Lecture on Optimal Taxation

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I. Theory of optimal taxation: Overview

Optimal taxation

Liberal or rightist politicians typically emphasize the efficiency costs of taxation, leftist politicians emphasize the welfare gains.

The theory of optimal taxation provides a conceptual framework that allows for a systematic assessment of these assertions.

Key applications:

- Commodity taxation
- Income taxation
- Taxation of capital incomes

No established framework to discuss optimal corporate taxation.

Outline

1. **Old principles, Ramsey (1927)**

   Implications for

   - differential commodity taxation
   - capital taxation
   - corporate taxation

2. **Younger principles, Mirrlees (1971)**

   Implications for

   - differential commodity taxation
   - capital taxation
   - corporate taxation

3. **Current policy debates**

Outline

1. Overview: Principles of optimal taxation
   - Old principles
   - Younger Principles

Taxation is distortionary

A commodity tax drives a wedge between

- the price paid by the buyer,
- the price received by the seller.

Suppose the seller requires 1 Euro and the buyer is willing to pay 1.1 Euros, but the value added tax is 20 percent.

The tax implies that the good is not sold, not produced etc. Gains of trade amounting to 0.1 Euros are not realized.

More generally, there is a loss of production and employment.

Deadweight loss

Deadweight loss is an aggregate measure of all the gains from trade that are not realized because of distortionary taxation.

Why the rhetoric?

- Based on an ideal according to which governments use non-distortionary taxes to raise revenue.
- Taxes that are independent of the individuals' economic decisions are non-distortionary. Examples: Poll tax, taxes based on height, eye colors...

  Example. In the debate on taxes on financial sector activities after the crises, the IMF proposed a tax based on past behavior. Such a tax would not be distortionary.
- These taxes are not very plausible policy options, but they are in principle feasible.
- The deadweight loss arises from a policy that does not follow this ideal.

Inverse elasticities rule and uniform commodity taxation

Ramsey (1927)-problem:

- Multi-sector economy, all prices passed to consumers.
- Government needs a fixed amount of revenue.
- Taxes can be differentiated.

Main result: Inverse elasticities rule. Goods in more inelastic demand should be taxed more heavily. Hence, no uniform commodity taxation.

Diamond (1975): Modified framework that takes account of distributive considerations.

Closing loopholes

Ramsey's analysis implies that all goods should be taxed, albeit not at a uniform rate.

- Introducing a tax on a previously untaxed good and lowering the tax on a previously taxed good generates welfare gains.
- Why? The higher a tax the larger is the deadweight loss that comes with a further increase of the tax.

Policy Implication: Lowering rates and broadening the tax base is a good idea.

Outline

1. Overview: Principles of optimal taxation
   - Old principles
   - Younger Principles

The Mirrleesian paradigm

Two innovations:

- Mathematical approach that allows for a characterization of optimal non-linear taxes.
- Justification of distortionary taxation.

Remember: With the old principles, the use of distortionary taxes has no deep theoretical justification. The use of non-distortionary taxes is recommended.

Why distortionary taxation?

Goal: Design a tax and transfer system that transfers resources to "the poor".

- A tax on earned income is distortionary.
- Non-distortionary taxes can depend only on publicly observable and non-manipulable characteristics of individuals (sex, age, gender...)
- To transfer resources from "the rich" to "the poor" in a non-distortionary way one would need an observable and non-manipulable characteristic that is perfectly correlated with observed income.
- If such *productive abilities* are not publicly observable, but private information of individuals, distortionary income taxation is the only tool that is available.

The formal result in the background is known as the *Taxation Principle*.

Optimal Income Taxation I

Mirrlesian approach to welfare-maximizing income taxation

- Marginal tax for the top earner equal to zero $\Rightarrow$ The rate at the top is not a good measure of how redistributive the tax system is.
- Positive marginal tax rates everywhere else $\Rightarrow$ Difficult to justify an earned income tax credit.
- More recent findings: Need fixed and variable costs of labor market participation to find a justification for earnings-subsidies, see e.g. Jacquet et.al. (2013)

Optimal Income Taxation II

Literature has developed formulas to quantify optimal tax rates, referred to as ABC-formulas: The marginal tax at income level y is

A increasing in the welfare weight of "the poor"

B increasing in the share of individuals with income above y relative to the share of individuals with an income close to y.

C decreasing in the elasticity of earnings with respect to marginal tax rates.

Diamond (1998): Increasing marginal tax rates for very high incomes, the zero rate at the top is "not relevant."

Flat tax proposals

Content of proposals

- Shift from taxation of income to the taxation of consumption expenditures.
- Uniform rate for consumption expenditures.

Theory of optimal taxation

- Uniform rate for consumption expenditures is fine.
- Optimal income tax is non-linear

$\Rightarrow$ Abolishing the non-linear income tax and replacing it with a uniform consumption tax is not in line with the theory of optimal taxation.

Universal and unconditional income

Content:

Every citizen gets the same payment from the government

Optimal income taxation

- Transfers to those with no income desirable.

  After-tax income must increase with pre-tax income.

  Optimal income tax in line with a transfer to all and an income tax T with $T(0) = 0$ and $T'(y) < 1$, for all y.

- Tagging desirable, i.e. transfer should depend on observable characteristics (age, gender, marital status, number of children), Akerlof (1978)

  Not in line with what the proponents want.

Politically feasible reforms of non-linear tax systems

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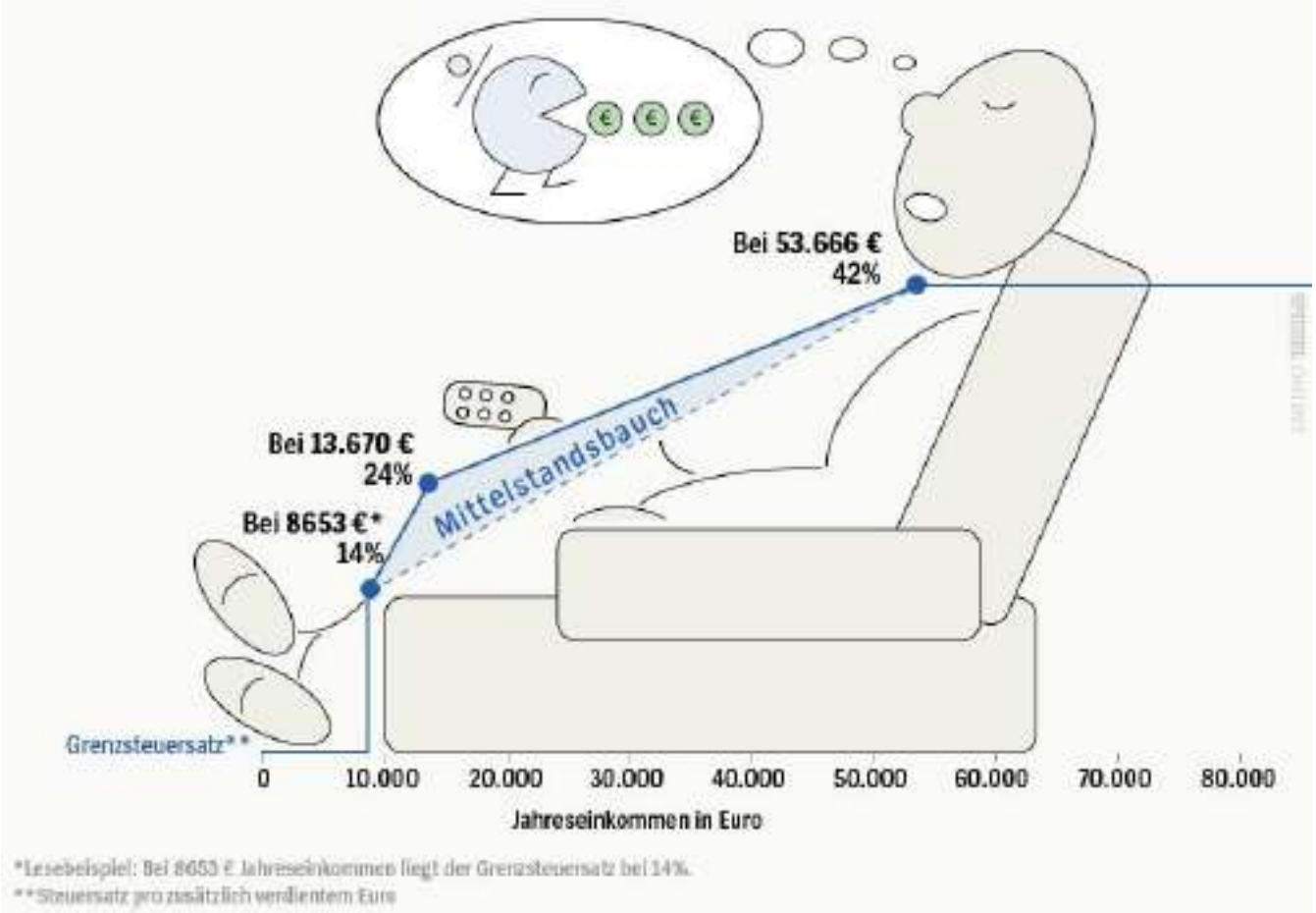
Figure: The "middle class belly" in Germany's federal income tax



Spiegel online on Aug 22, 2016

The agenda: Political economy of non-linear tax systems

I. Normative analysis:

Non-linear taxation, workhorse: Mirrlees (1971).

II. Political economy:

Workhorse only for linear income taxation: Roberts (1977), Meltzer and Richard (1981).

No broadly accepted conceptual framework for the political economy of non-linear tax systems.

Needed for Political Economy analysis of progressivity, top tax rates, income-tax threshold, earnings subsidies...

This paper I

Ambition: Propose a conceptual framework for the political economy of reforms of non-linear tax systems.

- Assume that there is some status quo tax policy.
- Characterize tax reforms that are politically feasible (ie. preferred by a majority of voters).
- Characterize reforms that are politically feasible and/or welfare-improving.

This paper II

Part 1: Monotonic reforms

Theorem 1 (Median voter theorem for tax reforms) Given an arbitrary non-linear tax system, a monotonic tax reform is preferred by a majority if and only if it is preferred by the voter with median income.

This paper III

Part 1: Monotonic reforms

Theorem 1 (Median voter theorem for tax reforms) Given an arbitrary non-linear tax system, a monotonic tax reform is preferred by a majority if and only if it is preferred by the voter with median income.

- Monotonic reform: Change in tax burden a monotonic function of income.
- Monotonic reforms can be used to characterize welfare-maximizing tax systems.

This paper IV

Part 2: Detecting politically feasible reforms

> **Theorem 2 (Characterization)** Given a Pareto-efficient tax system, moving towards lower taxes for below median incomes and towards higher taxes for above median incomes is politically feasible.

Possible explanation for high progressivity for middle incomes

Based on Theorem 2,

- Develop a sufficient statistics approach to identify reforms that are in the median voter's interest.
- Based on upper and lower Pareto bounds for marginal tax rates

This paper V

Extensions:

1. Taxation of savings/ Atkinson-Stiglitz (1976)/ Broadening of tax base.
2. Fixed costs of labor-market participation: Saez (2002).
3. Public-good provision/ Benefits-based taxation: Musgrave (1959).
4. Luck vs Effort: Alesina and Angeletos (2005).

Multidimensional heterogeneity $\Rightarrow$ identity of the median voter depends on the status quo.

This paper VI

Part 3: Empirical application

"History of (Federal) US tax reforms" through the lens of our model
(using tax return micro data and microsimulations)

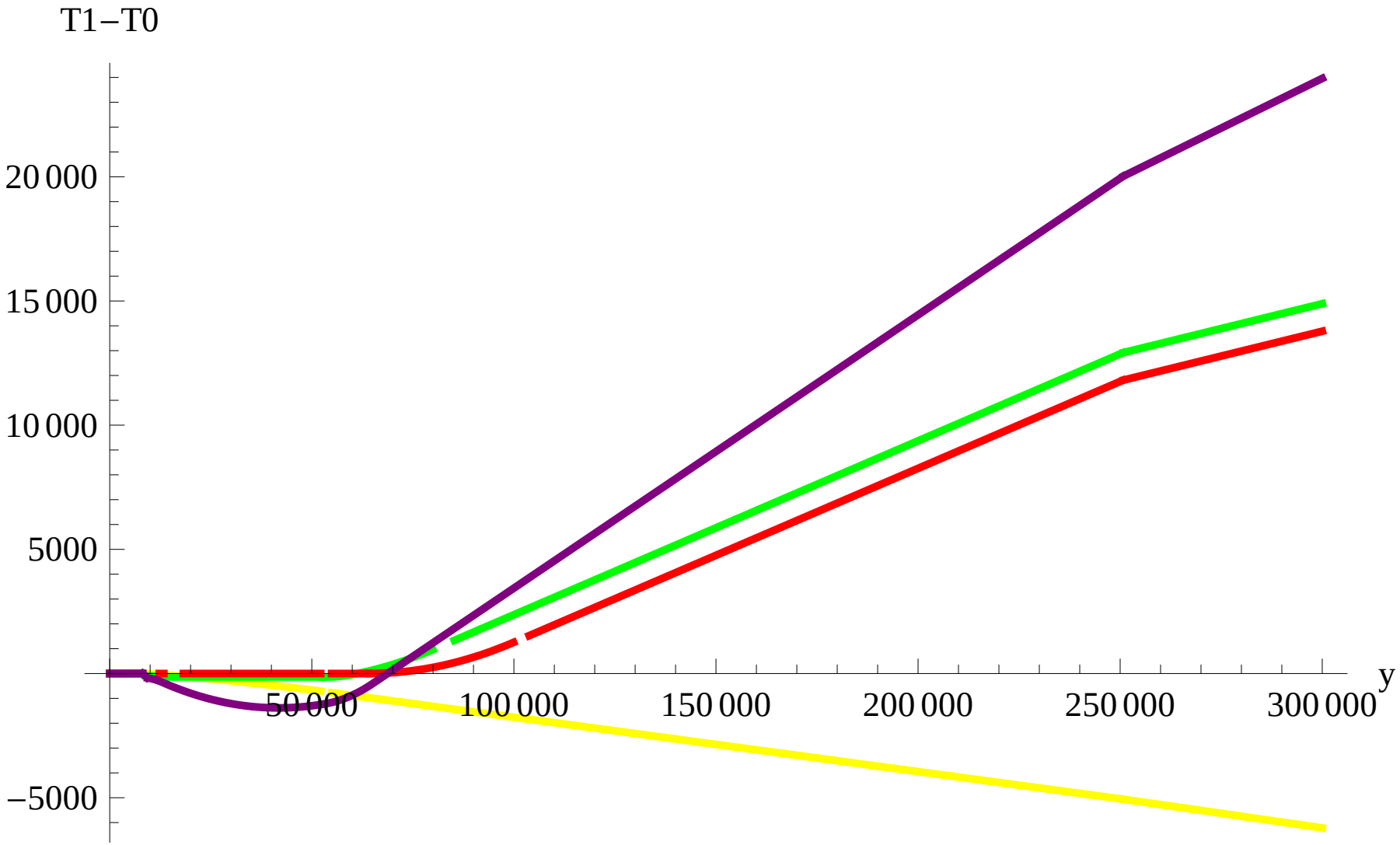
Key findings:

1. Are reforms monotonic? New stylized fact: yes, by and large
2. Are the reforms in the median voter's interest?
   - Yes if revenue effects are ignored.
   - Mixed picture if revenue effects are taken into account.
3. Sharp increase of tax rates around the median income: yes.

This paper VII

Figure: Germany's 2013 election campaign

This paper VIII



Related Literature

- *Optimal taxation:* Frequent use of the perturbation method: e.g. Piketty (1997), Saez (2001), Werning (2007), Jacquet and Lehmann (2014) or Golosov, Tsyvinski and Werquin (2014).
- *Single-crossing conditions and median voter theorems:* Roberts (1977), Rothstein (1990,1991), Gans and Smart (1996).
- *Income taxation and median voter theorems:* Downsian framework/ linear income taxes: Roberts (1977), ... Citizen candidate model: De Donder and Hindriks (2003), Röell (2012), Brett and Weymark (2016,2017).
- *Other political economy models and non-linear taxes:*
  - Political agency: Acemoglu, Golosov and Tsyvinski (2008, 2010).
  - Legislative bargaining: Battaglini and Coate (2008).
  - Probabilistic voting and lack of commitment: Farhi, Sleet, Werning and Yeltekin (2012).
  - Uncertainty and realization-dependent budget: Berliant and Gouveia (2018).

Outline

Model: Preferences

Preferences are represented by a utility function $u(c, y, \omega)$:

- Increasing in c, decreasing in y.
- Spence-Mirrlees single crossing property:

  $\Rightarrow$ Earnings monotonic in type under any decentralizable/ incentive compatible allocation.

  $\Rightarrow$ Median type ω^M also has median income.

Tax reforms I

Consumption schedule after a reform:

$$C_1(y) = c_1 + y - T_1(y) \,,$$

where

$$T_1(y) = T_0(y) + \tau\, h(y) \,,$$

$$c_1 = c_0 + \Delta^R(\tau, h) \,,$$

and

$$T_1(0) = T_0(0) = 0 \,,$$

where $\Delta^R(\tau, h)$ is the reform induced change in tax revenue.

$\Rightarrow$ Basic income absorbs changes in tax revenues. Consider alternative uses of tax revenue in extensions.

Represent a generic reform as a pair (τ, h).

