Progressive Taxation and Redistribution

Democracy and Inequality in the Americas
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Motivation

- As Inequality and Taxation return to public debate, two "venerable questions" on their way back:
  1. Is "taxing the rich" the most effective way to pursue redistribution curb down inequality? Do arguments on wealth (Piketty, Zucman, Scheve and Stasavage) translate well into income?
  2. Under what conditions are sustainable coalitions pro R feasible?
- Need to revisit the connection between Redistribution and Tax Progressivity.
- Theoretically, the field is a bit of a conceptual *mess*:
  1. Inverse relationship between redistribution and progressivity of tax structures (Kato 2003, Ganghof 2006, Lindert 2004, B& R 2007, Prasad and Deng 2009, Martin 2015, Piketty et al. 2014)
  2. Paradox of Redistribution (Korpi and Palme 1999, B & R 2016)
  3. All the action regarding redistribution is on the spending side, taxes being irrelevant (e.g., Kenworhty)
  4. And then there is common sense...
- Empirically, a festival of partial approaches overlooking two issues:
  1. Incidence (and its implications in terms of both theory and measurement)
  2. Measurement: progressivity in tax tools (income taxes) vs. progressivity in tax structures

Progressivity and Redistribution: This Paper

- Theoretical Contribution:
  1. Conceptually distinguishing progressivity and overall redistribution (*pace* Kakwani)
  2. Redistribution = Effort×Design (progressivity)
  3. What is the relationship between P & R when we use a framework that is politically informed?:
  4. Three aspects are relevant here:
     (a) Income bias in political influence
     (b) How political institutions moderate this income bias
     (c) Income bias in behavioral responses (labor market decisions/ extensive margin)

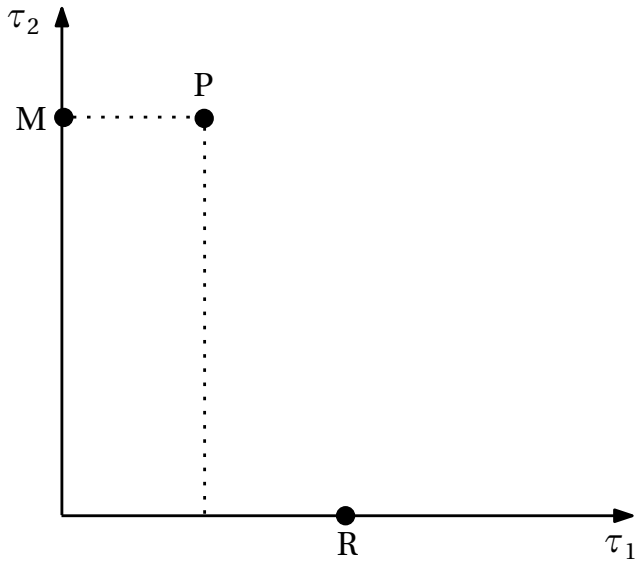
- Empirical Contributions
  1. Methodological: Quantitative measurement of the structure of policy and their effects (not allowing in the role of behavioral responses)
  2. Decomposing the relative importance of the different components of redistribution: size, design of benefits, design of taxes
  3. Accounting for unobservables; within-country design
  4. Suggests new lines of inquiry and analysis: Explicit analysis of trade-offs

