Fiscal Federalism: Efficient or unfair?

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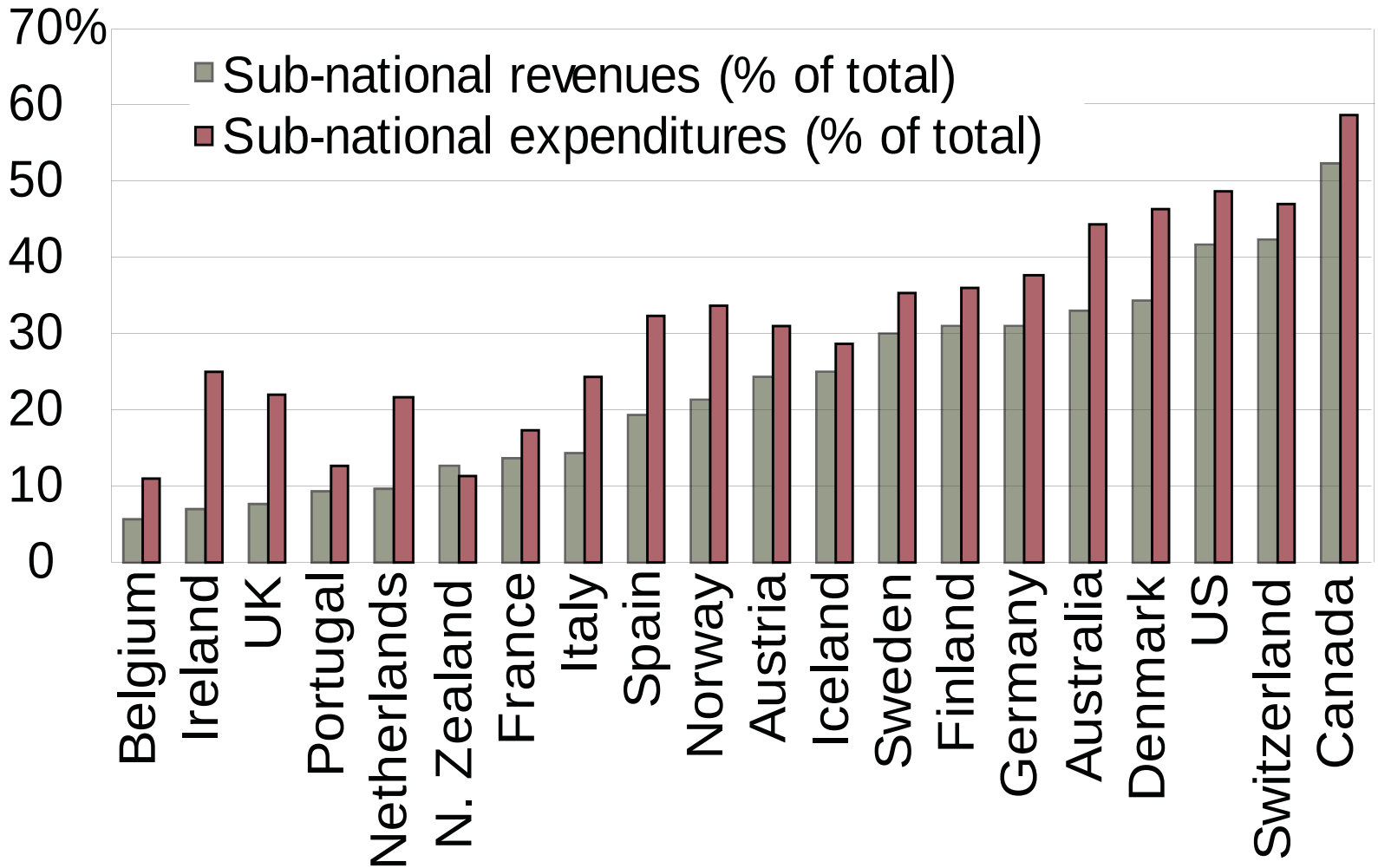
Fiscal Federalism



(OECD data for the most recent year available 1997-2000)

Literature on Effects

- Efficient public goods ("Vote with your feet!")
  - Tailored to local preferences
- Unfair public goods
  - Economic segregation
  - Low taxes for the rich
  - Fewer public goods for the poor
- Public expenditures
  - Fiscal constraint (with Leviathan government)
  - Fiscal indiscipline (with vertical equalization)

(Tiebout, 1956; Musgrave, 1959; Grueber, 2006; Rodden, 2003; Brennan & Buchanan, 1980)

Dynamics

- Simple dynamics might determine effects (Hirschman 1970)
  - Exit: (Public) Goods improve when consumers exit
  - Voice: (Public) Goods improve when consumers contribute
  - Loyalty: the ratio of exit & voice
- Plus more complex dynamics
  - Individual preferences for wealthy neighbors
  - Politicians competing to attract the rich
  - The wealthy like less public goods
  - Pork barrel politics
  - Veto players
  - ...

Project

- Question
  - Can exit and voice generate characteristics of federal states?
    - ★ Lower less progressive taxes in rich areas
    - ★ Lower spending in devolved states
    - ★ Rich want/consume fewer public goods
  - Can policy impact whether public goods are fair or efficient?
- Method: Agent based modeling (microsimulation)
  - Feedback between exit and voice
  - Interaction between micro behaviors and macro conditions

Similar Work: Kollman, 1997

How can politics yield efficient public goods allocation?

- Match agents to geography via moving and voting on public goods
- Why? Tiebout matching can yield non-optimal equilibrium
  - Political platforms
    1. Random policy permutations
    2. Random permutations with sample polling
    3. Genetic algorithm
  - Voting
    1. Majority rule by issue
    2. Agents vote for single party platform
    3. Agents rank party platforms
- Findings
  - Party platforms yield more efficient public goods under federalism

Sorting can only yield gains

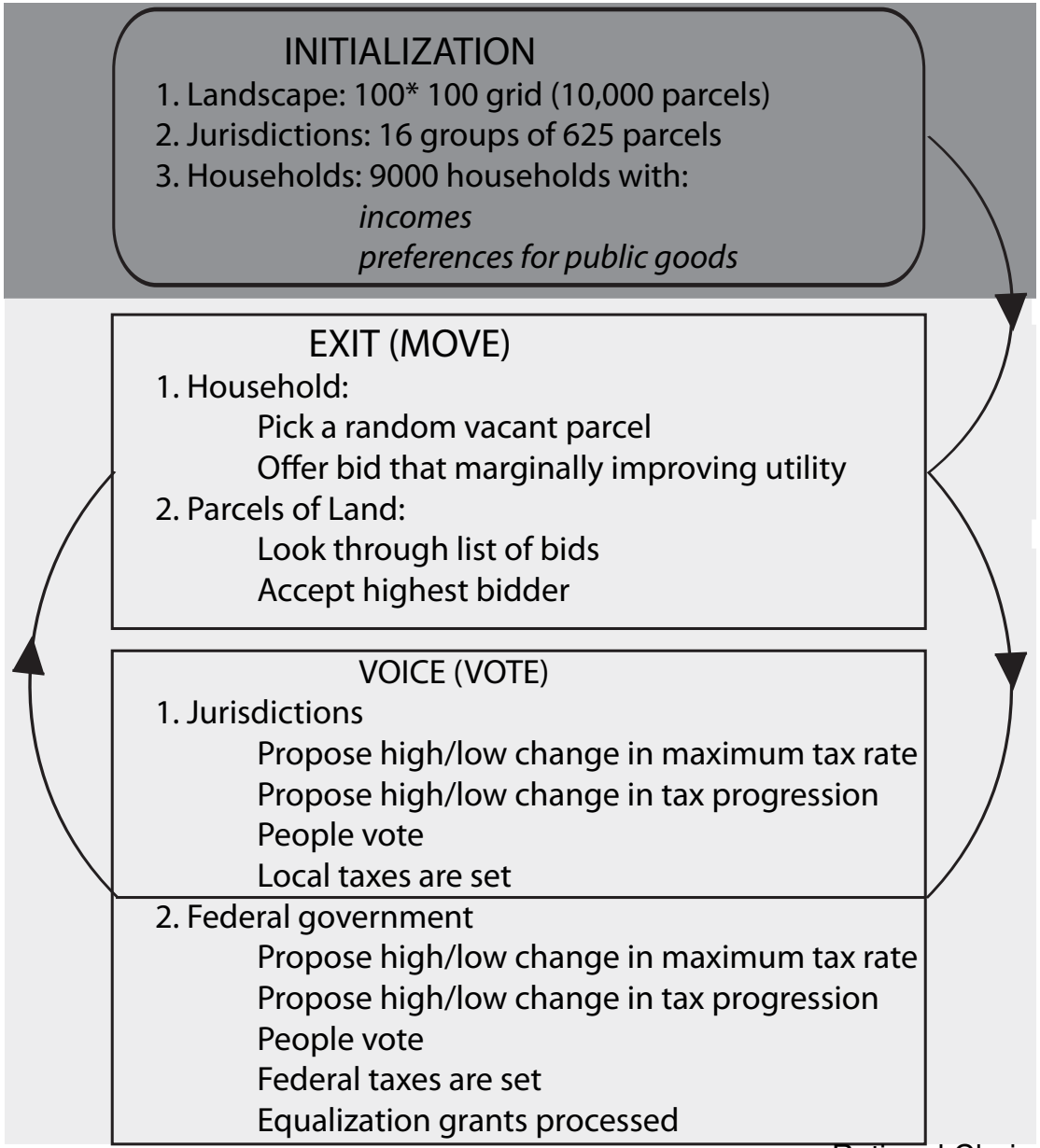
Similar Work: Penn, 2003

Does secession encourage inequality?

