^*:

$$\frac{(1-\tau-\Delta\tau_N) z_N^* + T_0}{z_N^* + \Delta z_N^*} - \frac{\varepsilon_N}{1+\varepsilon_N}(1-\tau)\left[\frac{z^*}{z^* + \Delta z^*}\right]^{\frac{1+\varepsilon_N}{\varepsilon_N}} - \frac{(1-\tau-\Delta\tau_N)^{1+\varepsilon_N}}{(1+\varepsilon_N)(1-\tau)^{\varepsilon_N}} = 0 \quad (3)$$

The minimum amount of income taxes households can pay is $T_0 = 61€$ as lower amounts are not collected.

A reduced-form approximation, relating variation in earnings Δz_N^* to a change in the implicit marginal tax rate $t^* \equiv [T(z_N^* + \Delta z_N^*) - T(z_N^*)] / \Delta z_N^* = \Delta\tau_N + T_0/\Delta z_N^*$, provides a formula for the ETI closer to an estimation at the kink:

$$e_R \equiv \frac{\Delta z_N^* / z_N^*}{\Delta t^* / (1-t^*)} = \frac{\Delta z_N^*}{z_N^*}\left[\frac{\Delta z_N^*}{\Delta\tau_N \Delta z_N^* + T_0} - 1\right] \quad (4)$$

As in the case of a kink, assuming a constant counterfactual distribution $h_0(z)$ around the kink, the mass of bunchers is given by $B = \int_{z_N^*}^{z_N^* + \Delta z_N^*} h_0(z)\mathrm{d}z \approx h_0(z_N^*)\Delta z_N^*$, and the average taxable income response Δz_N^* might be recovered from estimates of the bunching mass B_N and of the density $h_0(z_N^*)$.

5 A Difference-in-Bunching Estimation

In a classic bunching framework, it would be straightforward to estimate the ETI with respect to the net-of-marginal tax rate using polynomial approximation as developed by Chetty et al. [2011] for kinks and by Kleven and Waseem [2013] for notches. In the present framework, such an estimation seems impracticable for two reasons. First, the two excluded ranges are quite wide, making the estimation of the counterfactual density

potentially very dependent on the bounds of these ranges. Second, from 2012 on, the two peaks merge, making it impossible to disentangle bunching at the notch and at the kink through classic estimation methods.

5.1 Difference-in-bunching

Previous works took advantage of repeated cross-sections in order to estimate a structural elasticity. Brown [2013] estimates an elasticity of retirement age to retirement value using the difference in bunching between a pre- and a post-reform density. As it takes time for households to react to the reform, she finds a very low elasticity corresponding to short-run responses. To measure businesses evasion responses to taxation, Best et al. [2013] rely on a kink changing location over time, but use polynomial approximation and do not constrain their counterfactual distribution to be constant over time.

In the present paper, I suggest a special version of difference-in-bunching estimation to deal with at least two discontinuities, when their relative position is impacted by changes in underlying tax parameters over time. Polynomial approximation is then still necessary for fixed bunching point. As the focus here is on tax parameters variations, households are expected to adjust more quickly than for completely new reforms.

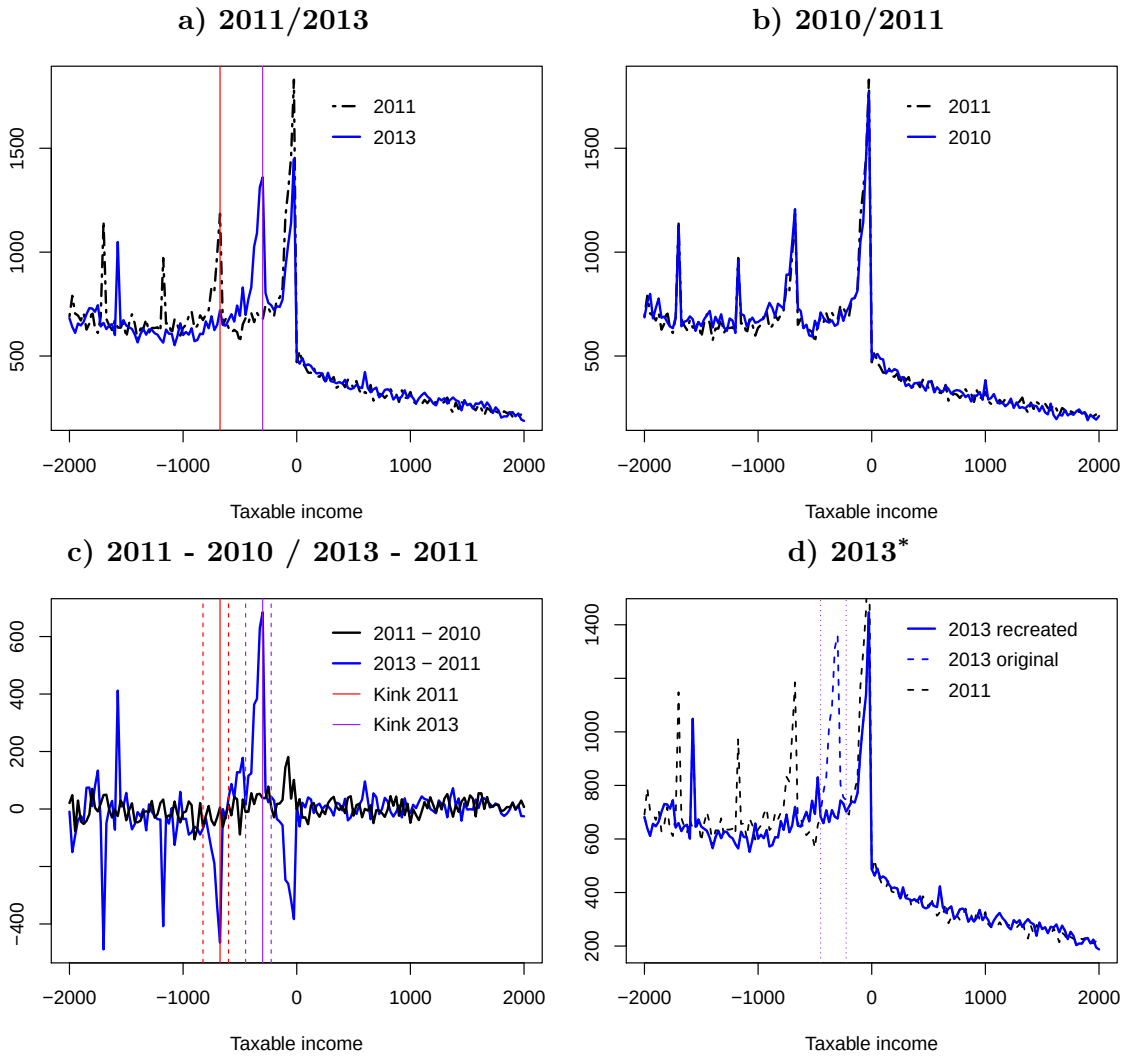
Figure 4 provides intuition about this method. Panel a) depicts the superposition of the 2013 taxable income distribution (solid blue line) with the rescaled 2011 distribution (dotted line) so that the tax collection threshold is at zero for both years and that the integrals of the two distributions are equal over the $[-2000, 2000]$ interval.[21] Between 2011 and 2013, the increase in the "décote" parameter is such that the taxation kink exceeds the lower bound of the 14% tax bracket and mechanically moves closer to the tax collection notch.[22] This narrowing gap between the two thresholds enables the identification of an ETI at the kink for each year, taking either 2011 or 2013 as a counterfactual.

In order to provide statistical inference, information about the counterfactual evolu-

[21] It can easily be shown that rescaling the density used as a counterfactual is the same as estimating a bunching parameter b on densities expressed as percents and as measuring the bunching mass B as the product of the total population the year of interest times the difference (in percentage points) between the two densities expressed in percents.

[22] The gap between the tax collection and the taxation threshold is given by $61/\tau$, where τ is the marginal tax rate of the theoretical tax bracket. This gap is worth 739 € if the 61€ are fully in the first bracket (where $\tau = 0.0825$ due to the "décote") and 290 € if they are totally in the second (where $\tau = 0.21$).

Figure 4: Difference-in-Bunching



Note: Single maintenance obligation recipients, metropolitan France, except retirement pensions holders. Tax files 2010-2013.

tion of this distribution absent any tax parameter change is required. Luckily, it is the case for 2010 and 2011, as evidenced by Table 1. Panel b) of Figure 4 confirms that the 2010 and 2011 distributions are quasi-identical. Differences between them are captured by an error term reflecting variability at each bin of the distribution, including in the bunching region, when the tax system remains unchanged.