Model Set-Up

1. Three types: rich, middle class, and poor, $i \in I = \{R, M, P\}$ with $w_R > w_M > w_P$. Each group has density p_i with $\sum_{i \in I} p_i = 1$, $p_R, p_P < \frac{1}{2}$.
2. Work opportunity cost: $\theta \in \Theta = \mathbf{R}_+$, cdf $G(\theta)$, pdf $g(\theta)$.
   (a) $\Rightarrow$ Labor supply on the extensive margin: $\bar{\theta} = (1 - \tau_i) w_i$, $G(\bar{\theta})$.
   (b) $\Rightarrow$ Elasticity: $\eta(w_i) \equiv \frac{\partial G}{\partial \tau} \frac{\tau}{G}$ and $\eta_w \equiv \frac{\partial \eta}{\partial w} \leq 0$.
3. Tax function: $\tau = (\tau_1, \tau_2) \in T$, with $T : [0,1] \times [0,1]$. R pays τ_2; M and P pay τ_1. Progressive tax: $\tau_2 - \tau_1 \geq 0$.
4. Utility: $V_i = (1 - \tau_i) w_i + b$, where b is lump-sum transfer solved via balanced budget constraint.
5. Redistribution: Change in the area under the Lorenz curve as a result of taxes and transfers. Empirically: difference in Gini coefficients of pre- & post-fisc income distributions
6. Simplified Political environment:
   (a) Probabilistic framework: following Coughlin and Nitzan (1981), two office seeking parties.
   (b) Introducing ideology and political institutions—majoritarian vs PR— rely on Austen-Smith (2000).

I: Preferences over Tax Schedules

- Let $\hat{\tau}_i \in T$ be each individual's group-specific ideal tax schedule.
- Then $\hat{\tau}_R = (\hat{\tau}_1, 0)$, $\hat{\tau}_1 \geq 0$, $\hat{\tau}_M = (0, \hat{\tau}_2)$, $\hat{\tau}_2 \geq 0$, and $\hat{\tau}_P = (\hat{\tau}_1, \hat{\tau}_2)$, $\hat{\tau}_1, \hat{\tau}_2 \geq 0$.
- Progressivity of an individual's **ideal tax schedule is nonmonotonic** (increasing and then decreasing) in income. In addition, the level of redistribution implied by an individual's ideal tax schedule is decreasing in income.



II: The Political Process under Income Biased Representation

- Two office-motivated parties, A and B. In this setting, π_i^A:

$$\pi_i^A = V_i(\tau_A)/(V_i(\tau_A) + V_i(\tau_B))$$

- Voter from group i more likely to vote for party A if party A's platform gives greater economic utility than party B. All voters vote, so $\pi_i^A + \pi_i^B = 1$. Parties care only about winning, thus choose platforms, τ_A and τ_B, to maximize:

$$\pi^A = \sum_{i \in I} \pi_i^A.$$

- As Coughlin & Nitzan demonstrate, this objective is equivalent to maximizing a Nash social welfare function:

$$N(\tau_A) = \sum_{i \in I} p_i \ln V_i(\tau_A)$$

- By assumption: Workers = voters. Unemployed have no weight in the political process

- Equilibrium convergence across platforms

Proposition 1. ***(Progressive Taxation under Democracy)*** *A symmetric equilibrium tax schedule, $\tau^* = \tau_A^* = \tau_B^*$, exists and is unique. Progressive tax schedules emerge in equilibrium if and only if there is income inequality.*

Inequality, Redistribution, and Progressivity under Income Biased Representation

- Consider a mean-preserving spread in the income distribution from X to Y such that $p_{X,P} < p_{Y,P}$, $p_{X,M} > p_{Y,M}$, and $p_{X,R} < p_{Y,R}$.
- Then progressivity and redistribution are higher under (more equal) distribution X than under distribution Y.
- The mechanisms behind this result are twofold:
  1. As the political influence of the rich (middle classes) increases, the level of τ_2 decreases (increases) and the level of τ_1 increases (decreases)
  2. A higher reliance on τ_1 boosts the labor supply reduction by lower income citizens and further reduce the income of M, reducing the pool of revenue available for redistribution
- **H1**: *On the marginal effect of tax progressivity on redistribution:* For any given level of effort and the progressivity of benefits, an increase in the progressivity of taxes does have a significant and positive effect on redistribution