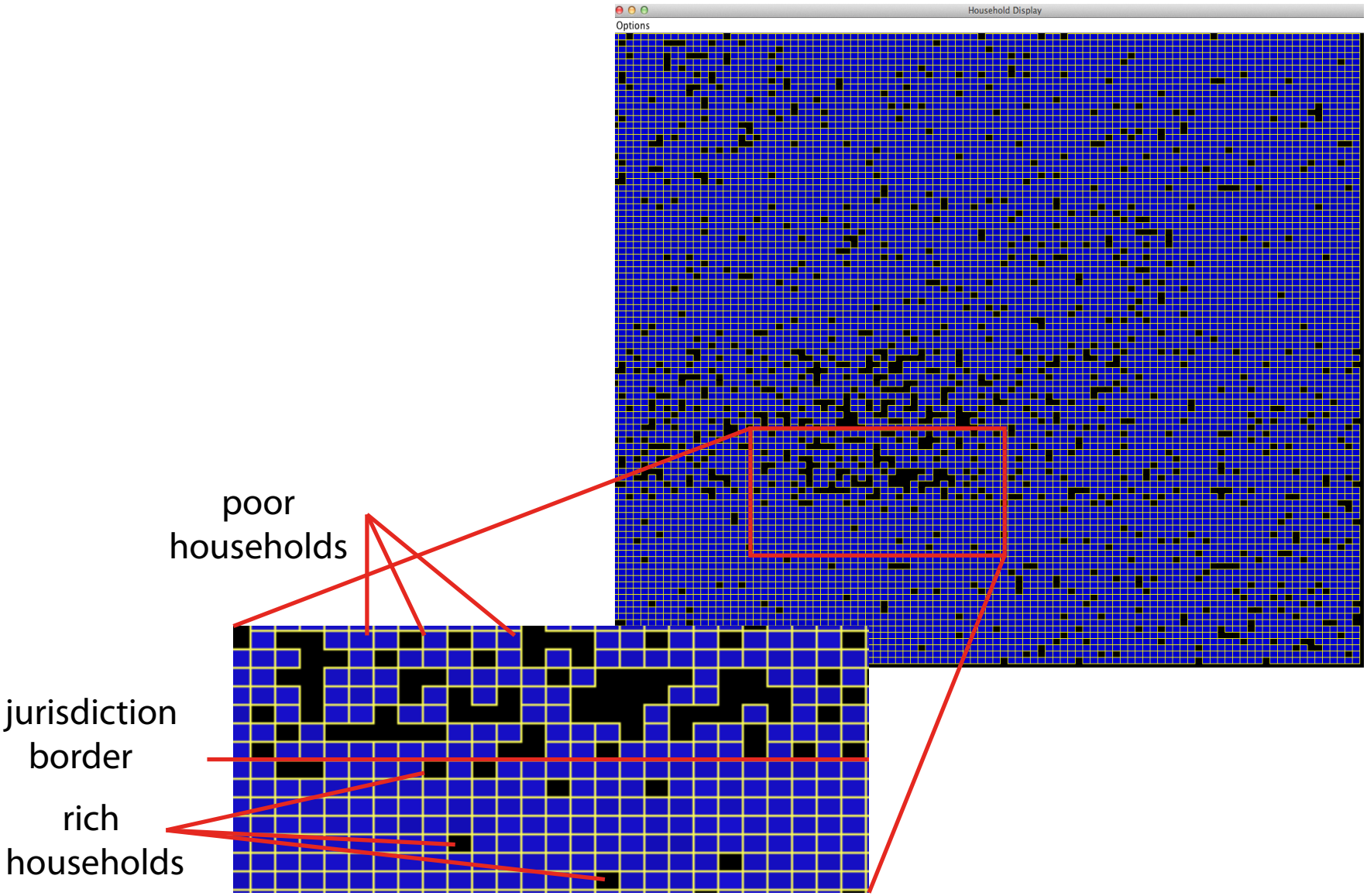
- Match people to political units through moving and voting
- Point? Progressive taxation means match is also about fairness
  - Voting
    1. Tax rates
    2. Secession
  - Politics
    1. Local tax discretion
    2. Majority vs supermajority for secession
- Findings
  - More discretion & easier secession $\rightarrow$ lower utility & more inequality

Sorting can only yield losses

Model Design



Model Design

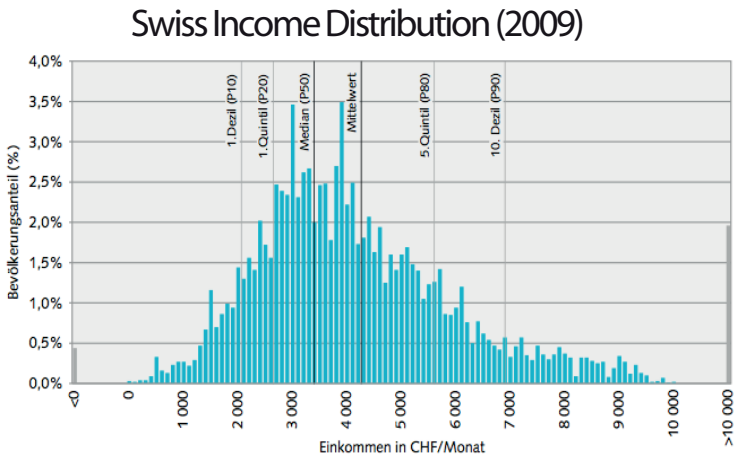


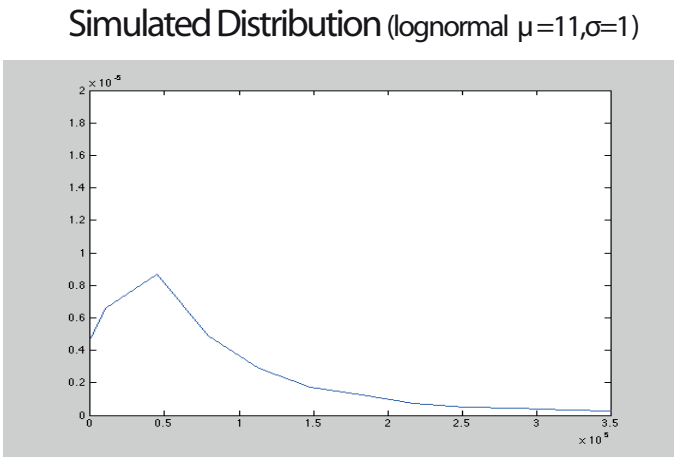
Model Details

- Agent Characteristics
  - Income
  - Public Goods Preference
  - *Utility*
    - Cobb Douglas
    - Constant returns to scale
    - Public and private goods consumption
- Individual Dynamics
  - Voting
  - *Moving*
    - Pick random vacant plots
    - Offer a price that would increase utility
    - Highest bidder moves
- Macro
  - Tax Form
  - Federal Equalization

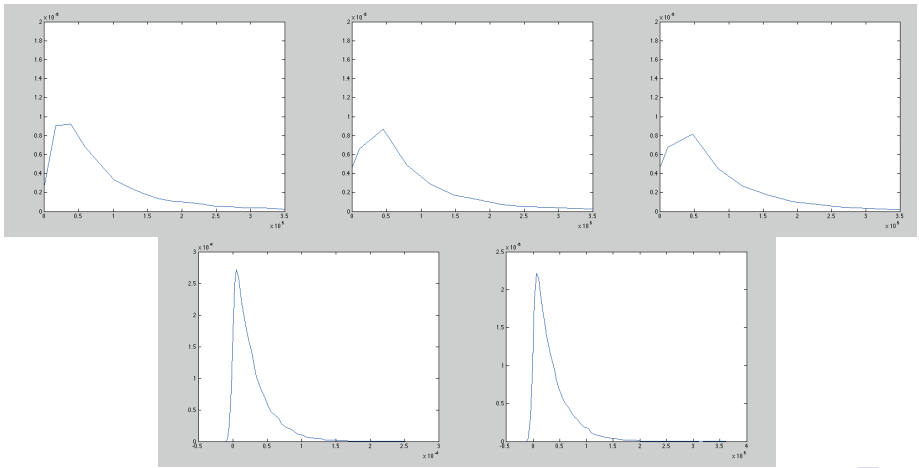
Assumed Income Distribution

- Currently using a lognormal





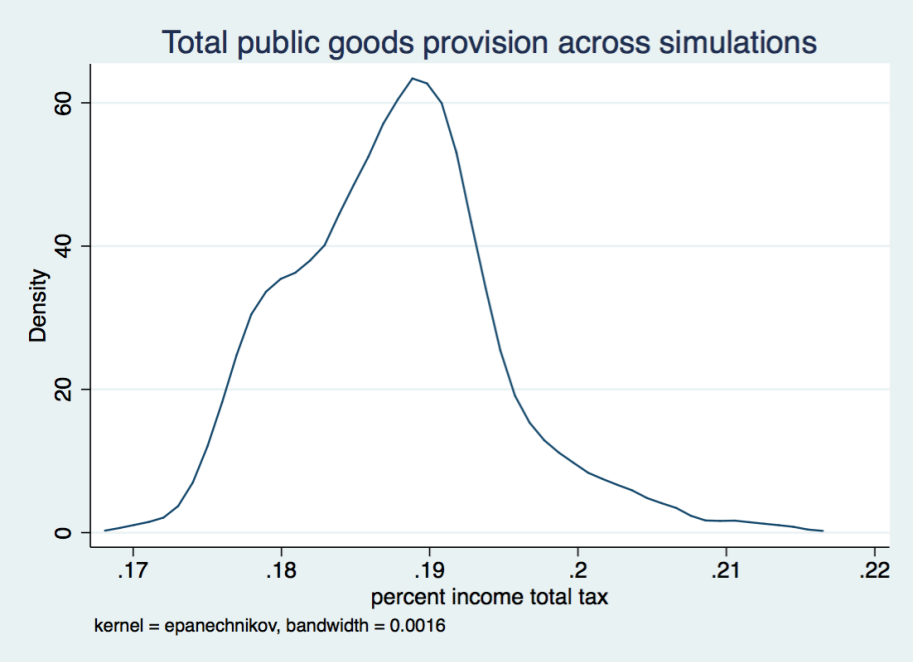
- Testing: Pareto, Weibull, generalized beta, gamma ...



Public Goods Preferences

- Randomly assigned from a normal distribution ($\mu = .2$, $\sigma = .05$)
- Private goods preference: (1- public goods preference)

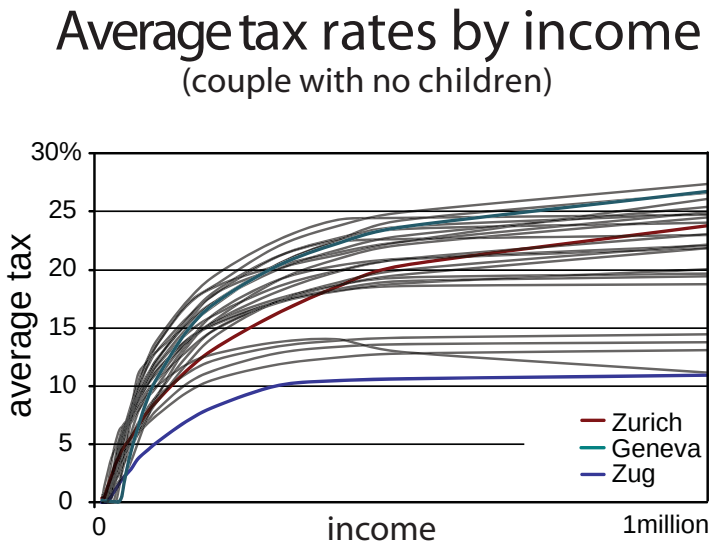
local	0 to 19% of income
federal	0 to 21% of income
total	17 to 21% of income



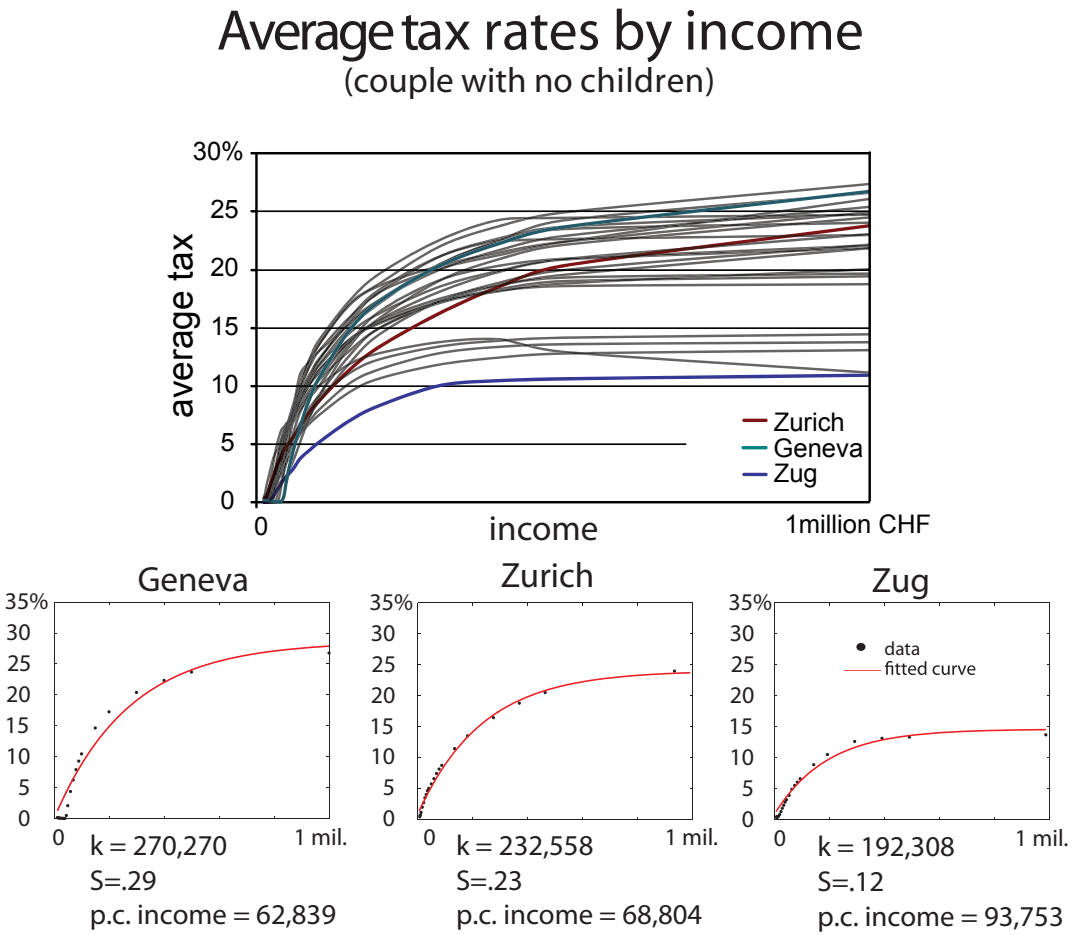
Key Point

- Income and preferences are set exogenously
- All other critical variables are set endogenously
  - *Results depend on income and preference distributions*