Tax reforms II

Monotonic reforms:

- A tax reform (τ, h) is said to be monotonic over a range of incomes $\mathcal{Y} \subset \mathbb{R}_+$ if $T_1(y) - T_0(y) = \tau\, h(y)$ is a monotonic function for $y \in \mathcal{Y}$.
- A reform is monotonic above (below) the median if $T_0(y) - T_1(y) = \tau\, h(y)$ is a monotonic function for incomes above (below) the median income.

Example: Reforms in the (τ, y_a, y_b)-class/ Saezian reforms:

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

Preliminaries

Let $y^*(e, \tau, \omega) := \text{argmax}_y \quad u(c_0 + e + y - T_0(y) - \tau h(y), y, \omega)$.

Corresponding indirect utility denoted by $V(e, \tau, \omega)$.

Status quo earnings: Define $\tilde{y}^0 : \Omega \to \mathbb{R}_+$ with $\tilde{y}^0(\omega) = y^*(0, 0, \omega)$.

Assumption 1. The function $\tilde{y}^0$ is strictly increasing, continuous and, for all ω, characterized by individuals' first order condition.

Rules out a status quo with bunching. Relaxed in the Appendix.

Terminology

Reform-induced change in indirect utility for type ω: $\Delta^V(\omega \mid \tau, h)$.

- **Pareto-improving reforms.** For all $\omega \in \Omega$, $\Delta^V(\omega \mid \tau, h) \geq 0$, strict for some $\omega \in \Omega$.
- **Welfare-improving reforms.**

$$\Delta^W(g \mid \tau, h) := \int_{\underline{\omega}}^{\overline{\omega}} g(\omega)\Delta^V(\omega \mid \tau, h)f(\omega)\, d\omega > 0\ .$$

- **Politically feasible reforms.**

$$S(\tau, h) := \int_{\underline{\omega}}^{\overline{\omega}} \mathbf{1}\{\Delta^V(\omega \mid \tau, h) > 0\}f(\omega)\, d\omega \geq \frac{1}{2}\ .$$

Small reforms I

Definition. An individual of type ω benefits from a small reform if, at $\tau = 0$,

$$\Delta_\tau^V(\omega \mid \tau, h) := \frac{d}{d\tau} V(\Delta^R(\tau, h), \tau, \omega) > 0 \ .$$

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.

Extensions to large reforms in the paper.

Weakening the monotonicity requirement

Proposition 1

Let $\tilde{y}^{0M}$ be median income in the status quo.

1. Let h be non-decreasing for $y \geq \tilde{y}^{0M}$. If the median voter benefits from a small reform with $\tau < 0$, then it is politically feasible.
2. Let h be non-decreasing for $y \leq \tilde{y}^{0M}$. If the poorest voter benefits from a small reform with $\tau < 0$, then it is politically feasible.

Detecting politically feasible reforms

From now on: Focus on reforms in the (τ, y_a, y_b)-class.

Theorem 2

Suppose that T_0 is an interior Pareto-optimum.

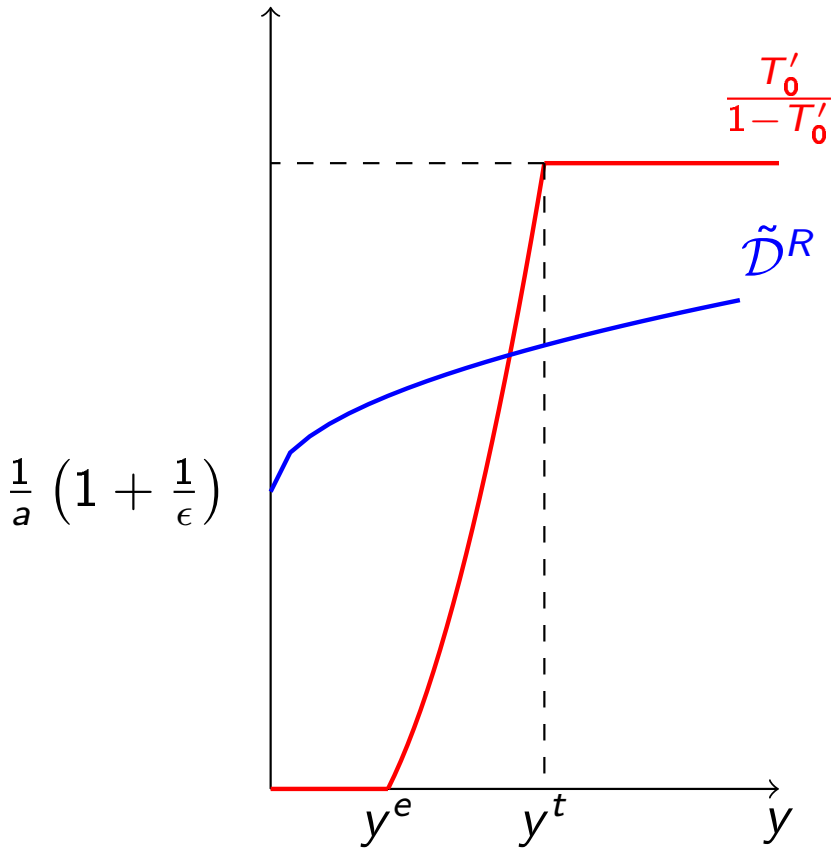
(i) For $y_0 < \tilde{y}^{0M}$, there is a small reform (τ, y_a, y_b) with $y_a < y_0 < y_b$ and $\tau < 0$ that is politically feasible.

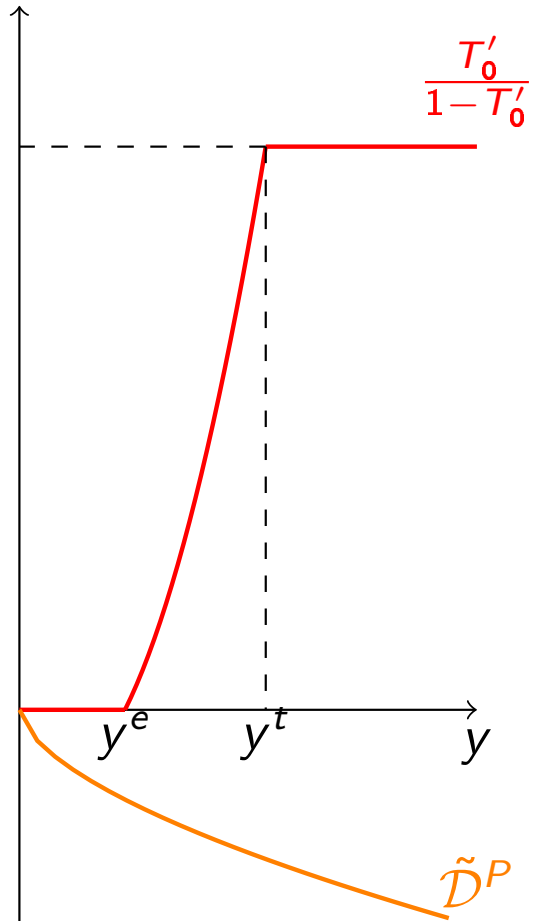
(ii) For $y_0 > \tilde{y}^{0M}$, there is a small reform (τ, y_a, y_b) with $y_a < y_0 < y_b$ and $\tau > 0$ that is politically feasible.

Within Pareto bounds,

- for incomes below the median, lower taxes are politically feasible.
- for incomes above the median, higher taxes are politically feasible.

$\Rightarrow$ Only need Pareto-bounds for a characterization of politically feasible reforms.


$\frac{T_0'}{1-T_0'}$
$\tilde{\mathcal{D}}^R$
$\frac{1}{a}\left(1+\frac{1}{\epsilon}\right)$
y^e
y^t
y


$\frac{T_0'}{1-T_0'}$
y^e
y^t
y
$\tilde{\mathcal{D}}^P$

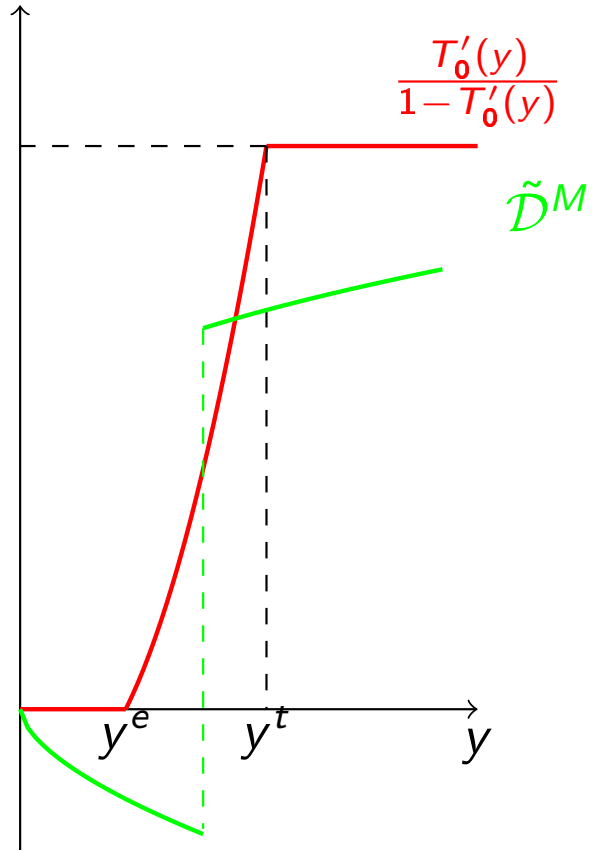


Figure: Sufficient statistics for politically feasible reforms

Outline

Are observed tax reforms monotone?

- Are observed tax reforms monotone?

  OECD countries.

  US: important reforms and microsimulations.
- Also in the paper: are proposed (but failed) reforms monotone?
- Robustness checks.

OECD 2000-2016

Total number of possible reforms (#years*#countries):	528	
Total number of reforms:	394	
Number of monotonic reforms:	309	(78%)
Number of non-monotonic reforms:	85	(22%)

Table: Summary statistics on the tax reforms for a panel of 33 OECD countries (2000-2016).

Germany (2000-2016)

Beginning of examination:	2000	
Total number of possible reforms until 2016:	16	
Total number of reforms until 2016:	11	
Number of monotonic reforms:	9	(82%)
Number of non-monotonic reforms:	2	(18%)

Table: Summary statistics on the tax reforms in Germany (2000-2016).

Years with a non-monotone reform: 2002, 2015. Germany uses a polynomial function that cannot be produced with the OECD database. The database can be accessed on $https://www.bmf-steuerrechner.de/index.xhtml;jsessionid=46D8EC6083BF2573A42C23A2B03B49DF$.

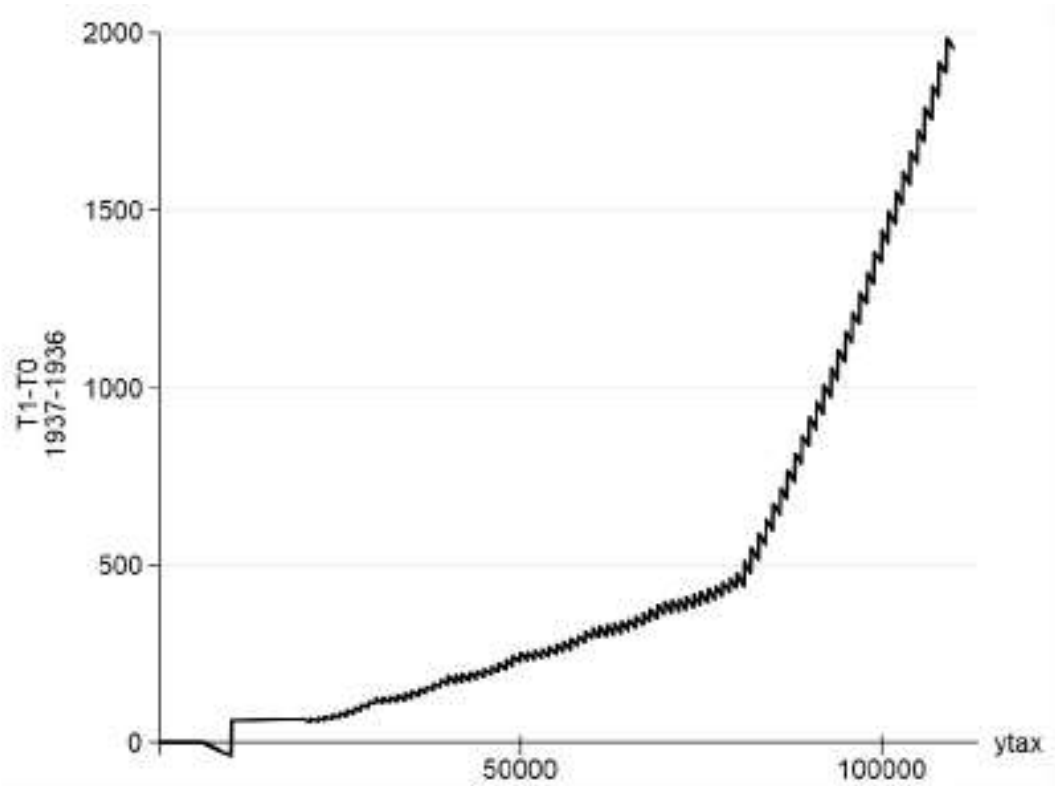
France (1916-2016)

First year of income taxes:	1916	
Total number of possible reforms until 2016:	100	
Total number of reforms until 2016:	74	
Number of monotonic reforms:	62	(84%)
Number of non-monotonic reforms:	12	(16%)

Table: Summary statistics on the history of French tax reforms (1916-2016).

(Non-)Monotonic Reform ?

Figure: Reform of the French income tax in 1937



Were US reforms monotonic? I

- We evaluate 9 major US tax reforms passed between 1964 and 2017:

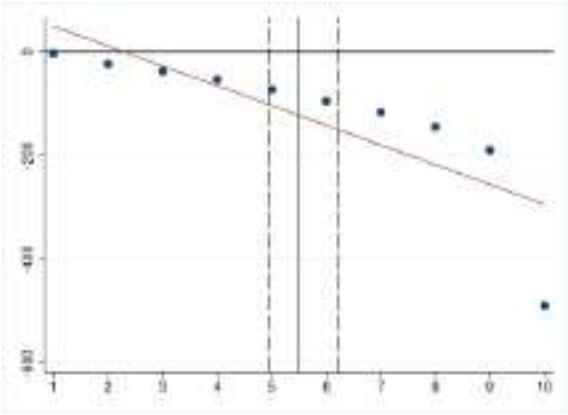
	pre-reform	post-reform
RA64	1962	1966
ERTA81	1980	1984
TRA86	1985	1988
OBRA90	1990	1991
OBRA93	1992	1993
EGTRRA01	2000	2002
JGTRRA03	2002	2003
ATRA12	2012	2013
TCJA17	2016	2018

Were US reforms monotonic? II

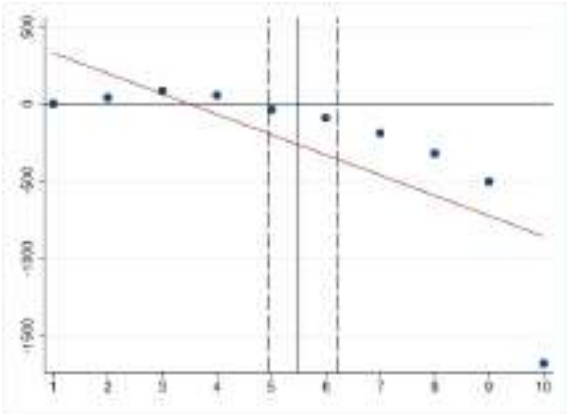
- Tax return micro data from SOI-IRS → full population heterogeneity
- NBER TAXSIM microsimulation model → tax rate & base changes
- Counterfactual simulations (following Eissa et al., 2008 & Bargain et al., 2015)
  - Use simulated taxes for all computations
  - Compare pre-reform incomes & pre-reform taxes (T_0) with the counterfactual of inflated pre-reform incomes & post-reform taxes (T_1') to measure the "direct (mechanical) policy effect"
  - Using post-reform incomes & post-reform taxes (T_1) additionally measures behavioral responses & GE effects ($T_1 - T_0$)

Type I (monotonic) reforms (by decile)

