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Political feasibility of French income tax reforms 2002–2019*

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Abstract

We study recent income tax reforms in France from a political economy perspective. Building on Bierbrauer et al. (2021), who establish that the median voter is decisive for reforms where the change in the tax burden is monotonic in income, we make three contributions. First, using administrative tax data and a microsimulation model, we show that major French tax reforms since 2002 have been monotonic. Second, median voter support consistently aligned with majority support across all major reforms. Third, we compute upper and lower Pareto bounds for a range of taxable income elasticities. Violations of these bounds indicate situations where self-financing tax cuts are possible. This characterization identifies the space of politically feasible reforms. For elasticities below 0.25, the French tax system lies below the upper Pareto bound, while the lower bound remains far from the current schedule for conventional elasticity values.

JEL Codes: C72, D72, D82, H21, H24.

Keywords: Non-linear income taxation; tax reforms; political economy; optimal taxation; Pareto efficiency.

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1 Introduction

We study recent income tax reforms in France from a political economy perspective using the conceptual framework developed in Bierbrauer et al. (2021). This paper establishes that the median voter is the decisive individual for monotonic tax reforms, i.e. reforms so that the change in the tax burden is a monotonic function of income. Bierbrauer et al. (2021)'s empirical analysis is based on US income tax reforms after World War II. We provide a complementary approach and test this theory using administrative tax data and a microsimulation model for the major French tax reforms since 2002. We also provide Pareto bounds for various elasticities of the taxable income in the French context. These bounds pin down a range for reforms of the French tax system that would have been politically feasible in the past and are politically feasible today. Hence, the approach provides some hints on where political feasible reform may happen in France in the future.

The novelty of the approach in Bierbrauer et al. (2021) is to focus on the political support for tax reforms rather than on tax systems themselves. This stands in contrast to equilibrium analyses in which politicians compete over the full set of nonlinear tax functions (see, e.g., Acemoglu et al. (2008), Bierbrauer and Boyer (2016), or Brett and Weymark (2016)), and complements the older literature in public finance that seeks to characterize welfare-improving incremental changes from a given status quo (Guesnerie, 1995). The two approaches differ in one key respect: under a tax reform analysis, the status quo plays an explicit role, and only politically feasible deviations from it are studied; under an equilibrium analysis, the status quo is irrelevant by construction, since deviations from any existing schedule are made until an equilibrium is reached: the status quo does not play a role.

Anecdotally, the real-world relevance of status quo for tax reforms is well illustrated by the French political debate. During the 2012 presidential campaign, François Hollande proposed to "make the wealthiest French residents contribute to the national effort by introducing an additional tax rate of 45% for incomes above 150,000 euros", an explicit modification of the prevailing system that was subsequently implemented after his election.[1] This kind of tax proposal is precisely what the framework of Bierbrauer et al. (2021) is designed to analyze. It is also the case that the evaluation of tax reforms and public policy discussions are centered around the effect of tax reform from a given status quo (see, e.g., Darricau et al. (2025)).

More precisely, the theoretical characterization of politically feasible reforms from Bierbrauer et al. (2021) provides conditions under which (i) the identity of the decisive voter corresponds to the median voter in the population, and (ii) directions of politically

[1] François Hollande's program is available at `https://www.liberation.fr/france/2012/01/26/les-60-engagements-de-hollande_791303/`.

feasible reforms can be found. Using administrative tax data (ERFS) and a microsimulation model (OpenFisca) to compute changes in tax liability, we first examine whether past French reforms are monotonic. Monotonicity is the key condition under which the median voter is decisive in Bierbrauer et al. (2021). For reforms satisfying this condition, we then assess empirically whether a majority of the French population supported them, i.e., we test the explanatory power of the theory.

Our main findings are as follows. We show that French tax reforms over this period are, by and large, monotonic, which validates the use of the median voter as the relevant decision-maker. We further show that, for all major reforms in this period, the median voter's support aligns with a majority of the population. This suggests that the political process has closely tracked majority preferences.

We complement this analysis by computing Pareto bounds for income tax reforms using a sufficient statistics approach. These bounds depend on the elasticity of taxable income (ETI), and we report results across the range of values discussed in the literature rather than committing to a single estimate (see the related literature below). When the status quo falls outside these bounds, Pareto-improving reforms exist, i.e., reforms that are supported by the entire population. These reforms correspond to self-financing tax cuts. We find that the French income tax system always lies below the upper Pareto bound for ETI values below 0.25, while the system is above the bound at the beginning of the period for an ETI of 0.5 and passed below the bound after the reforms made during the Chirac presidency. In all major tax reform years, the system is far from the lower Pareto bound, suggesting greater room for politically supported reforms that push marginal tax rates into negative territory for incomes below the median than for further increases at the top.

Finally, a comparison with the US case analyzed in Bierbrauer et al. (2021) reveals that the patterns of monotonicity are strikingly similar across the two countries. The upper Pareto bounds are, however, less binding in the US than in France, a difference driven by France's higher marginal tax rates at the top of the income distribution.

Related literature. As discussed above, previous literature on the political economy of taxation has focused on models of *voting over tax schedules*. Contributions differ in the specification of the policy domain, e.g. whether taxes are linear[2] or non-linear,[3] and in the specification of the political economy model, e.g. whether there is party competition as in Downs (1957) or competition between candidates as in the citizen-candidate framework due to Osborne and Slivinski (1996) and Besley and Coate (1997) (see Berliant and Boyer

[2]Initiated by the seminal contributions of Roberts (1977) and Meltzer and Richard (1981); see Acemoglu et al. (2015) for a review.

[3]See, e.g., Acemoglu et al. (2008), Farhi et al. (2012), Scheuer and Wolitzky (2016), Brett and Weymark (2016, 2017), Bierbrauer and Boyer (2016), or Bierbrauer et al. (2022).

(2024) for a review). An advantage of our focus on monotonic tax reforms is that it allows for a political economy analysis on a domain that is relevant for political debates. It is also the "right" environment to connect the literature on optimal taxes that invokes the tax reform approach, also called the perturbation method.[4]

Laffer Bounds define the range of tax rates over which governments can adjust the income tax schedule without decreasing government revenues. There is an upper Pareto bound for positive marginal tax rates and a lower Pareto bound for negative tax rate. The upper bound had been extensively discussed in the literature: although the idea of an inverse U-shaped relationship between tax rates and government revenues is often attributed to Arthur Laffer (an economic advisor under the Reagan administration), the French engineer Jules Dupuit already formalized these insights in an academic article from 1844 (Dupuit, 1844). The lower Pareto bound is important for the design of earning subsidies such as the Earned Income Tax Credit (EITC) in the US (Bierbrauer et al., 2023) or the Prime d'activité in France (Leroy, 2024). These earning subsidies are becoming increasingly important in modern democracies (Bierbrauer et al., 2024). Pareto bounds for non-linear taxes play an important role in our characterization of politically feasible tax reforms. This links our analysis to work on Pareto-efficient taxation, see Stiglitz (1982), Werning (2007), Bierbrauer and Boyer (2014), Lorenz and Sachs (2016), Bierbrauer et al. (2023), or Bierbrauer et al. (2026). We provide an application of these Pareto bounds to the data. The bounds depend crucially on the elasticity of taxable income selected. In our analysis we do not take a stand on this exact number, but show how the bounds vary within the range discussed in the literature.[5]

The empirical analysis in this paper makes use of tax return micro data (ERFS) and of OpenFisca microsimulation model.[6] In terms of research methodology, we build on work by Eissa et al. (2008), Bargain et al. (2015), and Bierbrauer et al. (2021). Similar approaches have also been used for the purpose of *ex ante* policy evaluation, see Immervoll et al. (2007). Our analysis makes use of these tools for a political economy analysis, and, at the same time, for an analysis of how various aspects of French tax policy have evolved since 2002. Our empirical analysis reproduces the analysis conducted for the United States in Bierbrauer et al. (2021) using French data.

[4]For references on the perturbation approach to the analysis of non-linear tax systems, see Piketty (1997), Saez (2001), Golosov et al. (2014), Jacquet and Lehmann (2021), Bergstrom and Dodds (2021), Ferey et al. (2024), or Jacquet and Lehmann (2025). Reviews of the optimal income tax literature are in Salanié (2011) or Piketty and Saez (2013).

[5]Cabannes et al. (2014) provide estimates of the elasticity of taxable income in France, and, for reviews, see Saez et al. (2012) and Sicsic (2023).

[6]Another example of analysis making use of tax return micro data (ERFS) and of OpenFisca microsimulation model is Bierbrauer et al. (2024).

Outline. The following section introduces the conceptual framework that will be used in our empirical analysis. Section 3 presents the institutional context, methodology and data. In Section 4, we document that French tax reforms since 2002 are, by and large, monotonic with income and whether the median voter is a beneficiary of the reforms. Our evaluation of the political feasibility of tax reforms can be found in Section 5. The last section concludes. Additional empirical findings and robustness checks are relegated to Appendices.

2 Conceptual framework

We make use of the framework developed in Bierbrauer et al. (2021) and bring the main results from their paper to the data in France. We sketch the main arguments in a simple version of their model. We refer the reader interested in a more general model and the proofs of the results to the articles Bierbrauer and Boyer (2018) and Bierbrauer et al. (2021).

Preferences. There is a continuum of individuals of measure 1. Individuals have a utility function u that is increasing in private goods consumption, or after-tax income, c, and decreasing in earnings or pre-tax income y. Individuals differ in their willingness to work harder in exchange for increased consumption. Formally, individuals have different types ω with the set of possible types denoted by $\Omega = [\underline{\omega}, \overline{\omega}] \subset \mathbb{R}_+$. The cross-section distribution of types in the population is represented by a cumulative distribution function F with density f. We denote the median of this distribution by ω^M. The utility that an individual with type ω derives from c and y is given by

$$u(c, y, \omega) = c - \frac{1}{1 + \frac{1}{\varepsilon}} \left(\frac{y}{\omega}\right)^{1+\frac{1}{\varepsilon}} .$$

This utility function guarantees that preferences satisfy the Spence-Mirrlees single crossing property, i.e., the marginal rate of substitution MRS_{yc} is strictly decreasing in ω for any given $y > 0$.

Tax reforms. Individuals are confronted with a predetermined income tax schedule T_0 that assigns a (possibly negative) tax payment $T_0(y)$ to every level of pre-tax income y. We call T_0 the status quo tax schedule. Individuals with no income receive a transfer equal to $c_0 \geq 0$. A reform induces a new tax schedule T_1 that is derived from T_0 so that, for any level of pre-tax income y, $T_1(y) = T_0(y) + \tau\ h(y)$, where τ is a scalar and h is a function. We represent a reform by the pair (τ, h).

A tax reform is said to be monotonic over a range of incomes $\mathcal{Y}$ if $T_1(y) - T_0(y) = \tau\ h(y)$ is a monotonic function for $y \in \mathcal{Y}$. Given a cross-section distribution of income, we say

that a reform is monotonic above (below) the median if $T_1 - T_0$ is a monotonic function for incomes above (below) the median income.

A reform induces a change in tax revenue denoted by $R(\tau, h)$. We assume that this additional tax revenue is used to increase the basic consumption level c_0, i.e. it is redistributed lump sum. Alternative uses of tax revenue are considered in Bierbrauer et al. (2021).

One-bracket reforms. Some of our results follow from looking at a special class of reforms that we refer to as *one-bracket* reform in what follows. Such a reform involves a change of marginal tax rates for incomes in a given bracket and plays a prominent role in the literature (Saez, 2001; Piketty and Saez, 2013). Formally, there exists a threshold level of income y_a, so that the new and the old tax schedule coincide for all income levels below the threshold, $T_0(y) = T_1(y)$ for all $y \leq y_a$. For incomes in the bracket, marginal tax rates change by τ. Let ℓ be the length of the bracket, and $y_b = y_a + \ell$ be the end of the bracket. Then, $T_0'(y) + \tau = T_1'(y)$ for all $y \in (y_a, y_b)$. For all incomes above y_b, marginal tax rates do not change, so that $T_0'(y) = T_1'(y)$ for all $y \geq y_b$. Hence, the function h is such that

$$h(y) = \begin{cases} 0, & \text{if} \quad y \leq y_a \ , \\ y - y_a, & \text{if} \quad y_a < y < y_b \ , \\ \ell, & \text{if} \quad y \geq y_b \ . \end{cases} \tag{1}$$

For reforms of this type we will write (τ, ℓ, y_a) rather than (τ, h).

Pareto-improving and political feasible reforms. To describe the implications of reforms for measures of revenue and political support, we introduce the following optimization problem: Individual ω chooses y so as to maximize

$$c_0 + R + y - T_1(y) - \frac{1}{1 + \frac{1}{\varepsilon}} \left(\frac{y}{\omega}\right)^{1+\frac{1}{\varepsilon}} \ , \quad \text{where} \quad T_1(y) = T_0(y) + \tau h(y) \ .$$

We assume that this optimization problem has, for each type ω, a unique solution that we denote by $y^*(\tau, h, \omega)$.[7] The corresponding level of indirect utility is given by

$$c_0 + R + v(\tau, h, \omega) \ ,$$

where the function v gives indirect utility net of government transfers. We can now express the reform-induced change in tax revenue as

$$R(\tau, h) := \int_{\underline{\omega}}^{\overline{\omega}} \{T_1(y^*(\tau, h, \omega)) - T_0(y^*(0, h, \omega))\} f(\omega) \, d\omega \ .$$

[7] This assumption can be relaxed, see Bierbrauer et al. (2026).

We assume that $R(\cdot, h)$ is a differentiable function of τ and denote the derivative by R_τ.[8] The reform-induced change in indirect utility for a type ω individual is given by

$$V(\tau, h, \omega) := R(\tau, h) + v(\tau, h, \omega) - v(0, h, \omega) \ .$$

Definition 1. *Pareto-improving reforms. A reform (τ, h) is said to be Pareto-improving if, for all $\omega \in \Omega$, $V(\tau, h, \omega) \geq 0$, and if this inequality is strict for some $\omega \in \Omega$.*

Political support for the reform is measured by the mass of individuals who are made better off if the initial tax schedule T_0 is replaced by T_1.

Definition 2. *Politically feasible reforms. A reform (τ, h) is supported by a majority of the population if $S(\tau, h) := \int_{\underline{\omega}}^{\overline{\omega}} \mathbf{1}\{V(\tau, h, \omega) > 0\} f(\omega)\, d\omega \ \geq \frac{1}{2}$, where $\mathbf{1}\{\cdot\}$ is the indicator function.*

This notion of political feasibility abstracts from other considerations that could determine individuals' votes such as ideological or fairness considerations that can be added to the analysis (Bierbrauer et al., 2021).

2.1 Median voter theorems for monotonic reforms

An individual of type ω benefits from small reform if, starting from some reform intensity τ', the reform intensity is increased at the margin, i.e. if

$$V_\tau(\tau', h, \omega) := \frac{d}{d\tau} V(\tau, h, \omega) \mid_{\tau=\tau'} > \quad 0 \ .$$

If this derivative is negative, the individual benefits from a reduction of the reform intensity. For a simple reform, an increase of τ simply means that marginal tax rates in the given bracket are increased.

Theorem 1. *Let h be a monotonic function. The following statements are equivalent:*

1. *The median voter benefits from a small reform.*
2. *There is a majority of voters who benefit from a small reform.*

The proof is in Bierbrauer et al. (2021) makes use of the envelope theorem (Milgrom and Segal, 2002) and the single-crossing property. We provide an intuition here: Consider a reform that entails tax cuts for all individuals, with larger reductions accruing to higher-income taxpayers than to lower-income taxpayers. Suppose that the median voter supports the reform; that is, for the median voter, the benefits from the tax cut exceed the associated loss in tax revenue. For individuals with above-median incomes, the gains

[8] General results on the existence of the revenue function are derived in Bierbrauer et al. (2023) and Bierbrauer et al. (2026).

are strictly larger, implying that all such individuals will also support the reform. The same logic applies if the median voters opposes the reform. In this case individuals with below-median incomes will likewise oppose it. Therefore, the median voter's support is both a necessary and sufficient condition for the political feasibility of the reform.

Not all conceivable reforms are such that h is monotonic for all levels of income. Bierbrauer et al. (2021) give conditions under which support of the median voter is a sufficient condition for political feasibility. Intuitively, if at least 50% of the population is facing a monotonic reform, we can make progress on its political feasibility. For instance, if there is a reform that is monotonic above (or below) median income, then having the median earner among the beneficiaries will insure its political feasibility.

In our empirical analysis below, we investigate to what extent past reforms were monotonic and also whether the taxpayer with median income was a beneficiary of the reform. When bringing the theory to data, we will make use of the following insights using the shorthand $y_1^M := y^*(\tau, h, \omega^M)$ and $y_0^M := y^*(0, h, \omega^M)$ for median income after and before the reform, respectively.

Corollary 1. *Let h be a monotonic function. Then, a sufficient condition under which the median voter is a beneficiary of a tax reform is*

$$R(\tau, h) - \max\left\{T_1(y_1^M) - T_0(y_1^M), T_1(y_0^M) - T_0(y_0^M)\right\} \quad \geq \quad 0\,. \tag{2}$$

Analogously, the median voter is worse off if

$$R(\tau, h) - \min\left\{T_1(y_1^M) - T_0(y_1^M), T_1(y_0^M) - T_0(y_0^M)\right\} \quad < \quad 0\,. \tag{3}$$

The proof of the Corollary can be found in the Appendix.