Assumed tax functional form



Assumed tax functional form



$$tax = S(1 - e^{-y/k})$$

y	income
S	parameter for tax level
k	parameter for tax progression

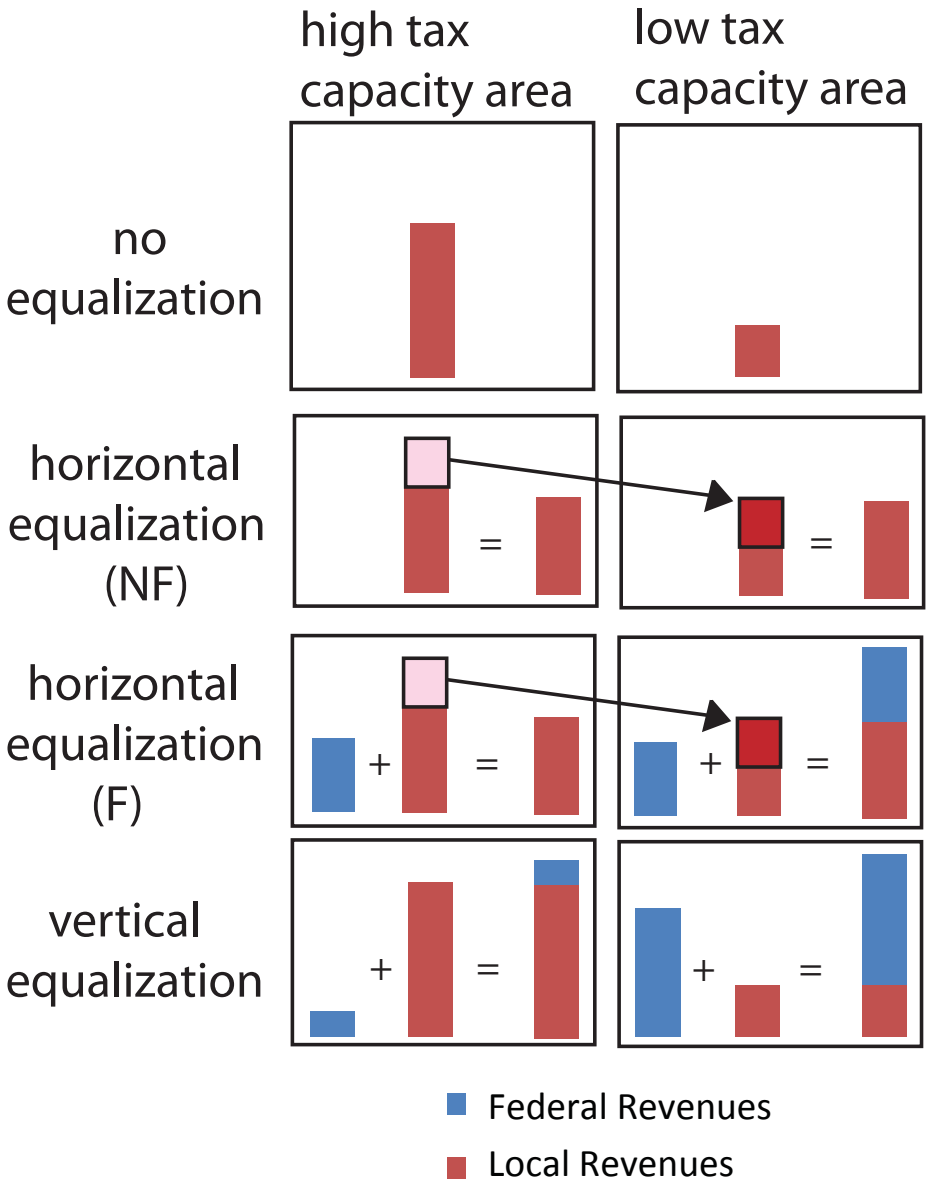
Voting and Voice

- Government proposes a random $+$ & $-$ deviation in
  - Maximum tax rate
  - Progression
- People vote
  1. "Average Man Voice"
     A median voter model
  2. "Rich Voice"
     Maximize constituent utility

Swiss Case: Voting

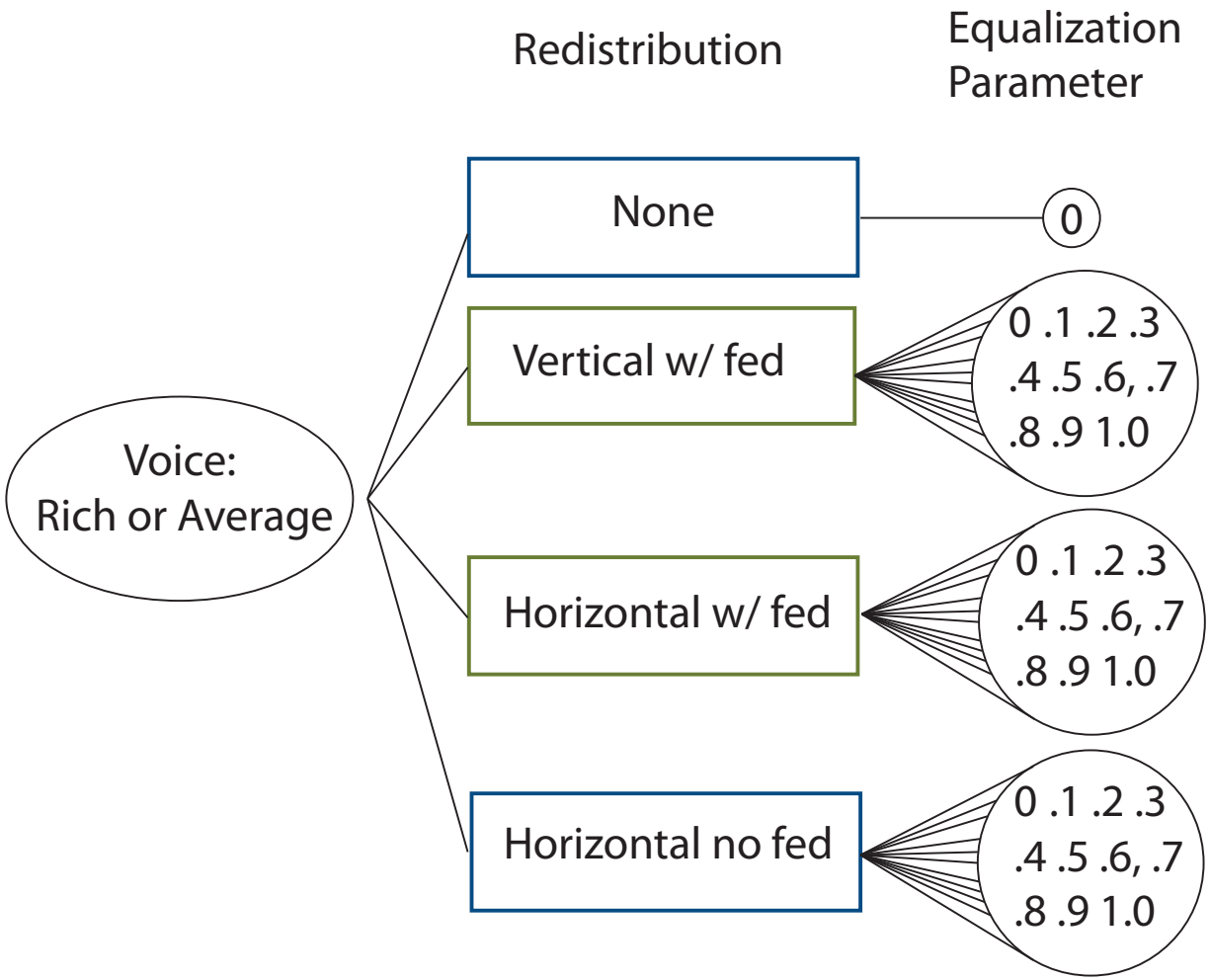
- Maximum tax rate (“Steuerfuss”)
  - Can be changed by people or politicians
- Progression
  - Primarily through politicians
  - Though deductions can be set by people

Model Design: Equalization



- Horizontal
  - Between jurisdictions
  - Based on the *difference* between tax capacities
- Vertical
  - From central government
  - Based on the *ratio* between tax capacities

Experiments



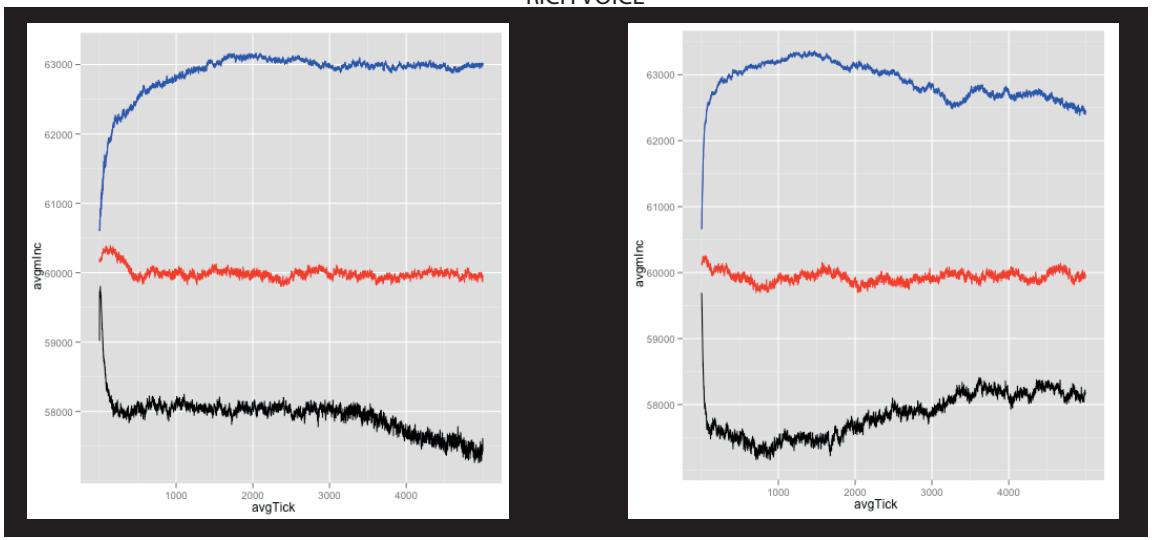
68 settings, 10 runs per setting, 5000 time steps