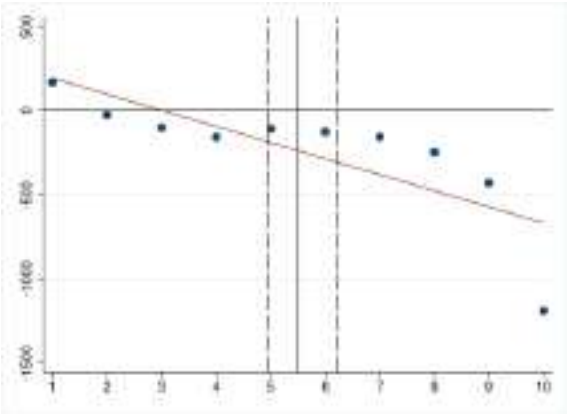
(a) RA64



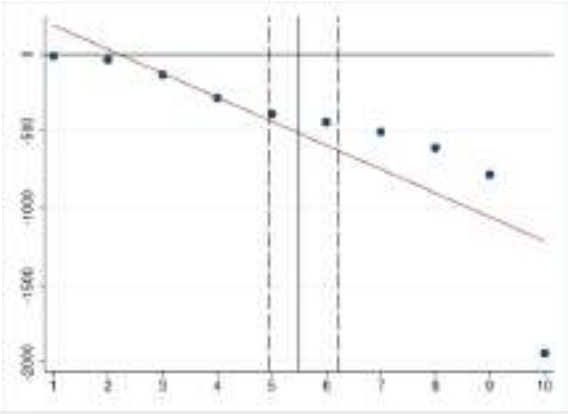
(b) ERTA81



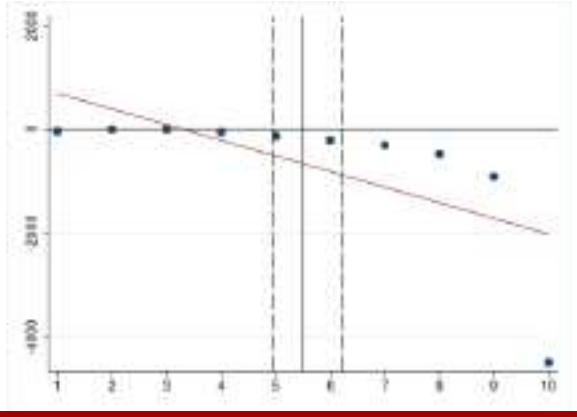
(c) TRA86



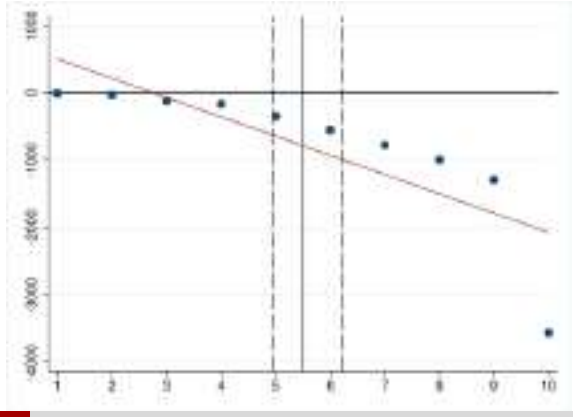
(d) EGTRRA01



(e) JGTRRA03

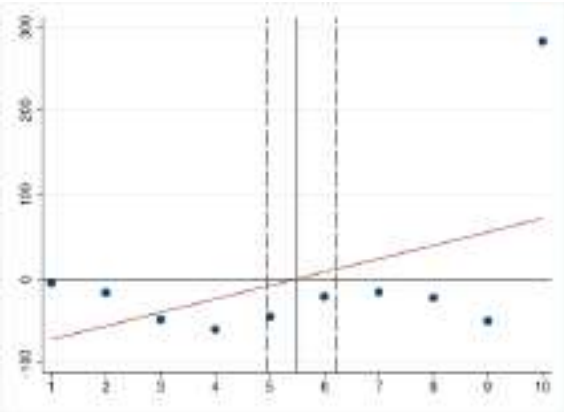


(f) TCJA17

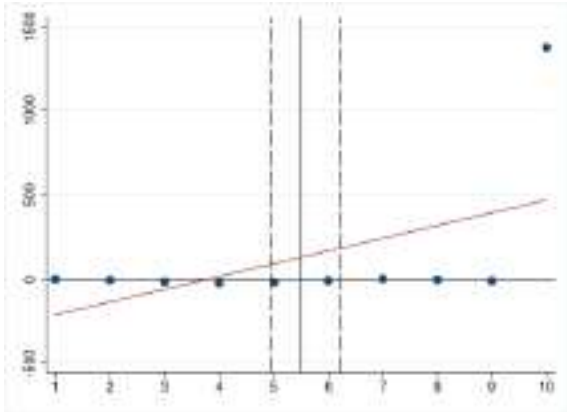


Type II (v-shaped) reforms (by decile)

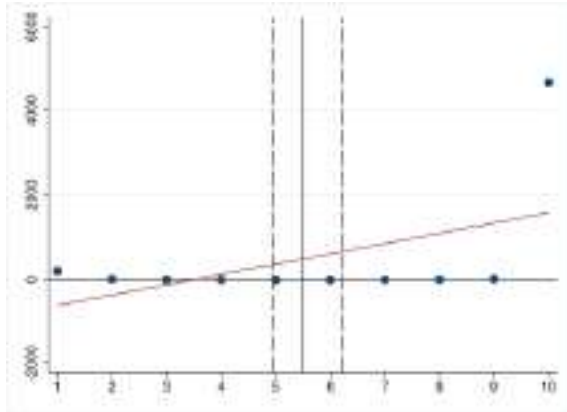
(a) OBRA90



(b) OBRA93



(c) ATRA12



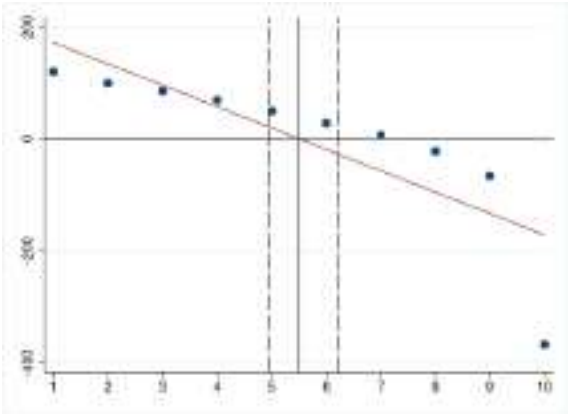
Were US reforms in the median voter's interest?

- US: important reforms and microsimulations.

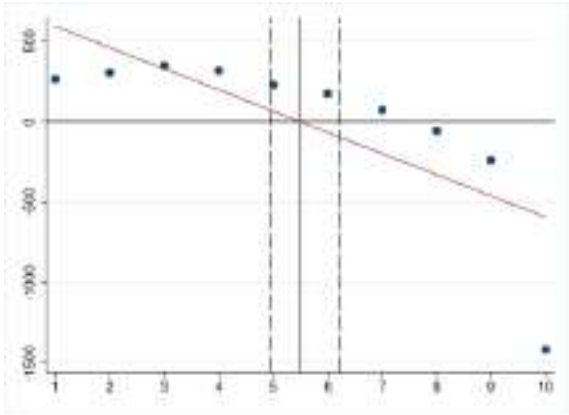
  Impose revenue neutrality by redistributing revenue gain/loss lump sum.
- Robustness checks.

Type I reforms – revenue neutral (by decile)

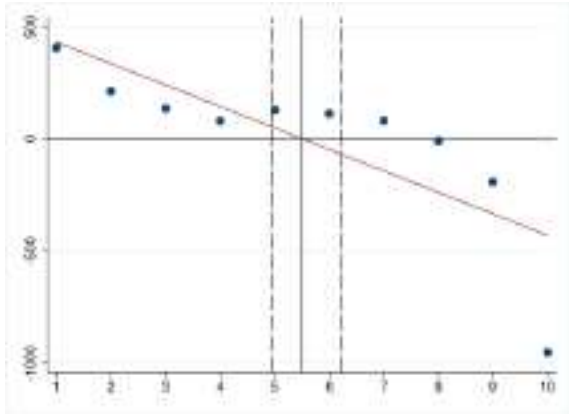
(a) RA64



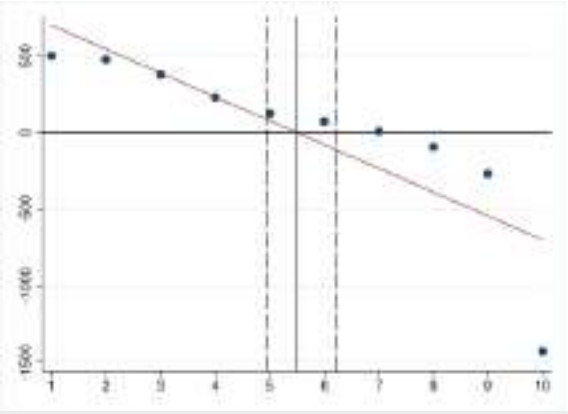
(b) ERTA81



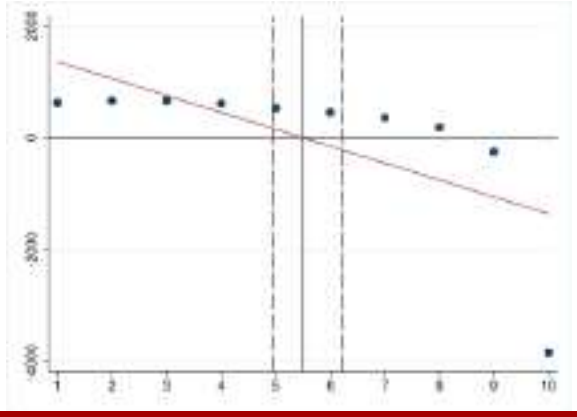
(c) TRA86



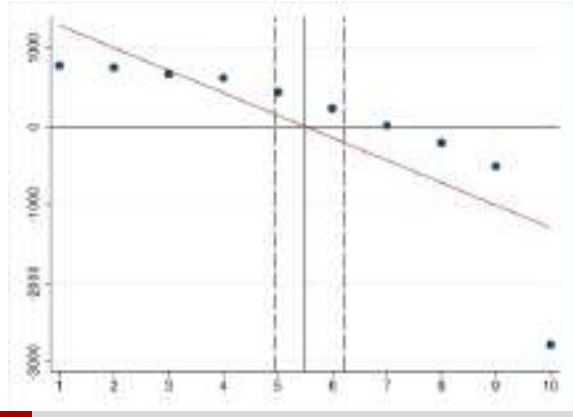
(d) EGTRRA01



(e) JGTRRA03

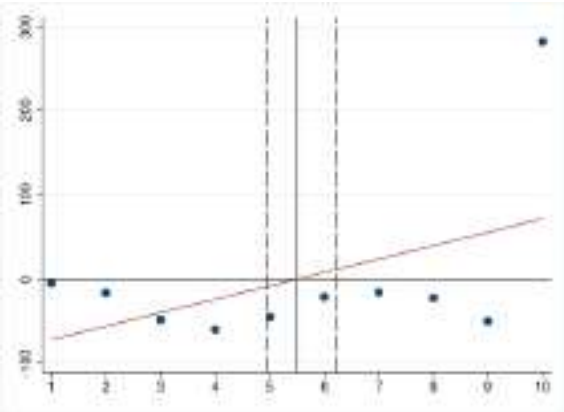


(f) TCJA17

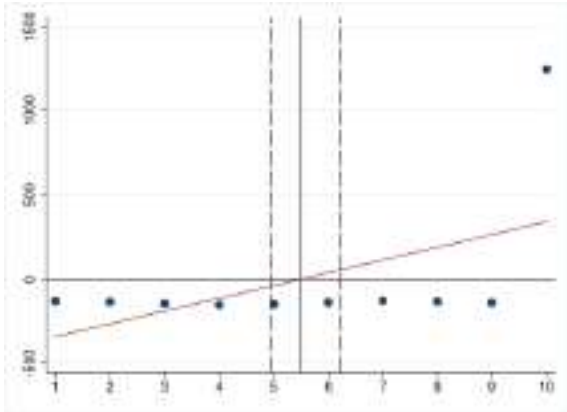


Type II reforms – revenue neutral (by decile)