2.2 Pareto-efficient tax systems and politically feasible reforms

To assess whether a given tax system can be reformed in a politically feasible manner, it is necessary to determine whether the reform can make the median-income voter better off. How can this be established? In this section, we restrict attention to one-bracket reforms. Theorem 2 below characterizes the conditions under which such reforms are politically feasible. Building on this characterization, we derive sufficient statistics that make it possible to identify politically feasible reforms empirically.

A tax schedule T_0 is Pareto-efficient if there is no Pareto-improving reform. If it is Pareto-efficient, then for all y_a and l,

$$\ell \quad \geq \quad R_\tau(0, \ell, y_a) \quad \geq \quad 0\,,$$

where $R_\tau(0, \ell, y_a)$ is the marginal change in tax revenue that results as we slightly rise τ above 0, while keeping y_a and ℓ fix. This follows from (1); if we had $R_\tau(0, \ell, y_a) < 0$, a

small reform (τ, ℓ, y_a) with $\tau < 0$ would be Pareto-improving: all individuals would benefit from increased transfers and individuals with an income above y_a would, in addition, benefit from a tax cut. With $\ell < R_\tau(0, \ell, y_a)$, a small reform (τ, ℓ, y_a) with $\tau > 0$ would be Pareto-improving. All individuals would benefit from increased transfers. Individuals with an income above y_a would not benefit as much because of increased marginal tax rates. They would still be net beneficiaries because the increase of the tax burden was dominated by the increase of transfers. Under a Pareto-efficient tax system there is no scope for such reforms. We say that T_0 is an *interior Pareto-optimum* if, for all y_a and ℓ,

$$\ell \quad > \quad R_\tau(0, \ell, y_a) \quad > \quad 0 \, .$$

The following Theorem states that one can find a politically feasible reform for any level of income $y_a \neq y_0^M$ if the status quo is an interior Pareto optimum.

Theorem 2. *Suppose that T_0 is an interior Pareto-optimum.*

1. *For any $y_a < y_0^M$, there is a one-bracket reform with $\tau < 0$ that is politically feasible.*
2. *For any $y_a > y_0^M$, there is a one-bracket reform with $\tau > 0$ that is politically feasible.*

Theorem 2 shows that reforms involving a shift towards lower marginal tax rates for below median incomes and reforms involving a shift towards higher marginal tax rates for above median incomes are politically feasible. Intuitively, a lowering of marginal taxes comes with a loss of tax revenue. For individuals with incomes above $y_b = y_a + \ell$, the reduction of their tax burden outweighs the loss of transfer income so that they benefit from such a reform. If y_b is smaller than the median income, this applies to all individuals with an income (weakly) above the median. Hence, the reform is politically feasible.

By the same logic, an increase of marginal taxes for incomes between y_a and y_b generates additional tax revenue. If y_a is chosen so that $y_a \geq y_0^M$, only individuals with above median income have to pay higher taxes with the consequence that all individuals with below median income, and hence a majority, benefit from the reform.

Proposition 1 characterizes upper and lower Pareto bounds on marginal tax rates in terms of sufficient statistics. Given data on the income distribution, the current tax system, and behavioral responses to taxation, these statistics allow one to assess whether the status quo is an interior Pareto optimum. The proposition is derived under two simplifying assumptions. First, income in the status quo, $\omega_0 : y \mapsto \omega_0(y)$, is strictly monotonic and continuous, which rules out bunching; relaxing this assumption requires only additional case distinctions and is straightforward, following Bierbrauer and Boyer (2018). Second, income in the status quo satisfies the first-order conditions of utility maximization, an assumption that is relaxed in Bierbrauer et al. (2026).

Proposition 1. *1. Suppose that the status quo schedule T_0 is such that, at income level y',*

$$\frac{T_0'(y')}{1-T_0'(y')} \quad > \quad \mathcal{D}^{up}(y') := \quad \frac{1-F(\omega_0(y'))}{f(\omega_0(y'))\,\omega_0(y')}\left(1+\frac{1}{\varepsilon}\right), \tag{4}$$

then there is a simple Pareto-improving reform (τ, ℓ, y') that involves a decrease of the marginal tax rate at y'.

2. Suppose that the status quo schedule T_0 is such that, at income level y',

$$\frac{T_0'(y')}{1-T_0'(y')} \quad < \quad \mathcal{D}^{low}(y') := -\frac{F(\omega_0(y'))}{f(\omega_0(y'))\,\omega_0(y')}\left(1+\frac{1}{\varepsilon}\right), \tag{5}$$

then there is a simple Pareto-improving reform (τ, ℓ, y') that involves an increase of the marginal tax rate at y'.

The upper Pareto bound, $\mathcal{D}^{up}(y')$, is given by the right hand side of Equation (4). It is a product of two terms, an inverse hazard rate and an inverse elasticities term. To see the role that they play, consider a reform that involves an increase of marginal tax rates for incomes in a small neighborhood of y': the inverse hazard rates relates the number of people who pay higher taxes and show no behavioral response, $1-F(\cdot)$, to the number of people who show a behavioral response and choose to earn less, $f(\cdot)$. The smaller this ratio, the smaller is the revenue effect of the tax reform. The elasticity ε measures the size of this behavioral response. Thus, a larger a behavioral response and a larger hazard rate make it more difficult to raise revenue with such a simple reform at y'. If these terms exceed critical values, then there is a loss rather than a gain of revenue. Tax cuts are then Pareto-improving.

Equation (5) provides a lower bound for marginal tax rates. Consider a reform that involves an increase of marginal taxes at y'. As we argued above, the revenue that is thereby raised is larger the larger is the inverse hazard rate and the smaller is the elasticity ε. To be Pareto-improving the revenue effect must be so strong that even those who are hit hardest by the tax increase are compensated by the additional transfers that are financed with this revenue. The right hand side of (5), $\mathcal{D}^{low}(y')$, has a negative sign. This shows that such a situation can only occur if the status quo involves earning subsidies, or, equivalently, negative marginal tax rates. A situation in which the lower Pareto bound is violated indicates that these subsidies are excessive: a move towards lower subsidies would then be Pareto-improving.

Finally, we can rewrite the Pareto bounds using the distribution F_y and density of incomes f_y because these functions are available in administrative data, not like the distribution of types (Saez, 2001). Therefore, the expressions used in our empirical analysis are

$$\mathcal{D}^{up}(y) = \frac{1-F_y(y_0(\omega))}{f_y(y_0(\omega))y_0(\omega)}\frac{1}{\varepsilon} \qquad \text{and} \qquad \mathcal{D}^{low}(y) = -\frac{F_y(y_0(\omega))}{f_y(y_0(\omega))y_0(\omega)}\frac{1}{\varepsilon}.$$

From Theorem 2, tax cuts are politically feasible for below median incomes and tax increases are politically feasible for above median incomes provided that the status quo is an interior Pareto optimum. The expressions above provide a characterization of these Pareto bounds that make it possible to check whether the conditions in Theorem 2 are fulfilled.

3 Context, methodology and data

3.1 Data on the income distribution

To derive the income distribution before the reforms, we use data from the National Institute of Statistics and Economic Studies (INSEE) survey *Enquête de Revenus Fiscaux et Sociaux* (ERFS). The ERFS matches data from three administrative sources: the Labour Force Survey (*Enquête Emploi*), tax records from the *Direction Générale des Finances Publiques* (DGFiP), and social benefits records from the main French social insurance agencies (CAF, CNAV, and Pôle Emploi). The survey provides information on the types of income the household receives, such as individual incomes received by each household member (wages, pensions, etc.), income that cannot be individualised (social benefits), and taxes paid by the household. Each household is associated with a survey weight (wprm) reflecting the number of individuals in the French population that the observation represents, allowing for the construction of nationally representative statistics.[9]

Specifically, we use as income in our empirical analysis an individual-level aggregate constructed from the ERFS-FPR variables, which aggregates three categories of individual income. First, labor income for employees in the private and public sectors: base wages (*salaire de base*), civil servants' index-linked salary (*traitement indiciaire brut*) and bonuses (*primes de la fonction publique*). Second, replacement income: gross pension and retirement benefits, unemployment benefits and pre-retirement allowances, disability pensions, and alimony received. Third, self-employment income: agricultural profits (BA), industrial and commercial profits (BIC), and non-commercial profits (BNC), covering notably farmers, tradespeople and liberal professions.

This measure of income explicitly excludes capital income (rental income and financial income). All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. Table 1 gives summary statistics of the income distribution for each ERFS survey. More details on income distribution are available in the Appendix.

[9]The data are not in open access but can be accessed after a procedure at `http://www.progedo-adisp.fr/enquetes_salrev_en.php`. The data are representative of metropolitan France (excluding overseas territories).

Table 1: ERFS surveys – Sample size and income distribution

Year	N	N weighted (M)	Mean	P10	P25	P50	P75	P90	P99
2002	61,000	44.29	18,351	4,340	9,325	15,367	22,624	32,718	84,038
2003	63,225	44.66	18,736	4,274	9,528	15,658	23,160	33,131	85,775
2004	64,193	45.07	19,169	4,232	9,750	15,994	23,360	33,813	88,719
2005	63,347	45.53	19,576	4,137	9,985	16,574	24,207	34,691	87,630
2006	63,885	45.87	20,128	4,206	10,290	17,060	24,724	35,361	88,562
2007	65,720	46.22	20,705	4,190	10,651	17,613	25,446	36,360	93,680
2008	65,116	46.49	21,448	4,585	11,110	18,266	26,330	37,917	96,461
2009	86,042	46.77	21,530	3,860	11,035	18,487	26,755	38,215	96,052
2010	95,582	47.07	22,003	3,960	11,161	18,755	27,145	38,692	99,810
2011	98,775	47.21	22,701	3,855	11,273	19,139	28,026	40,537	102,987
2012	97,448	47.10	23,197	3,785	11,895	19,848	28,638	40,908	103,792
2013	88,382	47.60	23,284	3,525	12,085	20,101	29,032	41,218	98,749
2014	87,291	47.90	23,484	3,360	12,190	20,213	29,280	41,530	102,469
2015	88,659	48.14	23,719	3,503	12,205	20,369	29,484	42,157	106,300
2016	90,005	48.40	23,972	3,344	12,282	20,520	29,794	42,831	103,729
2017	89,111	48.58	24,425	3,632	12,547	20,845	30,250	43,561	107,800
2018	86,978	48.72	25,122	3,790	12,798	21,203	30,845	44,736	112,127
2019	85,429	49.12	25,508	4,092	13,065	21,697	31,673	45,838	112,100

Notes: Sample of adults (age $\geq$ 18) from the ERFS-FPR surveys. All income statistics are weighted by survey weights *wprm* and expressed in euros. Total income excludes capital income.

3.2 Elasticity of taxable income (ETI)

The elasticity of taxable income (ETI) is a key parameter in our analysis of tax reforms. It plays a central role both in determining the median voter's support for a reform and in characterizing the Pareto bounds that delineate the set of potentially Pareto-improving reforms. There is a rich literature providing estimates of this parameter. Saez et al. (2012) review the ETI values that are considered plausible in the contemporaneous empirical literature and conclude that the most credible estimates range between 0.12 and 0.40, with 0.25 emerging as a consensus value for the general population. Higher estimates, around 1 or above, were defended by Feldstein (1995, 1999) based on difference-in-difference regressions around the 1986 Tax Reform Act, but were subsequently challenged on methodological grounds, notably regarding heterogeneous income trends unrelated to taxation. More recent work by Mertens and Olea (2018) using time-series methods on American data recovers higher estimates around 1.2, illustrating that the debate remains open, in particular for top incomes.

For France, the existing literature argues in favor of lower elasticities for the general population. Cabannes et al. (2014), using a French administrative dataset of 500,000 tax returns over the period 1997-2004, estimate an ETI of approximately 0.02 for the full population of tax filers, rising to 0.31 for the top income decile (P90 to P100). Working on survey data closer to ours (the ERFS surveys from 2003 to 2006), Lehmann et al. (2013) obtain an ETI of around 0.22 for labor income, consistent with the broader European consensus documented by Sicsic (2023) which places the average European estimate around 0.25. The meta-analysis of Neisser (2021) further confirms this consensus for continental European countries, combining 1 720 estimates from 61 studies. Using bunching evidence from the universe of French income tax returns from 2008 to 2014, Lardeux (2023) identifies a behavioral cross-influence arising from taxpayers' misperception of the tax schedule, and shows that standard ETI estimates underestimate true behavioral responses by approximately 60%.

In our empirical study below, we do not take a stand on the ETI estimates and present results for different ETI values.

3.3 Background on the French tax and transfer system

We describe the elements of the French tax and transfer system used in our empirical analysis.

Tax rates and tax brackets. The French tax system comprises a finite number of brackets, within each of which individuals face a constant marginal tax rate. We rely on the IPP tax and benefit tables for detailed documentation of the marginal rates applied to each bracket over time (Ben Jelloul et al., 2024), as well as the corresponding bracket

thresholds (available at `https://www.ipp.eu/baremes-ipp/`). A household's tax liability is computed as the sum, across all brackets, of income earned within each bracket multiplied by the applicable marginal tax rate.

Entry in the income tax: Décote. The *décote* is a tax relief mechanism that decreases the taxation of low income households. Taxpayers whose gross tax falls below a household-specific threshold (which differs for singles and married couples) benefit from a reduction equal to the difference between that threshold and a fixed fraction of their gross tax. An individual with gross income tax T effectively pays $min(T, \alpha T - S)$ if this quantity is positive, zero otherwise, where S is the threshold and α a fixed rate. In 2017, $S = 1165$ and $\alpha = 7/4$. This implies that the effective income tax threshold is at 14,465 euros, and that the income tax is reduced for incomes between 14,465 euros and 20,805 euros. Above 20,805 euros, the *décote* doesn't apply.

Thus, the *décote* reduces the tax burden of many low income individuals without reducing the tax burden of wealthier taxpayers, that are not concerned by the mechanism.

Prime d'activité. The *Prime d'activité* is an in-work benefit program that provides monthly earnings subsidies and is administered by the welfare agency *Caisse d'allocations familiales* (CAF). Introduced in 2016, it resulted from the merger of two preexisting instruments: the *Revenu de solidarité active – activité* (*RSA activité*) and the *Prime pour l'emploi*. The program retains the same objective as its predecessors, namely to incentivize labor force participation and increase the purchasing power of low-income workers.[10] Over the period we study, the most recent major reform of the *Prime d'activité* occurred in January 2019, in response to the *Gilets Jaunes* movement (Boyer et al., 2020, 2024), and triggered a large increase of beneficiaries (Leroy, 2024).

Microsimulation of the French tax and transfer system. To simulate the French system, we make use of OpenFisca, an open source microsimulation model of taxes and benefits, to which the Institut des Politiques Publiques (IPP) contributes.[11]

The French tax schedule is such that the income tax paid in year t is based on the income generated in year $t-1$, whereas the tax law for the income tax in year t is decided in the fall of year $t-1$. This institutional feature creates a mismatch between the year of the reform and the year of the ERFS survey used to evaluate this reform. Let us take

[10]The merger aimed to address shortcomings of the previous schemes, notably the high non-take-up rate of the *RSA activité* and the relatively low benefit levels and weak work incentives associated with the *Prime pour l'emploi*.

[11]The documentation is available at `https://openfisca.org/doc/index.html`. The code is also available at `https://github.com/openfisca/openfisca-france/tree/master`. The microsimulation model Taxipp is documented in IPP (2026).

as an example the 2002-2003 reform. By "2002-2003", we mean that we study the reform voted at the end of the year 2003 which applies to income generated in 2003.

The revenue generated in 2002, denoted by y_0^i, is considered as the pre-reform income. First, to estimate a counterfactual income $\hat{y}_0^i$ of what the income generated in 2003 would have been in the absence of reform, we only account for inflation across years by uprating pre-reform income y_0^i using the CPI deflator. Second, since the post-reform income y_i^1 (which incorporates behavioral response to taxation) is not observed in the data, we estimate it from the pre-reform income y_0^i using the assumption on the value of the ETI parameter. This methodology is standard in the literature using microsimulations (Eissa et al., 2008; Immervoll et al., 2007; Bierbrauer et al., 2021).

Therefore the analysis of the 2002-2003 income tax reform only requires data from the 2002 ERFS survey and tax schedules applying to incomes generated in 2002 and 2003 (resp. T_0 and T_1, which are included in OpenFisca).

3.4 Major tax reforms

The main reforms in terms of changes of tax liabilities in the period we study are happening in 2002-2003, 2005-2006, 2009-2010, 2010-2011, 2011-2012 and 2018-2019. In the following paragraph, we describe the main reason for these changes. In the main text, we will limit our analysis to these reforms. We present the same analysis for all years in the Appendix.

Here we briefly document what happened in those years:[12]

2002-2003 (***Chirac I***): Decrease of the marginal tax rate for all the brackets. They go from [0%, 7.05%, 19.74%, 29.14%, 38.54%, 43.94%, 49.58%] to [0%, 6.83%, 19.14%, 28.26%, 37.38%, 42.62%, 48.09%]. Note that the decrease is higher for higher incomes, from -0.2pp in the lowest bracket to -1.5pp in the highest bracket.