Simple model, realistic outcomes

- Model Assumptions
- Realistic Outcomes (emergence)
- Unnecessary Assumptions

Realistic Outcomes: Segregation

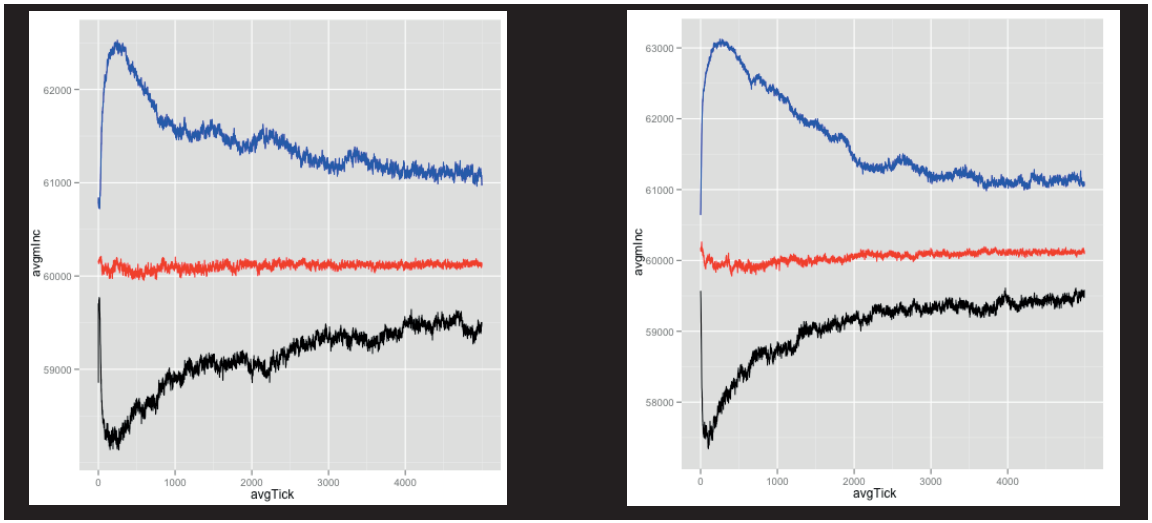
RICH VOICE



Strictly local taxation
no redistribution

Strictly local taxation
horizontal equalization =.1

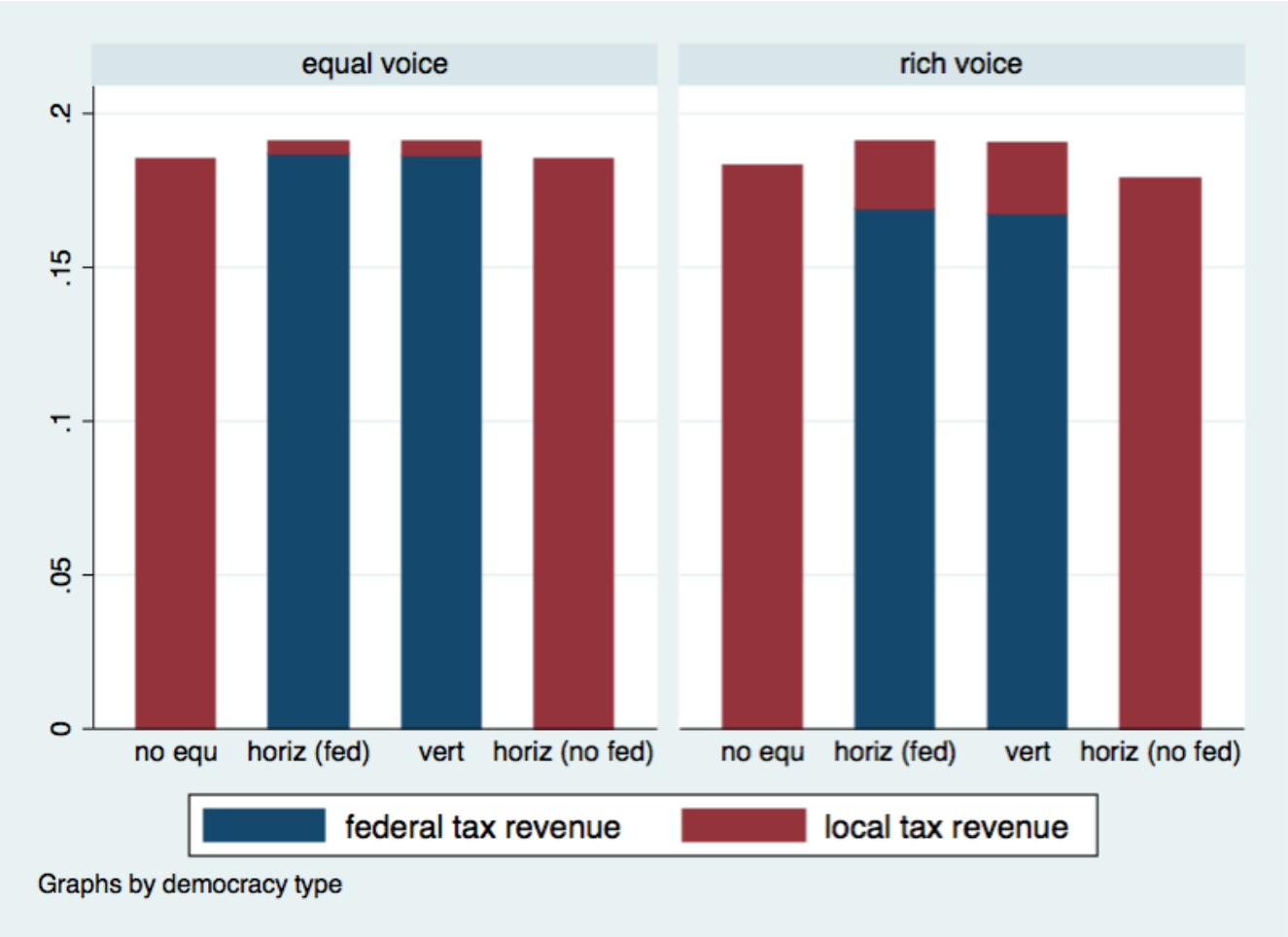
EQUAL VOICE



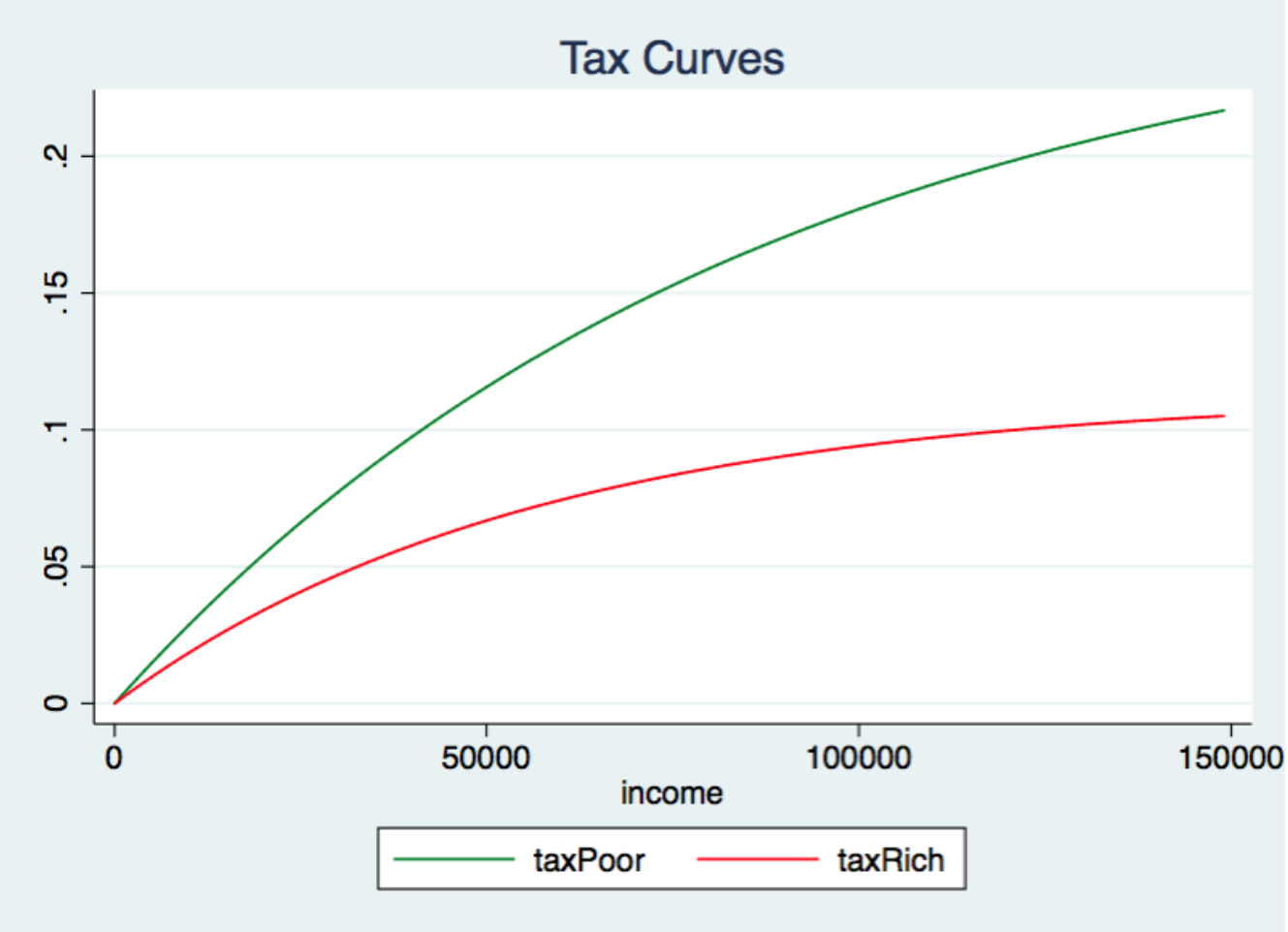
Strictly local taxation
no redistribution