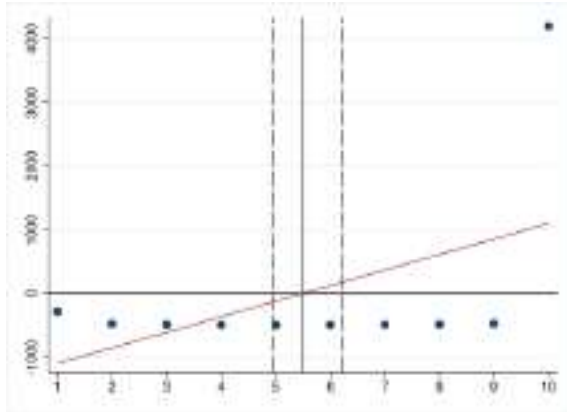
(a) OBRA90



(b) OBRA93

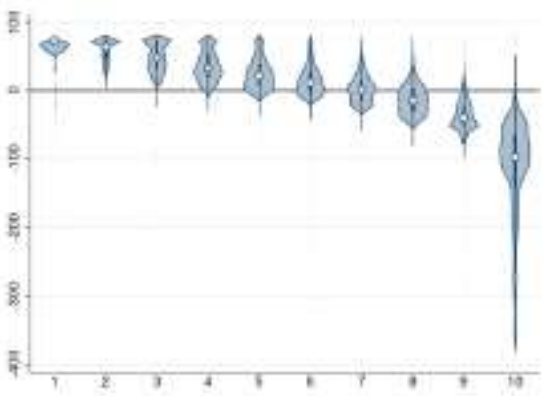


(c) ATRA12

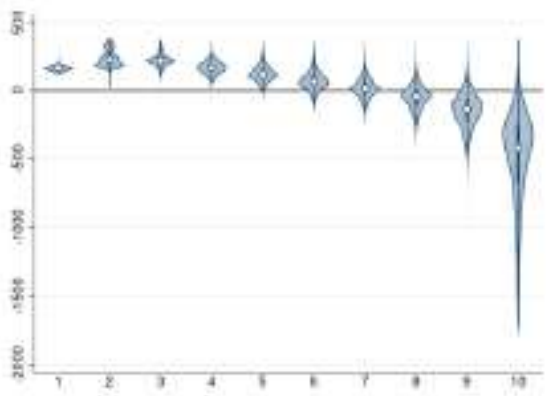


Type I reforms – heterogeneity; revenue neutral

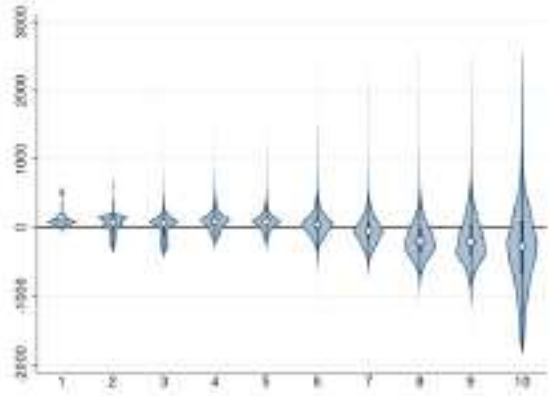
(a) RA64



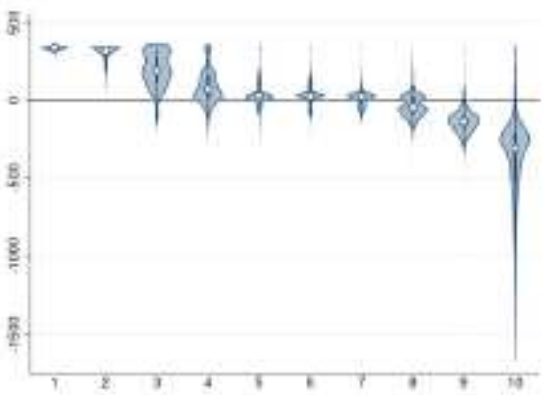
(b) ERTA81



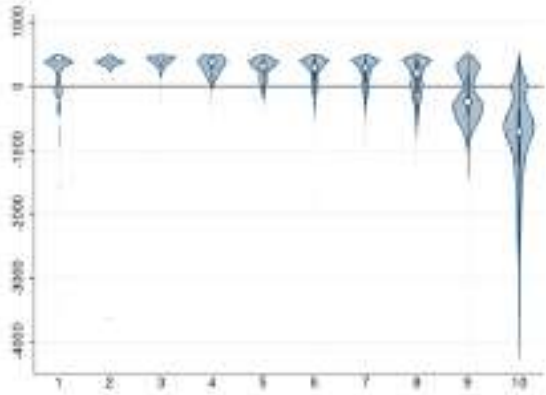
(c) TRA86



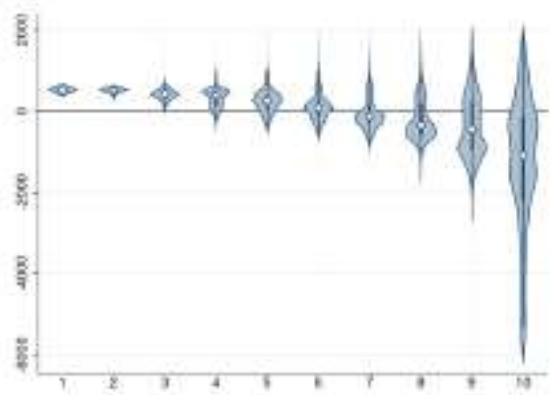
(d) EGTRRA01



(e) JGTRRA03

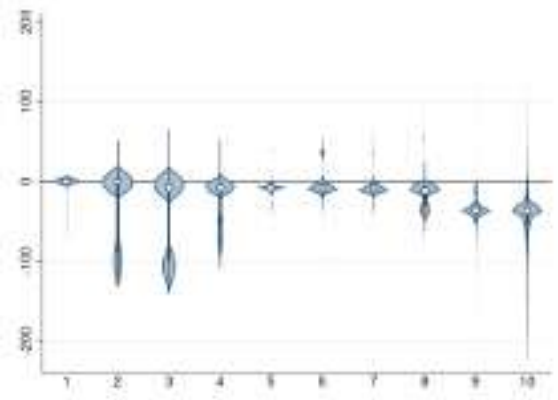


(f) TCJA17

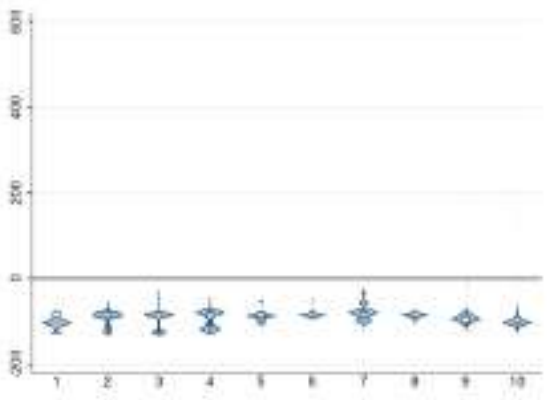


Type II reforms – heterogeneity; revenue neutral

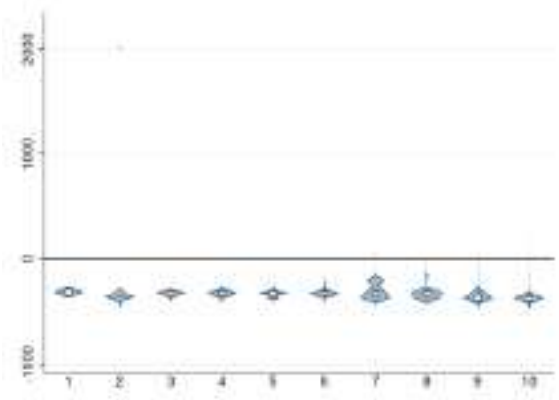
(a) OBRA90



(b) OBRA93

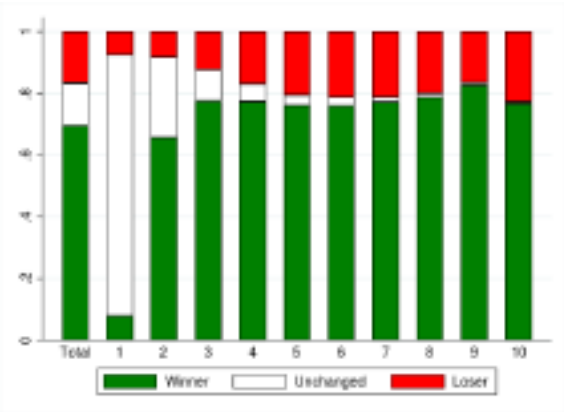


(c) ATRA12

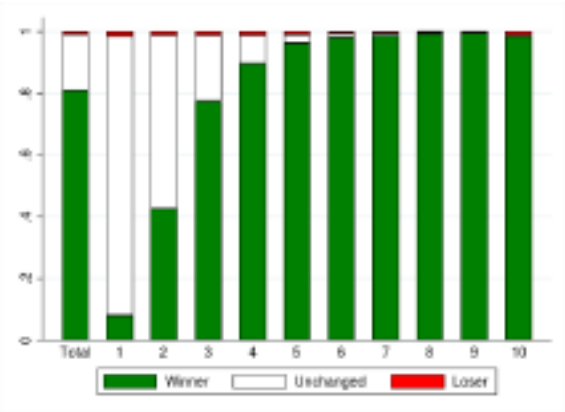


Share of Winners & Losers (by decile)

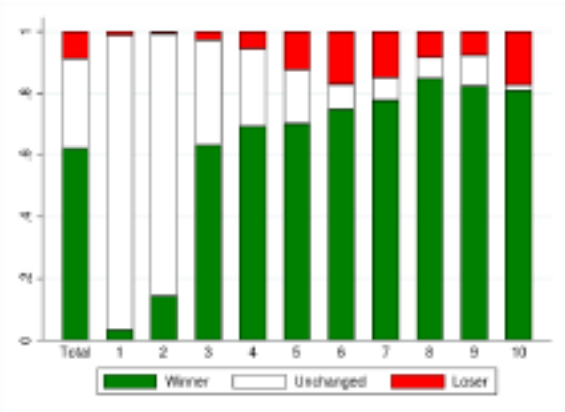
(a) TRA86



(b) EGTRRA01

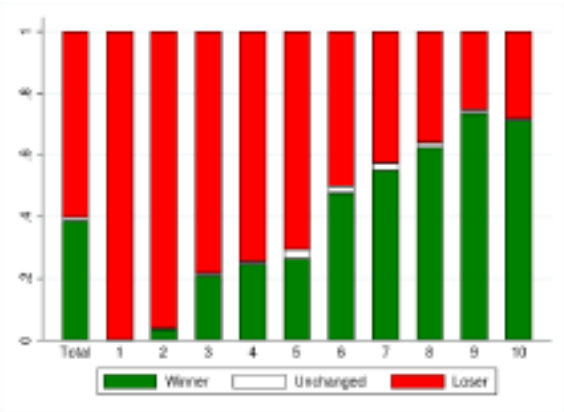


(c) ATRA12

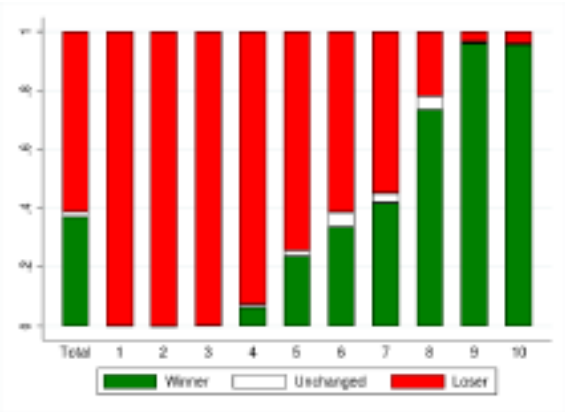


Share of Winners & Losers – revenue neutral (by decile)

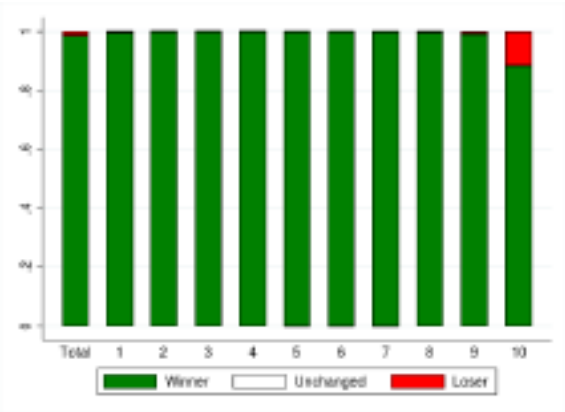
(a) TRA86



(b) EGTRRA01

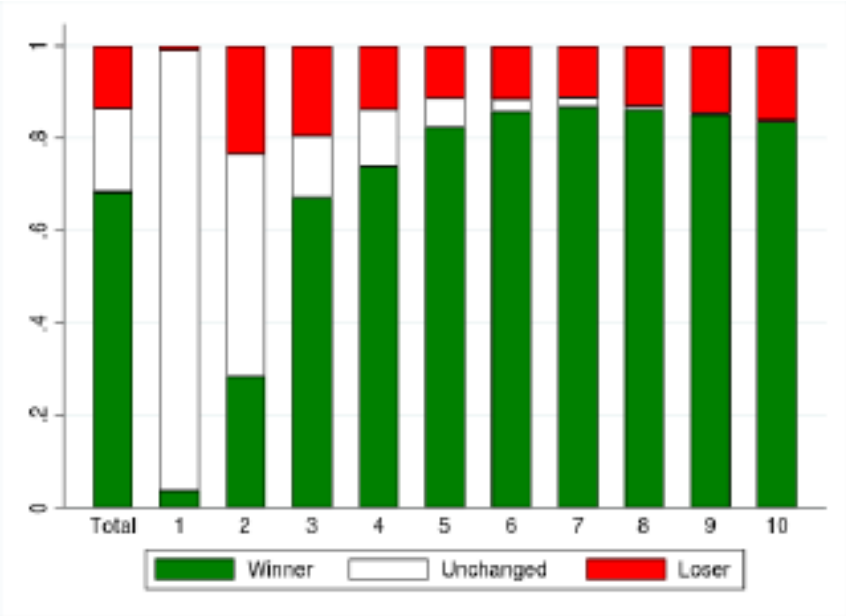


(c) ATRA12

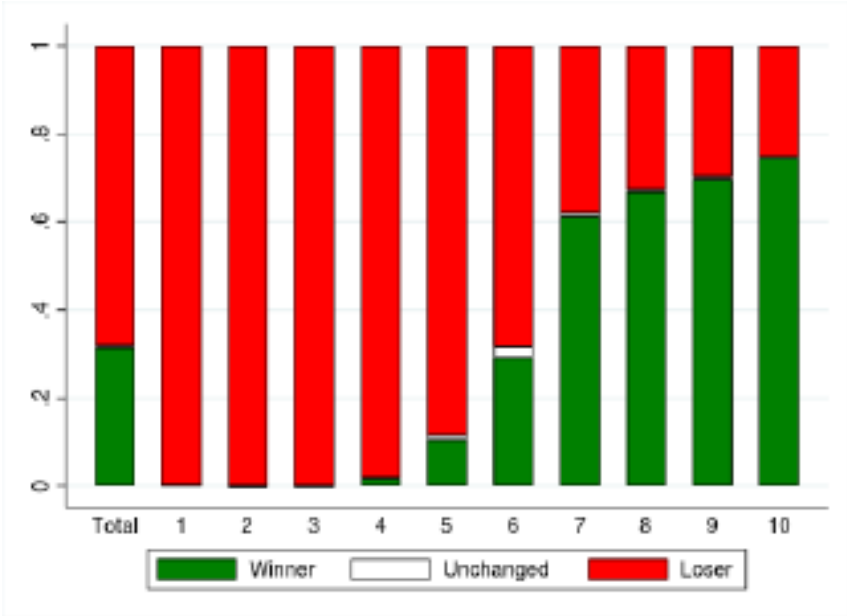


Trump's tax cut: share of Winners & Losers (by decile)

(a) TCJA17



(b) TCJA17 revenue neutral



Note: Decile "0" is total effect

Do we observed an increase of marginal tax rates around median income?

- US: important reforms and microsimulations.

  Impose revenue neutrality by redistributing revenue gain/loss lump sum.
- Robustness checks.

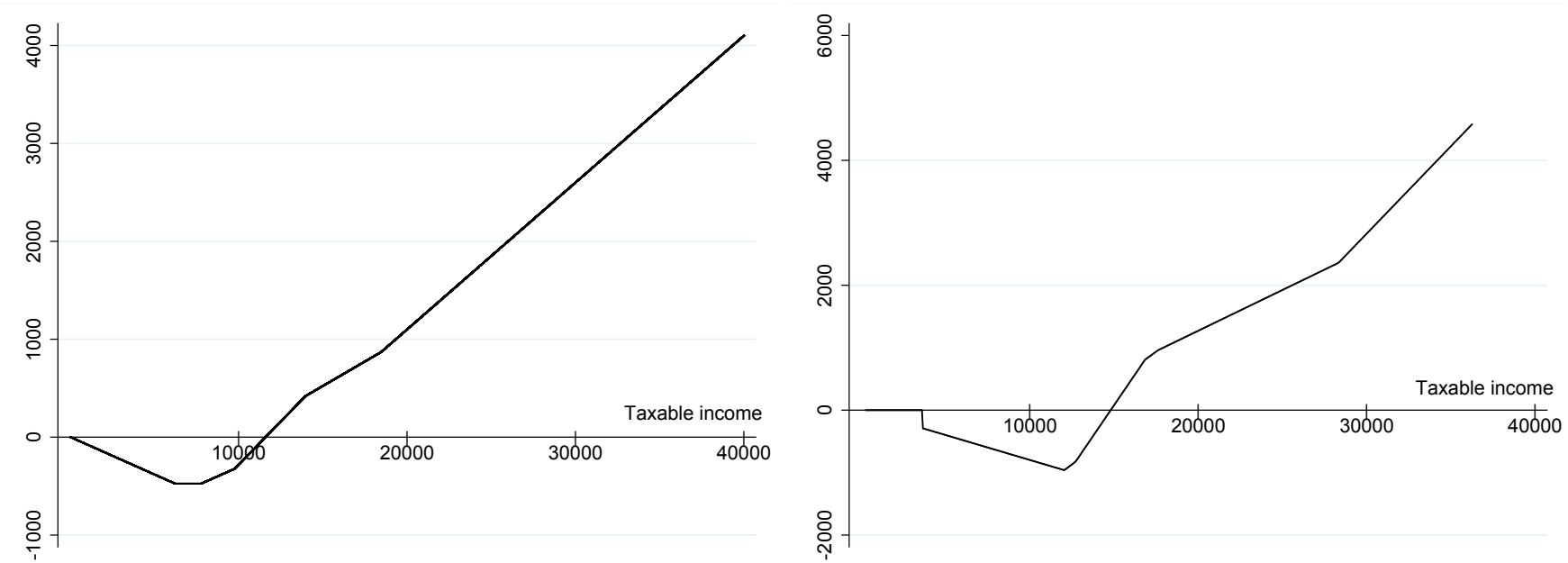
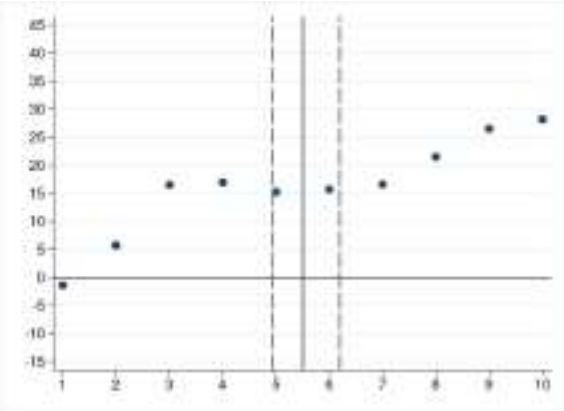


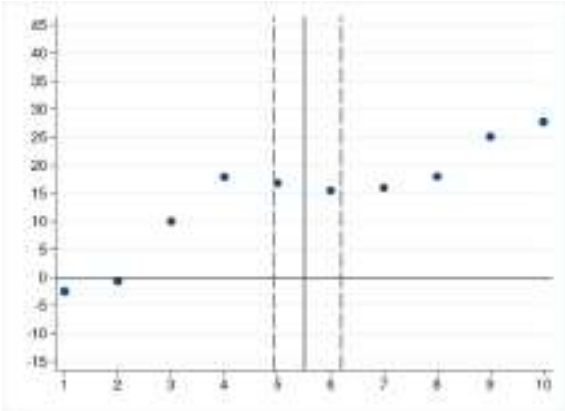
Figure: Income tax schedules for singles without dependants from micro-simulation models for the US (left figure) and France (right figure) in 2012