Panel c) of Figure 4 summarizes graphically the principle of the estimation. The solid blue line is the difference between the 2013 taxable income distribution and its counterfactual (the rescaled 2011 distributions of panel a): it captures bunching at the 2013 kink (purple vertical line). The solid black line is the difference between the 2011 and 2010 distributions (panel b), representing the evolution of the distribution absent any change in tax parameters. Bunching at the 2013 kink is measured as the area between the two differences in distributions within the bunching region (dotted vertical lines).[23] Statistical inference is obtained through bootstrap, resampling the point estimates of the difference between the 2011 and 2010 distributions (solid black line).

In a last step, I use suitable counterfactual distributions to suppress bunching around the kink for each distribution (Figure 4, Panel d).[24] The bunching mass $\widetilde{B}_N$, optimization frictions $\widetilde{\alpha}$ and the ETI $\widetilde{\varepsilon}_N$ might then be estimated from the corrected distribution at the tax collection notch using classic bunching methods.

This difference-in-bunching approach might bring some interesting features compared to polynomial approximation. Kleven [2016] lists four identifying assumptions on which bunching estimation relies : *(i)* smoothness and *(ii)* shape of the counterfactual distribution, *(iii)* a model specifying structural elasticities and *(iv)* no aggregation bias. The first two may not be an issue in a difference-in-bunching estimation, as the counterfactual distribution, characterizing another time period or another group, should capture all the noise that would appear absent the tax discontinuity. Moreover, this method seems to be an improvement, since bootstrapped standard errors are estimated resampling the noise from the whole distribution including the bunching region, whereas the classic approach resamples only residuals out of this bunching region.

5.2 Polynomial approximation around the tax collection notch

With taxable income distributions corrected for bunching at the kink, it is now possible to apply Kleven and Waseem [2013] in order to estimate parameters of interest at the tax collection notch. As in the case of a kink, a counterfactual density is estimated through polynomial approximation of the real distribution excluding a range $[z_L, z_U]$ as

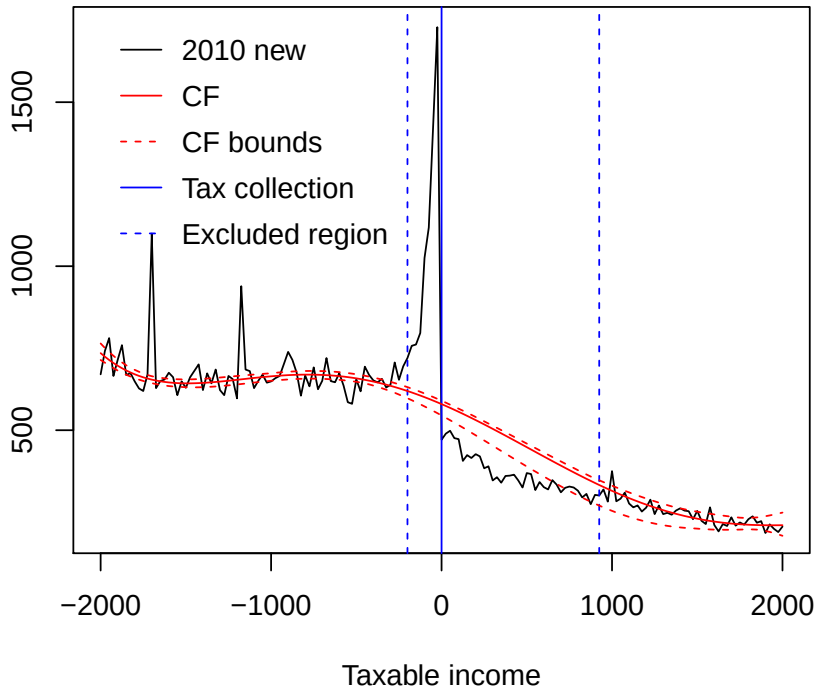
[23] This bunching region is determined visually, as suggested by Kleven [2016] p.450.

[24] Technically, it would be necessary to correct the counterfactual distribution above the kink to take into account intensive responses, as proposed by Chetty et al. [2011]. However, Kleven [2016] (p.451) says that such a correction might be ignored, especially when distributions are broadly flat, as in the present case.

well as round-number bunching points. Given z_L, the upper bound z_U is defined such that the bunching mass above the counterfactual distribution on the $[z_L, z_N^*]$ range is equal to the hole below the counterfactual within $[z_N^*, z_U]$.

Taxpayers have no interest to locate within a "dominated region" $[z_N^*, z_N^* + \Delta z^D]$ as their net income would be strictly reduced compared to the bunching point (Figure 1). The share $\alpha \equiv \int_{z_N^*}^{z_N^*+\Delta z^D} h(z)\mathrm{d}z / \int_{z_N^*}^{z_N^*+\Delta z^D} h_0(z)\mathrm{d}z$ of taxpayers in this range despite the strong disincentives might be subject to optimization frictions.

Figure 5: Bunching at the taxation and tax collection thresholds



Note: Single maintenance obligation recipients, metropolitan France, except retirement pensions holders. The black line represents the 2010 taxable income distribution, corrected from bunching at the kink using the 2013 distribution. The red line is the counterfactual distribution and red dotted lines are 99% confidence intervals. The vertical blue line is the tax collection threshold and the vertical blue dotted lines define the bunching window $[z_L, z_U]$. Tax files 2010-2013.

Kleven and Waseem [2013] develop two methods to get bounds for the structural and reduced-form elasticities (Equation (3) and 4). The bunching-hole method provides a lower bound for the ETI. Considering a counterfactual distribution $\widetilde{h}_0(z)$, the bunching mass $\widetilde{B}_N$ is computed as the difference between the true and counterfactual densities on

the $[z_L, z^*]$ range, taking into account optimization frictions α: $\widetilde{B}_N \approx (1-\alpha)\widetilde{h}(z_N^*)\Delta z_N^*$. The convergence method provides an upper bound for the ETI, relying directly on the earnings response of the marginal buncher: $\delta z_N^* = z_U - z_N^*$. As in Kleven and Waseem [2013] and Chetty et al. [2011], standard errors are computed through random resampling of the polynomial approximation residuals.[25]

Figure 5 displays the 2010 corrected taxable income distribution centered on the tax collection threshold. The counterfactual density in red is estimated excluding the bunching region $[z_L, z_U]$ marked by vertical blue dotted lines, and its 99% confidence bounds are estimated through the bootstrap procedure.

6 Results

6.1 Bunching, optimization frictions and elasticity estimates

Tables 4 and 5 present estimates of the bunching mass at the kink $\widetilde{B}_K$ and at the notch $\widetilde{B}_N$, of relative bunching $\widetilde{b}_k$ and $\widetilde{b}_N$, of optimization frictions $\widetilde{\alpha}$ and of the ETI at the taxation kink $\widetilde{\varepsilon}_K$ and at the tax collection notch for different methods $\widetilde{\varepsilon}_N$. As explained supra, this elasticity captures purely declarative responses and optimization frictions are consequently mainly informational.

Table 4 highlights significant bunching, for each year, both at the false taxation kink and a the true tax collection notch. Over the 2009-2011 period, bunching at the notch $\widetilde{b}_N$ is more than two times bigger than bunching at the kink $\widetilde{b}_K$, consistently with respective incentives at both discontinuities. From 2012 on, the bigger peak at the taxation threshold (Figure 2) is consistent with a significant increase in bunching at the kink, resulting from a rise in the marginal tax rate households think they would face as the taxation threshold moves closer to the lower bound of the second tax bracket. At the same time, bunching at the notch is reduced, such that bunching at both thresholds are of the same size. This could be the result of household switching from a discontinuity point to another. Optimization frictions α constantly affect 80% of the population over

[25] On a more technical note, I estimate bunching at the kink within a 250€ width window and at the notch within a 200€ width interval, meaning that $z_L = -200$ (set visually). The counterfactual density is based on a fifth-order polynomial. I take 25€ bins to insure a very local estimation and benefit from variability in the distribution. α is estimated on the extended interval $[0, z_U/2]$ compared to the dominated area, which is really small. Concerning the bootstrap process, I bound the earnings response from below by the dominated region and from above by the earning response of the convergence method, as in Kleven and Waseem [2013]. I also get rid of iteration where $\alpha \geq 1$. Overall, these cases are rare.