Strictly local taxation
horizontal equalization =.1

Realistic Outcomes: Federalism constrains spending

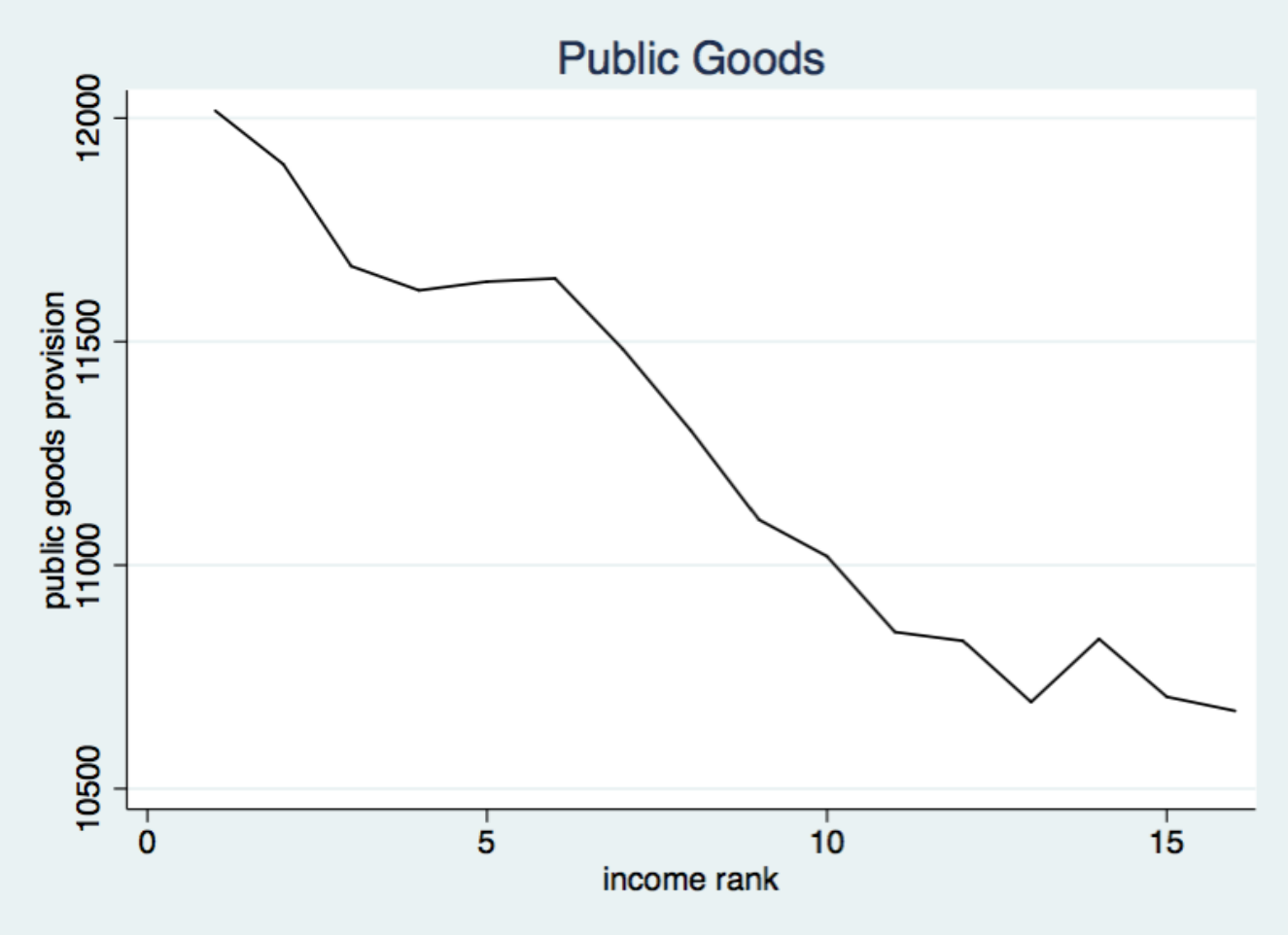


Realistic Outcomes: Rich have lower flatter taxes



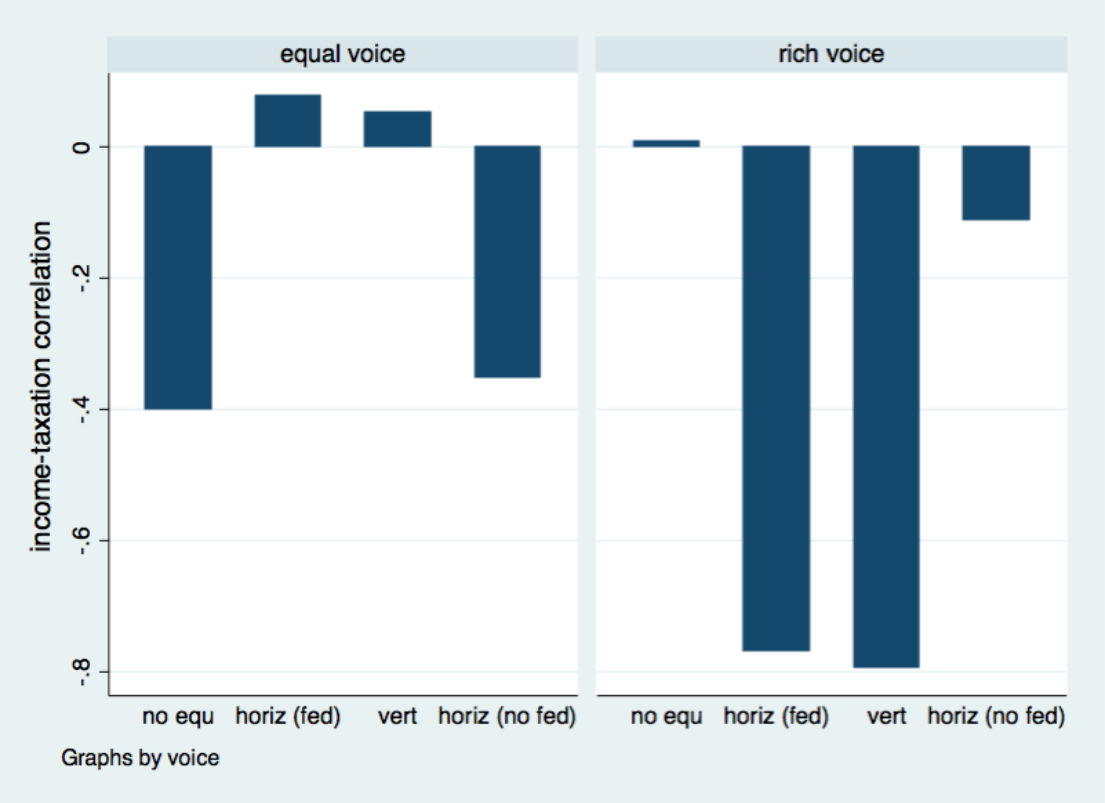
Tax curves for richest and poorest jurisdictions, across *all* experiments

Realistic Outcomes: Rich have fewer public goods



Public goods by jurisdiction's income rank, across *all* experiments

Realistic Outcomes: Applied taxes are regressive

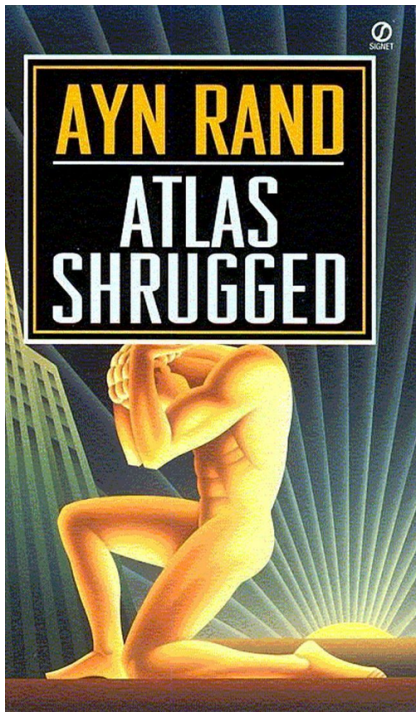


Simple model, realistic outcomes

- Model Assumptions
  - Dynamics: Move & Vote
  - Parameters: Income & Preference Distributions
- Realistic Outcomes (emergence)
  - Economic Segregation
  - Rich prefer lower flatter taxes, few public goods
  - Devolved federalism constrains spending
- Unnecessary Assumptions
  - Preferences for wealthy neighbors
  - The wealthy like less public goods
  - Veto-players
  - Pork barrel politics

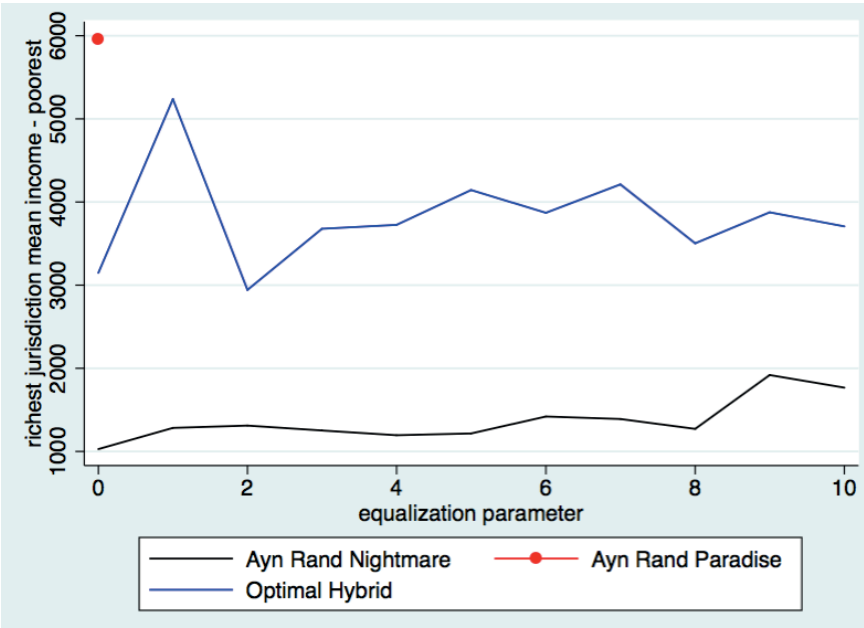
Three interesting cases

	Equal Voice	Rich Voice
Pure Federalism		**Ayn Rand Paradise**
Horizontal (F)		**Optimal Hybrid (CH)**
Vertical	**Ayn Rand Nightmare**	
Horizontal (NF)		