Marginal tax rates

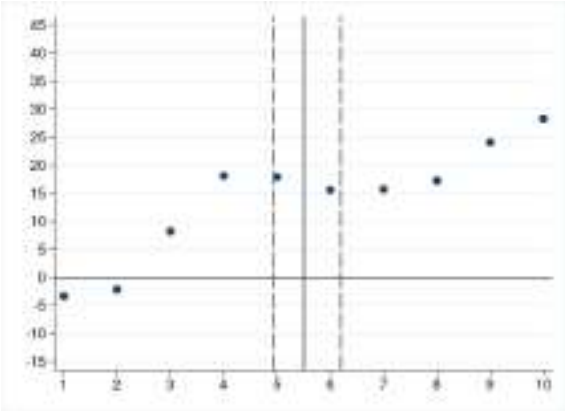
(a) TRA86



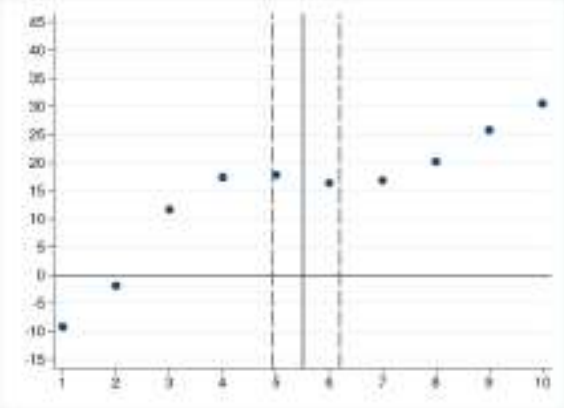
(b) OBRA90



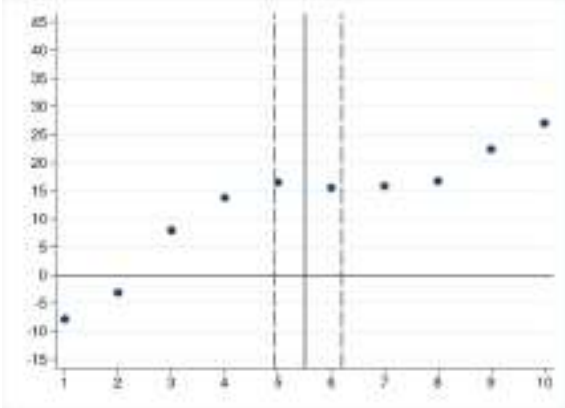
(c) OBRA93



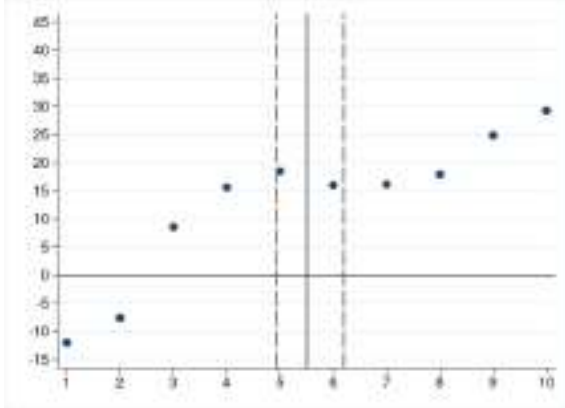
(d) EGTRRA01



(e) JGTRRA03



(f) ATRA12



Pareto bounds I

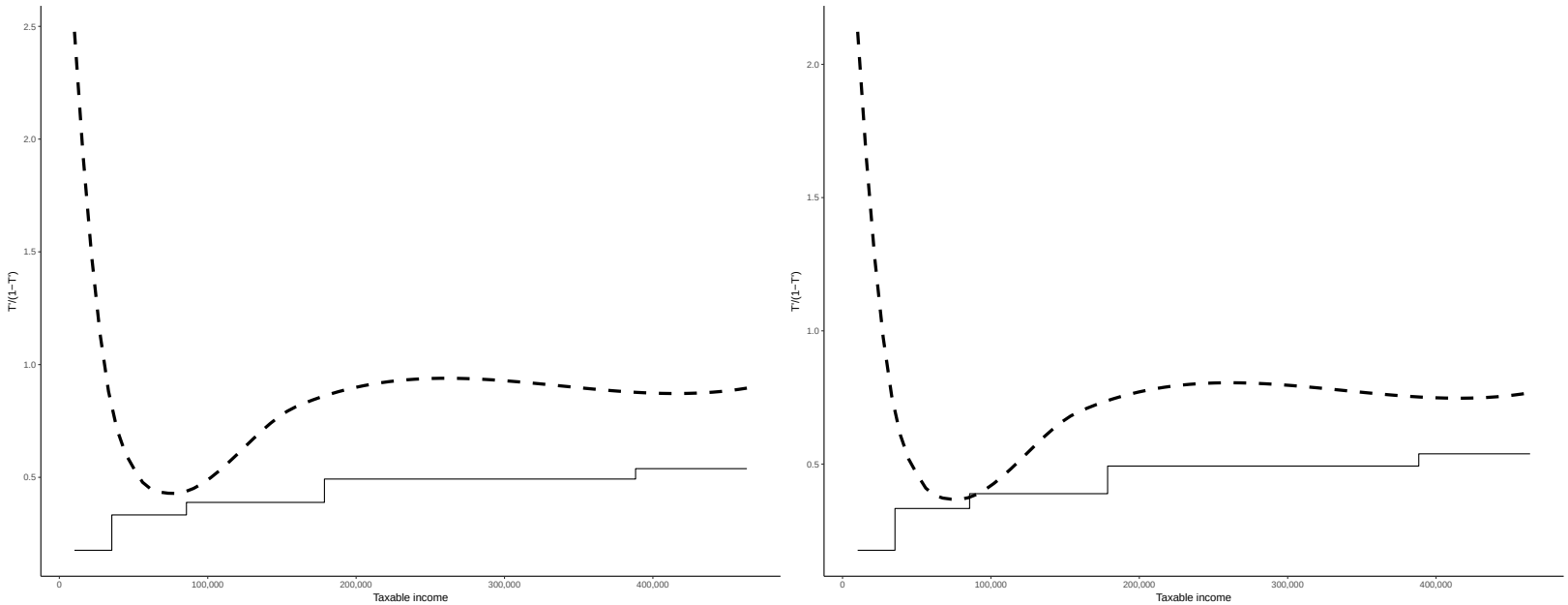


Figure: Upper Pareto bounds for the US income tax in 2012

On the left assumed an ETI of 1.2, on the right an ETI of 1.4. Cutoff is around 1.4. For higher estimates, the 2012 US tax system admits Pareto-improving reforms, for lower estimates it is an interior Pareto-optimum.

Pareto bounds II

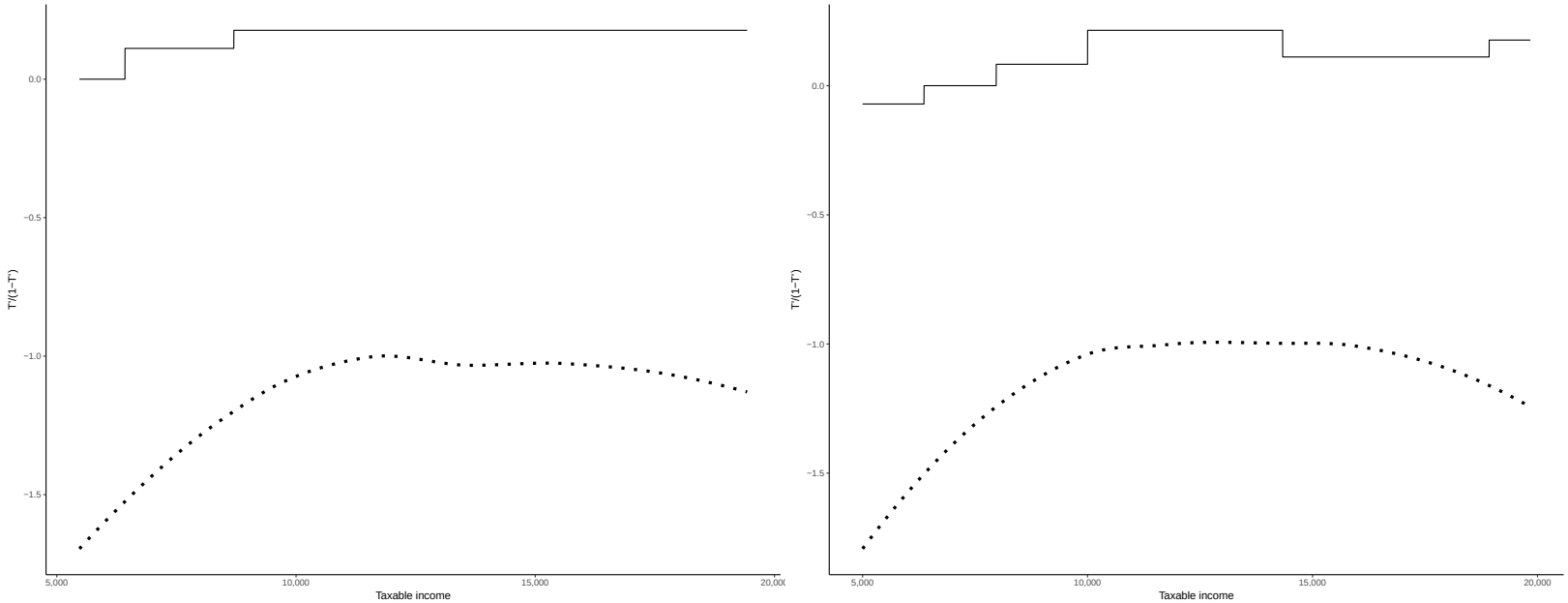


Figure: Lower Pareto bounds for the US income tax in 2012

US income tax system in 2012 for an ETI of 1.2. The figure on the left is drawn for the statutory schedule taken from the OECD database and the one on the right represents the full schedule with earning subsidies (EITC) for singles without dependents taken from the NBER TAXSIM database.

Outline

Conclusion

Methodological contributions:

- Conditions for revenue-increasing, Pareto-improving, welfare-improving or politically feasible reforms.
- Conditions take the form of sufficient statistics formulas.
- Diagnosis system for tax reforms.

Substantive contributions:

- Discontinuity of schedule for politically feasible reforms at the median level of income.
- Within Pareto bounds, tax cuts for the poor and tax raises for the rich are politically feasible.

Empirically:

- History of US tax reforms through the lens of our model

Jointly Optimal Income Taxes for Different Sources of Income

Johannes Hermle
(UC Berkeley)
Andreas Peichl
(ifo & LMU)

Canazei 2020

Motivation

- Some tax systems assign separate tax schedules to different income sources (e.g. "Nordic" dual income tax)

- Economic intuition:
  1. Different types vary in their responsiveness to taxes $\rightarrow$ efficiency costs
  2. Welfare weights of income types differ $\rightarrow$ redistribution

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- Economic intuition:
  1. Different types vary in their responsiveness to taxes $\rightarrow$ efficiency costs
  2. Welfare weights of income types differ $\rightarrow$ redistribution
- This paper: (i) consider an optimal tax model where the government can tax distinct income sources on separate schedules and (ii) estimate the model for Germany

This talk

- **Theory:**
  - Derive optimality conditions for the case of linear tax rates
    - ★ Theoretical challenge: accounting for fiscal externalities arising from cross-effects between tax bases (e.g. income shifting)
- **Empirics:**
  - Estimate the model for Germany (based on 3 income sources: wage, self-employment, and long-term investment income)
    1. Estimate heterogeneity in ETIs across income sources
    2. Estimate implicit welfare weights (by income source)
    3. Estimate optimal tax schedules

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    1. Estimate heterogeneity in ETIs across income sources
    2. Estimate implicit welfare weights (by income source)
    3. Estimate optimal tax schedules
- **Preview of results:**
  - Theory: optimal tax rates higher than without considering cross-effects
  - Empirics:
    - ★ ETI: self-employment $>$ wage $>$ long-term investment income
    - ★ Welfare Weights: wage $>$ long-term investment income $>$ self-employment income
    - ★ Tax rates: self-employment $>$ long-term investment income $>$ wage income

Related literature

- **Optimal income taxation**
  - Standard: Mirrlees (1971), Diamond (1998), Saez (2001); survey: Piketty and Saez (2013)
  - Tagging: Akerlof (1978), Mankiw and Weinzierl (2010), Weinzierl (2011), Best and Kleven (2013)
  - Income shifting: Piketty et al. (2014)
  - Multidimensional heterogeneity: Rothschild and Scheuer (2013), Scheuer (2014), Ooghe and Peichl (2015)
- **Elasticity of taxable income (ETI)**
  - Gruber and Saez (2002), Weber (2014), Doerrenberg et al. (2017); survey: (Saez et al. 2012)
- **Inverse optimal taxation to derive MSWW**
  - Bourguignon and Spadaro (2012), Lockwood and Weinzierl (2016), Jacobs et al. (2017)

Theory: Roadmap

- Derive jointly optimal tax schedules for different income sources
  - underlying framework in the spirit of Diamond (1998) & Saez (2001)
- Derive optimality condition for linear tax system
  - (i) *Mechanical*, (ii) *Welfare*, (iii) *Elasticity*, (iv) *Cross-Elasticity* Effect
- Our formula differs from standard optimal tax formula by a term capturing the fiscal externality from tax base i on tax base j

Differences to the standard model

1. **ETIs are type specific and we allow for cross-base responses**
   - ζ_{ii}: own-elasticity of income of type i wrt $(1-\tau_i)$
   - ζ_{ji}: cross-elasticity of income of type j wrt $(1-\tau_i)$
   - decomposition of ζ_{ii} in a real and cross-base response:
     - ★ β_{ji}: *share of the fiscal externality* on tax base j due to tax change in tax base $i \Longrightarrow \beta_{ji}\zeta_{ii} = \zeta_{ji}$

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2. **Average welfare weights are type specific**
   - Variation in the distributions of income sources induce differences in the valuation by the social planner
     $g_i = \int_{k\in K} z_i(k)S'(U(k))U'(k)dF(k)/(\lambda Z_i)$, with $Z_i = \int_{k\in K} z_i(k)dF(k)$

Optimal Linear Taxes

The optimality condition for the tax vector $\boldsymbol{\tau} = (\tau_1, \ldots, \tau_n)'$ *in a linear income tax system is given by:*

$$\begin{pmatrix} \mathbf{m_1} \\ \vdots \\ \mathbf{m_i} \\ \vdots \\ \mathbf{m_n} \end{pmatrix} \times \boldsymbol{\tau} = \begin{pmatrix} (1-g_1) \\ \vdots \\ (1-g_i) \\ \vdots \\ (1-g_n) \end{pmatrix}$$

where

$$\mathbf{m_i} = (-\beta_{1i}\zeta_{ii}, \ \ldots, \ -\beta_{i-1i}\zeta_{ii}, \ (1+\zeta_{ii}-g_i), \ -\beta_{i+1i}\cdot\zeta_{ii}, \ldots, -\beta_{ni}\cdot\zeta_{ii})$$

$$\beta_{ji} = -\frac{\partial z_j}{\partial(1-\tau_i)} \Big/ \frac{\partial z_i}{\partial(1-\tau_i)}$$

$$g_i = \int_{k\in K} z_i(k) S'(U(k)) U'(k) dF(k)/(\lambda Z_i), \ \text{with } Z_i = \int_{k\in K} z_i(k) dF(k)$$

Non-linear case

Summary of theory

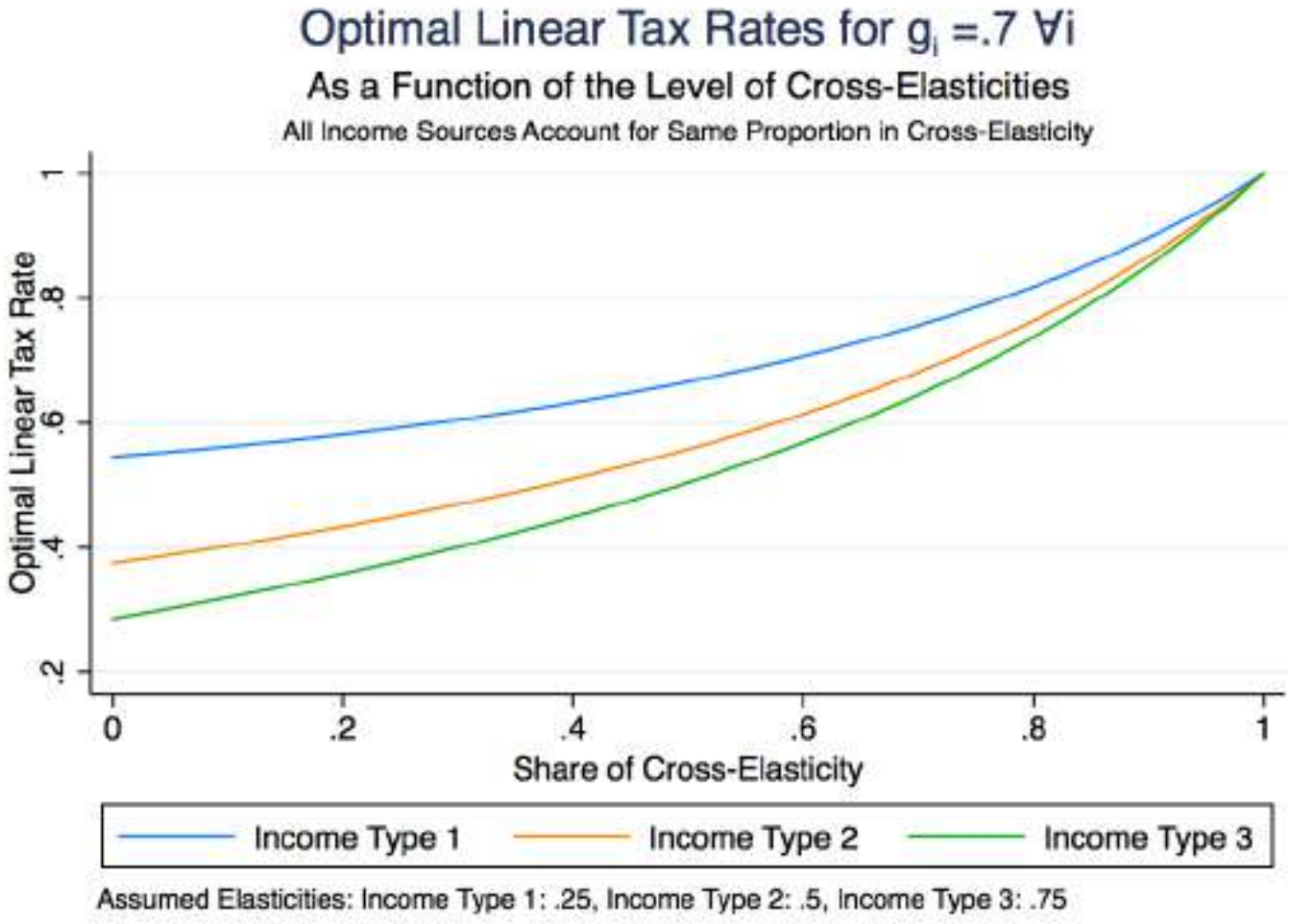
The standard linear model: (Saez 2001)

$$\tau_i = \frac{1 - \bar{g}_i}{1 - \bar{g}_i + \zeta_{ii}}$$

The modified linear model:

$$\tau_i = \frac{1 - \bar{g}_i - \sum_{i \neq j} \zeta_{ji} \frac{\bar{z}_j}{\bar{z}_i} \tau_j}{1 - \bar{g}_i + \zeta_{ii}}$$