Table 4: Bunching estimates

	Kink		Notch		
Year	$\widetilde{B}_K$	$\widetilde{b}_K$	$\widetilde{\alpha}$	$\widetilde{B}_N$	$\widetilde{b}_N$
2009	1386	1.80	0.80	3069	4.43
	[1029, 1688]	[1.33, 2.19]	[0.77, 0.96]	[2866, 3424]	[4.09, 5.21]
2010	1639	2.20	0.79	3495	5.08
	[1310, 1915]	[1.76, 2.57]	[0.76, 0.90]	[3277, 3753]	[4.71, 5.59]
2011	1283	1.75	0.77	3788	5.51
	[954, 1559]	[1.30, 2.13]	[0.73, 0.88]	[3564, 4071]	[5.12, 6.15]
2012	3057	3.82	0.79	2752	3.81
	[2744, 3330]	[3.43, 4.16]	[0.74, 0.95]	[2500, 3136]	[3.43, 4.47]
2013	2792	3.23	0.81	2893	3.80
	[2474, 3092]	[2.86, 3.57]	[0.74, 0.99]	[2609, 3374]	[3.40, 4.65]
2014	2612	3.52	0.80	2872	4.44
	[2275, 2927]	[3.07, 3.95]	[0.76, 0.93]	[2623, 3229]	[4.01, 5.26]

Note: Bunching estimates at the kink $\widetilde{B}_K$, at the notch $\widetilde{B}_N$ and % of optimization frictions $\widetilde{\alpha}$. 99% confidence intervals are in brackets below estimates. They are computed from 1000 bootstrap iterations. Single taxpayers receiving maintenance obligation, except retirement pensions holders. Tax files 2009-2014.

the whole period.

Table 5 displays ETI estimated at the kink and at the notch, with four different methods taken from Kleven and Waseem [2013] for the latter. Over the 2009-2011 period, elasticities are very constant over time and always significantly positive at 1%. Elasticity at the kink is equal to 0.05, a low value which is consistent with the assumption of no optimization frictions. Elasticities estimated at the notch take into account the 80% optimization frictions. They range between 0.09 and 0.25 depending on the method, with an average of 0.15 confirmed by two of the four methods. The increase in bunching at the kink resulting from stronger tax incentives after 2011 does not imply a constant ETI, which might be related to the conclusion of Chetty et al. [2011] that it takes time for households to react to new incentives. Bunching methods applied to reforms would only catch short term reactions, as suggested by Brown [2013]. Elasticity estimates at the notch also seem affected, but not significantly when considering confidence intervals.

The estimate at the tax collection threshold is close to the ETI of 0.18 estimated by Gruber and Saez [2002] for low-income earners and of 0.2 estimated by Saez [2010] at the

Table 5: Elasticity estimates

Year	**Kink**	**Notch**			
		Structural		*Reduced-form*	
	$\widetilde{\varepsilon}_K$	$\widetilde{\varepsilon}_1$	$\widetilde{\varepsilon}_2$	$\widetilde{\varepsilon}_{R1}$	$\widetilde{\varepsilon}_{R2}$
2009	0.047	0.085	0.159	0.133	0.241
	[0.035, 0.057]	[0.064, 0.294]	[0.095, 0.300]	[0.101, 0.435]	[0.148, 0.443]
2010	0.057	0.092	0.157	0.143	0.239
	[0.045, 0.066]	[0.071, 0.280]	[0.115, 0.296]	[0.111, 0.414]	[0.178, 0.436]
2011	0.045	0.097	0.168	0.151	0.254
	[0.033, 0.055]	[0.070, 0.243]	[0.108, 0.296]	[0.110, 0.361]	[0.167, 0.436]
2012	0.034	0.062	0.105	0.097	0.161
	[0.031, 0.037]	[0.037, 0.286]	[0.055, 0.289]	[0.059, 0.422]	[0.086, 0.426]
2013	0.028	0.076	0.120	0.118	0.183
	[0.025, 0.031]	[0.039, 0.287]	[0.056, 0.287]	[0.061, 0.422]	[0.088, 0.422]
2014	0.027	0.074	0.125	0.114	0.188
	[0.024, 0.030]	[0.049, 0.247]	[0.073, 0.256]	[0.077, 0.362]	[0.113, 0.374]

Note: ETI at the kink $\widetilde{\varepsilon}_K$ and at the notch, estimated according to Kleven and Waseem [2013] structural $\widetilde{\varepsilon}_i$ or reduced-form $\widetilde{\varepsilon}_{Ri}$ method. $i = 1$ stems from the lower-bound bunching-hole method and $i = 2$ from the upper-bound convergence method. Percent change in the marginal tax rate is computed compared to a 0 marginal tax rate below the threshold. For 2014, I assume that taxpayers do not see the change in the "décote" formula and behave as if they were facing a 21% marginal tax rate rather than a 28% one. 99% confidence intervals are in brackets below estimates. They are computed from 1000 bootstrap iterations. Single taxpayers receiving maintenance obligation, except retirement pensions holders. Tax files 2009-2014.

entry point in the American income tax schedule. Kleven and Waseem [2013] estimate a 0.12 ETI and around 65% optimizations frictions among self-employed workers, while these values are respectively around 0.02 and 90% for wage earners. Estimated on a kink in a frictionless model, the ETI of 0.05 is close to values found by Bastani and Selin [2014] for self-employed or by Chetty et al. [2011]. Absent any reaction among other households than maintenance obligation recipients, this result is also consistent with the average 0.02 ETI estimated by Cabannes et al. [2014] for France.

Concerns might be raised about the denominator of this elasticity. Indeed, taxpayers reporting year n their year $n-1$ income will benefit, if they are not taxable, from a 3.8% social contribution rate on their $n+1$ unemployment benefits instead of a 6.2% one.[26] This could be another incentive for tax households to maintain their taxable income be-

[26]For social contributions, wages are taxed at a 7.5% rate.

low the tax collection threshold, in which case previously estimated elasticities would be downward biased. However, such people will pay social contributions on unemployment benefits up to the amount where their total net income reaches the minimum wage.[27] As the population of interest is made of people whose earnings are clearly below the tax collection threshold and the minimum wage, such a strategy seems unsustainable and thus unlikely. Interestingly, as shown by Figure 13, single maintenance obligation recipients receiving also unemployment benefits display a stronger bunching behavior at the tax collection notch.

Table 6 in Appendix shows the same result for a wider estimation window ([-3000, 3000] rather than [-2000, 2000]). Elasticity at the kink remains unchanged, which tends to validate the difference-in-bunching approach. Elasticity at the notch is bigger (0.2 rather than 0.15 on average), indicating that polynomial approximation might be quite dependent on the estimation window. Optimization frictions α are unaffected.

Results from these two tables might be rationalized. First, when applying the share of optimization frictions α to the frictionless elasticity $\widetilde{\varepsilon}_K$, the resulting average elasticity is 0.24 for 2009-2011 and 0.14 for 2012-2014. These elasticities at the kink accounting for frictions are quite close to corresponding values for the reduced-form of the elasticity at the notch : 0.2 over 2009-2011 and 0.16 over 2012-2014, which sheds light on the consistency between kink-based and reduced-form notch-based estimations. Such an elasticity is however not sufficient to compute optimal tax rates, since a tax household reporting X€ less of maintenance obligations should legally be compensated by a taxable family member reporting those X€.

Second, among households who display behavioral reactions, 30% bunch at the "wrong" entry point in 2009-2011 and 50% in 2012-2014. Even among those households who behave according to some form of economic rationality, a non-negligible share is liable to miss the real point of entry in the income tax, resulting in an underestimation of the bunching mass B.

6.2 Information, uncertainty and reaction to incentives

The previous analysis highlights the incidence of imperfect information on bunching and elasticity estimates since, among these maintenance obligation recipients who are able to adjust the taxable income they report, a non-negligible proportion locates in the

[27] Social Security Code, Article L136-2, III, 1.

dominated region of the notch or at the false taxation threshold.

When analyzing taxpayers' search for information, Hoopes et al. [2015] distinguish two drivers of attention to taxes : faced with uncertainty, imperfectly rational individuals either actively search for costly information or are influenced in their decisions by exogenous news such as salient tax reforms. I illustrate how these two mechanisms might impact bunching among maintenance obligation recipients.