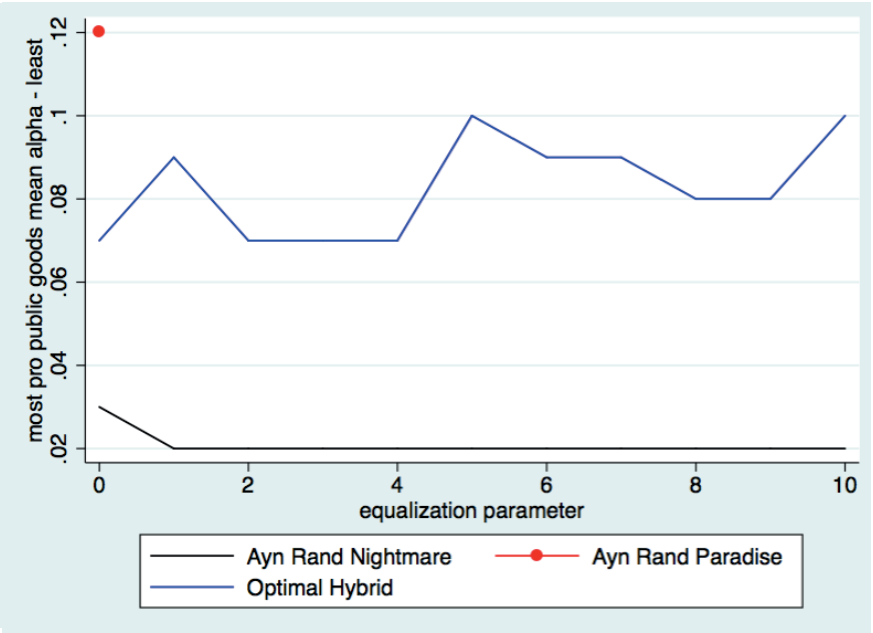


Segregation

Economic Segregation



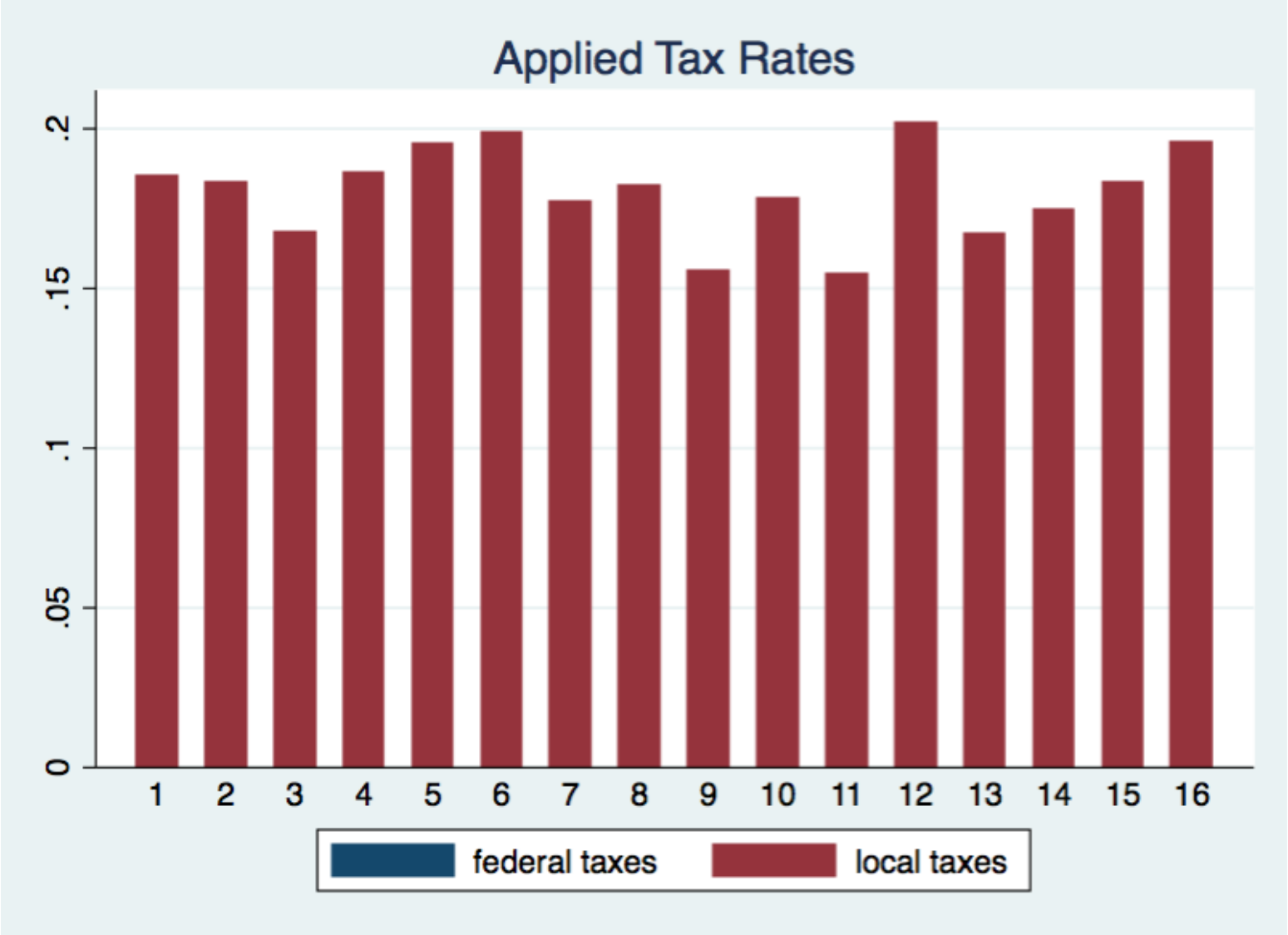
Preference Segregation



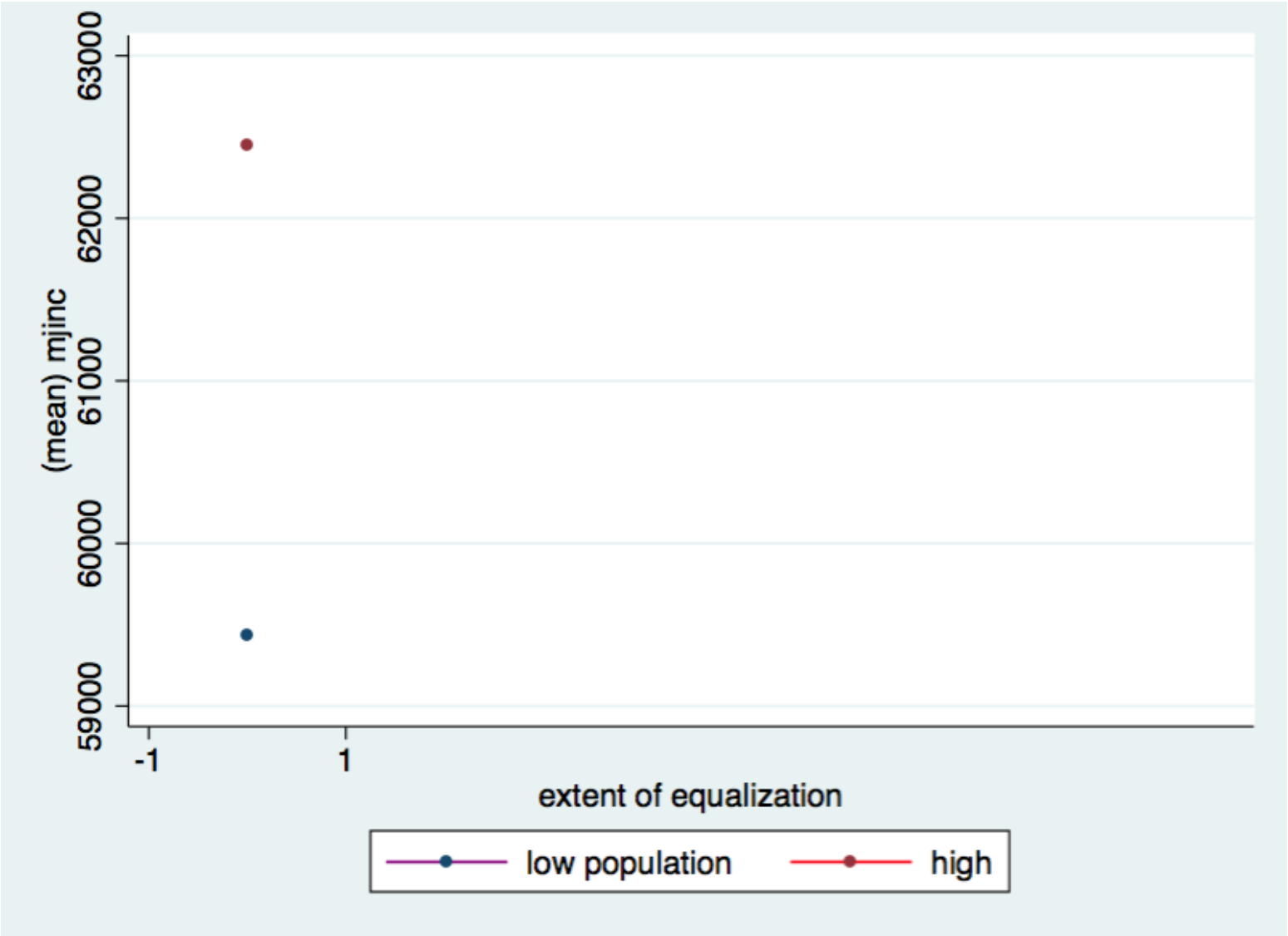
Ayn Rand Paradise: Outline

- Taxes
- Population
- Public Goods
- Utility
- Efficiency

Ayn Rand Paradise: Taxes

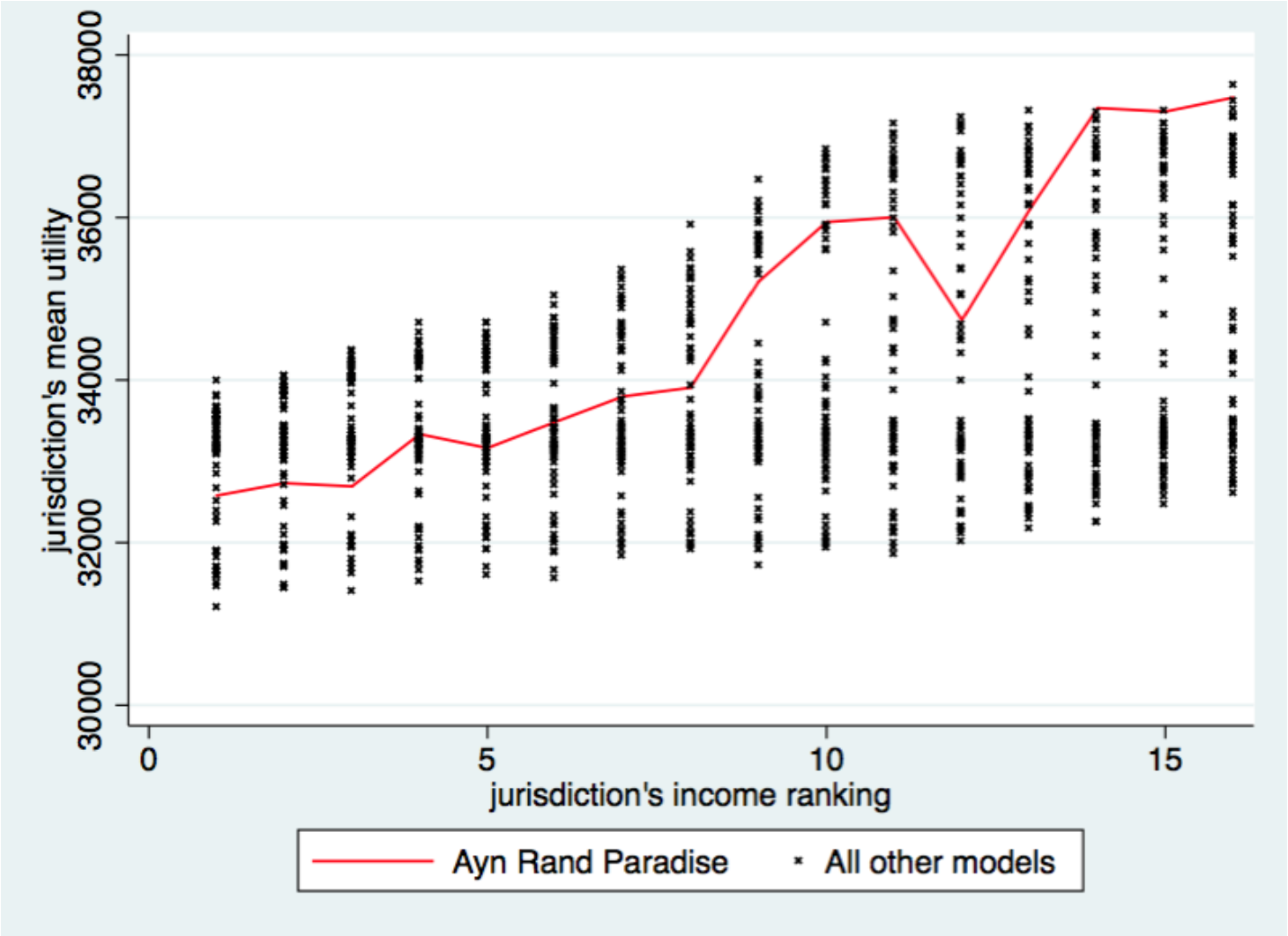


Ayn Rand Paradise: Population

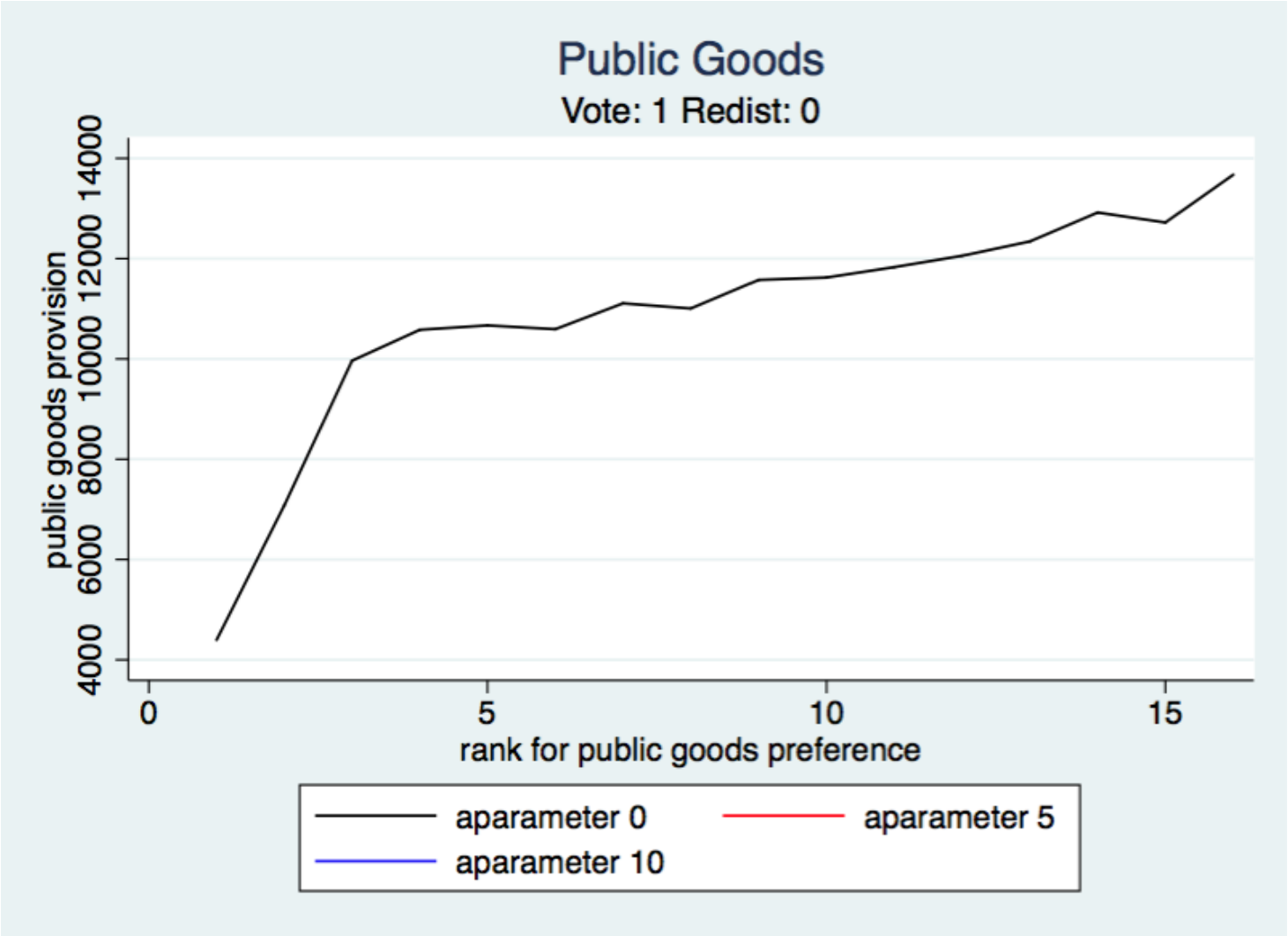


Ayn Rand Paradise: Public goods

Ayn Rand Paradise: Utility