Optimal Linear Income Tax Rates – Illustration



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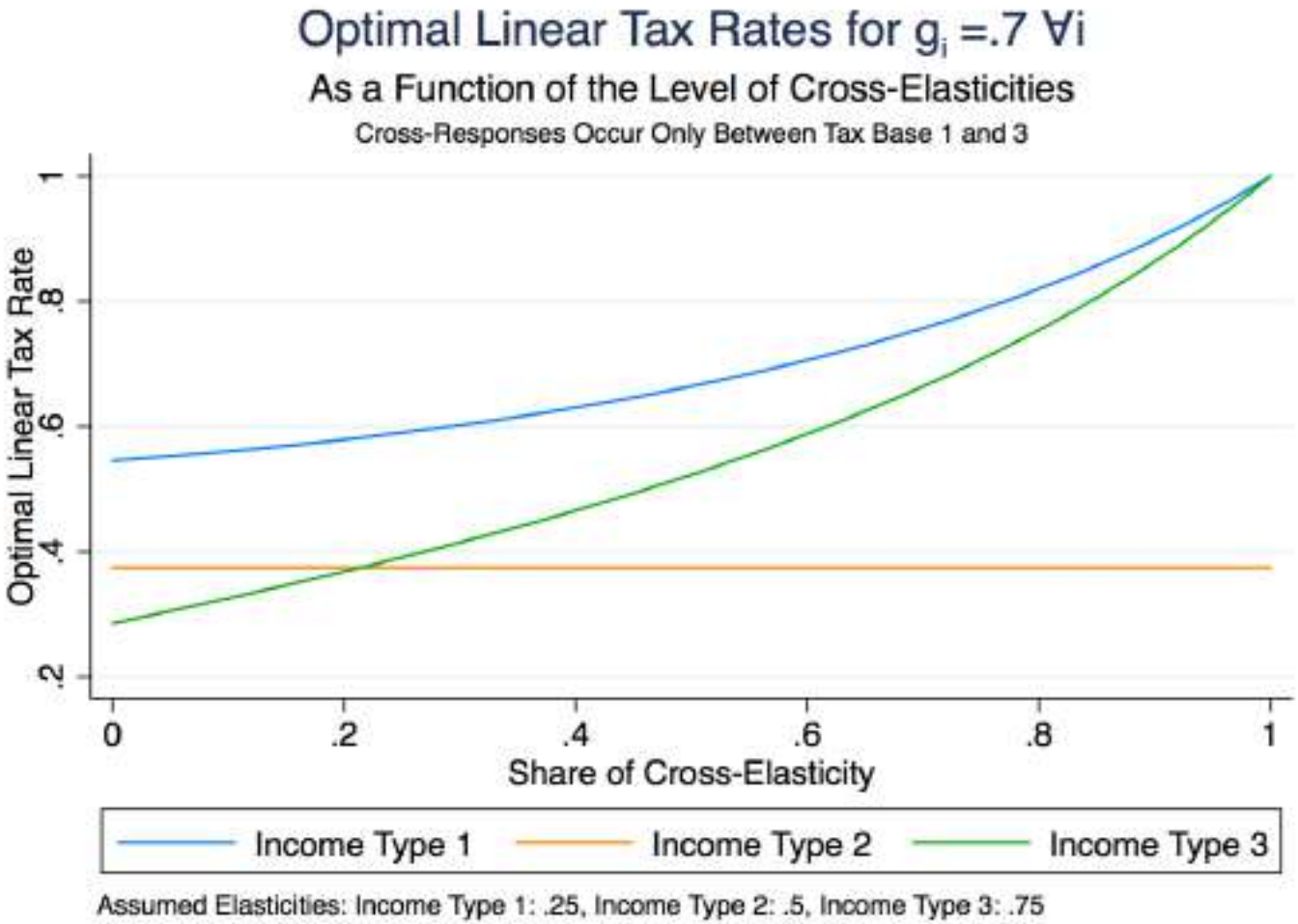

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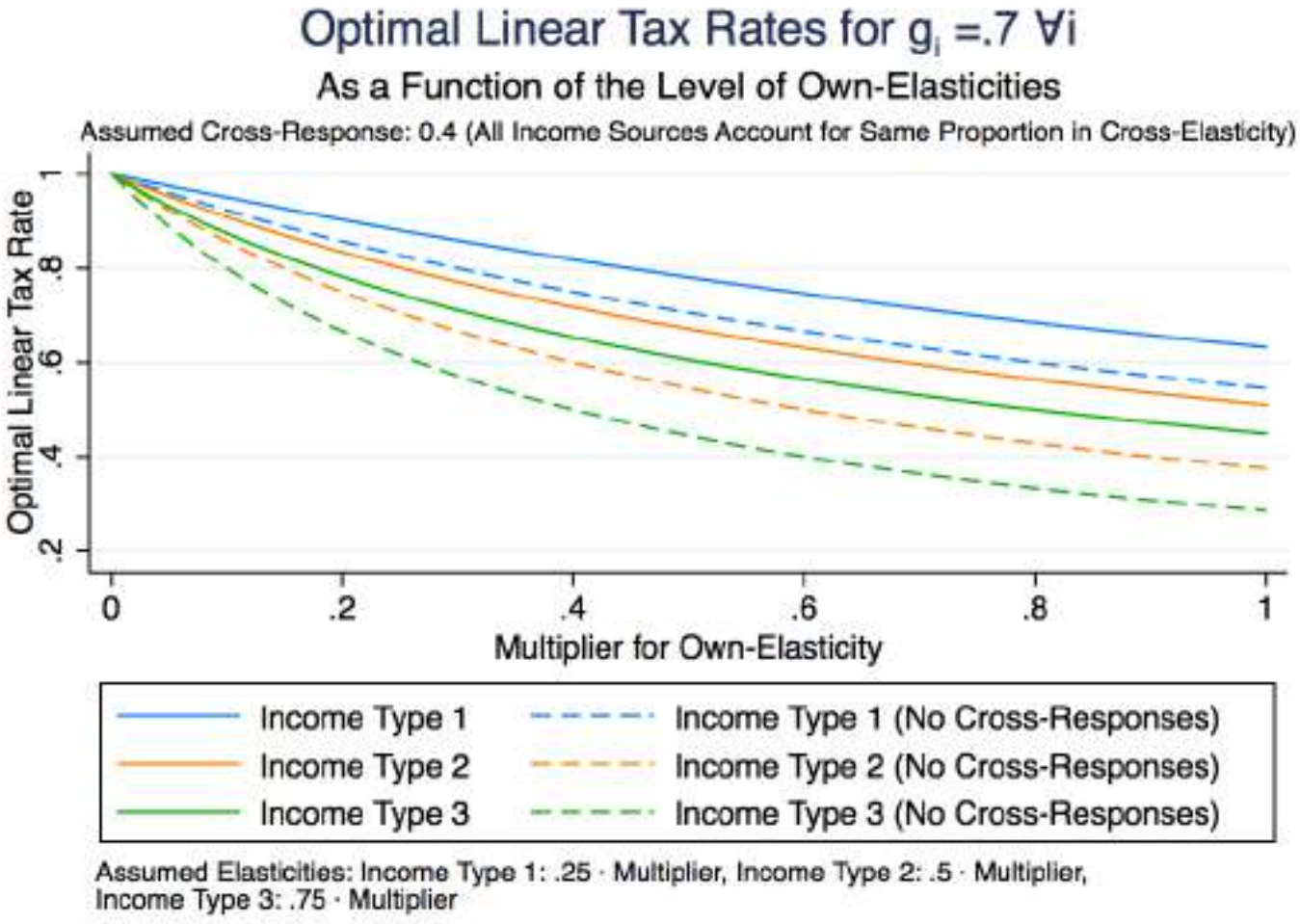

Empirics: Roadmap

- Estimate the model for Germany for the case of three tax bases
  - wage income; self-employment income (agriculture, forestry + business + entrepreneurial income); other income $\cong$ capital income (investment + rental + other income)

- **Implicit thought experiment:** Holding welfare considerations constant, what is the optimal schedular income tax system if Germany replaced its global non-linear tax schedule?

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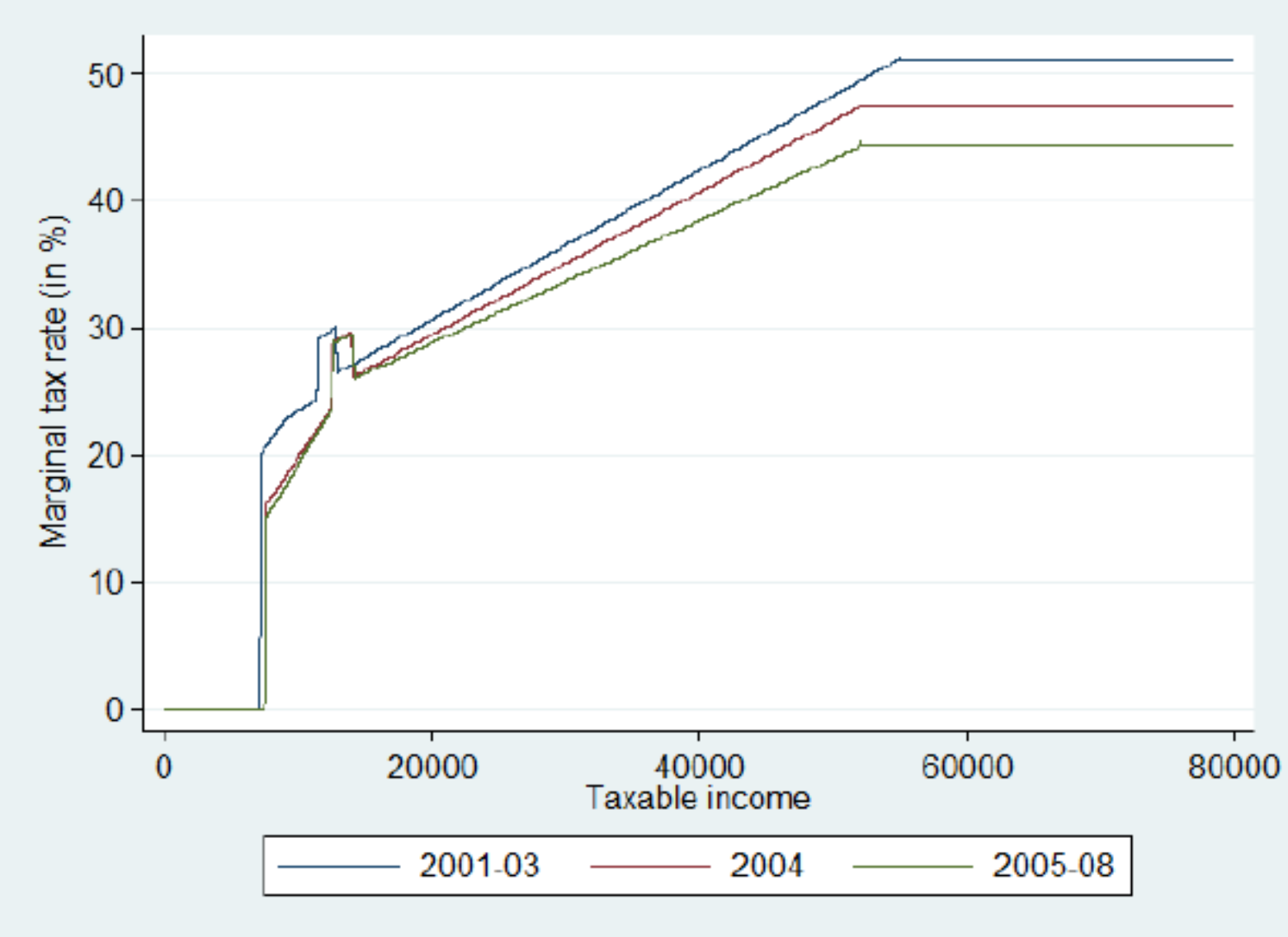
- **Implicit thought experiment:** Holding welfare considerations constant, what is the optimal schedular income tax system if Germany replaced its global non-linear tax schedule?

- Agenda:
  1. Estimate income source specific ETIs (Gruber and Saez 2002; Weber 2014)
  2. Estimate implicit welfare weights (by income source)
  3. Estimate optimal tax rates

Marginal tax rates and reforms

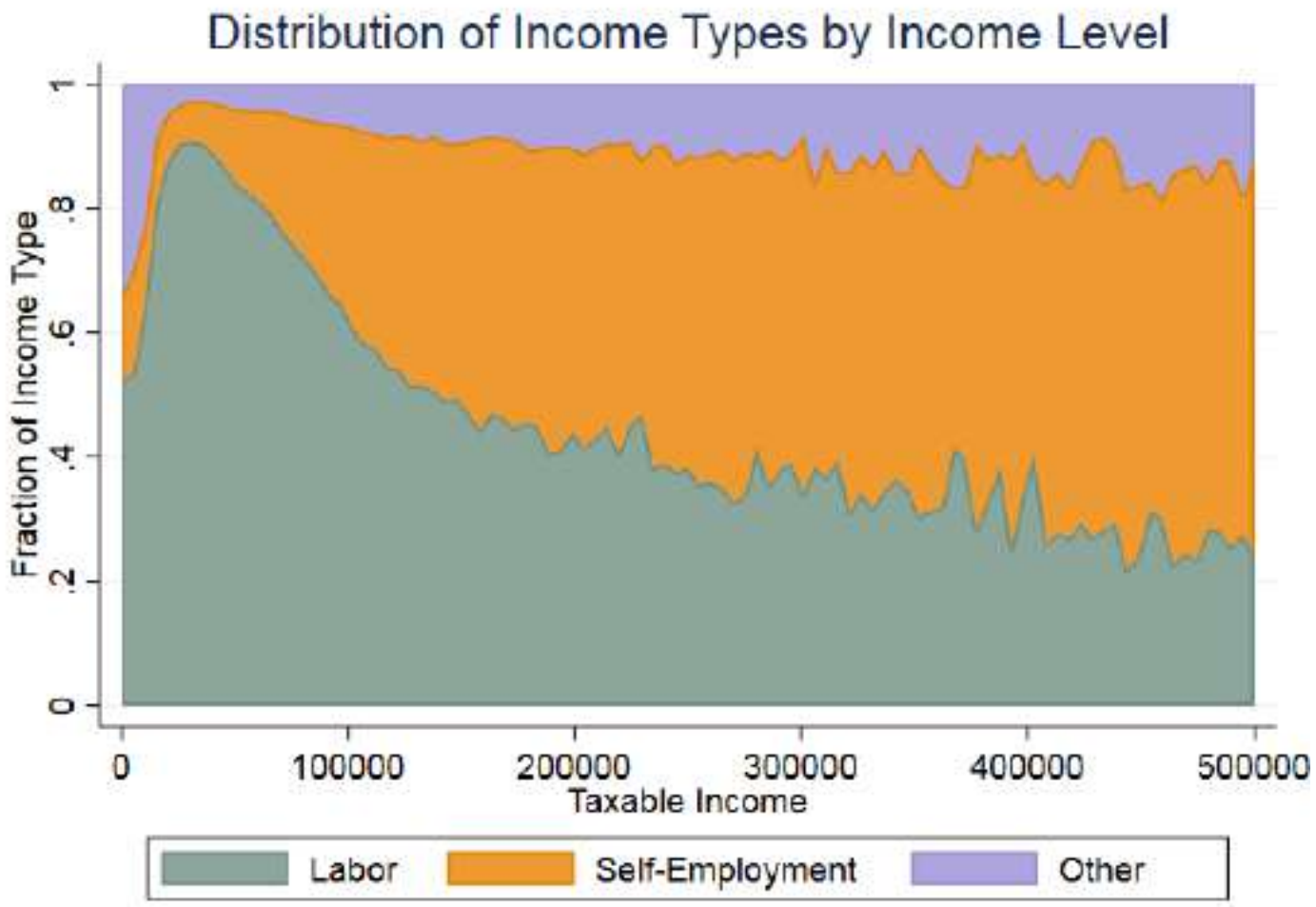


Data

German Taxpayer Panel:

- Universe of German taxpayers: about 28 million tax units per year
- Time span: 2001 - 2008, 5% sample
- Contains all information that are part of a tax return:
  incomes from all sources, deductions & some demographics
- Selection: working age singles with $TI > 10,000$

Distribution of income sources



Standard ETI panel model (Gruber and Saez 2002) of taxpayer i in year t:

$$\Delta \ln Y_{i,t} = \varepsilon_W \Delta \ln(1 - \tau_{i,t}) + f(GI_{i,t-k}) + \phi \mathbf{X}_{i,t} + \gamma_t + \eta_{i,t},$$

- Δ: difference between year t and $t - k$ with $k = 2$
- $Y_{i,t}$: taxable inc (TI), $(1 - \tau_{i,t})$: (marginal) net-of-tax rate, $f(GI_{i,t-k})$: controls for base-year gross income, $\mathbf{X}_{i,t}$: basic demographics, γ_t: year fixed effects
- Variation: reforms 2001-08 $\rightarrow$ Different taxpayers affected differently

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- Variation: reforms 2001-08 $\rightarrow$ Different taxpayers affected differently
- Usual endogeneity concerns:
  - Reverse causality: $\tau(TI)$
  - Heterogeneous income trends and mean reversion
- We use same specification as Doerrenberg et al. (2017):
  - Differences: wipe out time-invariant individual effects
  - Different types of base-year income splines (Kopczuk 2005)
  - IV for NTR: apply year t tax schedule to TI_{t-k-1} (Weber 2014)

ETI estimates

	Gruber-Saez	Weber
Overall	0.299***	0.347***
	(0.020)	(0.024)
	By income source	
Labor income	0.135***	0.128***
	(0.013)	(0.018)
Self-employment income	0.304***	0.434***
	(0.030)	(0.038)
Other Income	0.132*	0.223*
	(0.074)	(0.120)
No. obs.	1,241,029	