2005-2006 (***Chirac II***): Reform from 7 brackets (with marginal tax rates [0%, 6.83%, 19.14%, 28.26%, 37.38%, 42.62%, 48.09%]) to 5 brackets (with marginal tax rates [0%, 5.5%, 14%, 30%, 40%]). The apparent reduction in marginal rates largely reflects the simultaneous integration of a pre-existing 20% income deduction (*abattement de 20%*) into the rate schedule. This deduction applied specifically to wage earners, pensioners and civil servants whose income was reported by third parties (but not to self-employed workers). For those benefiting from the deduction, the effective top marginal rate was approximately $48.09\% \times 0.80 \approx 38.5\%$, close to the new statutory rate of 40%. The reform is therefore primarily a technical simplification for wage earners rather than a reduction in effective taxation.

[12]For annual historical data on the income tax schedule, see the IPP tax schedule: `https://www.ipp.eu/baremes-ipp/impot-sur-le-revenu/impot_revenu.bareme_ir_depuis_1945.bareme/table/`.

2009-2010 (***Sarkozy I***): Increase of the top marginal tax rate from 40% to 41%. It was the first modification of a statutory rate since the 2006 reform, and it was presented as a complementary measure to the 2010 pension reform, which raised the legal retirement age from 60 to 62 years so as to sustain the balance of the pension system and limit fiscal deficits.

2010-2011 (***Sarkozy II***): Freeze of the tax schedule thresholds for revenues earned during the year 2011, departing from the usual practice of annual indexation on inflation. As inflation reached 2.1% in 2011, this freeze mechanically pushes households whose income merely kept pace with inflation into higher tax brackets.[13]

2011-2012 (***Hollande I***): Creation of a new top tax bracket with a marginal tax rate of 45% for income above 150 000 euros. Creation of an Exceptional Contribution on High Incomes (CEHR, *Contribution Exceptionnelle sur les Hauts Revenus*), an add-on to the standard income tax: 3% on the fraction of fiscal reference income between 250 000 and 500 000 euros for single filers and 4% above this threshold. Finally, the tax schedule thresholds remain frozen for revenues of year 2012.

2018-2019 (***Macron I***): Decrease in the marginal tax rate of the second bracket from 14% to 11%. The tax reduction was also achieved through an extension of the *décote* mechanism to the entire second bracket (from 10,084 to 25,710 euros) and the elimination, for simplification purposes, of the means-tested tax reduction introduced in 2016.[14]

Then, up to 2022, French finance acts (*lois de finances*) include no structural modifications to the tax rates, but only inflation-indexed adjustments to the thresholds, particularly during the Covid period.

4 Median voter and monotonicity of reforms

First, we check to what extent past tax reforms were monotonic. Second, we investigate whether the median voter was a beneficiary of these reforms. Moreover, we check whether support of a reform by the median voter goes together with majority support in the population at large, i.e., we check whether the median voter theorem holds in France.

4.1 History of French statutory income tax reforms

Before doing our analysis of the monotonicity of tax reforms using our microsimulation model for recent years, we provide the same analysis for *statutory* tax schedule for the

[13]For a general analysis of the role of indexation on tax brackets, see Duchesne et al. (2024).

[14]For further details on the income tax reforms of that year, see Fabre et al. (2020).

whole history of French income tax reforms. An analysis of the monotonicity of reforms of statutory tax functions do not take into account the richness of the changes in the tax systems (deductions, loopholes, etc.) but gives a historical perspective on the reforms of income tax schedules in France from its creation in 1914 (the first year where the schedule applied is in 1916 on the income generated in 1915). This section relies on the *Institut des politiques publiques* (IPP) database.[15] We refer the reader to Piketty (2001) for a description of these reforms and their historical context.

Summary statistics on the period 1916–1945. We begin with a detailed account of the reforms that took place before the end of World War II (WWII). Table 2 shows that only 4 reforms before WWII are non-monotonic (1918, 1920, 1937, 1943). A careful inspection of these reforms shows, however, that they are "essentially" monotonic, even though the function that indicates the change in the tax burden exhibits some small local non-monotonicities (all figures are reproduced in the Appendix). Overall, before WWII, tax reforms were rare, there are 17 years without a reform.

Table 2: Summary statistics on French tax reforms before World War II (1916-1945)

Beginning of examination:	1916	
Total number of possible reforms until 1945:	29	
Total number of reforms until 1945:	12	
Number of monotonic reforms:	8	(67%)
Number of non-monotonic reforms:	4	(33%)

Notes: In France, out of the 29 years inspected (period 1916–1945), there were 8 monotonic and 4 non-monotonic income tax reforms; in 17 years there was no reform. Years with a monotonic reform: 1917, 1924, 1925, 1926, 1927, 1929, 1933, 1935. Years with a non-monotonic reform: 1918, 1920, 1937, 1943. Years without a reform: 1919, 1921, 1922, 1923, 1928, 1930, 1931, 1932, 1934, 1936, 1938, 1939, 1940, 1941, 1942, 1944, 1945.
Source: Authors' calculations based on Institut des politiques publiques (IPP) database, accessible at `https://www.ipp.eu/baremes-ipp/`.

Summary statistics on the period 1945–2016. We now provide a detailed account of the reforms that occurred after WWII. Table 3 shows that there are adjustments of the French income tax system almost every year in this period. In most of the cases, the changes in tax payments are monotonic for all incomes. There are eight exceptions. Under at least two of those (1983 and 2011), the changes in tax payments were strictly monotonic below the median (all reforms with non-monotonic pattern are reproduced in the Appendix). More generally, as we show in the Appendix, an inspection of the non-monotonic reforms reveals that there is usually one bracket where monotonicity is

[15] For more details and a cross-country comparison, see Bierbrauer et al. (2021).

violated. In some cases this bracket is, moreover, very narrow or the tax reforms are monotonic above or below the median.

Table 3: Summary statistics on French tax reforms after World War II (1945-2016)

Beginning of examination:	1945	
Total number of possible reforms until 2016:	71	
Total number of reforms until 2016:	62	
Number of monotonic reforms:	54	(87%)
Number of non-monotonic reforms:	8	(13%)

Notes: In France, out of the 71 years inspected (period 1945–2016), there were 54 monotonic and 8 non-monotonic income tax reforms; in 9 years there was no reform. Years with a monotonic reform: 1947, 1948, 1949, 1950, 1952, 1954, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1970, 1971, 1972, 1973, 1974, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2013, 2014, 2016. Years with a non-monotonic reform: 1946, 1951, 1961, 1975, 1983, 1994, 2011, 2015. Years without a reform: 1953, 1955, 1956, 1957, 1958, 1959, 1960, 1969, 2012.
Source: Authors' calculations based on Institut des politiques publiques (IPP) database, accessible at `https://www.ipp.eu/baremes-ipp/`.

The analysis above shows that for statutory tax reforms, there is a large majority of reforms that are monotonic. We now turn back to the empirical analysis of French income tax reforms, using microsimulation data from the ERFS surveys over the period 2002-2019.

4.2 Are tax reforms monotonic?

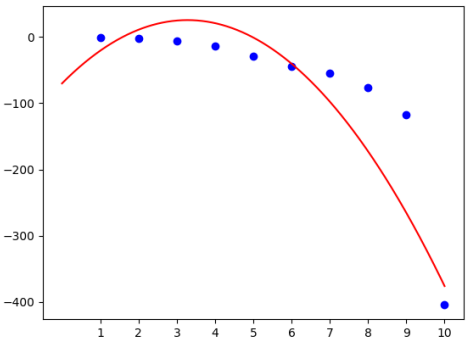
For each reform, Figure 1 shows, separately for each decile of the income distribution, the average value of $T_1(\hat{y}_0^i) - T_0(y_0^i)$. This enables us to look at the monotonicity of reforms.

Reforms *Chirac I* and *Chirac II* are clearly monotonic: they involve tax cuts for all individuals, these tax cuts being larger for larger incomes. Reforms *Sarkozy I* and *Hollande I* are also monotonic: they almost don't change the tax liability of the population, except for the highest incomes, that are subject to higher marginal tax rates and an exceptional contribution on high incomes. Reform *Sarkozy II* also appears mostly monotonic. Non-monotonicities can be explained by the fact that the involved reform is not a general tax cut or tax increase, but a freeze of the tax schedule thresholds. Therefore, given the distribution of income over the tax brackets, deciles may be hit differently by the threshold freeze.

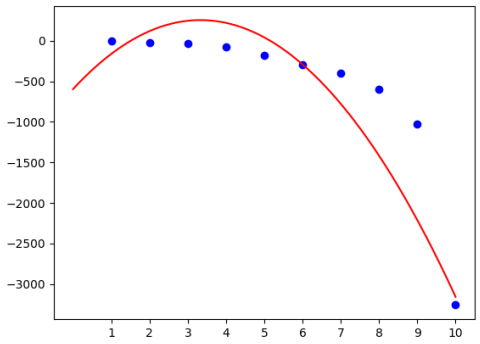
Finally, *Macron I* reform also exhibits a globally monotonic pattern, with small deviations from monotonicity. As we will argue in Figure 4, the local non-monotonicities are small in the sense of our theory: they do not upset the alignment of support by the median voter and majority support in the population.

Figure 1: Changes in tax liability: Average values per decile

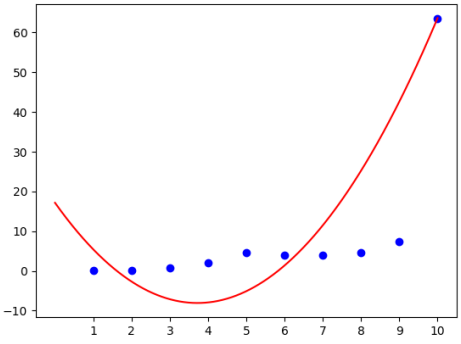
(a) Chirac I



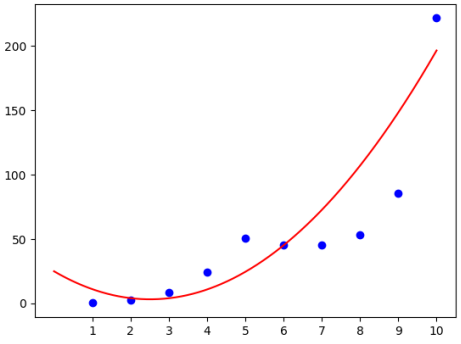
(b) Chirac II



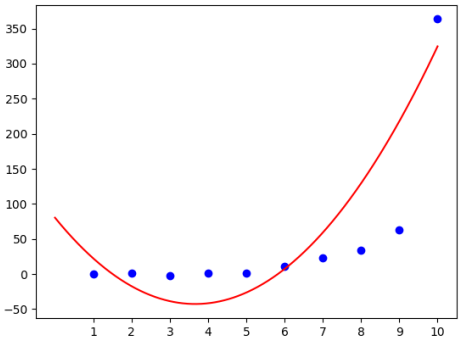
(c) Sarkozy I



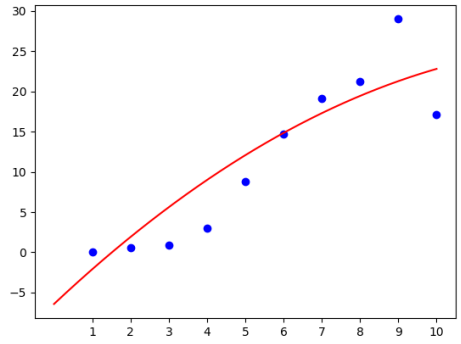
(d) Sarkozy II



(e) Hollande I



(f) Macron I

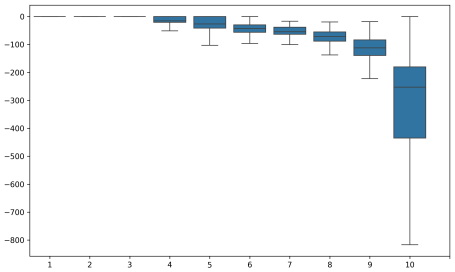


Notes: This figure shows the average value of the counterfactual change in tax liability $T_1(\hat{y}_0^i) - T_0(y_0^i)$ for reforms of the French federal personal income tax. The red line represents a quadratic fit based on the underlying microdata. All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.
Source: Authors' calculations based on OpenFisca and ERFS.

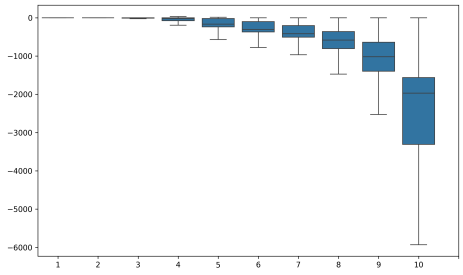
Figure 2 provides additional information on the underlying heterogeneity using box plots. We observe significant heterogeneity within the deciles affected by the reforms across the income distribution, especially *Sarkozy I* and *Macron I*. In most years, the largest heterogeneity is concentrated in the top of the income distribution.

Figure 2: Changes in tax liability: Heterogeneity within deciles

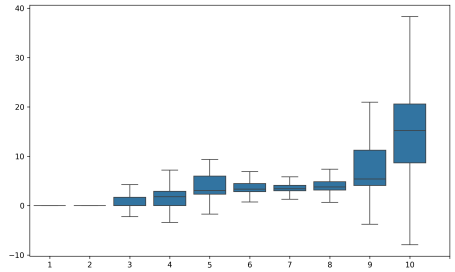
(a) Chirac I



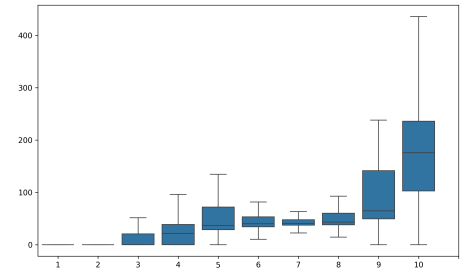
(b) Chirac II



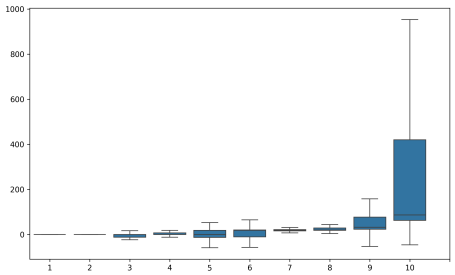
(c) Sarkozy I



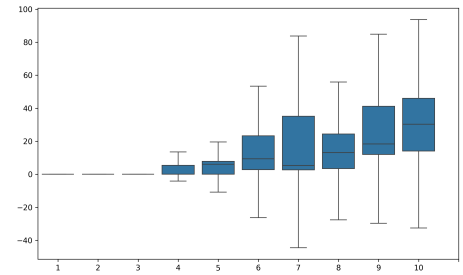
(d) Sarkozy II



(e) Hollande I



(f) Macron I



Notes: This figure illustrates, for each decile, the cross-sectional distribution of the counterfactual change in tax liability $T_1(\hat{y}_0^i) - T_0(y_0^i)$ for reforms of the French federal personal income tax by means of a box plot. All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.
Source: Authors' calculations based on OpenFisca and ERFS.

4.3 Did the median voter gain? Was there majority support?

From Corollary 1, a taxpayer is a beneficiary of a reform if

$$\max\{T_1(y_1^i) - T_0(y_1^i), T_1(\hat{y}_0^i) - T_0(y_0^i)\} - R(\tau, h) \leq 0$$

We investigate majority support in the population when this inequality holds for at least one half of the population.

In this empirical analysis, we adapt the abovementioned formula in order to microsimulate y_1^i, $T_1(y_1^i)$ and $R(\tau, h)$. In such formulas, assumptions about the elasticity of taxable income (ETI) play a key role. Our benchmark is naturally an ETI of zero, when there is no behavioral response. In this benchmark y_1^i is only the inflated version of y_0^i, that is $\hat{y}_0^i$. Hence the maximum simplifies to $T_1(\hat{y}_0^i) - T_0(y_0^i)$ and what we plot in the Figure 3 is very close to Figure 1 because we plot the average of $T_1(\hat{y}_0^i) - T_0(y_0^i) - R(\tau, h)$ across deciles. Positive values in this Figure indicate an overall loss for the decile while negative value indicate an overall gain.

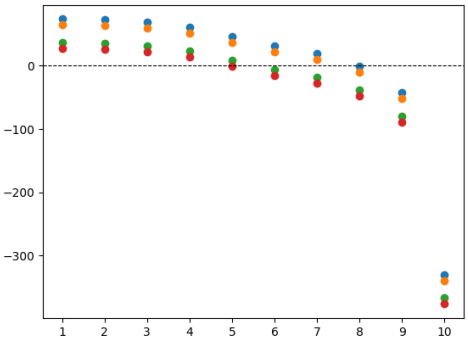
The first observation from Figure 3 is that the fraction of winners and losers depend on the ETI parameters: tax cuts are supported by a larger fraction of the population is the ETI is high, while tax increases are increasingly popular when ETI goes down.

Hence, the monotonic reforms *Chirac I* and *Chirac II* involved tax cuts for all individuals, these tax cuts being larger for larger incomes. Here, Figure 3 clearly shows that first deciles up to the 6th or 7th decile are losers for ETI of 0 and 0.25.