III: Political Institutions,Progressivity, and Redistribution

- Suppose that under majoritarian representation, tax policy is coincident with middle-class preferences: $\tau^* = \hat{\tau}_M$. Consider now a PR setting (Austen-Smith 2000)
- Then redistribution is higher and progressivity is lower under proportional representation than under majoritarian representation.
- Plausible reasons:
  1. the poor impose their preferences and to maximize revenue reduce the gap in tax burden between R and M
  2. the poor and M make a cross-class coalition in which excessively progressive schemes must give in to minimize behavioral responses and jeopardize the agreement.
  3. The idea is to maximize revenue and facilitate redistribution without concentrating the costs excessively.
- **H2**: *On the relationship between redistribution and tax designs:*
  1. There is a negative association between the progressivity of the tax system and the level of (flat rate) taxation
  2. *Corollary*: as the political influence of the poor increases (PR vs SMD), the ratio of progressivity to flat-rate level (proportional) taxation decreases.

Recapitulation: Results and Empirical Implications

- **H1** *On the marginal effect of tax progressivity on redistribution* For any given level of effort and the progressivity of benefits, a change in the progressivity of taxes does have a significant and positive effect on redistribution
- **H2** *On the relationship between redistribution and tax designs*
  1. There is a negative association between the progressivity of the tax system and the level of (flat rate) taxation
  2. *Corollary*: as the political influence of the poor increases (PR vs SMD), the ratio of progressivity to flat-rate level (proportional) taxation decreases.

Challenges

- Decompose the different elements of progressivity and redistribution empirically
- Reproduce at the micro-level the tax and benefit systems as they are captured by the legislation
- Capture the intended policy effect, isolating it from the behavioral responses that contaminate observational data
- Approach: Comparative Microsimulation Analysis

Empirical Strategy and Measurement

- Policy simulation
  - Calculation of income effects of tax and benefit policies via OECD TAXBEN model
  - For 4 types of households (single, married w/ no, 1, 2 kids)
  - At each percentile of income distribution, 50–200% of APW
  - Data set with ca. 250,000 cases

- Tax function approach to measure tax progressivity
  - Follows clearly from public finance (Feldstein 1969, Persson 1983, Benabou 2002)
  - Tax function fit to our income data