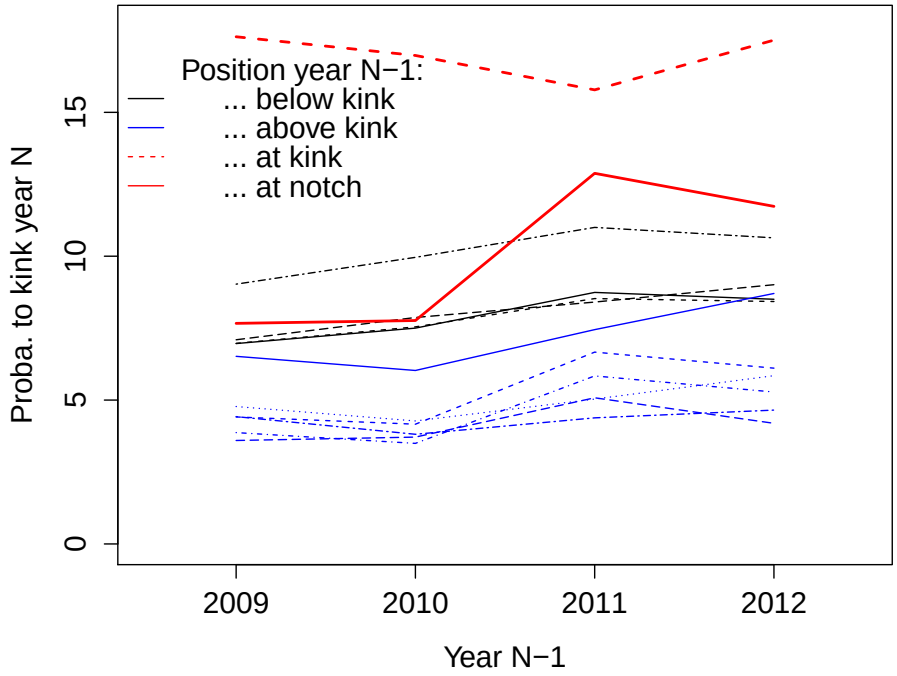
Reactions to a false incentive. Table 4 displays a significant increase in bunching at the taxation kink between 2011 and 2012, graphically illustrated by Figure 2. At the same time, bunching at the tax collection notch was significantly reduced, such that total bunching seems roughly constant. Doubting about which one of the two thresholds is the true point of entry in the income tax system, some households would react to a rise in the marginal tax rate at the false taxation threshold by switching from the tax collection threshold to this point.

In order to assess this hypothesis, I analyze transitions between different positions in the taxable income distribution. I follow single maintenance obligation recipients two consecutive years within a $[-3000, 3000]$ euros interval. I create 12 groups defined by taxable income bounds : two groups of width 225€ and 200€ respectively gather households in bunching windows around the kink and the notch, ten groups are defined by 500€ width intervals, four below the kink and six above the notch. Observations between the two thresholds are dropped.

Figure 6 displays the probability for individuals of each group year $n-1$ to bunch at the kink year n. Transitions between 2009 and 2010 are quite similar to those between 2010 and 2011. This stability is broken between 2011 and 2012: probability to locate at the kink year n increases much more for households at the notch in $n-1$ than for individuals from any other location. It seems to be also the case for groups above the notch. This observation must be consistent with stronger incentives at the false taxation kink attracting tax filers from above this threshold. However, it could also be an artifact resulting from the two thresholds becoming closer: transition rate toward a closer location in the distribution might be higher.

In order to disentangle the displacement of the kink toward the notch from the effect of the marginal tax rate, I estimate a multinomial logistic regression of the choice to locate at the taxation kink, at the tax collection notch or in any other group year n as a

Figure 6: Probability to locate at the kink year N depending on position year $N-1$



Note: Each line displays the probability, for an individual belonging to an income group close to the two thresholds year $N-1$, to locate within the taxation kink interval year N. Black lines refers to groups below the two thresholds, blue lines to groups above the two thresholds, the plain red line to individuals bunching at the notch (within the $[z_L, 0]$ interval) and the dashed red line to individuals bunching at the kink. 12 taxable income groups are created within a $[-3000, 3000]$ interval around the tax collection threshold, two of them defined by bunching regions around the kink and around the notch, the last 10 being 500€ intervals below and above the two thresholds. Observations between the two thresholds are dropped.

function of the position in the taxable income distribution year $n-1$, including group, year and interacted dummies. The estimated equation is:

$$\mathbb{P}[Y = k|X] = F\left(\beta_{k,0} + \mathbb{I} \cdot \beta_k + \mathbb{T} \cdot \gamma_k + \mathbb{I} \times T_{2012} \cdot \delta_k + \mathbb{I} \times T_{2013} \cdot \zeta_k + u_k\right)$$

where $Y \in \{0, 1, 2\}$ is the income group year n, $\mathbb{I}$ is a $(N \times 11)$ matrix of $n-1$ group dummies, $\mathbb{T}$ is a $(N \times 3)$ matrix of year dummies for 2011, 2012 and 2013 and F is the logistic distribution. $\beta_k, \gamma_k, \delta_k, \zeta_k$ are vectors of parameters. If i denotes location at the kink and j at the notch, then δ_i is a vector of parameters referring to the variation in the probability (in the sense of odds ratios) to locate at the kink in 2012 compared to 2011[28], whose j^{th} component concerns specifically households initially locating at the

[28]In order to simplify the model, let's note N the dummy for the location at the notch year $n-1$ and

notch year $n-1$. I consider two potential reference groups: tax households from the lower income group or from just above the notch. Each one is constant in the reference frame of one of the two thresholds. Households in these locations are not expected to react to a change in the marginal tax rate either because they are in the left part of the distribution or as they are in the neighborhood of the dominated region. In particular, if the rise in transitions toward the kink were a pure artifact resulting from the two thresholds becoming closer, it should be the same for households initially at the notch or just above.

Results of this estimation are reported in Table 7 in Appendix. The probability for someone initially locating at the notch to jump to the kink significantly rises in 2012 compared to 2010 and 2011, relatively to the lower income group or to households just above the notch. It is also the case for taxpayers in a $[500, 1000[$€ range above the notch. This result confirms the assumption of tax households switching away from the true entry point in the income tax or from a location above toward the false taxation kink where the marginal tax rate rises. Otherwise, the fall in the probability to remain at the kink might be the result of households taking time to adjust.

This conclusion challenges the hypothesis that taxpayers are divided into two groups depending on whether they make a mistake or not when considering the point of entry in the income tax. The two thresholds rather appear as communicating vessels, taxpayers jumping from one to the other when incentives are changed. Faced with uncertainty about the true entry point, households from above in the distribution would react to a potentially higher marginal tax rate at the false taxation threshold by bunching there more frequently. Such a cautious behavior can be justified when assuming imperfect rationality.

No reaction to an effective incentive. In Table 5, the 2014 ETI computed with a 21% marginal tax rate is equal to the 2013 ETI, which seems consistent with the absence of perturbations in incentives. However, the "décote" formula changed in 2014:

write the probability to locate at the kink year n : $P[Y=1] = \beta_0 + \beta_1 N + \beta_2 T_{2012} + \beta_3 N \cdot T_{2012}$. We consider 2010 and 2011 as the reference and $[Y=0]$ is bunching outside the kink and the notch year n. Then the sign of β_3 might be related to the evolution of the odds ratio between 2010-2011 and 2012 :

$$\frac{\frac{\mathbb{P}[Y=1|N=1,T=2012]}{\mathbb{P}[Y=0|N=1,T=2012]} \Big/ \frac{\mathbb{P}[Y=1|N=0,T=2012]}{\mathbb{P}[Y=0|N=0,T=2012]}}{\frac{\mathbb{P}[Y=1|N=1,T=2010-11]}{\mathbb{P}[Y=0|N=1,T=2010-11]} \Big/ \frac{\mathbb{P}[Y=1|N=0,T=2010-11]}{\mathbb{P}[Y=0|N=0,T=2010-11]}} = \frac{OR_{2012}}{OR_{2011}} = e^{\beta_3}$$

the marginal tax rate where tax liabilities start was raised from 21% to 28%. Taking the 2013 ETI as well as the 2014 parameters including the 28% marginal tax rate, the bunching mass B_N computed through reverse engineering should lie within the 99% bounds of the estimated value $\widetilde{B}_N$ for 2014 in Table 4. However, the resulting value is around 3700, which is far above the upper bound of the 99% confidence interval of the bunching at the notch.

The "décote"formula is much harder to find and to understand than the taxation and tax collection thresholds. Although this effective change in the marginal tax rate at the point of entry in the income tax definitely affected incentives, taxpayers may not have seen such a non-salient evolution.