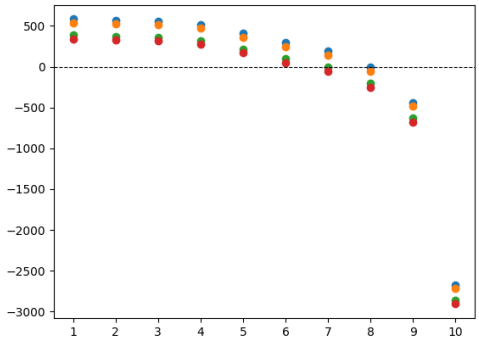
The reforms *Sarkozy I*, *Sarkozy II* and *Hollande I* suggest that a majority of the population benefits from the reform, though this majority is narrow and sensitive to the ETI assumption, particularly for *Sarkozy I*. For these reforms, both the median voter and the population as a whole are more likely to support the reform when behavioral responses are limited, that is when the ETI is low.

Figure 3: Winners and losers of major French tax reforms

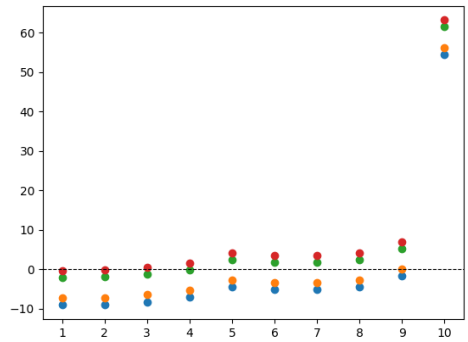
(a) Chirac I



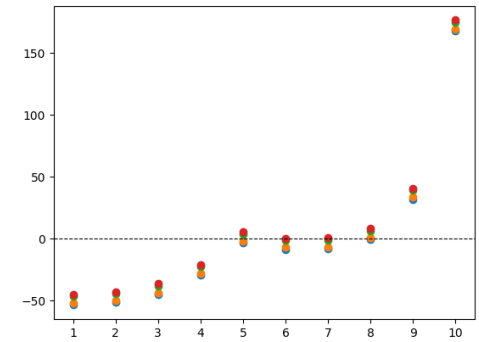
(b) Chirac II



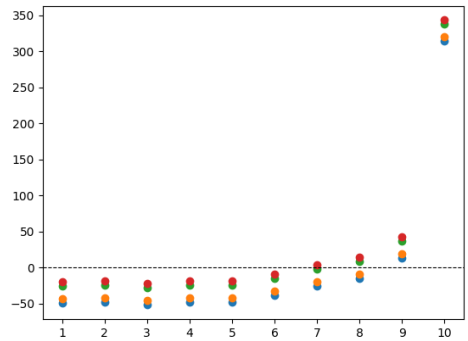
(c) Sarkozy I



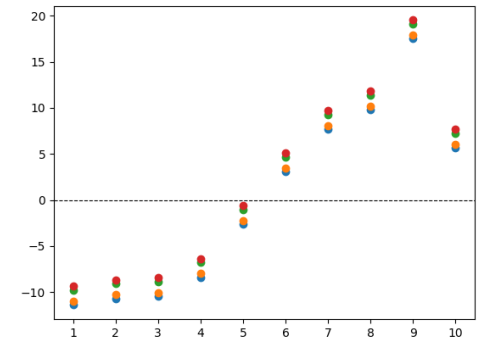
(d) Sarkozy II



(e) Hollande I



(f) Macron I



Notes: This Figure shows the average of the counterfactual change in tax liability net of tax revenue $\max\{T_1(y_1^i) - T_0(y_1^i), T_1(\hat{y}_0^i) - T_0(y_0^i)\} - R(\tau, h)$ for reforms of the French federal personal income tax by income decile for four different ETI values: 0 (blue), 0.25 (orange), 1 (green) and 1.25 (red). The dashed black line at zero distinguishes reform winners (below) from reform losers (above). All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.

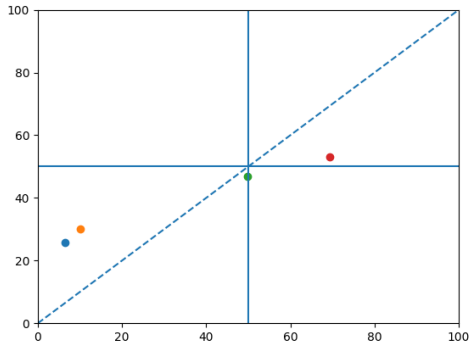
Source: Authors' calculations based on OpenFisca and ERFS.

Theorem 1 states that for monotonic reforms, support from the median voter and from the whole population are aligned. However, as we saw in Figure 1, all reforms under consideration are not perfectly monotonic. Figure 4 investigates if reforms are sufficiently monotonic for the theory to apply, that is compares the support of the whole population to the support around the median (between the 45th and the 55th percentile of the income distribution). Specifically, points in the upper right quadrant indicate both majority support and support among those with incomes close to the median, while points in the lower left quadrant indicate the opposite: no majority support and opposition from near-median income earners. Both quadrants are thus consistent with the median voter theorem. By contrast, points in the lower right quadrant and the upper left quadrant reveal a discrepancy between the median voter's preference and majority support.

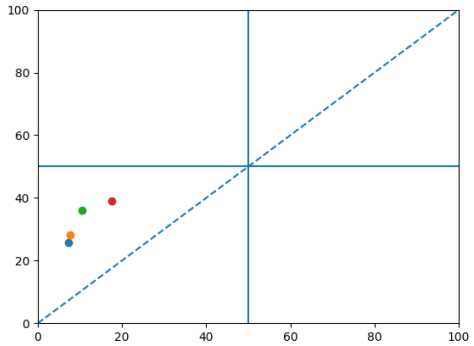
Figure 4 shows that, regardless of our assumption about the ETI, majority support and support among near-median income earners move in the same direction. We therefore conclude that French tax reforms were sufficiently monotonic and that the median voter theorem holds in the data. In particular, for the *Macron I* reform, whereas Figure 3 left ambiguous whether a majority of winners existed at the population and median levels, Figure 4 clearly shows majority support and alignment between the two.

Figure 4: Majority support versus support by the median voter

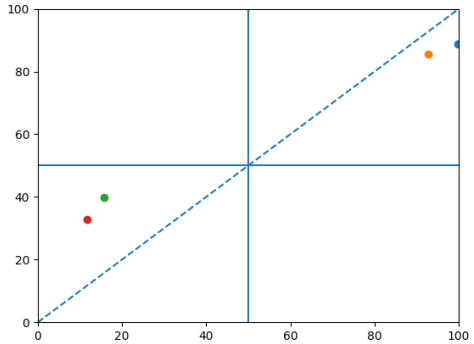
(a) Chirac I



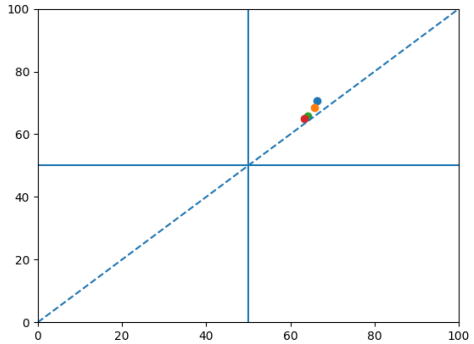
(b) Chirac II



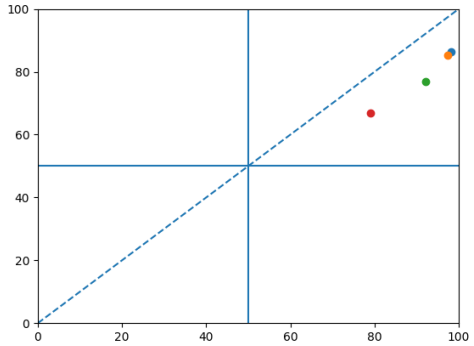
(c) Sarkozy I



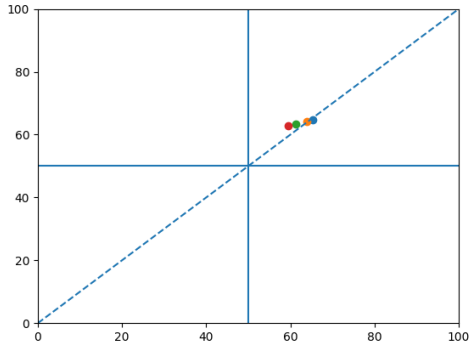
(d) Sarkozy II



(e) Hollande I



(f) Macron I



Notes: This Figure shows the shares of reform winners, i.e. of tax units i with $\max\{T_1(y_1^i) - T_0(y_1^i), T_1(\tilde{y}_0^i) - T_0(y_0^i)\} - R(\tau, h) \leq 0$ for the full adult population (vertical axis) and the middle of the distribution (P45–P55, horizontal axis) for major reforms of the French federal personal income tax and for four different ETI values: 0 (blue), 0.25 (orange), 1 (green), and 1.25 (red). All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\tilde{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.
Source: Authors' calculations based on OpenFisca and ERFS.

5 Sufficient statistics for politically feasible reforms

Using the Pareto bounds $\mathcal{D}^{up}$ and $\mathcal{D}^{low}$ that we derived in the theoretical analysis, we are able to identify whether reforms were Pareto-improving. Violations of these bounds indicate situations where self-financing tax cuts are possible. This characterization identifies the space of politically feasible reforms.

For each reform and each level of income, we plot the upper Pareto bound $\mathcal{D}^{up}$ (Figure 5) and lower Pareto bound $\mathcal{D}^{low}$ (Figure 6) alongside the pre-reform value of $\frac{T'(y)}{1-T'(y)}$ (in blue) and the post-reform value (in black). These ratios of marginal tax rates were computed using a Gaussian kernel. For display purposes, we show the bounds for the relevant range of the income distribution. The lower Pareto bound is shown up to the 35^{th} percentile (P35) of the income distribution. The upper Pareto bound is plotted up to an income of 60,000 euros, which corresponds approximately to P96–P97 depending on the year considered. Beyond this threshold, i.e., for the highest incomes, the upper Pareto bounds converge toward zero and the tax ratios become flat and uninformative, as all high-income individuals face the same top marginal tax rate.

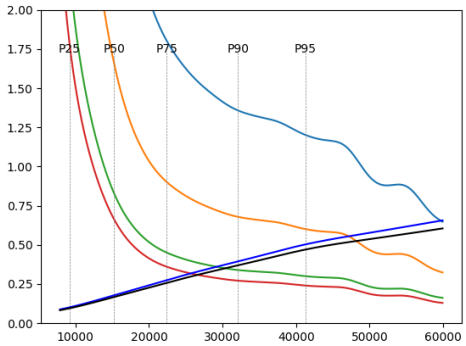
We report below that the upper bound is hit for values of the ETI discussed in the literature, while the lower bound is far from the tax schedules for conventional elasticity values.

Upper Pareto bound. Figure 5 shows that, at the beginning of the period, the upper bound is violated for ETIs of 0.5 and higher. Indeed, the status quo schedule T_0 clearly lies above the upper Pareto bound, showing that Pareto-improving reforms exist, i.e., reforms that are supported by the entire population. These reforms correspond to self-financing tax cuts. The reforms of *Chirac I* and *Chirac II* are of this kind, they progressively bring the tax schedule below to the upper Pareto bound for an ETI of 0.5, while the *Sarkozy I* reform is the first to entirely fall below this bound for such ETI. An ETI of 0.25 guarantees that the tax system is always Pareto efficient, while the tax system violates the upper bound throughout the entire period for an ETI of 1.

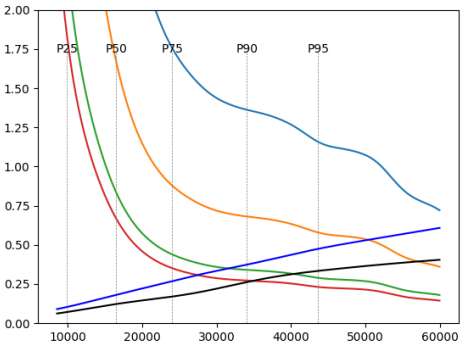
Lower Pareto bound. Figure 6 shows that the lower bound always remains far below both the pre- and post-reform schedules for conventional elasticity values. This indicates that reforms reducing tax rates at the bottom of the distribution command broad political support. This finding is consistent with the introduction and subsequent expansion of the Prime d'activité, which pushes marginal tax rates into negative territory for the lowest incomes.

Figure 5: Upper Pareto bounds $\mathcal{D}^{up}$

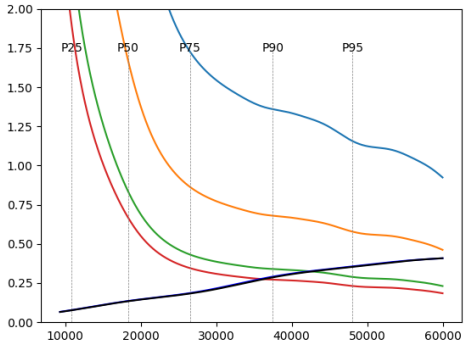
(a) Chirac I



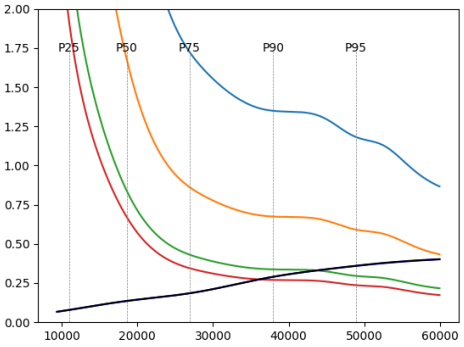
(b) Chirac II



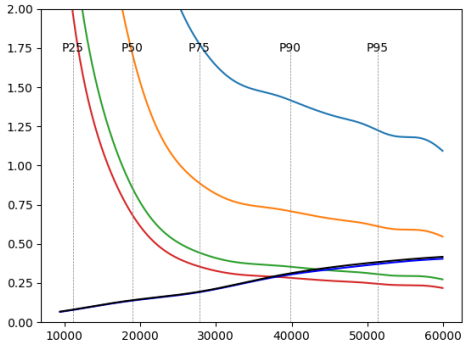
(c) Sarkozy I



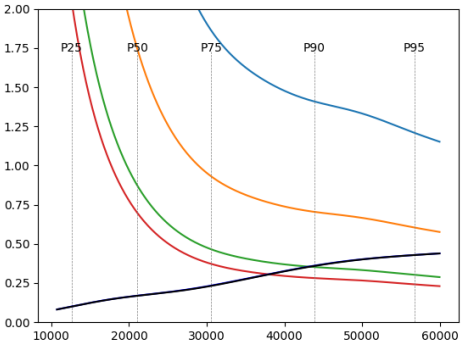
(d) Sarkozy II



(e) Hollande I



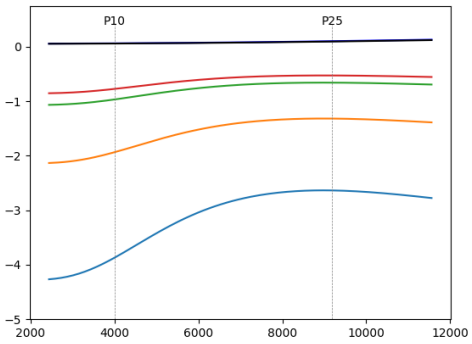
(f) Macron I



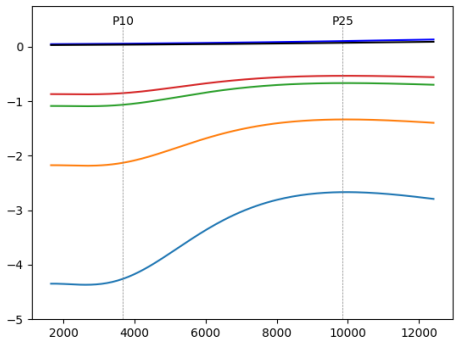
Notes: This Figure shows the ratio $\frac{T'}{1-T'}$ of the effective marginal tax rates (EMTRs) (y-axis) before (solid blue line) and after (solid red line) major reforms of the French personal income tax. These ratios were obtained with a gaussian kernel. The Figure also shows upper Pareto bounds $\mathcal{D}^{up}$ (dashed lines) for four different ETI values: 0.25 (blue), 0.5 (orange), 1 (green) and 1.25 (red). All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor. Vertical dashed lines show different percentiles of the income distribution.
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 6: Lower Pareto bounds $\mathcal{D}^{low}$

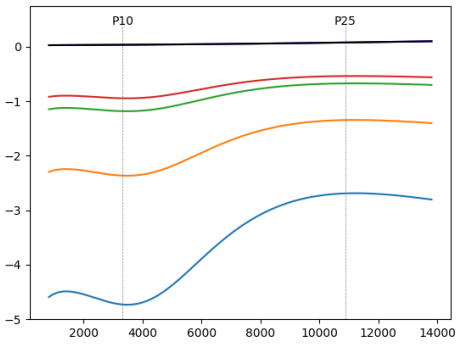
(a) Chirac I



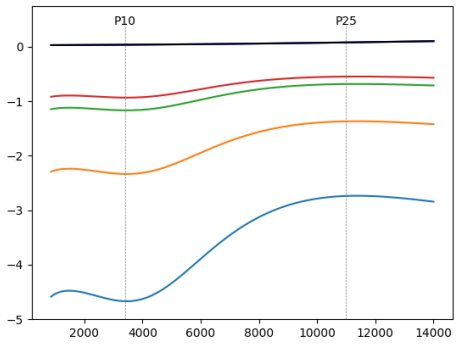
(b) Chirac II



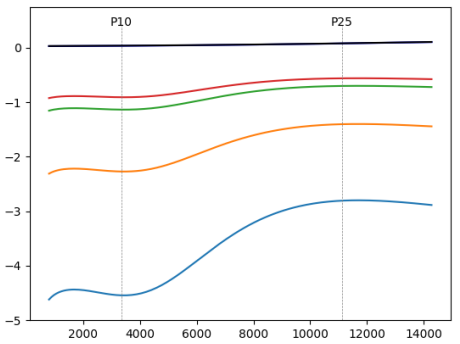
(c) Sarkozy I



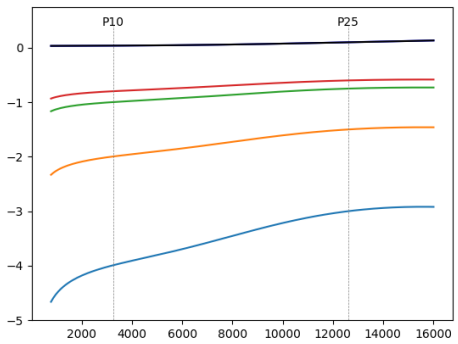
(d) Sarkozy II



(e) Hollande I



(f) Macron I



Notes: This Figure shows the ratio $\frac{T'}{1-T'}$ of the effective marginal tax rates (EMTRs) (y-axis) before (solid blue line) and after (solid black line) major reforms of the French personal income tax. These ratios were obtained with a gaussian kernel. The Figure also shows lower Pareto bounds $\mathcal{D}^{low}$ (dashed lines) for four different ETI values: 0.25 (blue), 0.5 (orange), 1 (green) and 1.25 (red). All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor. Vertical dashed lines show different percentiles of the income distribution.
Source: Authors' calculations based on OpenFisca and ERFS.