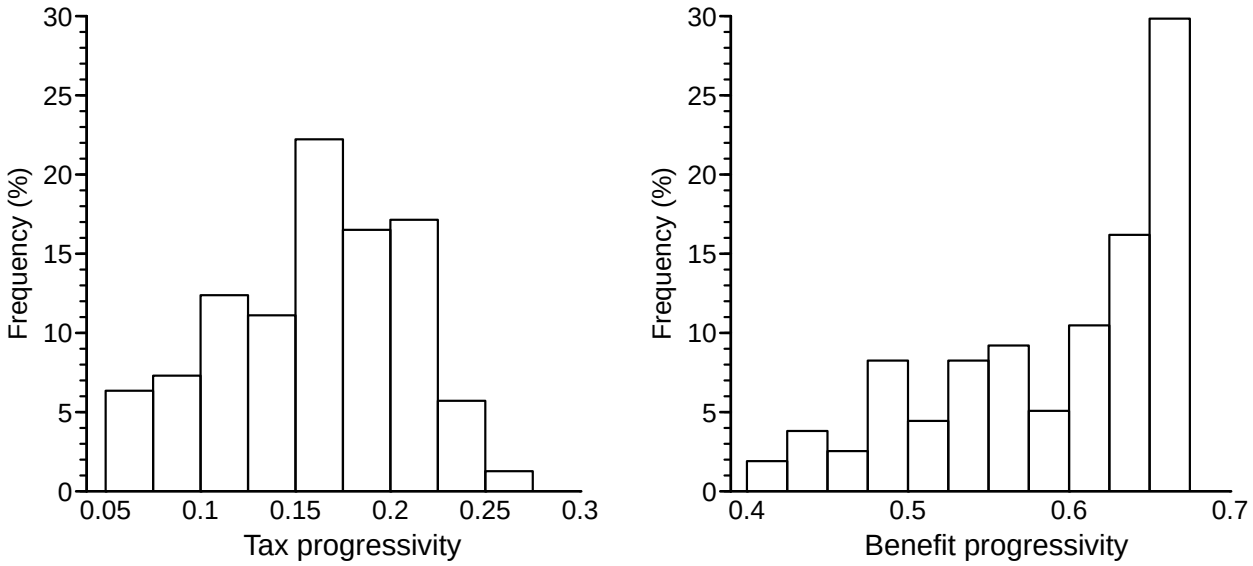
$$T(w_i) = w_i - \lambda w_i^{1-\tau}$$

  - Mapping of post to pre tax income: $x = \lambda w^{(1-\tau)}$
  - τ is direct measure of progressivity
  - $1 - \lambda$ depicts the level of flat rate taxation in the country's tax function

- Benefit progressivity via Kakwani index
- Redistribution is absolute reduction in (pre-post) Gini of equivalized HH income

Tax and Benefit progressivity

- Substantial cross-national variation



- But also *within*-country variation

	Within variance share
Tax progressivity	0.26
	[0.20, 0.32]
Benefit progressivity	0.13
	[0.10, 0.17]

Note: Entries are $\psi_e/(\psi_e + \psi_u)$ from mixed model variance decomposition

Statistical specifications

- 203 country-years for 21 OECD countries, 2001–2015
- Unbalanced Panel
- Median years per country: 11
- "Within country" design strategy
  - Two-way (country and year) fixed effects
  - Within specification

$$y_{it} = \alpha\tau_{it} + x_{it}'\beta + \phi_i + \zeta_t + \epsilon_{it}, \qquad i = 1,\ldots,N,\ t = 1,\ldots,T_i.$$

  - Dynamic panel models (via IV GMM)

$$y_{it} = \rho y_{i,t-1} + \alpha\tau_{it} + x_{it}'\beta + \phi_i + \zeta_t + \epsilon_{it}, \qquad t = 2,\ldots,T_i.$$

  - CRVE (Clustered Robust Standard Errors)

Parameter estimates (H1)

	(1)	(2)	(3)	(4)	(5)	(6)
Spending levels	0.844	0.842	0.989	0.501	0.476	0.343
	(0.119)	(0.120)	(0.117)	(0.070)	(0.089)	(0.102)
Benefit progressivity		−0.036	−0.092	−0.071	−0.131	−0.054
		(0.231)	(0.196)	(0.059)	(0.081)	(0.093)
Tax progressivity			0.439	0.284	0.243	0.229
			(0.098)	(0.072)	(0.091)	(0.089)
ρ				0.607	0.534‡	0.583‡
Two-way fixed effects	✓	✓	✓	✓	✓	✓
Δ economic vars.						✓
Estimator	FE	FE	FE	FE AR(1)	GMM	GMM
R-squared†	0.31	0.32	0.44	0.53	0.42	0.54
N	203	203	203	182	141	141

Note: Unbalanced panel of 21 OECD countries, 2001–2015. All inputs normalized to mean zero and unit standard deviation. Cluster-robust standard errors.

Specifications: (1)-(3) Two-way fixed effects models (country and year). Average T=10.7. (4) AR(1) model with fixed effects (Baltagi and Wu 1999). (5) LDV model with fixed effects (Arellano and Bond 1991; Arellano 2003), GMM IV estimates; estimated on differenced system, using lagged LDV and differenced covariates as instruments: AR test of residuals $p = 0.652$. Sargan overidentifying restrictions test: $p = 0.162$ Specification (6) is (5) with added economic variables (first differences in inflation, real GDP growth, and unemployment rate). AR test $p = 0.157$, Sargan test $p = 0.367$. All models include the share of the 65+ population.

† Refers to "within-panel" R-squared (calculated using doubly demeaned data)

‡ Coefficient on lagged dependent variable.