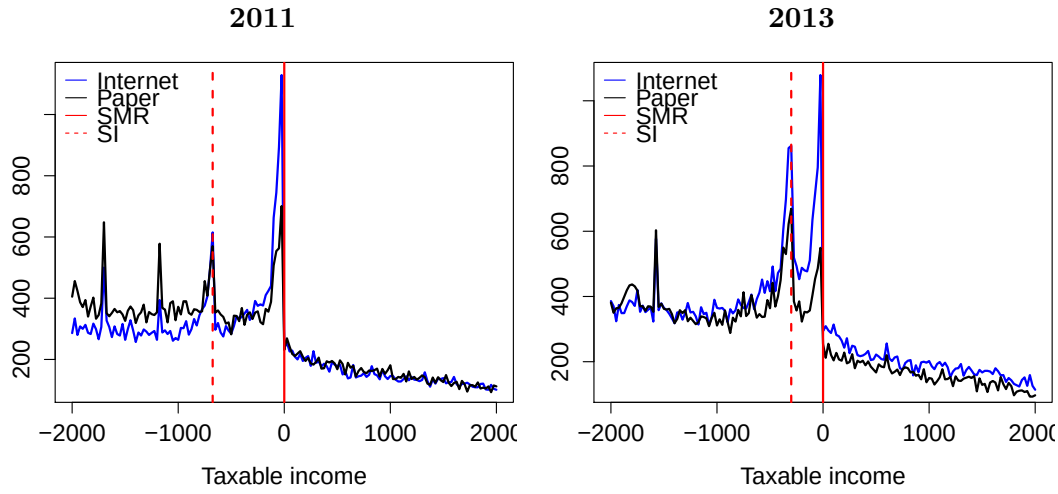
Internet. In this uncertain environment, taxpayers search for information in order to optimize their reported earnings. However, even maintenance obligation recipients, who are allegedly able to perfectly adjust their reported income, display 80% optimization frictions. Those might be due to an inefficient search for information. In order to assess this assumption, I divided this population into two groups, depending on whether tax households report their taxes online or in hard copy.[29] As stated by Hoopes et al. [2015], taxpayers increasingly rely on the internet to search information about taxes.

Figure 7 graphically confirms that bunching at the tax collection threshold is stronger for internet users. Applying the same method as in the previous section to 2011, bunching at the kink is similar for both populations whereas bunching at the notch is two times bigger for internet users ($\widetilde{b}_N = 7.7$) than for paper filers ($\widetilde{b}_N = 3.7$).[30] Moreover, optimization frictions are lower for the former ($\widetilde{\alpha} = 0.73$) than for the latter ($\widetilde{\alpha} = 0.81$). Internet skills would help access efficient information to build up a better knowledge of the tax system. The size of bunching and the resulting elasticities are decreasing functions of informational optimization frictions, confirming that access to relevant information is costly. Bunching at the false taxation threshold seems relatively smaller for online tax filers but is still positive, meaning that a better access to information does not fully eliminate uncertainty about the tax system.

[29] Online tax reporting was introduced by the decree of March 22, 2002 and encouraged through deadline extensions compared to paper tax reports. The website where tax households report their taxes also provides a simulator of the income tax and explanatory material.

[30] In order to compare bunching among different population, the literature generally considers the measure $b_N = B_N/\bar{h}(z)$ for $z \in [z_L, 0[$, which is the bunching mass rescaled by the average density in the bunching region.

Figure 7: Taxable income distribution : paper vs. internet.



Note: Single maintenance obligation recipients, metropolitan France, except retirement pensions holders. Tax files 2011 & 2013.

7 Conclusion

In this paper, I analyze behavioral responses at the earnings level where income tax liabilities start. Real reactions are implausible since tax parameters are voted at the end of the income year and only declarative responses are highlighted, especially among maintenance obligation recipients.

There is an ambiguity between three potential entry points in the French income tax. Tax filers display reactions at two of them : the tax collection notch, which is the true threshold, and the false taxation kink. Using a difference-in-bunching approach, I estimate a frictionless elasticity of taxable income of 0.05, which is close to an ETI of 0.15 estimated at the notch when accounting for the 80% optimization frictions.

Bunching at the false taxation threshold grows as the marginal tax rate just above rises in 2012, which would be consistent with taxation theory if this point were a real issue. This is mainly the result of households not fully aware of the tax system, switching from the true tax collection notch to the false taxation kink. To the contrary, the marginal tax rate where tax liabilities start increased from 21% to 28% in 2014, but households did not react to this non-salient change in the "décote"formula. This imperfectly rational behavior gives rise to informational optimization frictions when access

to relevant information is difficult, as evidenced when comparing paper and online tax filers.

Bunching estimates have been criticized because they take into account only local and short-run reactions, and are subject to optimization frictions. Hence, they might be interpreted as a lower bound for behavioral reactions. However, they prove very useful when looking at individual information, rationality and understanding of the tax system. In particular, present conclusions advocate for the development of information channels and the saliency of incentive policies, as uncertainty and ignorance about the tax system might estrange households from targeted incentives.

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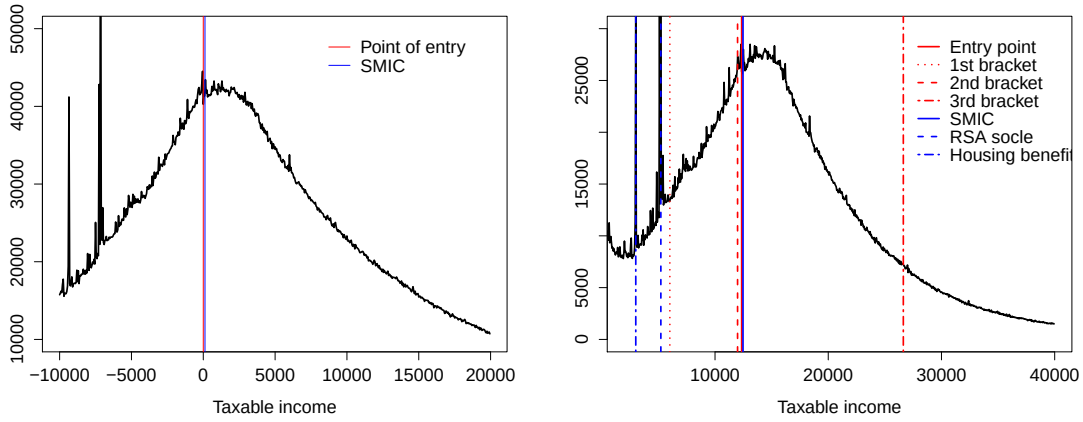
8 Appendix

Figure 8: Distribution of taxable income



Note: Distribution centered on the tax collection threshold per size of tax household (left), for a single taxpayer (right). Metropolitan France, except retirement pensions holders. Tax files 2013.

8.1 Maintenance obligation in the French legislation (in French)

"Les pensions alimentaires versées n'ouvrent droit à déduction que si vous êtes tenu à une **obligation alimentaire** vis-à-vis du bénéficiaire. C'est le cas s'agissant d'aider vos **parents, beaux-parents, grands-parents, enfants et ex-conjoint**."[31]

Pour un ascendant. "Vous êtes tenu à une obligation alimentaire vis-à-vis de vos parents, beaux-parents et grands-parents. Lorsque vous les aidez à subvenir aux besoins essentiels de la vie courante, vous pouvez déduire les dépenses correspondantes (nourriture, logement, habillement, santé...). En revanche, vos n'avez pas d'obligation alimentaire envers vos frères, sœurs, oncles, tantes...

Cette déduction des sommes versées au titre de l'obligation alimentaire est toutefois soumise à conditions. Ainsi, le montant déductible de la pension est limité aux besoins de celui qui en bénéficie et aux ressources de celui qui la verse. En outre, les pensions alimentaires déduites de votre revenu doivent être déclarées par le bénéficiaire.

Si l'ascendant ne vit pas avec vous, vous pouvez verser une pension alimentaire sous diverses formes à savoir : en argent (chèques, virement...), en payant directement diverses dépenses comme les frais de maison de retraite ou d'établissement hospitalier, les frais médicaux... Pour bénéficier de la déduction, vous devez pouvoir justifier : le versement effectif de la pension ou la réalité des dépenses effectuées (factures...), l'état de besoin du bénéficiaire (l'ascendant que vous aidez ne dispose pas de ressources personnelles suffisantes, le montant de l'aide à apporter peut être justifié par certains frais...). Cependant, **la loi ne fixe pas un niveau précis de ressources justifiant le versement d'une pension alimentaire, ni un montant de pension déductible du revenu**. Celui-ci dépendra des besoins de l'ascendant que vous aidez et de vos ressources personnelles."

[31] This subsection is entirely quoted from an explanatory notice about alimony and maintenance obligation on the website of the DGFip.