6 Concluding remarks

This paper presents an empirical analysis of tax reforms in France, guided by the theory of politically feasible tax reforms developed in Bierbrauer et al. (2021), that is, reforms preferred by a majority of citizens over a predetermined status quo in tax policy. Our empirical analysis focuses on reforms to the French income tax schedule after 2002, drawing on administrative tax data (ERFS) and the OpenFisca microsimulation model. Despite the heterogeneity in the distributional effects of tax reforms across taxpayers, we find that actual reforms, by and large, satisfy the monotonicity property underpinning our theoretical framework. We further find that tax reforms frequently appear to have been deliberately designed to include near-median income earners among their beneficiaries. Finally, we derive sufficient statistics that allow for the identification of politically feasible reforms, given data on the income distribution and behavioral responses to taxation. These sufficient statistics provide insights on where future tax reforms may happen.

Comparing our results with those derived in the US context in Bierbrauer et al. (2021), we find strong similarities between the French and American cases in terms of the structure of political support for tax reforms. A noteworthy difference is that the upper Pareto bounds are tighter in the French case, suggesting that the French income tax schedule leaves less room for upward Pareto-improving reforms.

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Appendix

A Proof of Corollary 1

Let h be a monotonic function. Suppose that an individual of type ω benefits from a reform (τ, h) if $V(\tau, h, \omega) > 0$ and note that the gains or losses from the reform can be written as

$$\begin{aligned} V(\tau,h,\omega) &= \int_0^\tau V_\tau(s,h,\omega)\, ds \\ &= R(\tau,h) - \int_0^\tau h(y^*(s,h,\omega))\, ds \\ &=: R(\tau,h) - H(\tau,h,\omega)\ . \end{aligned}$$

Then, suppose that the function h is non-decreasing and that median income $y^*(s,h,\omega^M)$ is a monotonic function of the reform intensity s. Also, for concreteness, suppose that the reform involves an increase of the marginal tax rate for the median income. Then, using the shorthand $y_1^M := y^*(\tau,h,\omega^M)$ for median income after the reform,

$$\tau\ h(y_1^M) \quad \leq \quad H(\tau,h,\omega) \quad \leq \quad \tau\ h(y_0^M)$$

or, equivalently,

$$T_1(y_1^M) - T_0(y_1^M) \quad \leq \quad H(\tau,h,\omega) \quad \leq \quad T_1(y_0^M) - T_0(y_0^M)\ . \tag{6}$$

As a consequence,

$$\begin{aligned} &R(\tau,h) - \Big(T_1(y_0^M) - T_0(y_0^M)\Big) \\ &\quad \leq V(\tau,h,\omega^M) \\ &\qquad \leq \quad R(\tau,h) - \Big(T_1(y_1^M) - T_0(y_1^M)\Big)\ . \end{aligned} \tag{7}$$

Thus, when the median voter experiences an increase of the marginal tax rate, we underestimate her utility gain when we compare the overall revenue effect to the change of the tax burden and thereby take account only of the mechanical effect. By contrast, we overestimate her utility gain, when we base the change of her tax burden on the post-reform income. This pattern is reversed when there is a decrease of the marginal tax rate at the median level of income. In this case,

$$\begin{aligned} &R(\tau,h) - \Big(T_1(y_1^M) - T_0(y_1^M)\Big) \\ &\quad \leq V(\tau,h,\omega^M) \\ &\qquad \leq \quad R(\tau,h) - \Big(T_1(y_0^M) - T_0(y_0^M)\Big)\ . \end{aligned} \tag{8}$$

In the light of (7) and (8), a sufficient condition under which the median voter is a beneficiary of a tax reform is

$$R(\tau,h) - \max\left\{T_1(y_1^M) - T_0(y_1^M), T_1(y_0^M) - T_0(y_0^M)\right\} \quad \geq \quad 0\ . \tag{9}$$

Analogously, the median voter is worse off if

$$R(\tau, h) - \min\left\{T_1(y_1^M) - T_0(y_1^M), T_1(y_0^M) - T_0(y_0^M)\right\} \quad < \quad 0\,. \tag{10}$$

Note that the lower and the upper bound coincide when there are no behavioral responses, so that $y_1^M = y_0^M$.

B Figures of French statutory income tax reforms between 1916 and 2016

We provide figures on all non-monotonic reforms in France between 1916 and 2016. Over those 100 years, 12 *statutory* reforms of the tax schedule appear non-monotonic. For these 12 reforms we provide the figures below. These figures are based on information provided by *Institut des politiques publiques* (IPP): `http://www.ipp.eu/outils/baremes-ipp/`. For more details and a cross-country comparison, see Bierbrauer et al. (2021).

A careful inspection of the following figures shows that even non-monotonic reforms are essentially monotonic: they either exhibit some small local non-monotonicities (see Figures 7, 8, and 9) or exhibit one bracket where monotonicity is violated. In some cases, this bracket is moreover very narrow. Finally, some tax reforms are monotonic above or below the median (see Figures 10 and 11), which is sufficient to apply the median voter theorem derived in the main text. Piketty (2001) provides a description of these reforms and puts them in their historical context. It is noteworthy that the reforms introduced by the *Front populaire* in 1937 changed the tax schedule from a function with marginal tax rates and brackets to a schedule directly specified in average tax rates and brackets. This was reverted to a schedule with marginal tax rates and brackets in 1943 under the Vichy administration. These are the reasons why the lines display a sawtooth pattern, which is highly non-monotonic, while the intent was clearly for tax burdens to increase monotonically with income.

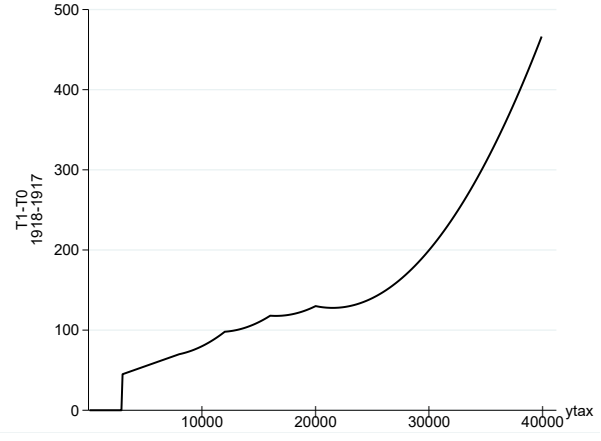


Figure 7: Reform of the French income tax in 1918

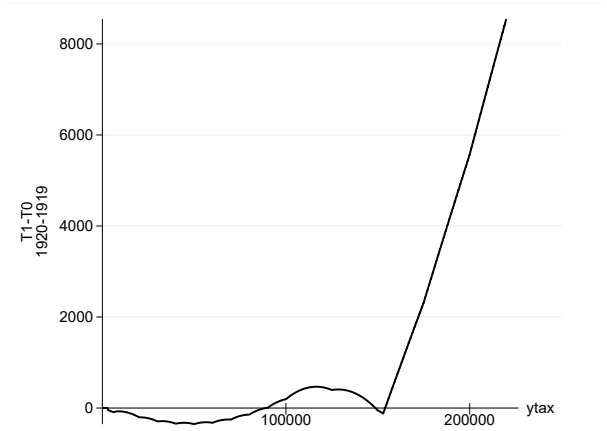


Figure 8: Reform of the French income tax in 1920

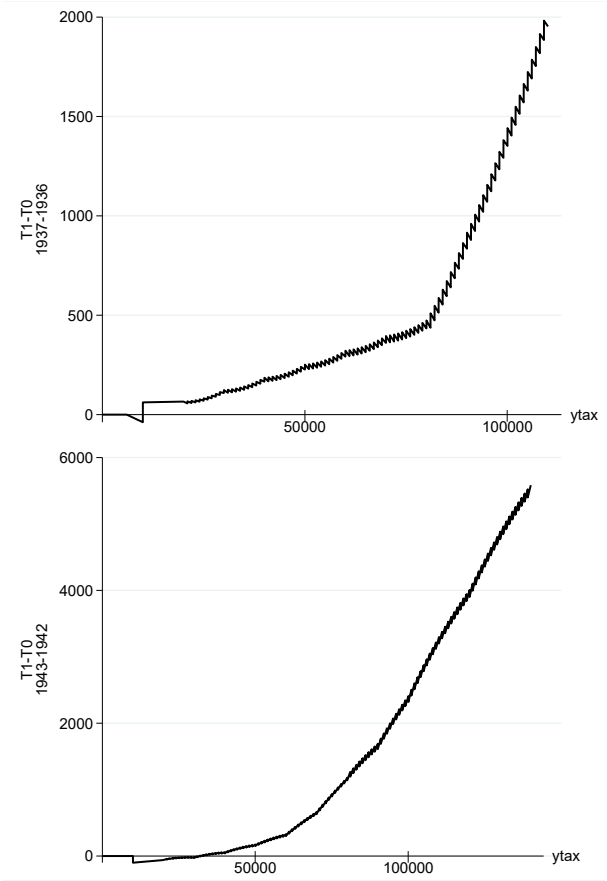


Figure 9: Reform of the French income tax in 1937 (top) and 1943 (bottom)

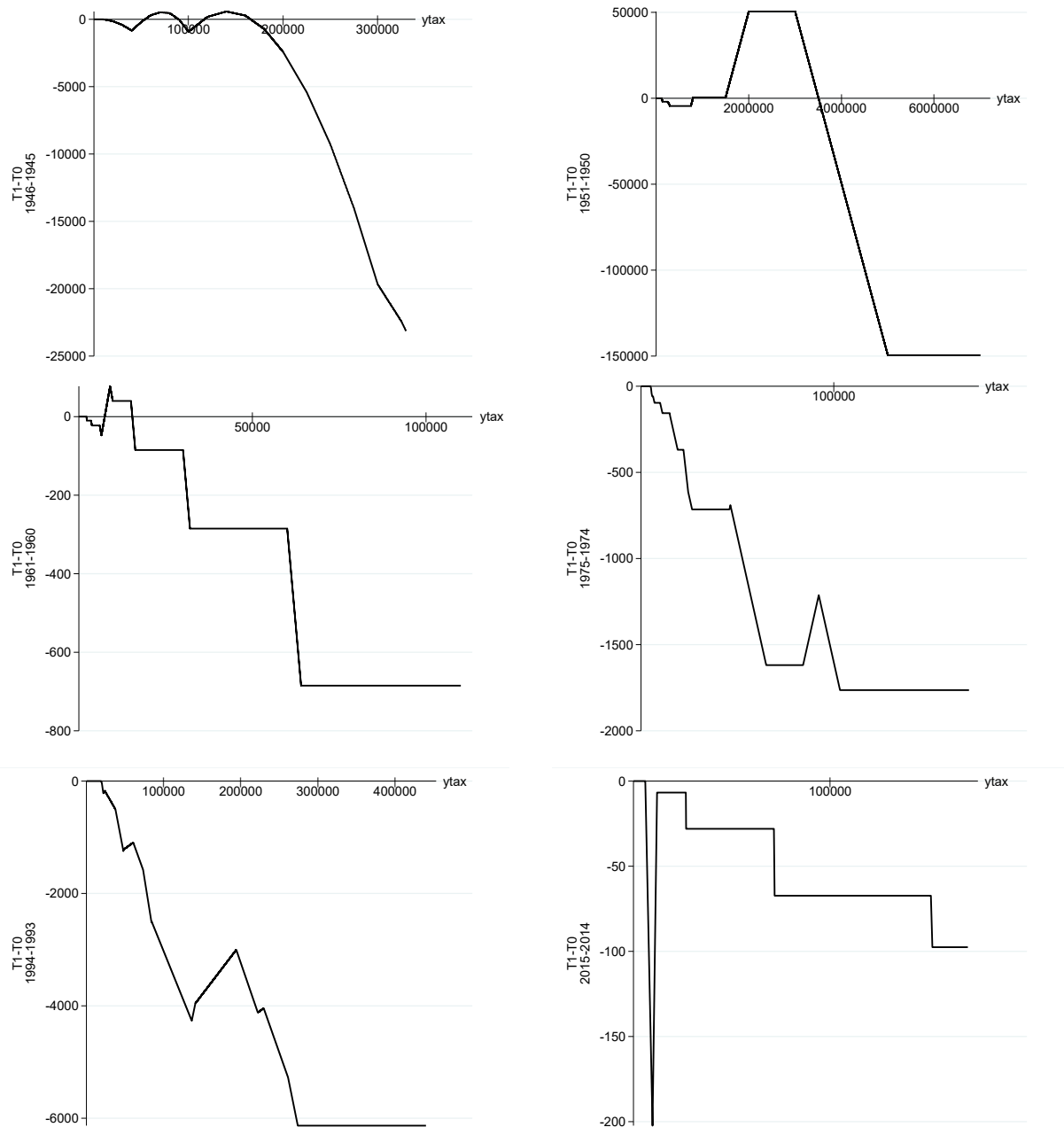


Figure 10: Non-monotonic reforms of the French income tax (1946, 1951, 1961, 1975, 1994, 2015)

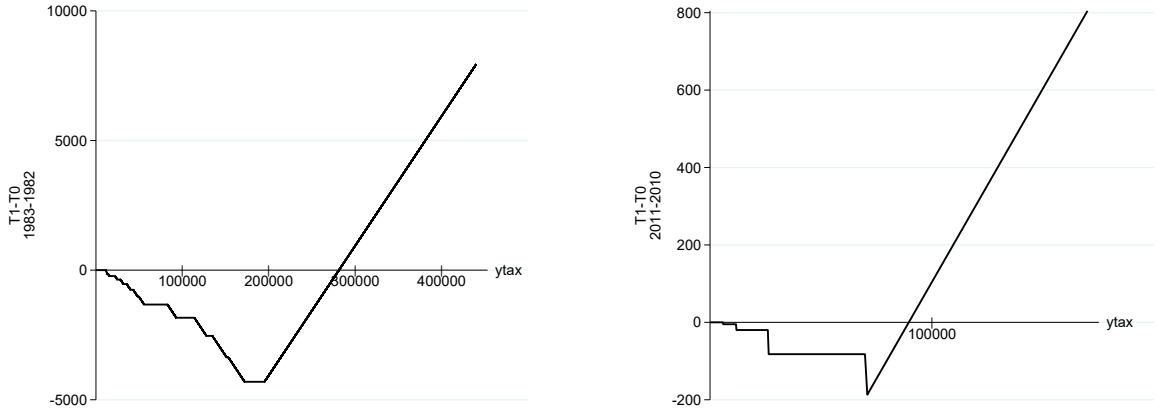


Figure 11: Non-monotonic reforms of the French income tax in 1983 and 2011

C Increased progressivity in the middle ?

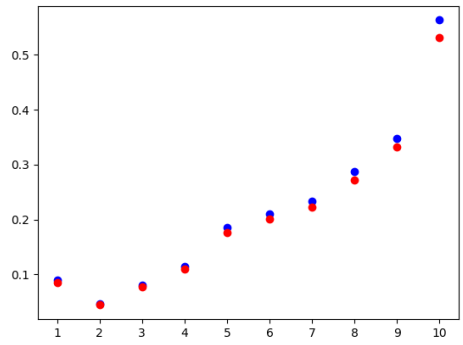
Theorem 2 involves a discontinuity at the median level of income. Below, tax cuts are politically feasible. Above, higher taxes are politically feasible. Thus, if the status quo indeed is an interior Pareto-optimum, a sequence of politically feasible reforms should give rise to lower and lower tax rates below the median and to higher and higher tax rates above the median. If the status quo schedule hits the upper bound above the median, then only a lowering of marginal tax rates below the median is to be expected. There must also be a transition from the low rates below the median to the high rates above. If the tax schedule is continuous, this necessitates pronounced progression at some middle income range.