Estimation of welfare weights

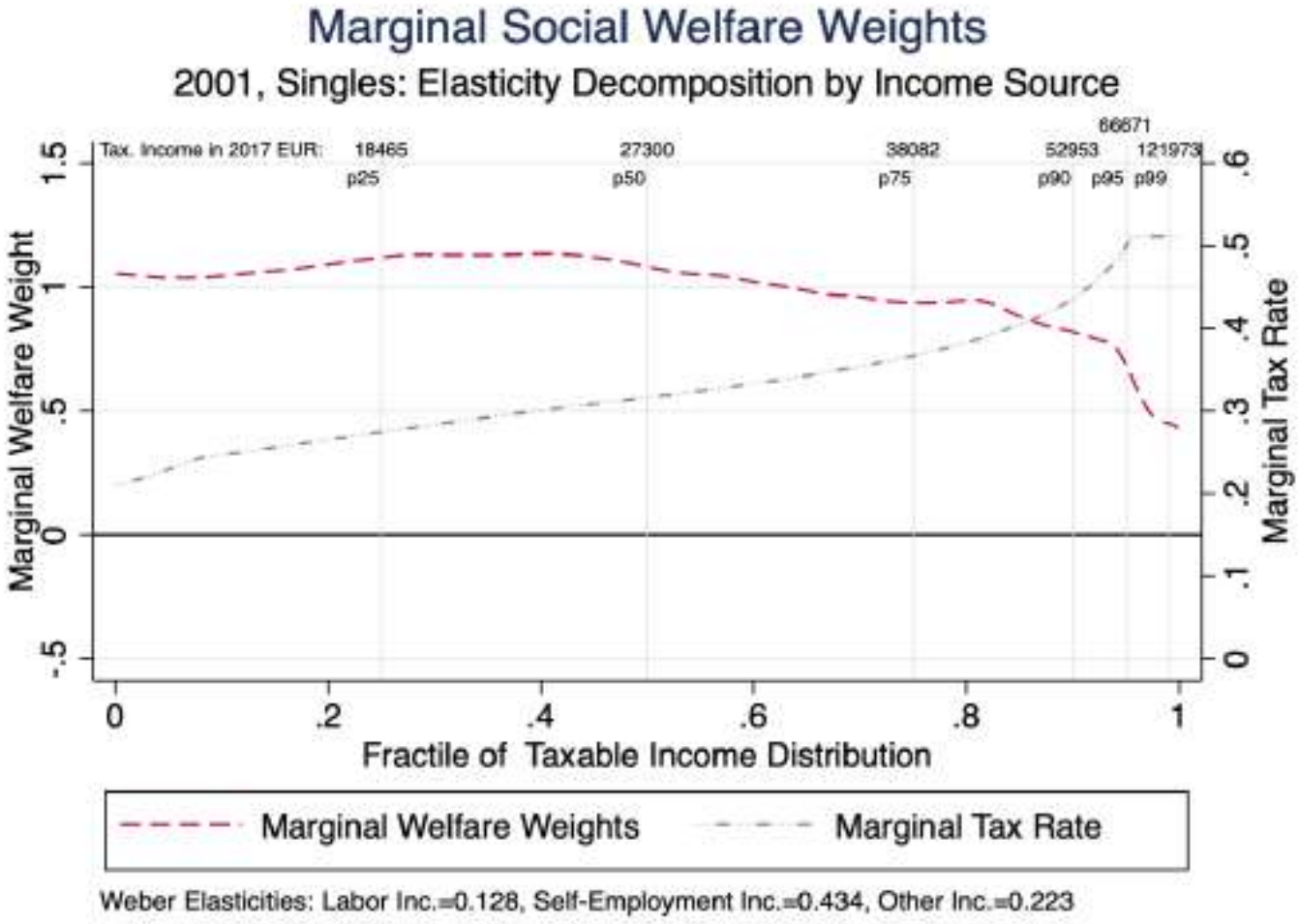
- Estimate implicit marginal social WW (Lockwood and Weinzierl 2016)
- Decompose ETI into income type specific elasticities (assuming constant elasticities for each type)
- This implicitly endogenizes the elasticity w.r.t. the amount of taxable income since shares of income types change

Formula for welfare weights

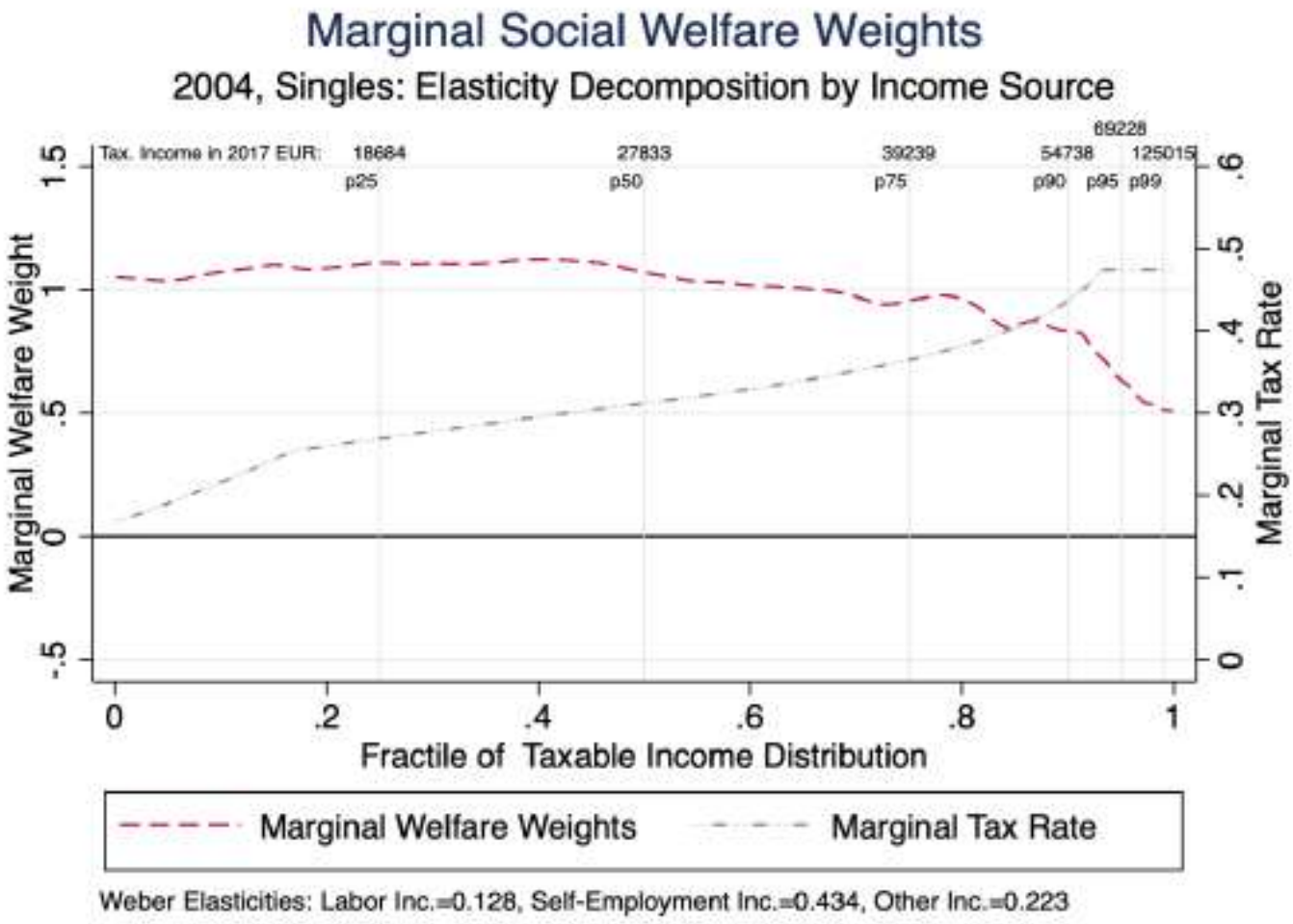
- Consider social planner restricted to levy same tax from every taxpayer with same income
- The social planner will take into account the differential in the elasticities across different types of income
- The implicit welfare weights are given by:

$$g(z) = -\frac{1}{h(z)}\frac{d}{dz}\left(1-H(z)-\sum_{i=1}^{n}\left(\int_0^z h_i(z_i'|z)z_i'\zeta_{ii}dz_i'\right)h(z)\frac{\tau(z)}{1-\tau(z)}\right)$$

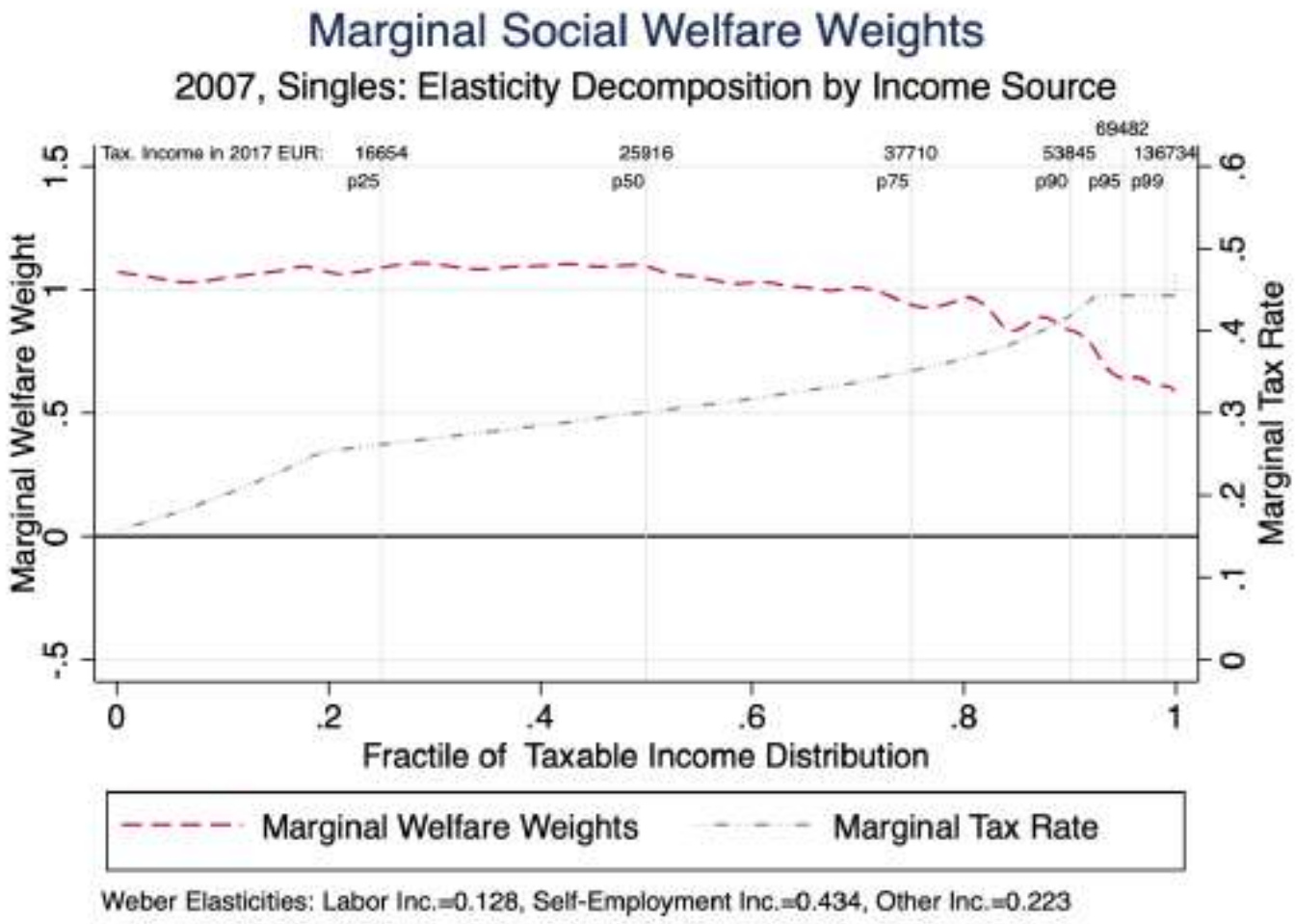
Social Marginal Welfare Weights



Social Marginal Welfare Weights



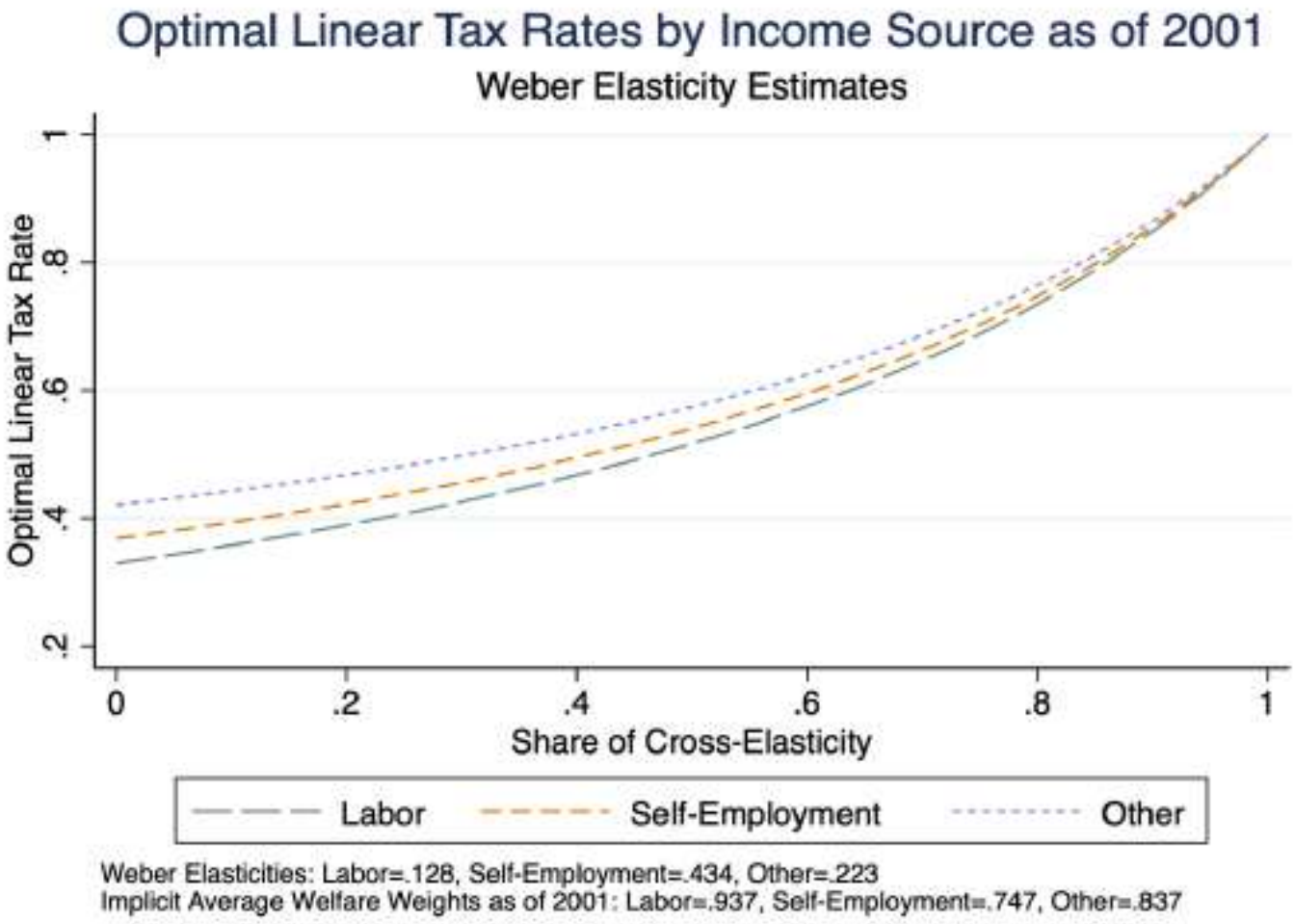
Social Marginal Welfare Weights



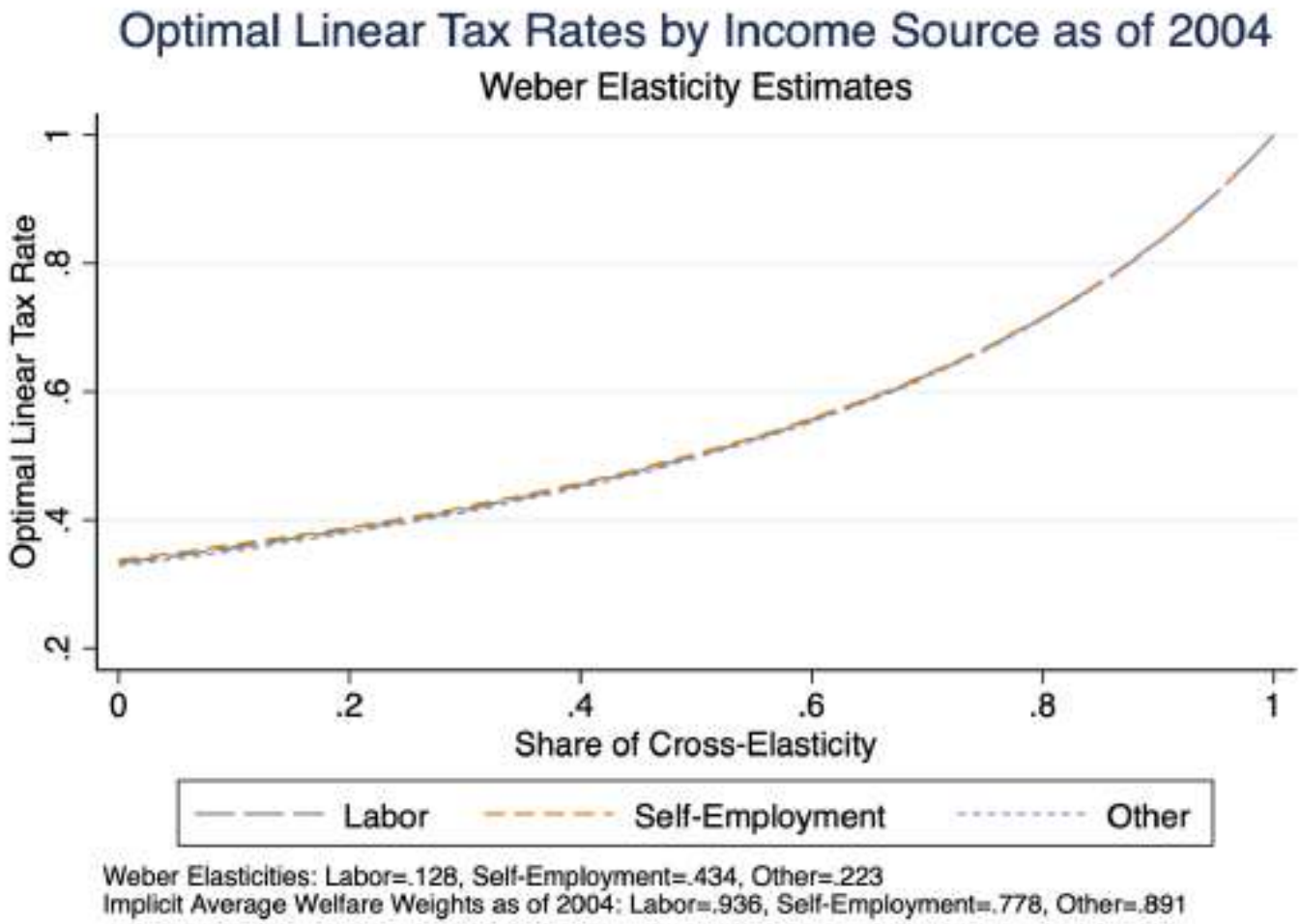
Income-Type Specific Average Welfare Weights