Pour un enfant mineur. "Vos enfants âgés de moins de 18 ans, que vous comptez à charge, sont pris en compte à l'impôt sur le revenu pour la détermination du nombre de parts. Vous bénéficiez, pour chacune des deux premières personnes à charge, d'une demi-part supplémentaire et d'une part supplémentaire à partir de la 3eme personne à charge. Dans certaines situations (divorce, union libre), le parent qui n'a pas la garde de l'enfant, ne peut le compter à charge. Mais la pension alimentaire qu'il verse pour l'entretien de cet enfant est déductible de son revenu imposable.

Si vous êtes **divorcé ou séparé**, Vous pouvez déduire la pension que vous versez pour l'entretien et l'éducation de votre enfant. A condition : d'être divorcé ou séparé (avec une imposition séparée avec votre ex-conjoint), de ne pas avoir la garde de l'enfant, exclusive ou alternée. **Si le juge a fixé le montant de la pension, vous ne pouvez pas déduire plus que ce montant.**

S'il n'y a pas eu de jugement, vous pouvez déduire une pension qui tient compte des besoins de l'enfant (les revenus du parent ayant la garde) et de vos ressources. Vous devez pouvoir justifier les versements. En revanche, vous ne pourrez pas déduire les frais occasionnés par le droit de visite (frais de voyage, dépenses engagées pour accueillir votre enfant ...). **La pension est déductible pour le parent qui la verse et imposable au nom du parent qui la reçoit.**

Pour les enfants naturels, si vous êtes imposé séparément de l'autre parent et que vous n'avez pas la garde de l'enfant, vous ne pouvez pas le compter à votre charge sur votre déclaration de revenus. En revanche, vous pouvez déduire la pension alimentaire que vous versez, si les conditions suivantes sont remplies : vous avez reconnu l'enfant, vous pouvez justifier la réalité des versements. La pension versée doit dépendre des besoins de votre enfant et du niveau de vos ressources. **La pension est alors imposable chez le parent qui compte l'enfant à charge.**"

Pour un enfant majeur. "Si votre enfant n'est pas rattaché à votre foyer fiscal pour l'impôt sur le revenu, la pension que vous lui versez peut être déductible. Il n'est pas nécessaire que vous l'hébergiez. **A la différence du rattachement, il n'y a pas lieu de distinguer selon que votre enfant est âgé de plus ou moins de 25 ans, étudiant ou non, invalide ou non.** Toutefois, **le montant de la pension déductible est limité et varie suivant la situation de famille de votre enfant.** De plus, vous devez pouvoir justifier à la demande de votre centre des finances publiques : des versements effectifs de la pension, des justificatifs de dépenses pour les pensions versées en nature (logement, nourriture, ...), de l'état de besoin de votre enfant (étudiant, chômage...). **Les pensions alimentaires déduites sont imposables au nom de votre enfant.**

Si votre enfant est majeur et célibataire: Si vous subvenez seul aux besoins de votre enfant, célibataire, veuf ou divorcé non chargé de famille, vous pouvez bénéficier d'une déduction maximum de 5 732 € par enfant et par an. Si vous subvenez seul aux besoins de votre enfant, célibataire, veuf ou divorcé mais chargé de famille, vous pouvez déduire le double, soit 11 464 €. Cette limite est appliquée quel que soit le nombre de vos petits-enfants. Cette pension alimentaire est considérée comme un revenu perçu par votre enfant. **Il doit la déclarer sur sa déclaration de revenu, dans la rubrique pension alimentaires perçues, à hauteur du montant admis en déduction (limité à 5 732 € ou 11 464 €)**.

Si vous ne déduisez pas de pension alimentaire, vous avez la possibilité de choisir le rattachement. Pour cela, votre enfant ou son conjoint, s'il est marié ou pacsé, doit remplir les **conditions suivantes** : être âgé de moins de 21 ans [ou] être âgé de moins de 25 ans et poursuivre ses études. Le rattachement permet de bénéficier soit d'une **majoration du nombre de parts soit d'un abattement**. Tout dépend de sa situation de famille."

Pour un ex-conjoint. "Si vous êtes divorcé ou séparé et que vous versez une pension alimentaire ou une contribution aux charges du mariage (cessation de la vie commune, sans dissolution du mariage), vous pouvez peut-être déduire ces sommes de votre revenu. Les pensions déduites sont imposables au nom de celui qui les reçoit.

Si vous êtes **divorcé ou en instance de divorce**, les pensions alimentaires peuvent être déduites sous 3 conditions : les époux ou ex-époux doivent être séparés de corps ou divorcés, ou en instance de séparation de corps ou de divorce, et faire l'objet d'une imposition séparée; **les pensions doivent être versées en vertu d'une décision de justice**; les pensions doivent avoir un **caractère alimentaire**

(nourriture, logement...). Vous ne pouvez pas déduire : les sommes versées à titre de dommages et intérêts, les sommes versées suite à un accord amiable, l'abandon de droits immobiliers.

Si vous êtes **toujours marié mais séparé**, en cas de cessation de la vie commune sans dissolution du mariage, la contribution aux charges du mariage est déductible si les conditions suivantes sont remplies : le **montant a été fixé par le juge**, vous et votre conjoint faites l'objet d'impositions distinctes : époux mariés sous le régime de la séparation de biens et ne vivant pas ensemble, abandon du domicile conjugal lorsque chacun dispose de revenus distincts."

8.2 A model of income taxes and intra-family transfers

Consider a family where a member A benefit from a maintenance obligation G given by a member B who does not belong to the same tax household. $\overline{G}$ denotes the maximum deductible transfer (in the case the recipient is an adult child for instance). B is allowed to deduct this amount from his taxable income as long as A declares it. B is richer than A and thus has a higher gross income $z_B > z_A$.

In the case of a smoothly piecewise linear and progressive tax system $T(.)$, B has an interest to transfer the maximal amount to A until the taxable income of both agents are equal, because it minimize the total tax burden at the family level. This result holds whether the donor truly gives G or just compensate A for the tax increase he suffers.

A tax system featuring a notch can be written $T(z) = \tau_1 z + [T_0 + \tau_2(z - \underline{z})] \cdot \mathbb{I}_{[z>\underline{z}]}$ where we consider for simplicity two marginal tax rates τ_1 and τ_2, with $\tau_1 < \tau_2$. $\underline{z}$ is the entry point in the income tax, where a notch occurs if $T_0 > 0$ and a kink occurs otherwise. We further assume that $z_B - \overline{G} > \underline{z}$ and that B is facing a marginal tax rate $\tau_3 > \tau 2$.

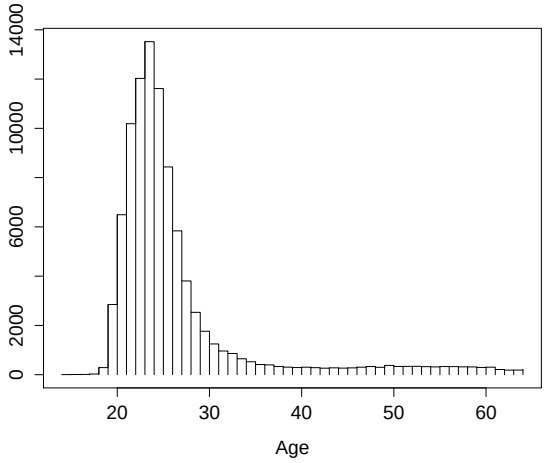
The discontinuity induces potential behavioral reactions for $\underline{z} - \overline{G} < z_A \leq \underline{z}$[32]. Within this interval, there is a local optimum $G^* = \underline{z} - z_A$. Any small deviation would result in a loss of wealth. A rise in G would increase taxes by $\Delta T_G = T_0 - (\tau_3 - \tau_2)(G - G^*)$, up to a point where $G = G^{**} = \frac{T_0}{\tau_3 - \tau_2} + G^*$, after which taxes would start decreasing again. Thus, in the interval $[G^*, G^{**}]$, the optimal transfer is always G^*. Starting from a smooth density for z_A, total taxable income of A is then:

$$z = \begin{cases} z_A + \overline{G}, & \forall z_A + \overline{G} \leq \underline{z} \\ \underline{z}, & \forall z_A + \overline{G} \in \left[\underline{z}, \frac{T_0}{\tau_3 - \tau_2} + \underline{z}\right] \\ z_A + \overline{G}, & \forall z_A + \overline{G} > \frac{T_0}{\tau_3 - \tau_2} + \underline{z} \end{cases}$$

In conclusion, there is an strictly dominated interval whose width is equal to $\frac{T_0}{\tau_3 - \tau_2}$ and in which families have an interest to bunch at the entry point $\underline{z}$ for pure tax burden considerations. In the French tax system, $T_0 = 61$ and the marginal tax rate at the tax collection threshold is $\tau_2 = 21\%$. For $\tau_3 = 0.3$, the width of this interval is 678€ and for $\tau_3 = 0.41$, it is 305€. Finally, if B faces a marginal tax rate of 14%, he should never transfer more than G^*.