To check empirically this pattern of increased progressivity, we plot in Figure 12 $\frac{T'}{1-T'}$ (recall that this ratio is a monotonic function of T') by decile before and after each reform.

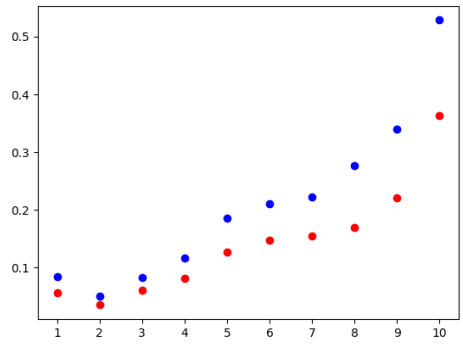
What we see at the bottom of the distribution is a reduction of the marginal tax rates ratio, from 0.1 in the first graph to 0.05 in the following ones. Note that the second decile has lower marginal tax rate that the first one. We could explain this tendency by the introduction of the *décote* mechanism, which leads to lower marginal tax rates for the working poor. We may assume that the first decile is not working. However, we do not see a tendency towards higher marginal tax rates above the median.

Figure 12: $\frac{T'}{1-T'}$ by decile before and after each reform

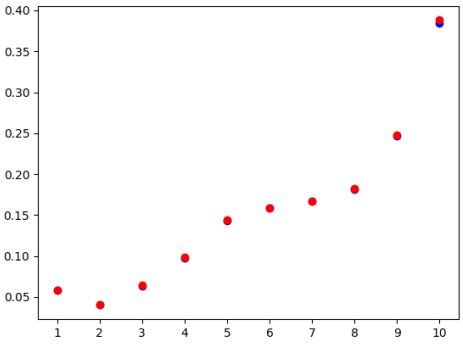
(a) Chirac I



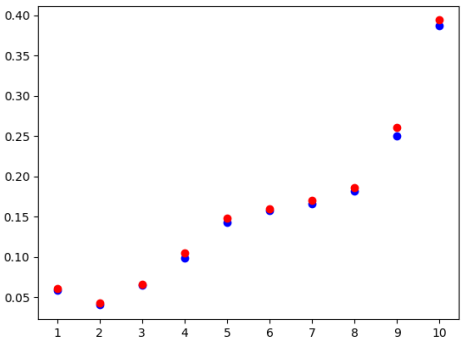
(b) Chirac II



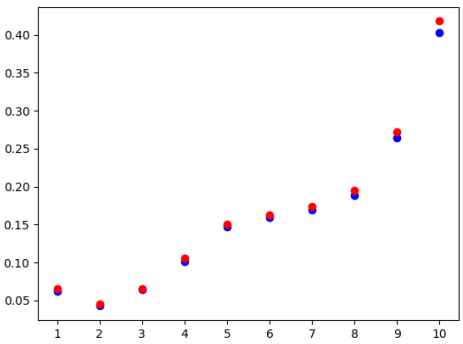
(c) Sarkozy I



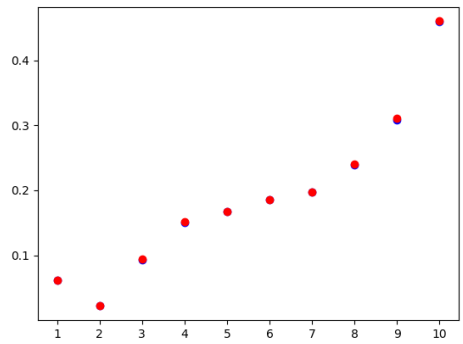
(d) Sarkozy II



(e) Hollande I



(f) Macron I

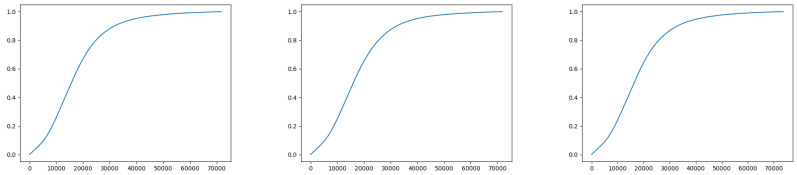


Notes: This Figure shows, separately for each decile, the ratio $\frac{T'}{1-T'}$ based on effective marginal tax rates (EMTRs) before (blue) and after (red) major reforms of the French federal personal income tax. All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.
Source: Authors' calculations based on OpenFisca and ERFS.

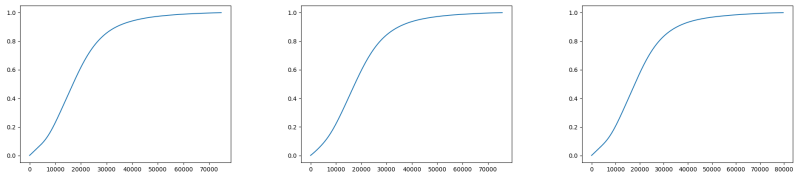
D Income distributions for all years 2002-2019

Figure 13: Cumulative distribution function

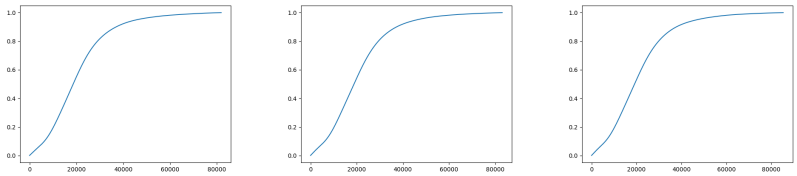
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



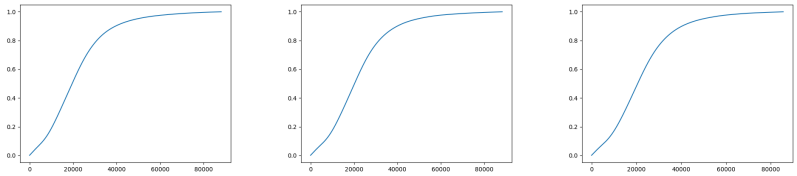
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



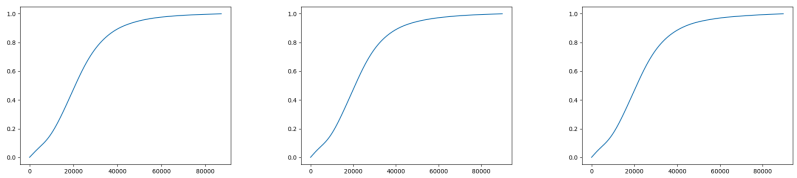
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



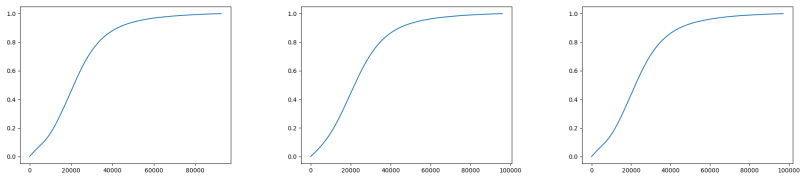
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



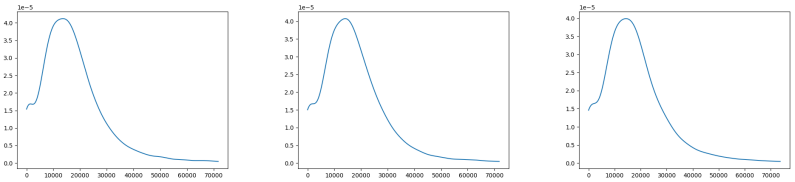
(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



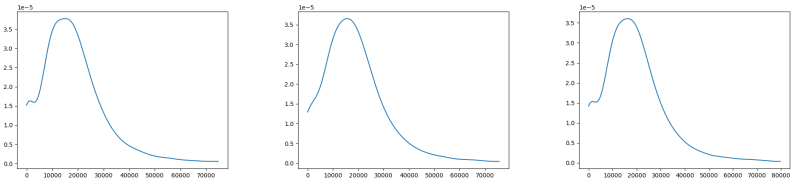
Notes: This Figure shows the earnings cumulative distribution function for the first year under consideration (that is for 2002-2003, it shows the cdf for year 2002).
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 14: Density

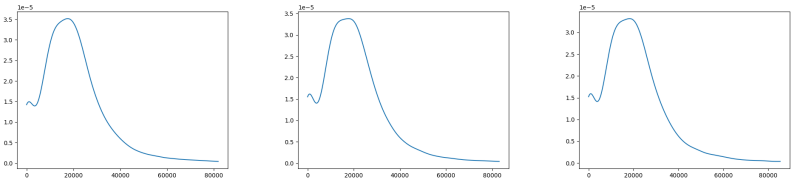
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



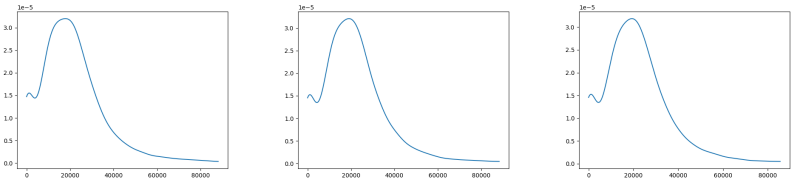
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



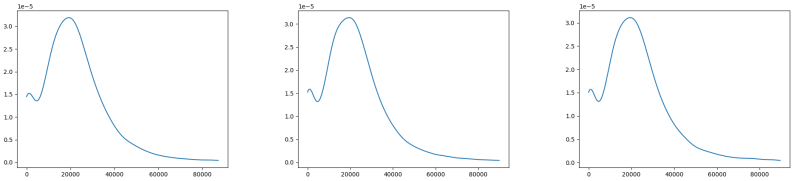
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



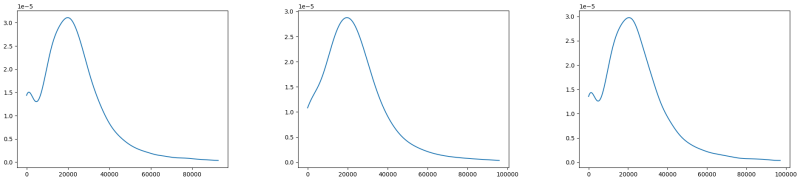
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



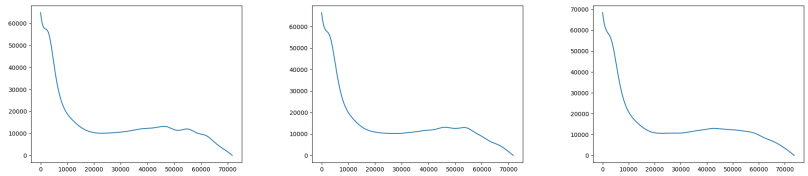
(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



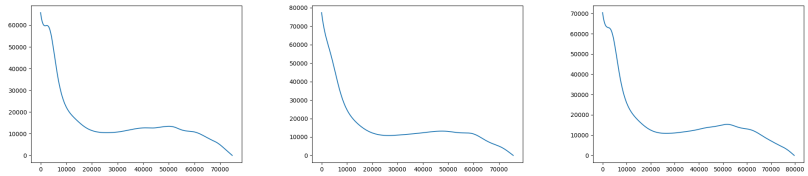
Notes: This Figure shows the earnings density for the first year under consideration (that is for 2002-2003, it shows the density for year 2002).
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 15: Inverse hazard rate

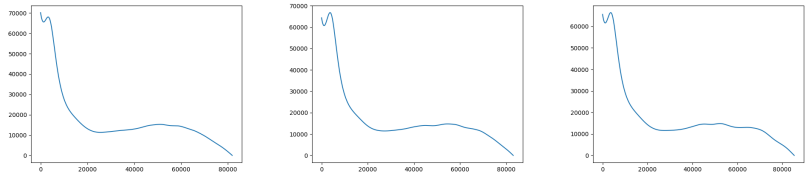
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



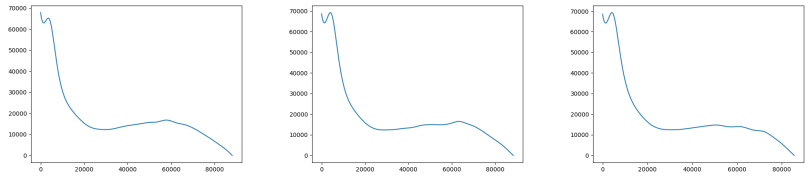
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



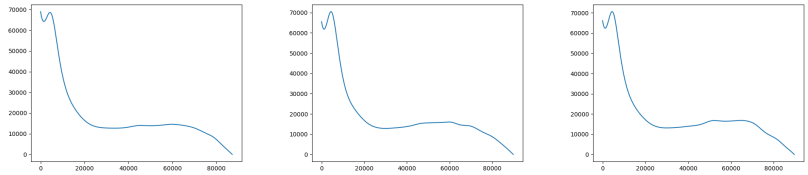
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



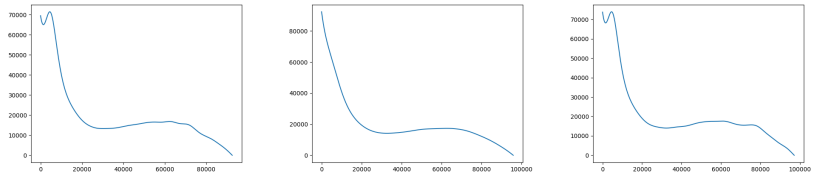
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



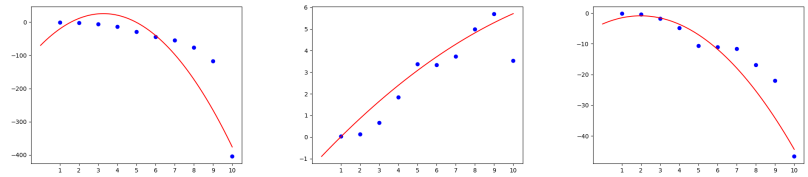
Notes: This Figure shows the inverse hazard rate $\frac{1-F(x)}{f(x)}$ for the first year under consideration (that is for 2002-2003, it shows the density for year 2002).
Source: Authors' calculations based on OpenFisca and ERFS.

E Empirical analysis for all years 2002-2019

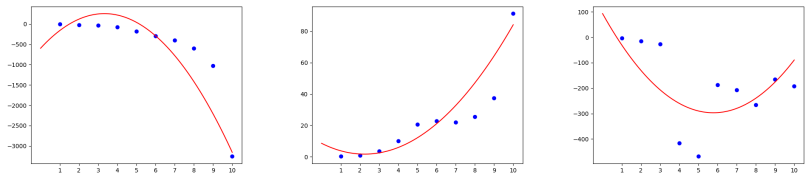
We reproduce all the figures done in the main text for all years.

Figure 16: Changes in tax liability: Average values per decile

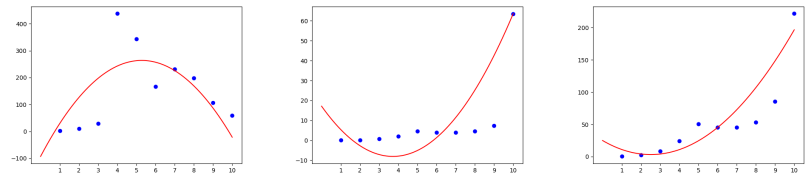
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



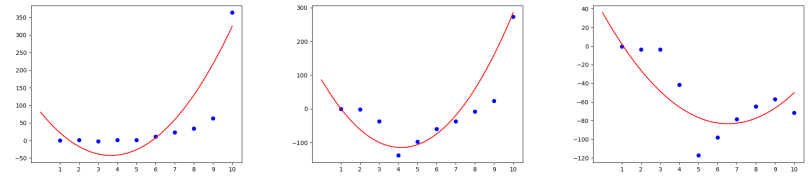
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



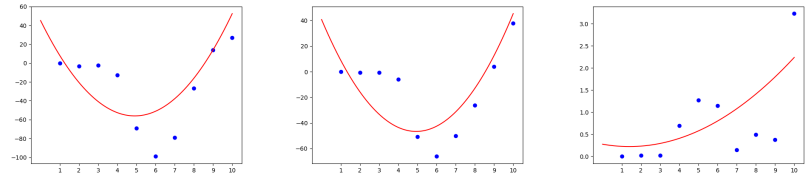
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



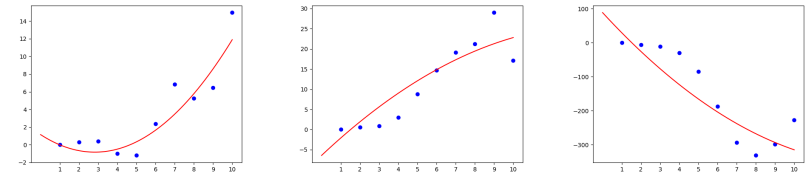
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017