Progressivity and expected value of redistribution

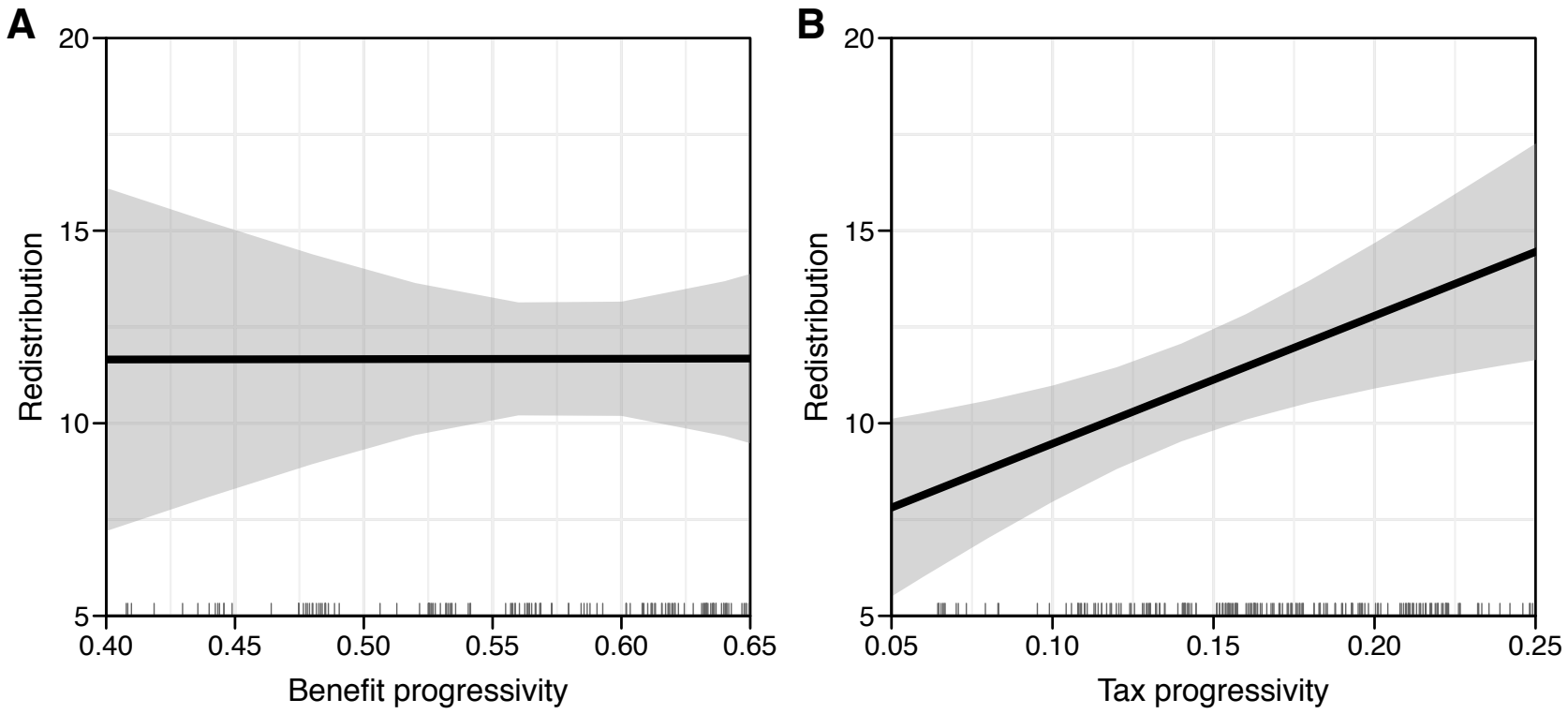


FIGURE I
The structure of taxes and transfers and redistribution

Expected value (with 95% confidence intervals) of redistribution at levels of tax progressivity and benefit progressivity. Based on two-way fixed effects model fitted to panel of 21 OECD countries, 2001-2015.