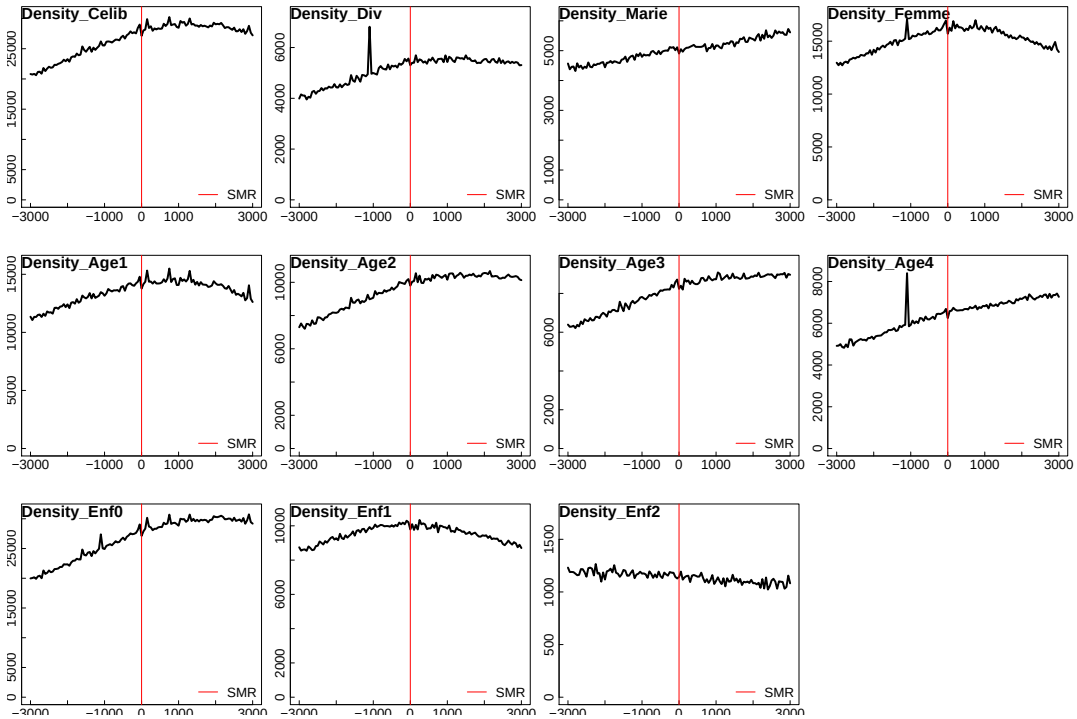
[32] If $z_A < \underline{z} - \overline{G}$, the family always chooses the maximum transfer $\overline{G}$ but will not be able to bunch at the tax collection threshold. If $z_A > \underline{z}$, nobody is concerned by the notch anymore. In this model, we underestimate bunching reactions as we do not take into account potential avoidance or administrative costs related to this transfer.

Figure 9: Age distribution among maintenance obligation recipients



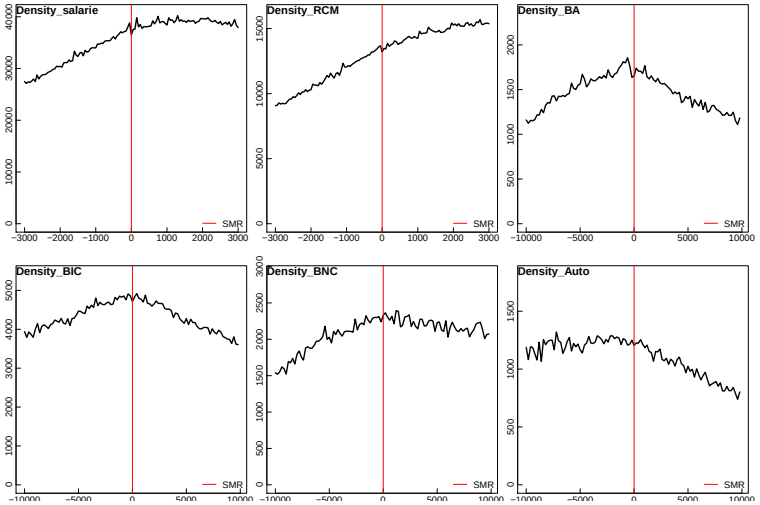
Note: Single maintenance obligation recipients, metropolitan France, within a 2000€ width interval from the tax collection threshold, except retirement pensions holders. Tax files 2013.

Figure 10: Taxable income density : household characteristics



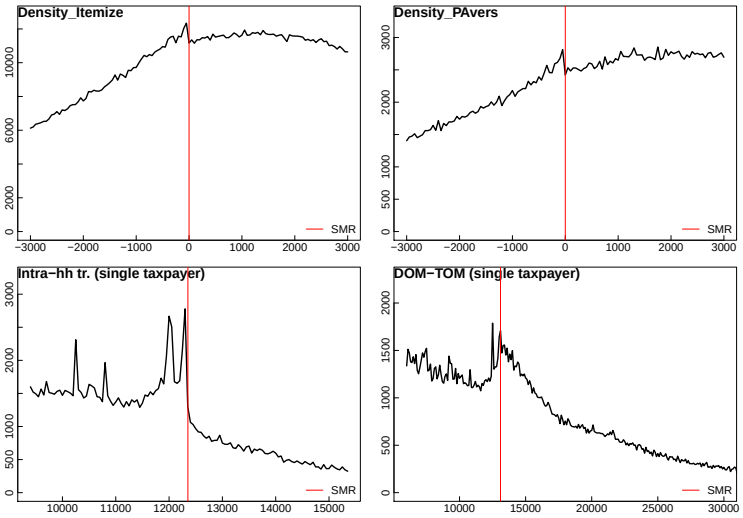
Note: Single person, divorced, married, women (1st row), < 30, 30 to 40, 40 to 50, > 50 (2nd row), no children, 1 or 2 children, three children or more (3rd row). Metropolitan France, tax households whose number of tax units is a multiple of 0.5, except retirement pensions holders and maintenance obligation recipients. Distributions are centered on the tax collection threshold. Tax files 2013.

Figure 11: Taxable income density : type of income



Note: Wage earners, investment income, agricultural profits (1st row) and industrial profits, non-commercial profits, self-employed (2nd row). Metropolitan France, tax households whose number of tax units is a multiple of 0.5, except retirement pensions holders and maintenance obligation recipients. Distributions are centered on the tax collection threshold. Tax files 2013.