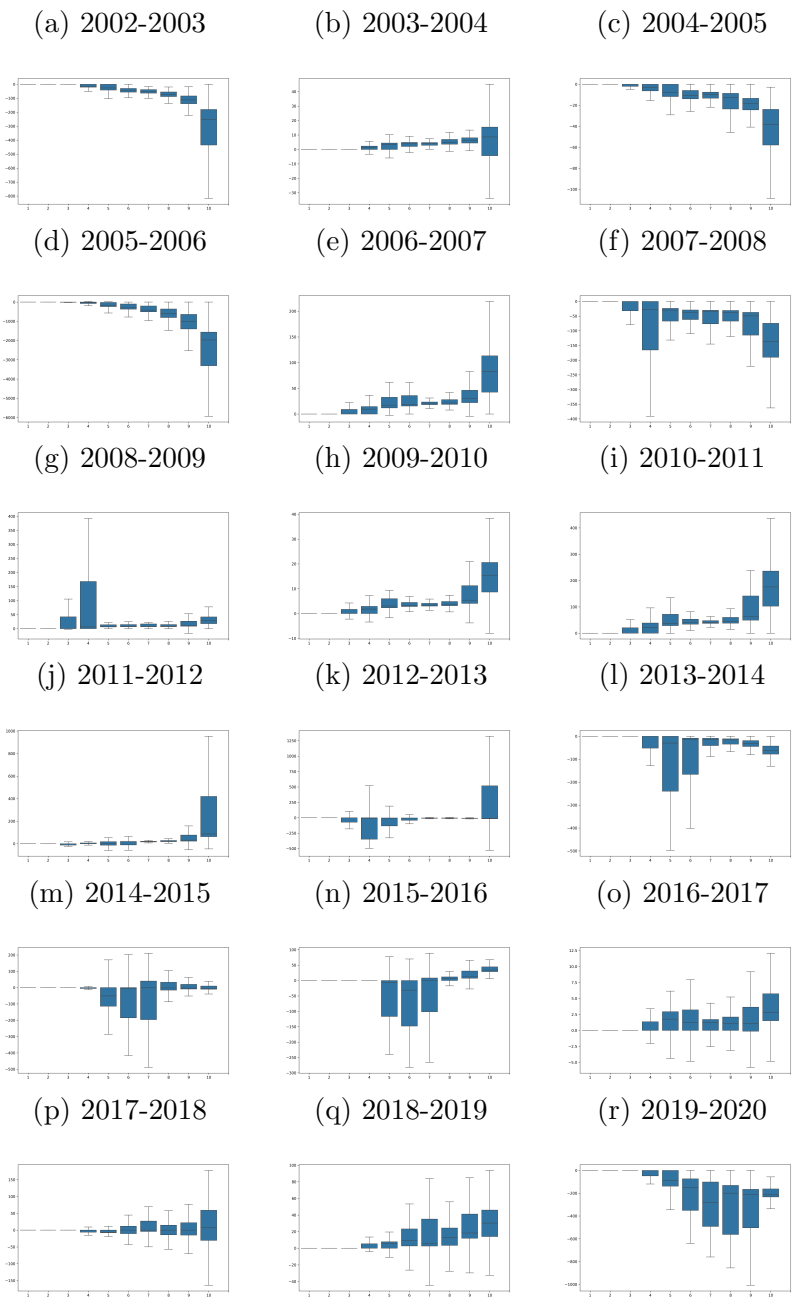


(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



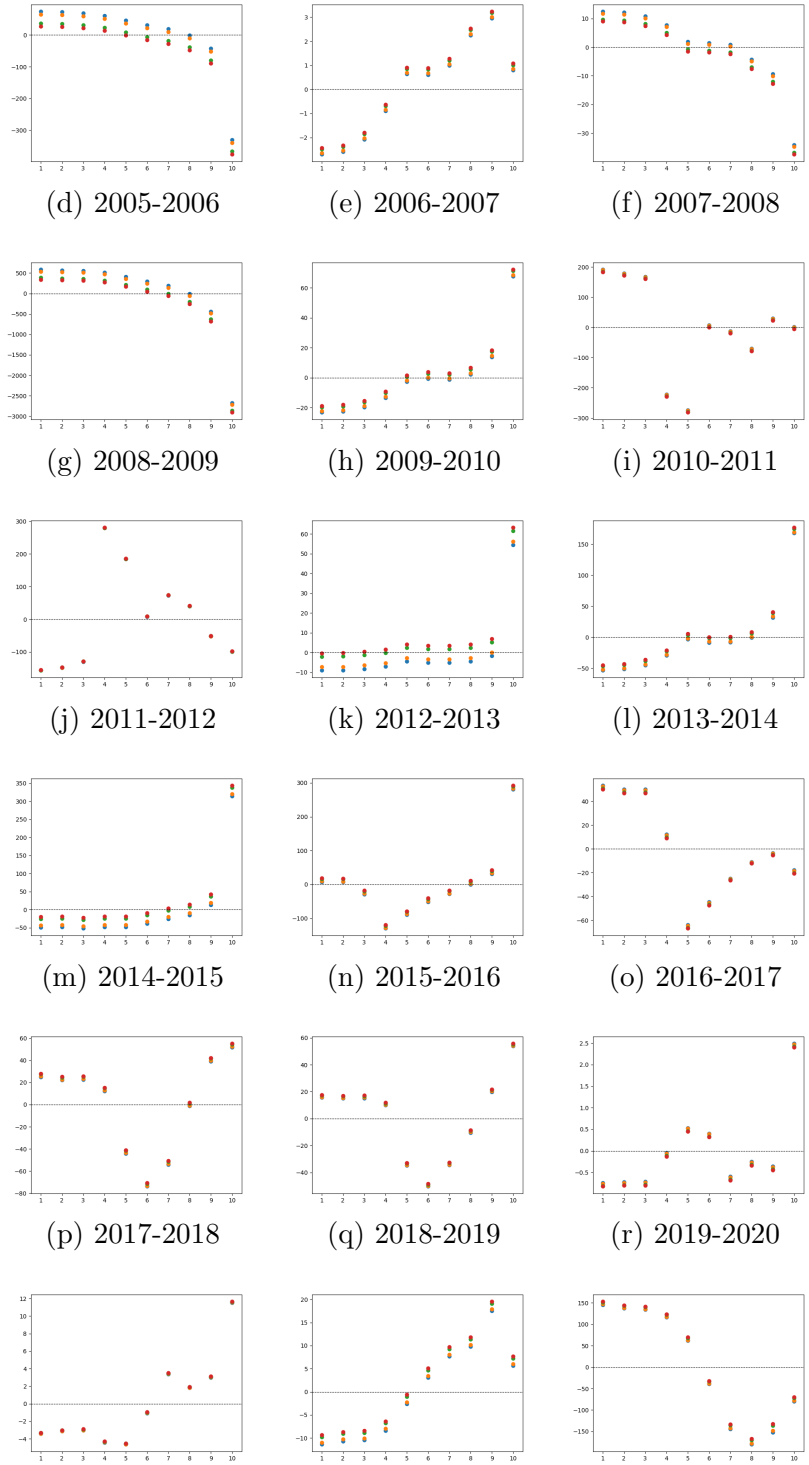
Notes: This figure shows the average value of the counterfactual change in tax liability $T_1(\hat{y}_0^i) - T_0(y_0^i)$ for reforms of the French federal personal income tax. The red line represents a quadratic fit based on the underlying microdata. All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T1(y_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 17: Changes in tax liability: Heterogeneity within deciles



Notes: This figure illustrates, for each decile, the cross-sectional distribution of the counterfactual change in tax liability $T_1(\hat{y}_0^i) - T_0(y_0^i)$ for reforms of the French federal personal income tax by means of a box plot. All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.
Source: Authors' calculations based on OpenFisca and ERFS.

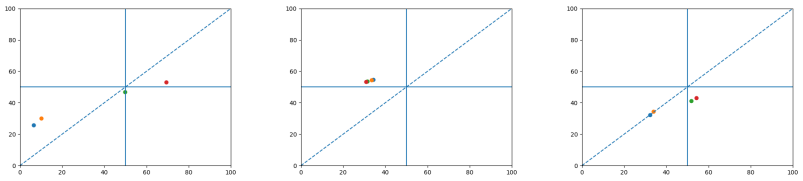
Figure 18: Winners and losers of major French tax reforms



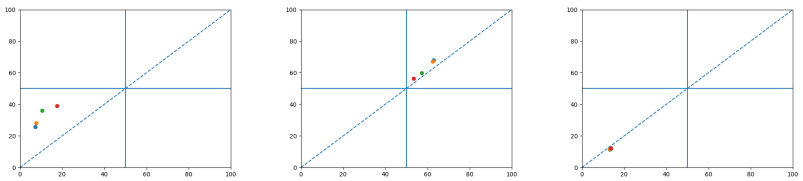
Notes: This Figure shows the average of the counterfactual change in tax liability net of tax revenue $\max\{T_1(y_1^i) - T_0(y_1^i), T_1(\hat{y}_0^i) - T_0(y_0^i)\} - R(\tau, h)$ for reforms of the French federal personal income tax by income decile for four different ETI values: 0 (blue), 0.25 (orange), 1 (green) and 1.25 (red). All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 19: Majority support versus support by the median voter

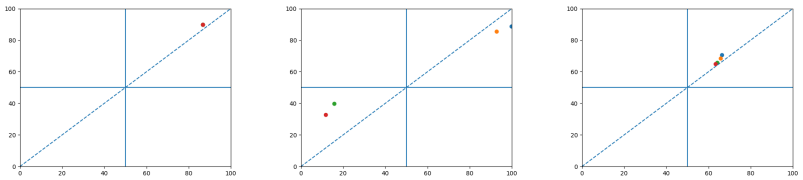
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



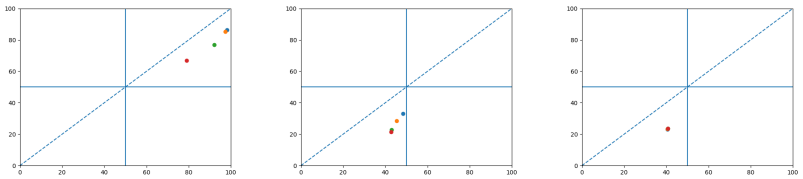
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



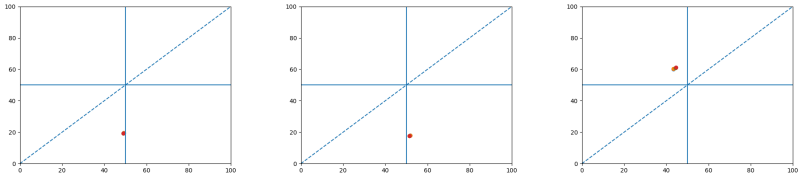
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



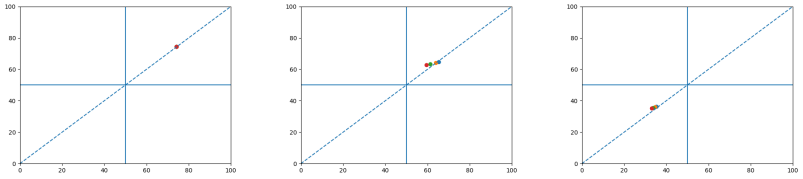
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



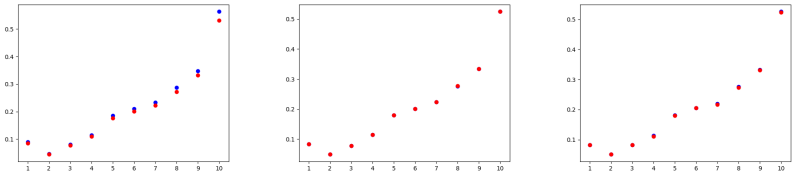
(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



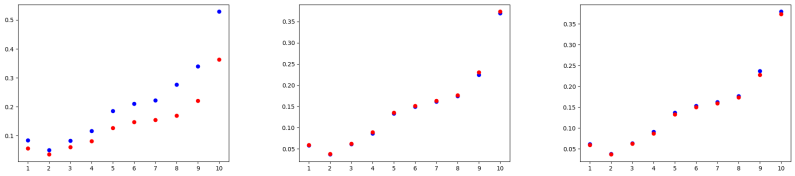
Notes: This Figure shows the shares of reform winners, i.e., of tax units i with $\max\{T_1(y_1^i) - T_0(y_1^i), T_1(\hat{y}_0^i) - T_0(y_0^i)\} - R(\tau, h) \leq 0$ for the full adult population (vertical axis) and the middle of the distribution (P45–P55, horizontal axis) for major reforms of the French federal personal income tax and for four different ETI values : 0 (blue), 0.25 (orange), 1 (green), and 1.25 (red). All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 20: $\frac{T'}{1-T'}$ by decile before and after each reform

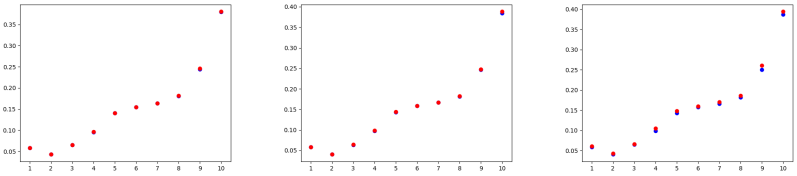
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



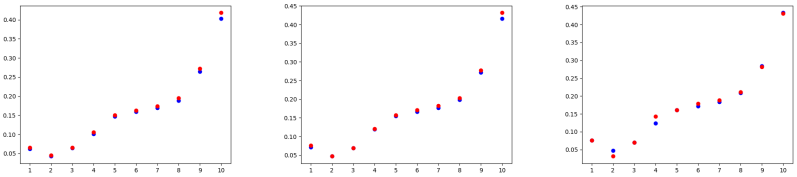
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



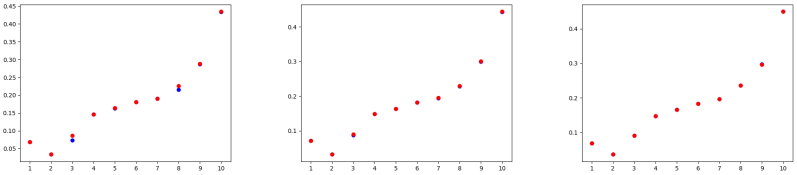
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



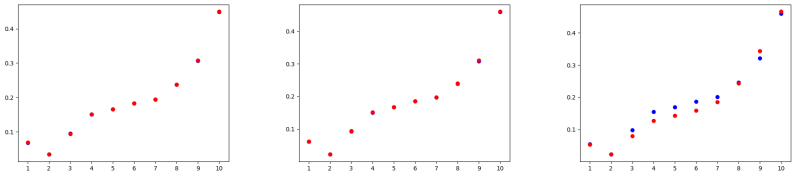
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



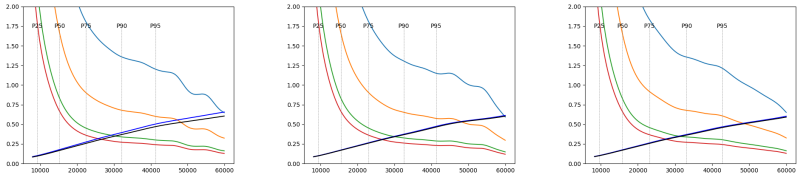
(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



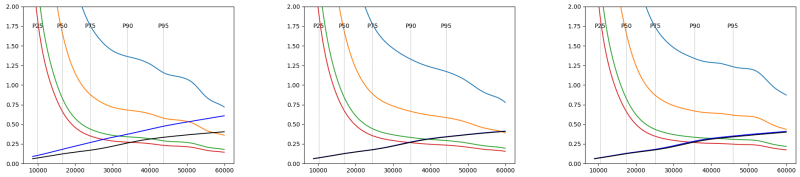
Notes: This Figure shows, separately for each decile, the ratio $\frac{T'}{1-T'}$ based on effective marginal tax rates (EMTRs) before (blue) and after (black) major reforms of the French federal personal income tax. All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor.
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 21: Upper Pareto bounds $\mathcal{D}^{up}$

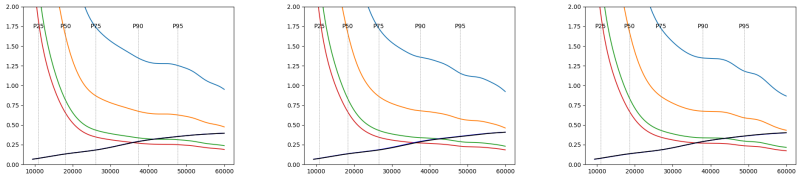
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



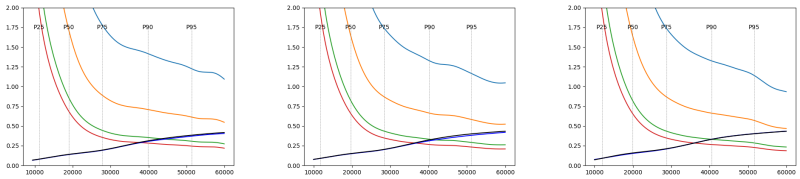
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



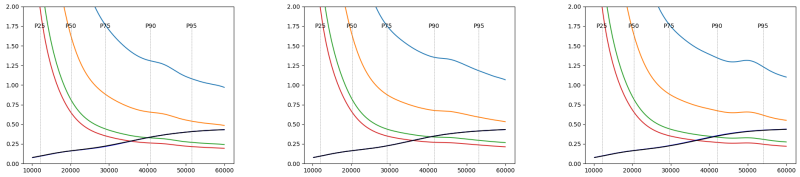
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



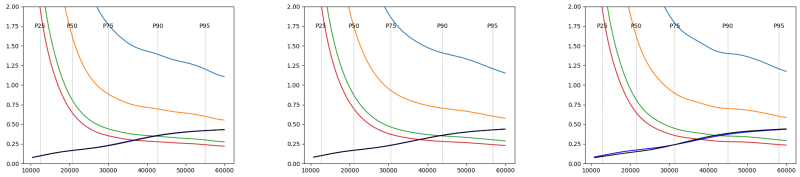
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