	Using Weber (2014) Elasticities			
Year	Aggregate	Labor	Self-Employment	Other Income
2001	0.901	0.936	0.747	0.837
2004	0.907	0.936	0.778	0.891
2007	0.908	0.935	0.801	0.939

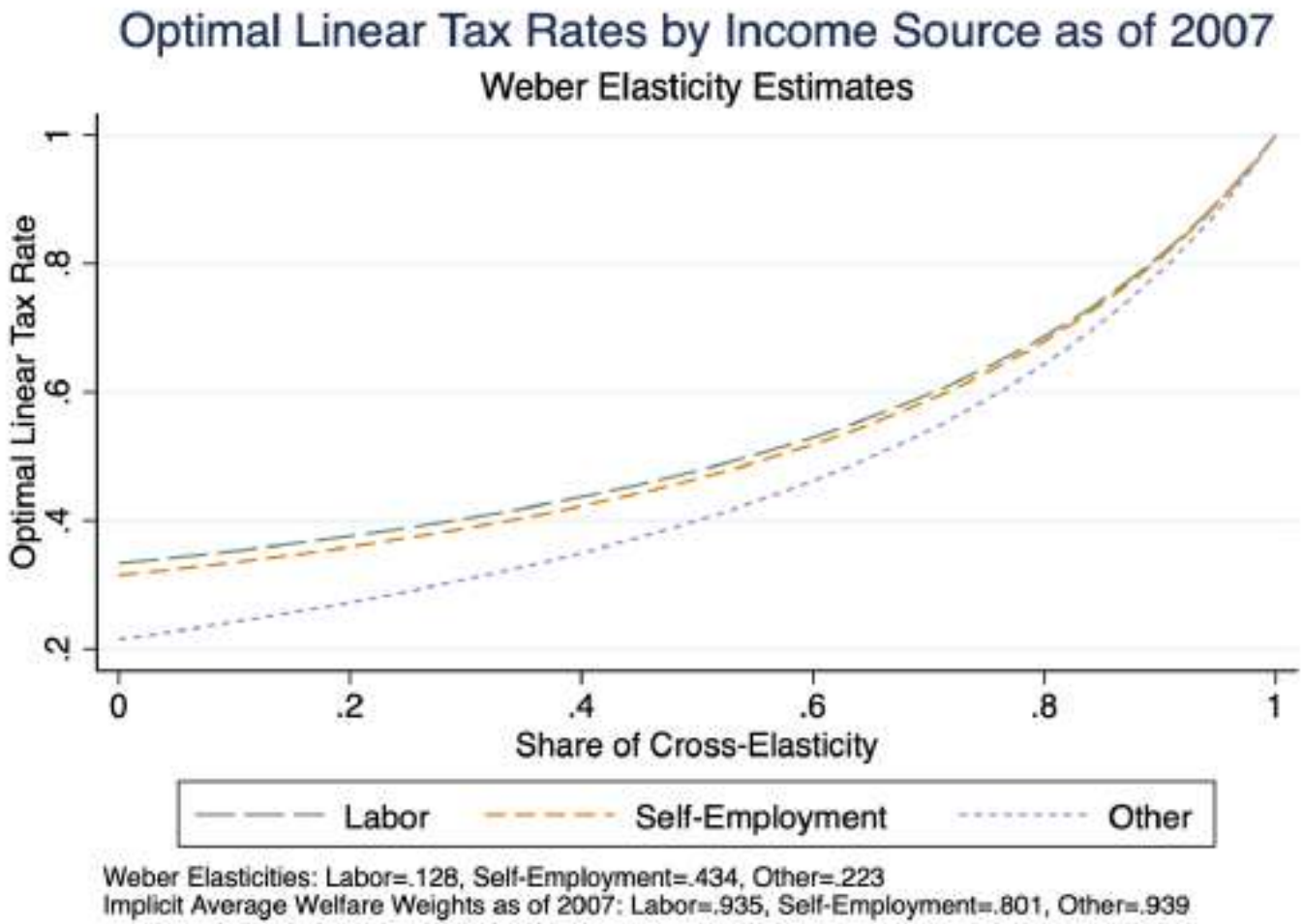
Optimal Linear Income Tax Rates – Weber elasticities



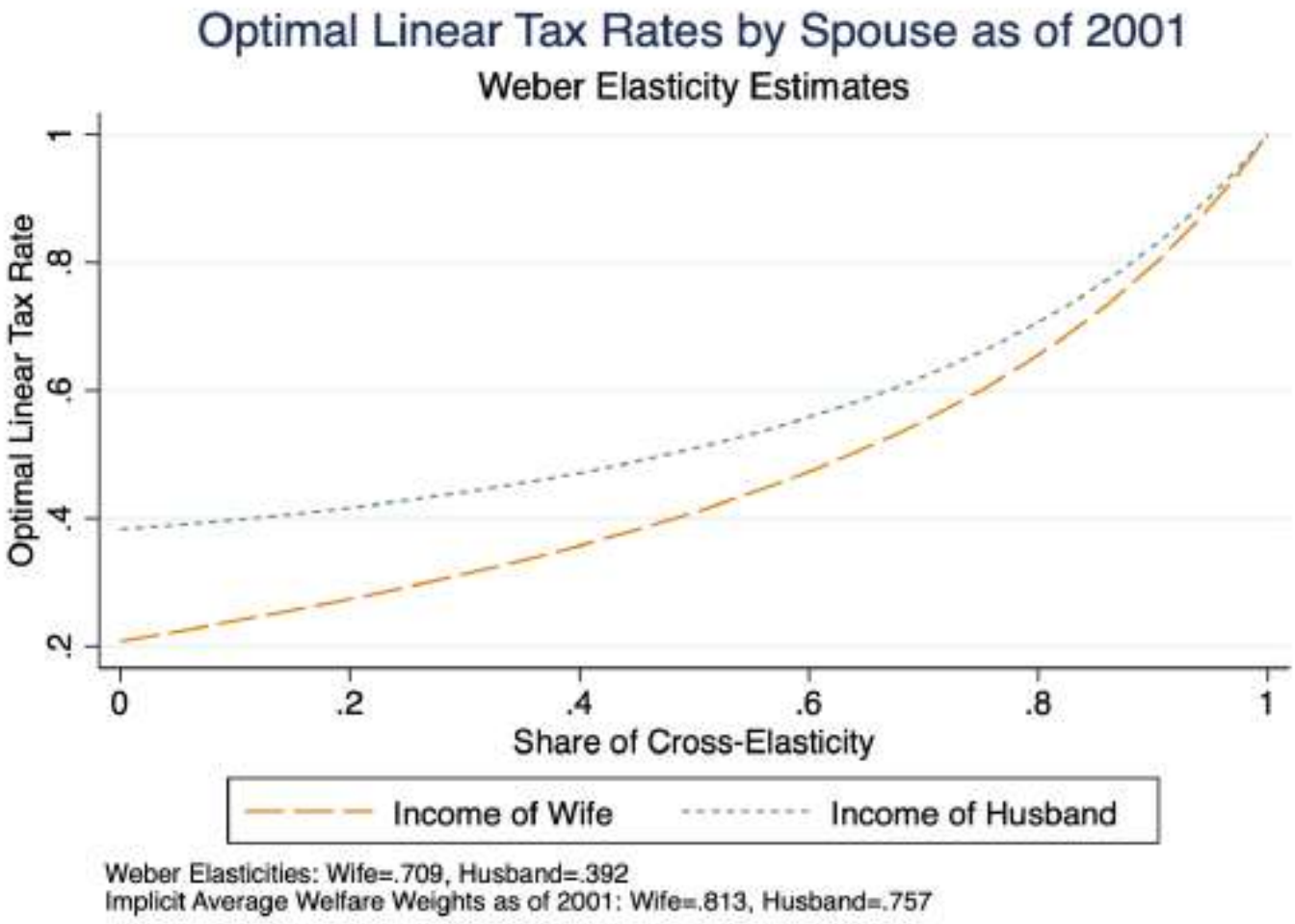
Optimal Linear Income Tax Rates – Weber elasticities



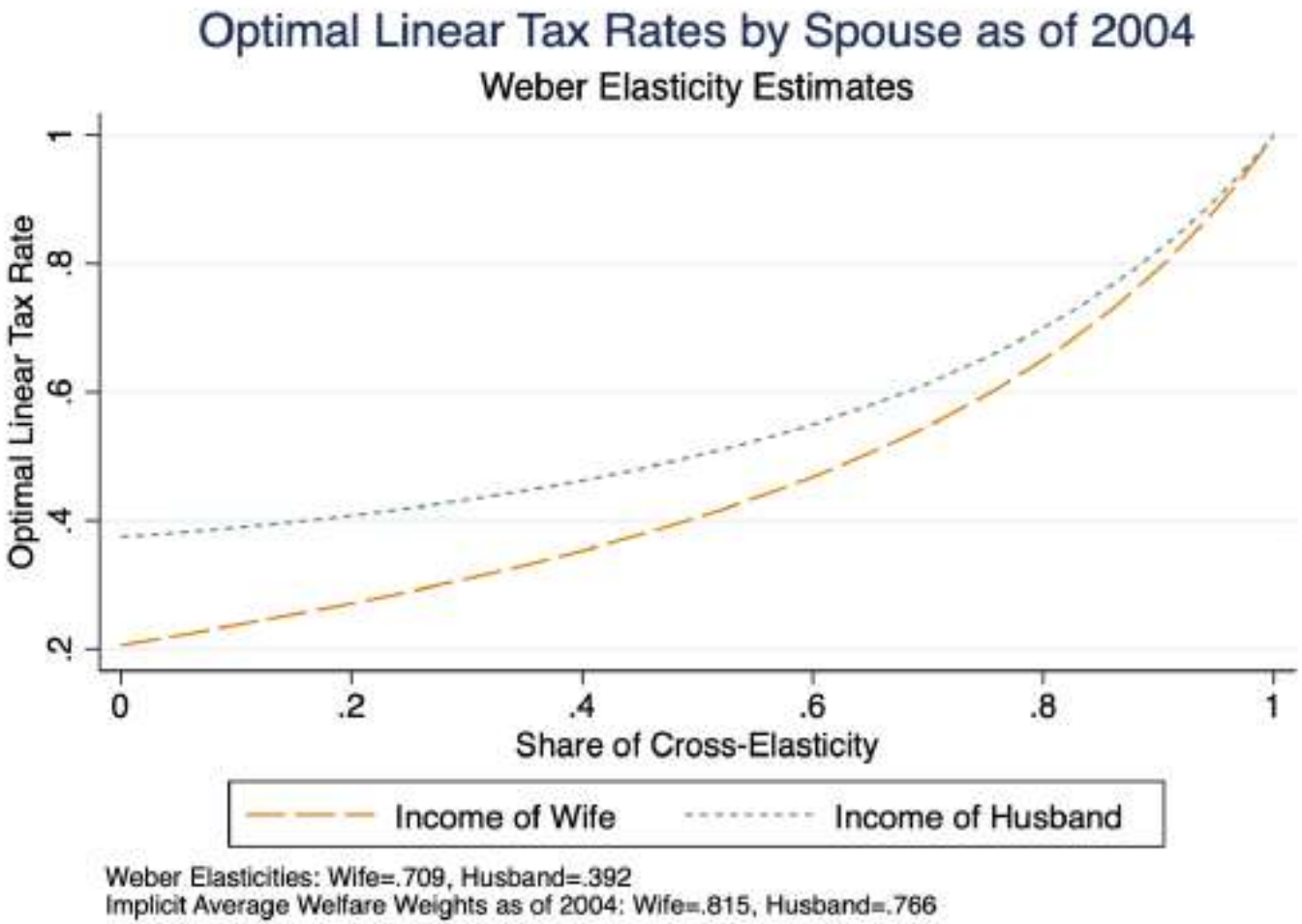
Optimal Linear Income Tax Rates – Weber elasticities



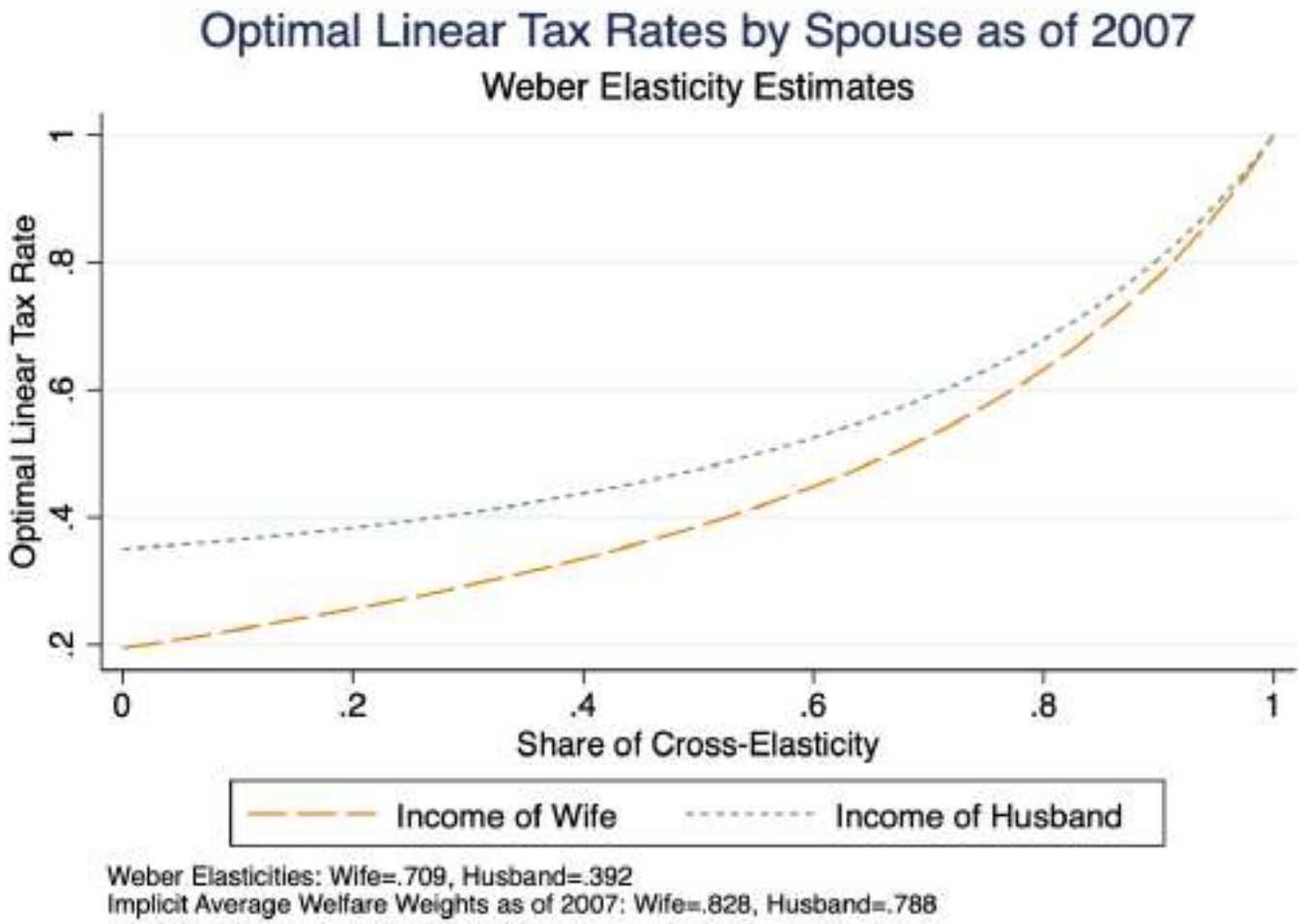
Second application: Taxation of Married Couples



Second application: Taxation of Married Couples



Second application: Taxation of Married Couples



Conclusion

- Model of jointly optimal income taxes for different income sources accounting for fiscal externalities
- Estimate income type-specific ETI and implied social marginal welfare weights for Germany
- Estimate optimal linear tax rates accounting for differences in WW and ETI across income types
- Incorporating fiscal externalities leads to significant increases in optimal linear tax rates

The End

Thank you!

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