Specification issues

Correlated shocks, endogenous covariates

- Allow common factor(s) F_t with heterogenous impact
- Interactive fixed effects

$$y_{it} = \alpha\tau_{it} + x'_{it}\beta + \xi'_i F_t + \epsilon_{it}.$$

- Endogenous covariates (arising from dynamics in unobservables)

$$x_{it} = \mu_i + \theta_t + \sum_{k=1}^{r} a_k \xi_{ik} + \sum_{k=1}^{r} b_k F_{kt} + \sum_{k=1}^{r} c_k \xi_{ik} F_{kt} + \pi'_i G_t + \eta_{it}$$

Heterogeneity

- Heterogenous α coefficients
- Allow for full heterogeneity in controls and unit-specific time trends
- Pooled Mean Group Estimator (for $T_i > 5$)

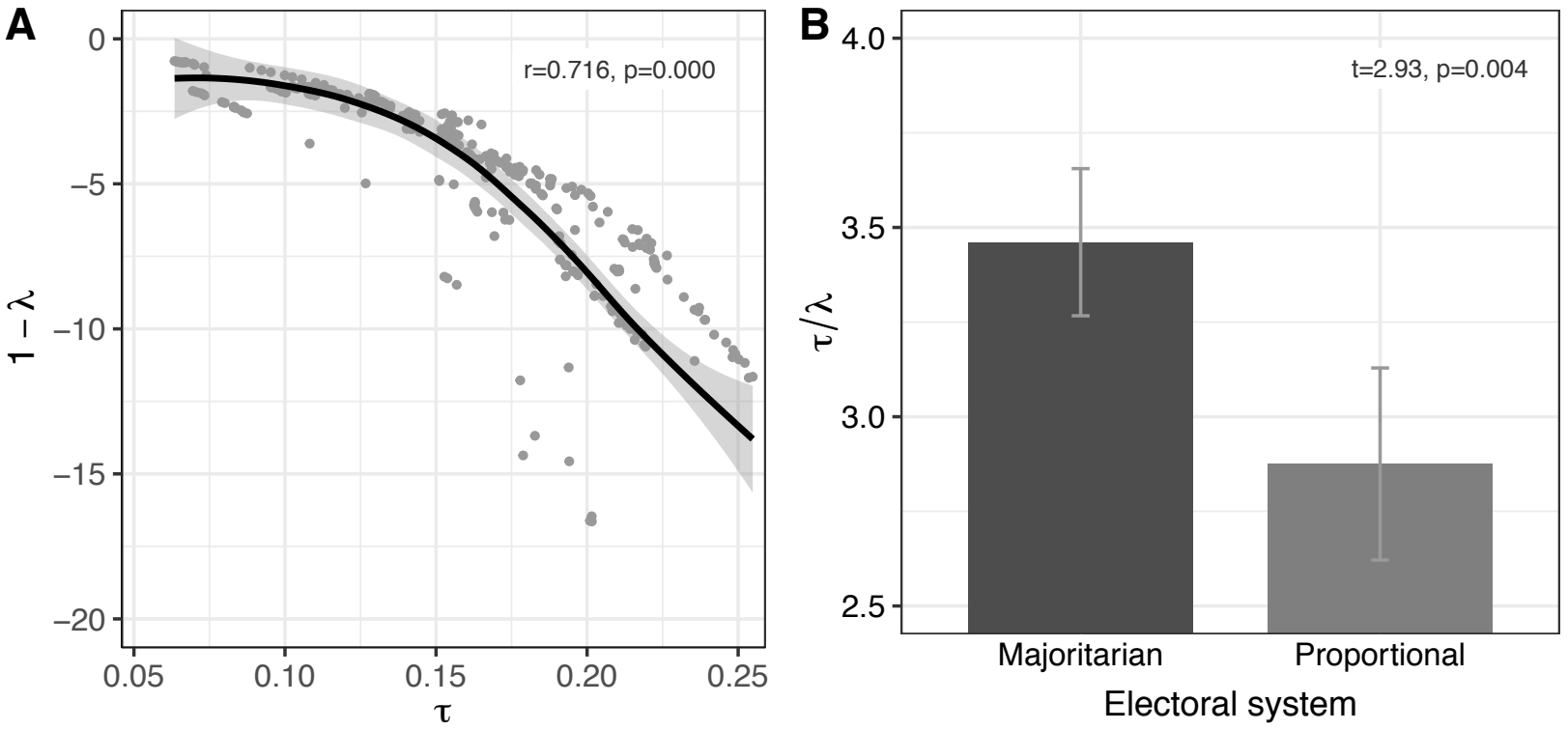
Specification tests

	Tax progressivity
(1) Interactive fixed effects estimator	
One common factor (r=1)	0.411 (0.084)
Two common factors (r=2)	0.438 (0.114)
(2) Heterogeneous panel estimator (MG)	0.613 (0.293)
(3) Bayesian TSCS model with two-way RE	0.420 (0.068)
(4) Balanced panel (multiple imputation)	0.397 (0.133)
(5) Percentile-t wild bootstrap imposing null	p=0.018

Specifications: (1) Interactive fixed effects estimator with 1 and 2 common factors (Bai 2009). (2) Allows for heterogeneous regressor slopes and time trends via Pooled Mean Group estimator (Pesaran and Smith 1995). (3) Bayesian hierarchical model with country and year random effects, regressor RE dependence via Mundlak device. Based on 20,000 MCMC samples. (4) Balanced panel, N=313. Regression imputation using country-specific time trend (M=100). MI corrected standard robust errors. (5) Country and time cluster SEs. First entry uses analytic cluster-robust variance estimator. Second entry is test of significance using 1000 percentile-t wild bootstrap samples imposing the null (Cameron, Gelbach, and Miller 2008).

Exploring further implications (H2)

- (Negative) relationship between progressivity (τ) and flat-rate tax parameter ($1-\lambda$)