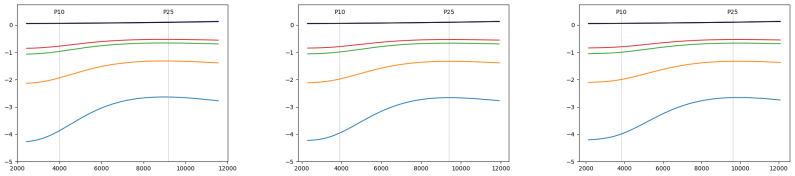
(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



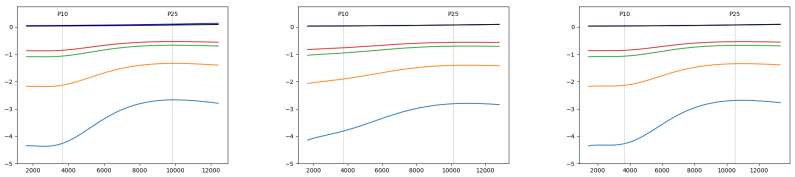
Notes: This Figure shows the ratio $\frac{T'}{1-T'}$ of the effective marginal tax rates (EMTRs) (y-axis) before (solid blue line) and after (black red line) major reforms of the French personal income tax as well as upper Pareto bounds $\mathcal{D}^{up}$ (dashed lines) for four different ETI values: 0.25 (blue), 0.5 (orange), 1 (green) and 1.25 (red). All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor. Vertical dashed lines show different percentiles of the income distribution.
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 22: Lower Pareto bounds $\mathcal{D}^{low}$

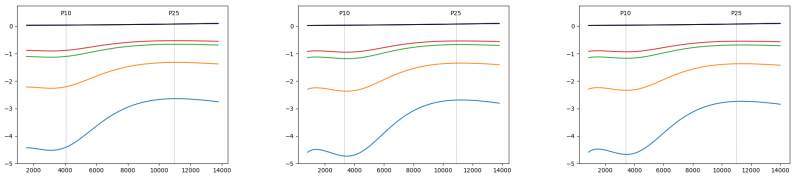
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



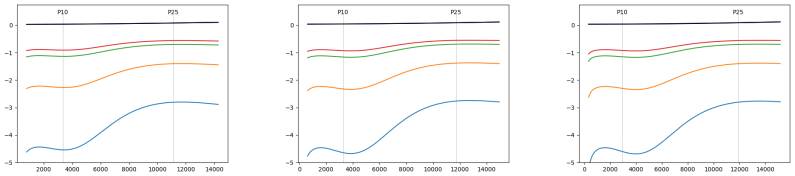
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



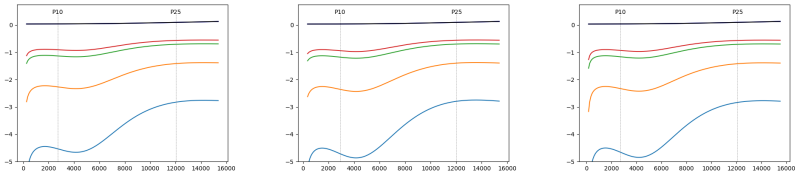
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



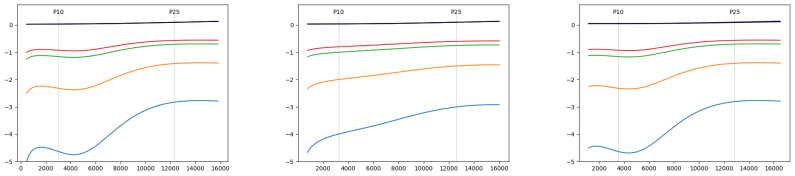
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



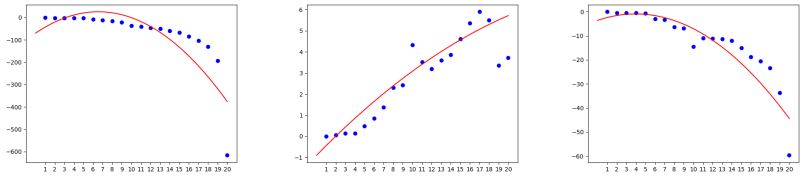
Notes: This Figure shows the ratio $\frac{T'}{1-T'}$ of the effective marginal tax rates (EMTRs) (y-axis) before (solid blue line) and after (solid black line) major reforms of the French personal income tax as well as lower Pareto bounds $\mathcal{D}^{low}$ (dashed lines) for four different ETI values: 0.25 (blue), 0.5 (orange), 1 (green) and 1.25 (red). All computations are on the individual level. For this, the income of couples filing jointly is allocated equally to each spouse. In order to simulate counterfactual tax payments $T_1(\hat{y}_0^i)$, income from year 0 are inflated to year 1 using the CPI deflator as uprating factor. Vertical dashed lines show different percentiles of the income distribution.
Source: Authors' calculations based on OpenFisca and ERFS.

F Robustness checks

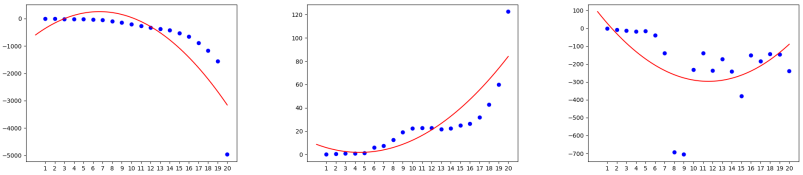
In the main text many figures were presented for deciles, we now reproduce all these figures across vingtiles.

Figure 23: Changes in tax liability: Average values per vingtile

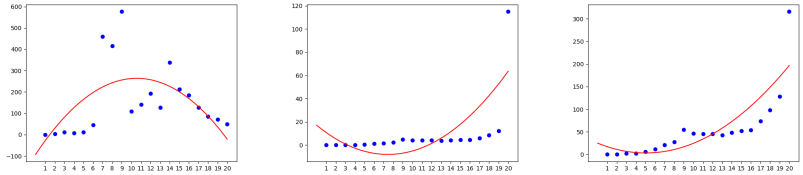
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



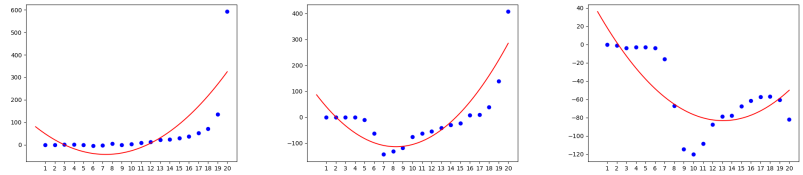
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



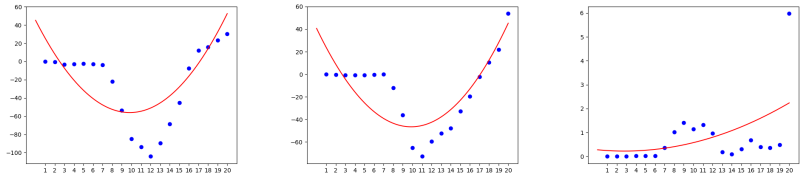
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



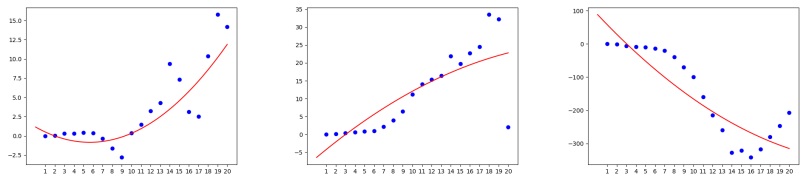
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



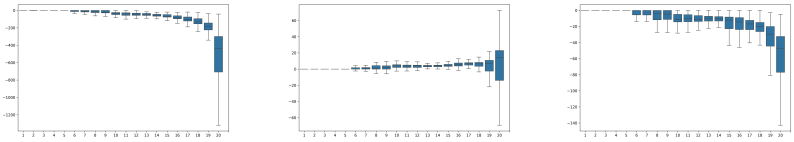
(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



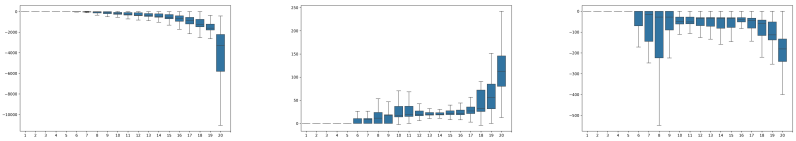
Notes: This Figure replicates Figure 16 for vingtiles instead of deciles.
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 24: Changes in tax liability: Heterogeneity within vingtiles

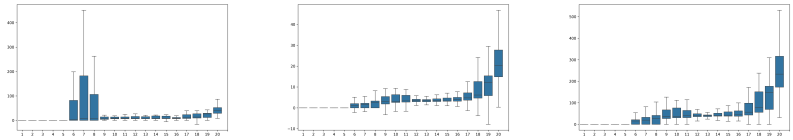
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



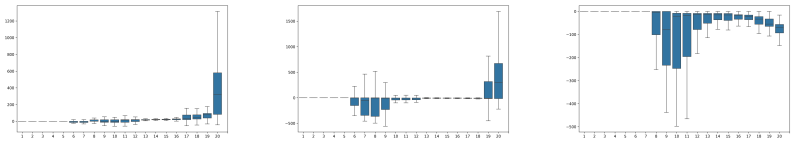
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



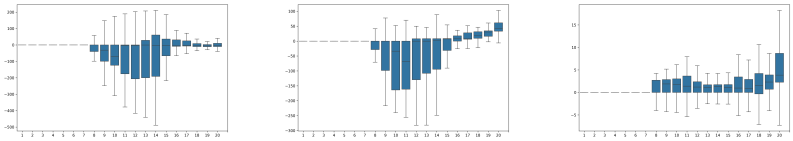
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



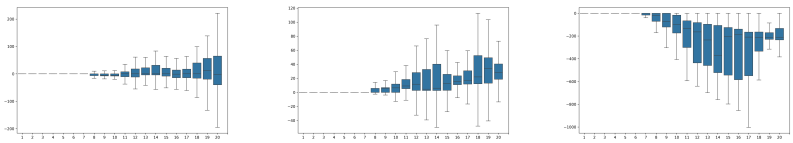
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



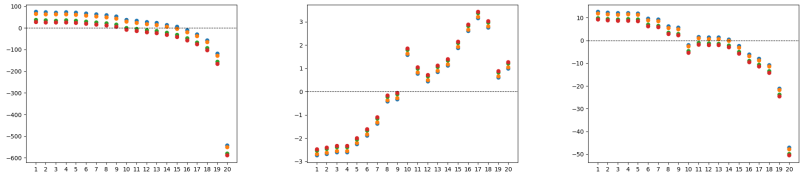
(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



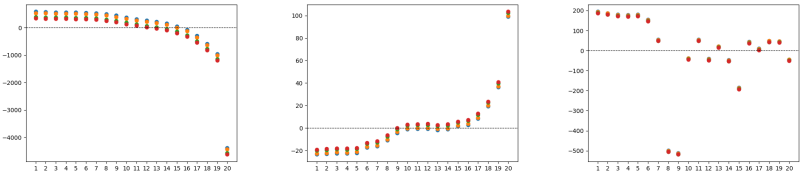
Notes: This Figure replicates Figure 17 for vingtiles instead of deciles.
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 25: Winners and losers of major French tax reforms

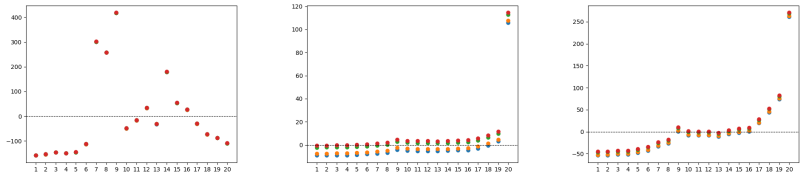
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



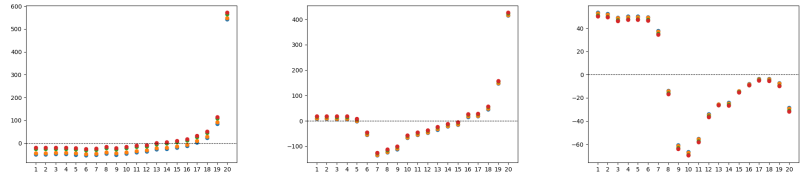
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



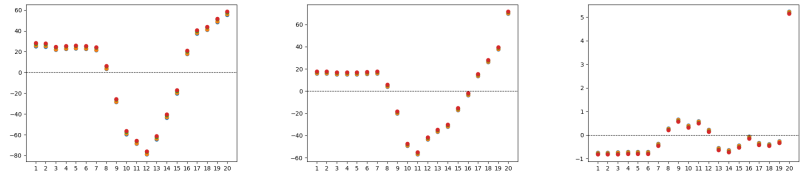
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



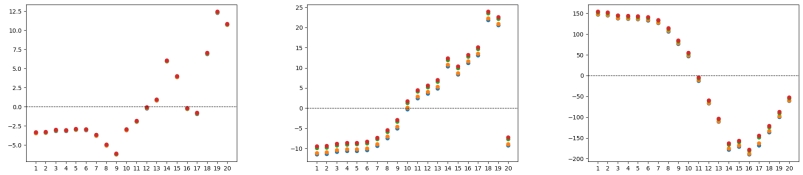
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



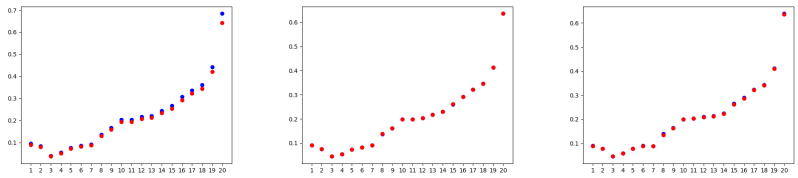
(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



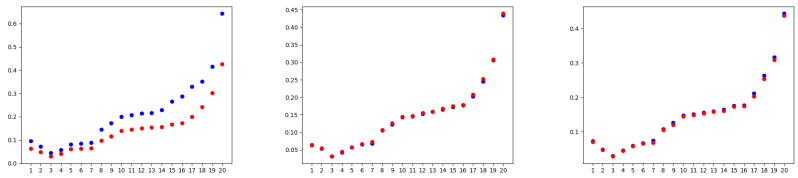
Notes: This Figure replicates Figure 18 for vingtiles instead of deciles.
Source: Authors' calculations based on OpenFisca and ERFS.

Figure 26: $\frac{T'}{1-T'}$ by vingtile before and after each reform

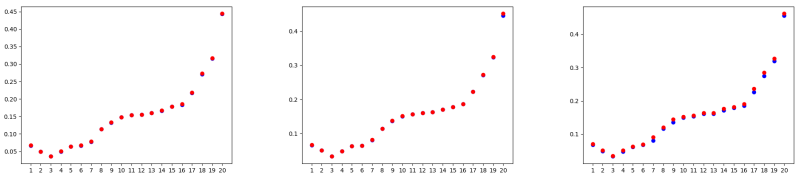
(a) 2002-2003 (b) 2003-2004 (c) 2004-2005



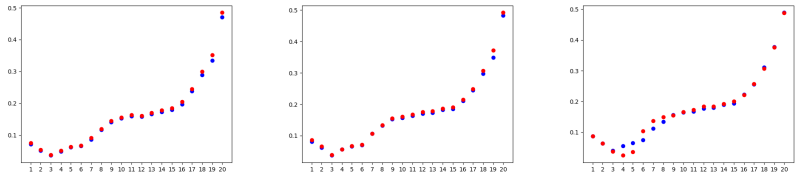
(d) 2005-2006 (e) 2006-2007 (f) 2007-2008



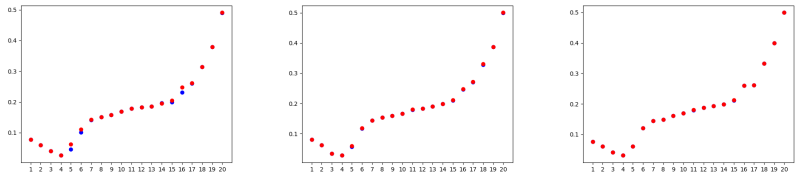
(g) 2008-2009 (h) 2009-2010 (i) 2010-2011



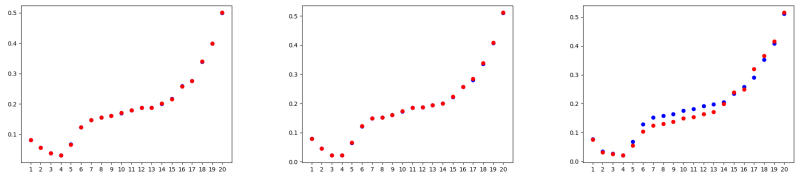
(j) 2011-2012 (k) 2012-2013 (l) 2013-2014



(m) 2014-2015 (n) 2015-2016 (o) 2016-2017



(p) 2017-2018 (q) 2018-2019 (r) 2019-2020



Notes: This Figure replicates Figure 20 for vingtiles instead of deciles.
Source: Authors' calculations based on OpenFisca and ERFS.

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