Figure 12: Taxable income density : cases of behavioral reactions



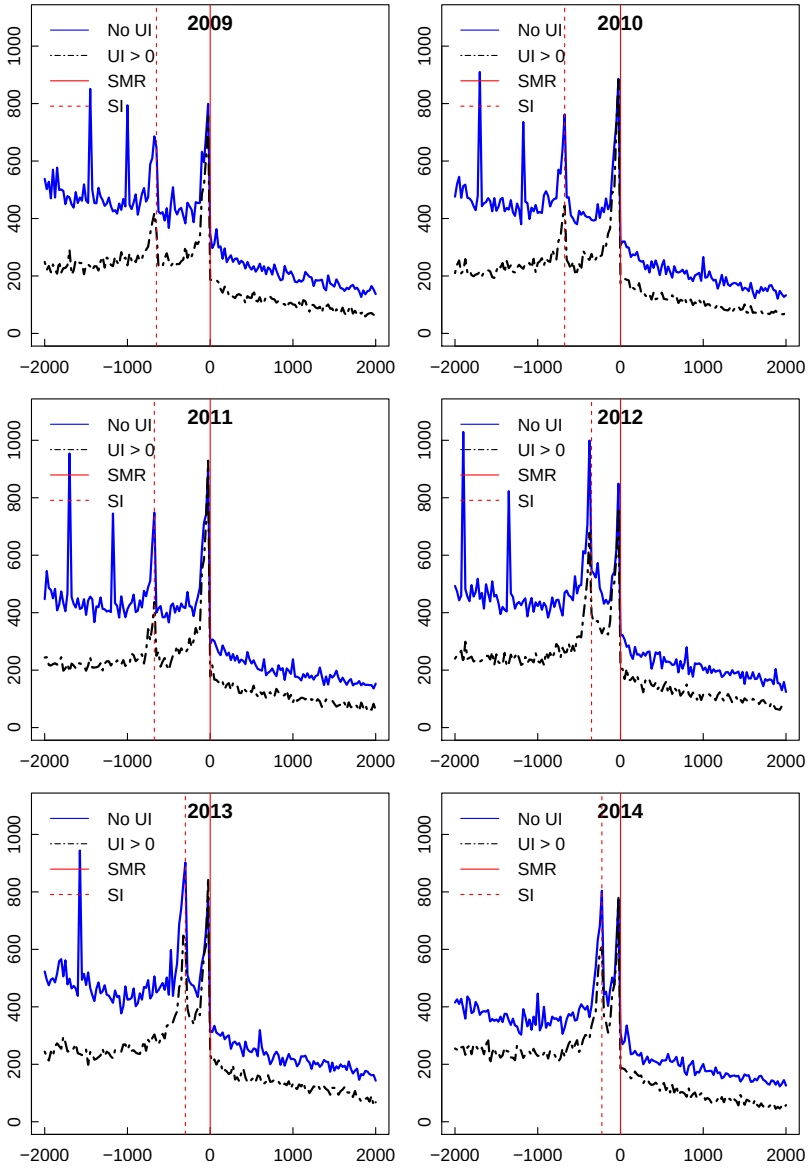
Note: Households itemizing professional expenses (up. left), paying transfers (up. right), benefiting from intra-family transfers (low. left) and living in DOM (low. right). Metropolitan France, tax households whose number of tax units is a multiple of 0.5, except retirement pensions holders and maintenance obligation recipients. Distributions are centered on the tax collection threshold. Tax files 2013.

Table 6: Elasticity estimates estimated on [-3000, 3000]

Year	**Kink**	**Notch**			
		Structural		*Reduced-form*	
	$\widetilde{\varepsilon}_K$	$\widetilde{\varepsilon}_1$	$\widetilde{\varepsilon}_2$	$\widetilde{\varepsilon}_{R1}$	$\widetilde{\varepsilon}_{R2}$
2009	0.047	0.130	0.219	0.199	0.327
	[0.036, 0.057]	[0.083, 0.410]	[0.114, 0.410]	[0.130, 0.599]	[0.177, 0.599]
2010	0.057	0.138	0.236	0.211	0.351
	[0.044, 0.068]	[0.098, 0.399]	[0.128, 0.405]	[0.152, 0.583]	[0.196, 0.591]
2011	0.047	0.128	0.198	0.196	0.298
	[0.034, 0.058]	[0.103, 0.260]	[0.133, 0.402]	[0.159, 0.386]	[0.203, 0.587]
2012	0.035	0.101	0.150	0.155	0.226
	[0.031, 0.038]	[0.058, 0.399]	[0.076, 0.399]	[0.092, 0.581]	[0.119, 0.581]
2013	0.028	0.121	0.170	0.184	0.255
	[0.025, 0.030]	[0.060, 0.387]	[0.077, 0.393]	[0.095, 0.564]	[0.121, 0.571]
2014	0.027	0.110	0.158	0.168	0.235
	[0.024, 0.030]	[0.076, 0.275]	[0.101, 0.351]	[0.118, 0.400]	[0.155, 0.505]

Note: ETI at the kink $\widetilde{\varepsilon}_K$ and at the notch, estimated according to Kleven and Waseem [2013] structural $\widetilde{\varepsilon}_i$ or reduced-form $\widetilde{\varepsilon}_{Ri}$ method. $i = 1$ stems from the lower-bound bunching-hole method and $i = 2$ from the upper-bound convergence method. Percent change in the marginal tax rate is computed compared to a 0 marginal tax rate below the threshold. For 2014, I assume that taxpayers do not see the change in the "décote" formula and behave as if they were facing a 21% marginal tax rate rather than a 28% one. 99% confidence intervals are in brackets below estimates. They are computed from 1000 bootstrap iterations. Single taxpayers receiving maintenance obligation, except retirement pensions holders. Tax files 2009-2014.

Figure 13: Bunching among unemployment benefits earners



Note: Single maintenance obligation recipients, metropolitan France, except retirement pensions holders. The black dotted line stands for tax households earning non-negative unemployment benefits and the blue line for those earning no unemployment benefits.

Table 7: Probability to bunch at the kink or at the notch year n

	Reference: G1†		*Reference: G7*‡	
	Kink (n)	Notch (n)	Kink (n)	Notch (n)
Age	0.003	0.029***	0.003	0.029***
	(0.008)	(0.009)	(0.008)	(0.009)
Women	-0.020	-0.098***	-0.020	-0.098***
	(0.023)	(0.022)	(0.023)	(0.022)
G4*2012	-0.055	-0.246**	-0.013	-0.001
	(0.107)	(0.115)	(0.122)	(0.116)
G4*2013	-0.056	-0.023	-0.228*	-0.017
	(0.106)	(0.113)	(0.117)	(0.110)
Kink (n-1)*2012	-0.345***	-0.295**	-0.303**	-0.050
	(0.113)	(0.129)	(0.127)	(0.130)
Kink (n-1)*2013	-0.143	0.186	-0.314***	0.192*
	(0.106)	(0.118)	(0.117)	(0.116)
Notch (n-1)*2012	0.290**	-0.268**	0.332**	-0.023
	(0.119)	(0.108)	(0.133)	(0.109)
Notch (n-1)*2013	0.216*	-0.158	0.045	-0.152
	(0.121)	(0.108)	(0.131)	(0.106)
G8*2012	0.260*	-0.089	0.302*	0.155
	(0.155)	(0.141)	(0.166)	(0.142)
N	104,453		104,453	
AIC	119,626		119,626	

Note: Single maintenance obligation recipients in metropolitan France, within a 3000€ from the tax collection threshold two consecutive years, except retirement pensions holders and individuals between the two bunching regions. Multinomial logistic regression of the probability to locate at the kink, at the notch or at another taxable income level year n, depending on the position in the distribution year $n-1$. Apart from the two bunching regions, 10 groups of width 500 are constituted : four below the kink (G1 to G4) and six above (G7 to G12). The regression includes group, time and interacted dummies, as well as some characteristics (sexe, age, age squared and marital status). *Reference:* tax households from the lower income group in 2010 (†) or from just above the notch (‡). Unmentioned interacted dummy variables are either never significant or indicate a lower bunching at the notch in 2012. Standard errors are in parenthesis. *, ** and *** stand respectively for significance at 10%, 5% and 1%. Income tax files 2009-2013.

Table 8: Taxation threshold (TT) and Tax collection threshold (TCT)

Parts	2009		2010 & 2011		2012		2013		2014			
	TT†	TCT†	TT	TCT†	TT	TCT	TT	TCT	TT		TCT	
									P. seule	Couple	P. seule	Couple
1	11 136	11 776	11 300	11 946	11 791	12 141	12 067	12 353	13 744	-	13 958	-
1.5	14 073	14 800	14 281	15 005	14 772	15 500	15 190	15 917	18 589	-	18 803	-
2	17 011	17 738	17 263	17 987	17 754	18 481	18 195	18 922	23 434	26 063	23 648	26 277
2.5	19 948	20 675	20 244	20 968	20 735	21 463	21 201	21 928	28 279	30 908	28 493	31 122
3	22 886	23 613	23 226	23 950	23 717	24 444	24 206	24 933	33 124	35 753	33 338	35 967
3.5	25 823	26 550	26 207	26 931	26 698	27 426	27 212	27 939	37 969	40 598	38 183	40 812
4	28 761	29 488	29 189	29 913	29 680	30 407	30 217	30 944	42 814	45 443	43 028	45 657
4.5	31 698	32 425	32 170	32 894	32 661	33 389	33 223	33 950	47 659	50 288	47 873	50 502
5	34 636	35 363	35 152	35 876	35 643	36 370	36 228	36 955	52 504	55 133	52 718	55 347
5.5	37 573	38 300	38 133	38 857	38 624	39 352	39 234	39 961	57 349	59 978	57 563	60 192
6	40 511	41 238	41 111†	41 839	41 606	42 333	42 239	42 966	62 194	64 823	62 408	65 037

Note : The taxation threshold for 2010-2014 and the tax collection threshold for 2012-2014 are provided by the "Brochure pratique" files. †: values computed from the income tax system parameters (brackets, rates, tax collection minimum and "décote" threshold S) and thus subject to a small approximation ($\leq$ 5€ as estimated on years where the true thresholds are available). From 2014 on, thresholds depend on the structure of the family.