Ayn Rand Paradise: Efficiency



Ayn Rand Paradise: Summary

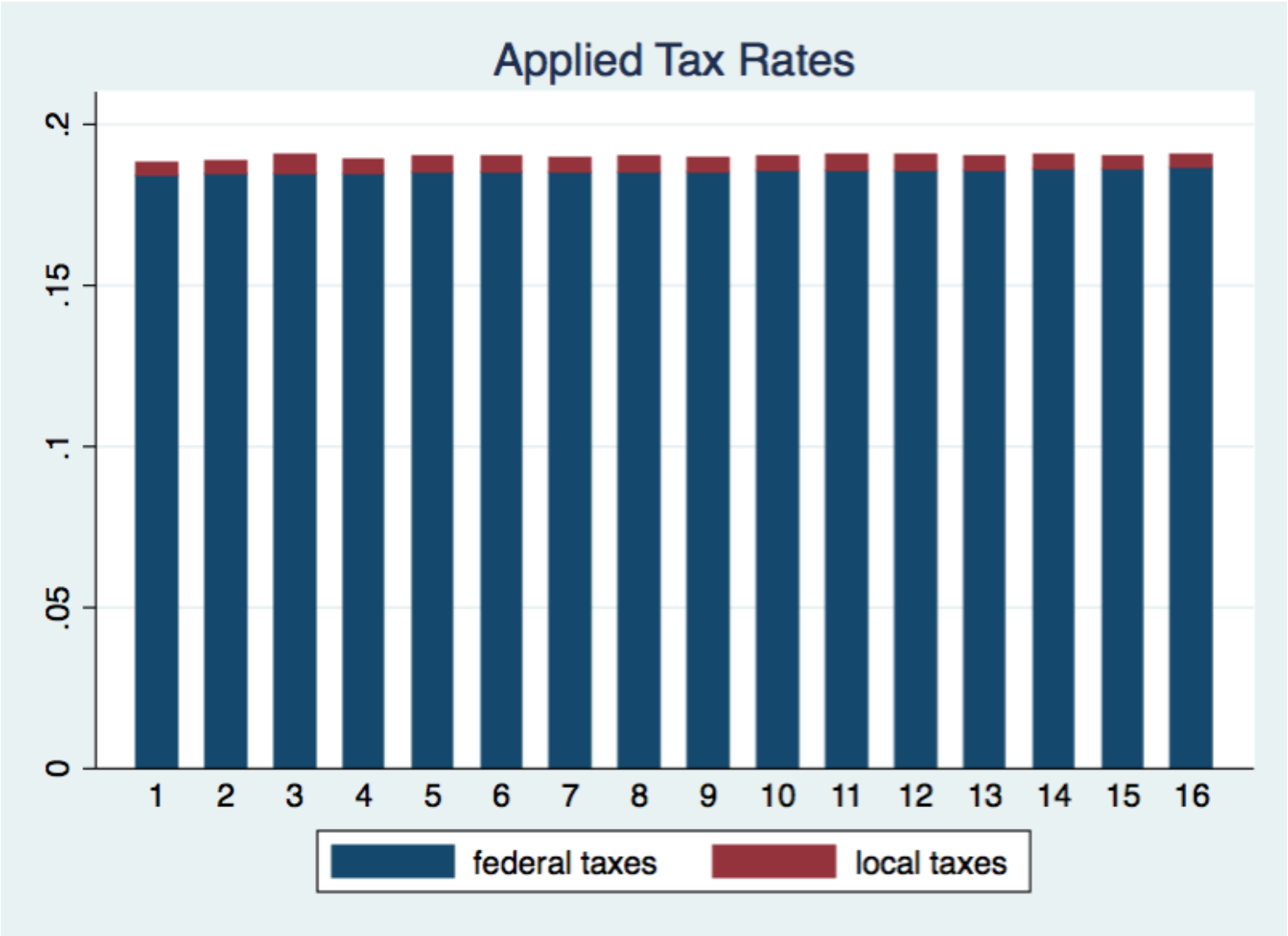
- Segregation
  - High by income & preferences
- Taxes
  - About equal rates
- Population
  - People want to live near the rich
- Public Goods
  - Rich have somewhat more
- Utility
  - Rich jurisdictions have high utilities, the poor middling
- Efficiency
  - Some gains

The rich self-segregate, provide their own public goods, and maintain high utilities