- τ/λ ratio in majoritarian and proportional electoral systems



Discussion

- Redistribution and Progressivity: A relationship driven by political influence

- Two Faces of Progressivity

- Next Steps:

  1. Need to explore conditional relationships suggested by the argument
  2. Unexplored Comparative Statics- Endogenous Progressivity as a function of Inequality and Representation
  3. Change the focus: general patterns vs unpacking groups and tools

Summary of estimated tax function parameters

Country	τ [×100]	λ
Australia	17.73	5.51
Austria	17.38	5.53
Belgium	21.96	8.79
Canada	19.60	7.52
Denmark	21.23	10.78
Finland	14.82	3.61
France	6.71	1.85
Germany	15.12	4.53
Greece	19.83	7.15
Iceland	19.88	19.97
Ireland	17.99	6.00
Japan	7.98	3.22
Netherlands	24.45	11.49
New Zealand	10.51	2.48
Norway	16.40	6.72
Portugal	12.49	3.25
Spain	13.96	3.84
Sweden	19.76	9.07
Switzerland	13.03	4.85
United Kingdom	13.76	3.49
United States	10.88	2.89
Pooled mean	15.97	6.31
Pooled std.dev.	4.84	4.58
Within-country std.dev.	1.55	2.14

Note: Parameter estimates of equation 13, 2001–2015 averages. Within-country std.dev. calculated on $\tau_{it} - \bar{\tau}_i + \bar{\bar{\tau}}$ (*mutatis mutandis* for λ).

Country	Years included in analysis
Australia	2004, 2008, 2010, 2012, 2014
Austria	2007–2015
Belgium	2004–2015
Canada	2001–2015
Denmark	2005–2014
Finland	2001–2015
France	2005, 2008, 2009–2015
Germany	2004, 2008, 2009-2014
Greece	2004–2015
Iceland	2004-2014
Ireland	2005–2014
Japan	2003, 2006, 2009, 2012
Netherlands	2005–2014
New Zealand	2003, 2008, 2009, 2011, 2012, 2014
Norway	2004, 2008, 2009-2014
Portugal	2004–2015
Spain	2007–2015
Sweden	2004, 2008, 2009-2015
Switzerland	2009, 2011, 2013, 2014
United Kingdom	2001–2015
United States	2005, 2008, 2009–2015

Semi-parametric evidence for impact of τ