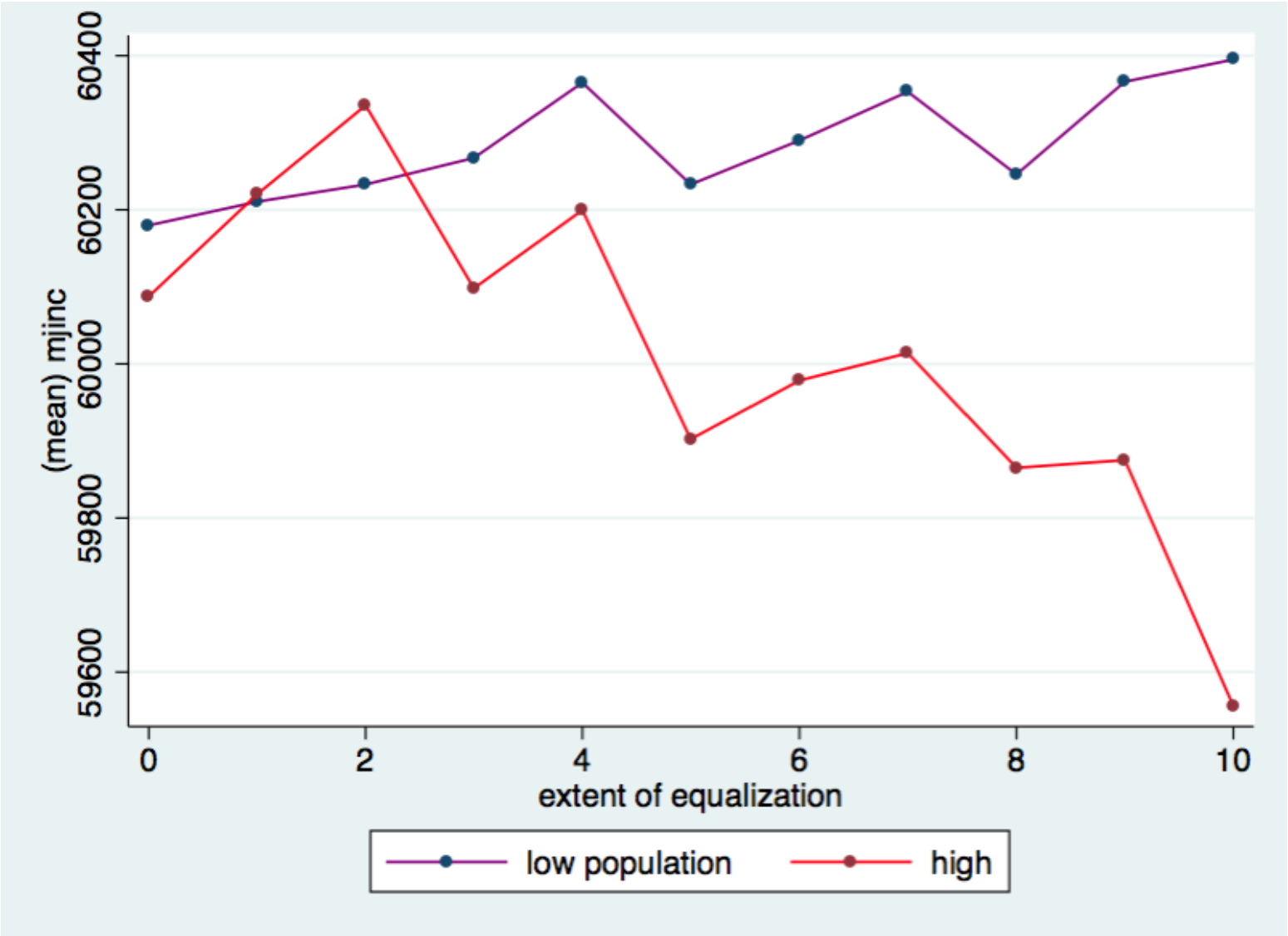
Ayn Rand Nightmare: Overview

- Taxes
- Population
- Public Goods
- Utility
- Efficiency

Ayn Rand Nightmare: Taxes

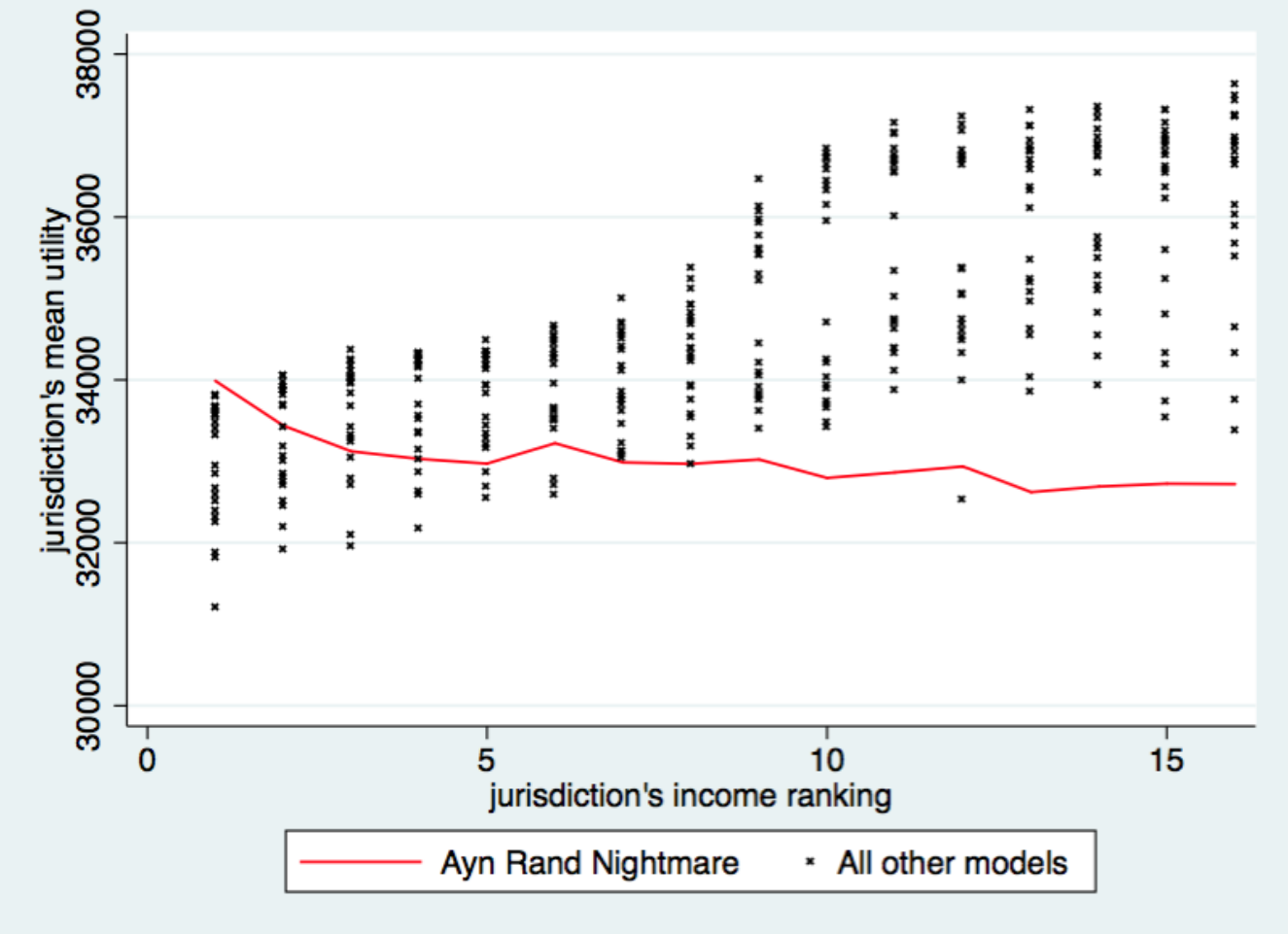


Ayn Rand Nightmare: Population



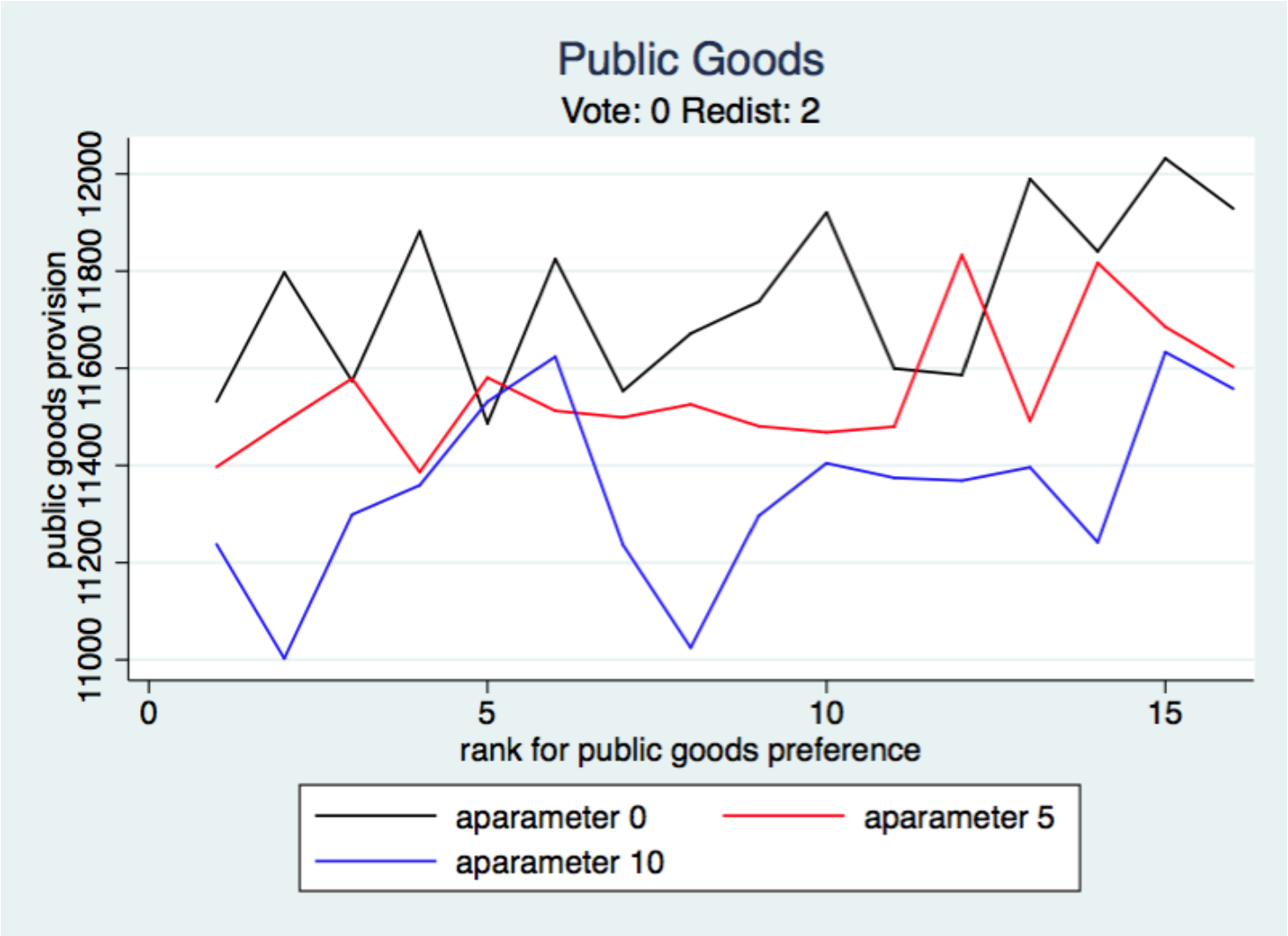
Ayn Rand Nightmare: Public goods

Ayn Rand Nightmare: Utility



- Policy inverted the correlation between income and utility
- It is a plague to be rich or to live near a rich person!

Ayn Rand Nightmare: Efficiency



Ayn Rand Nightmare: Summary

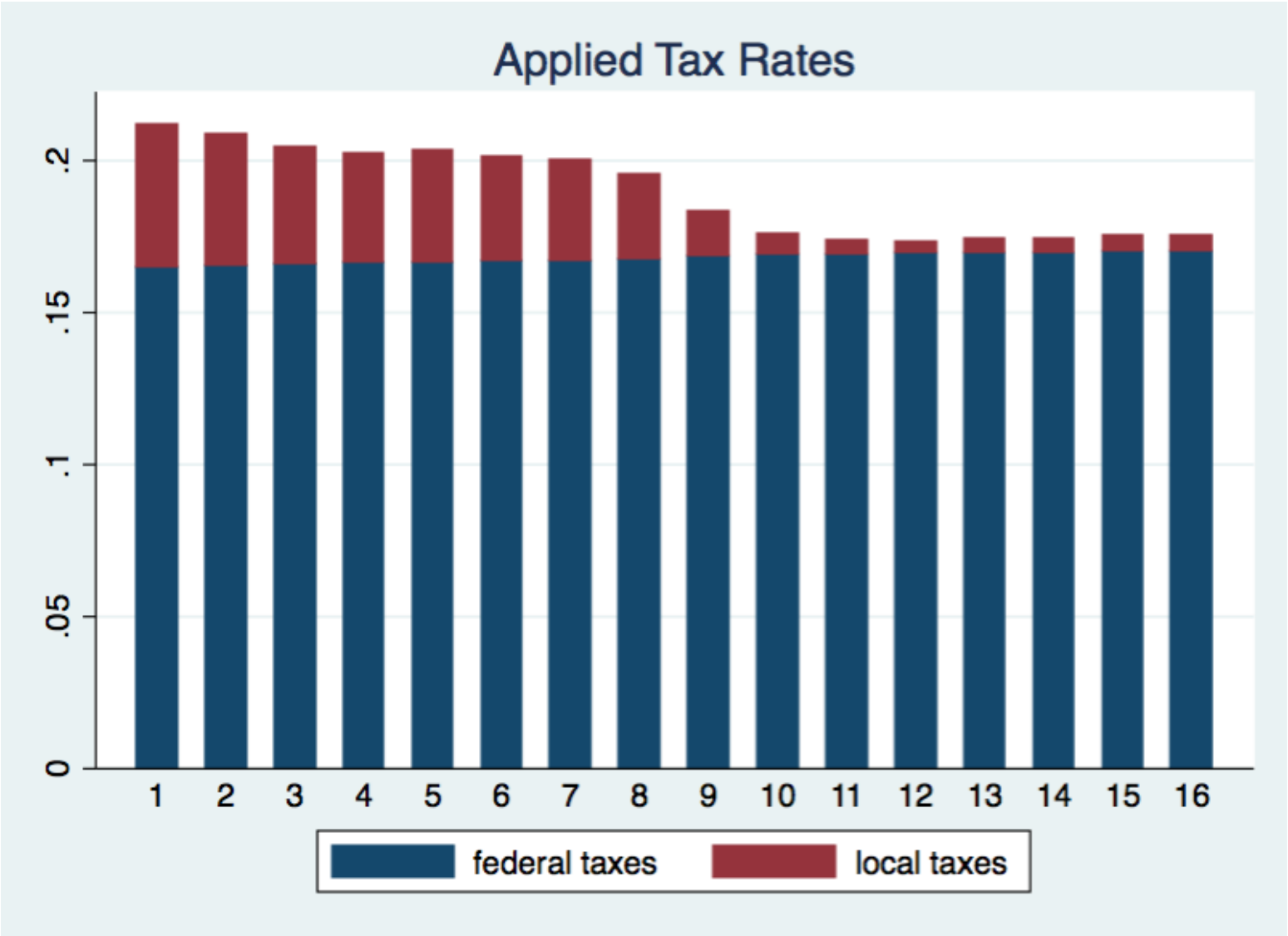
- Segregation
  - Neither by income nor preference
- Population
  - Agents run away from the rich
- Taxes
  - Largely federal and mildly progressive
- Public Goods
  - About equal, and sporadic
- Utility
  - Good for the poorest, bad for the rest
- Efficiency
  - No gains from preference sorting

The tyranny of the majority

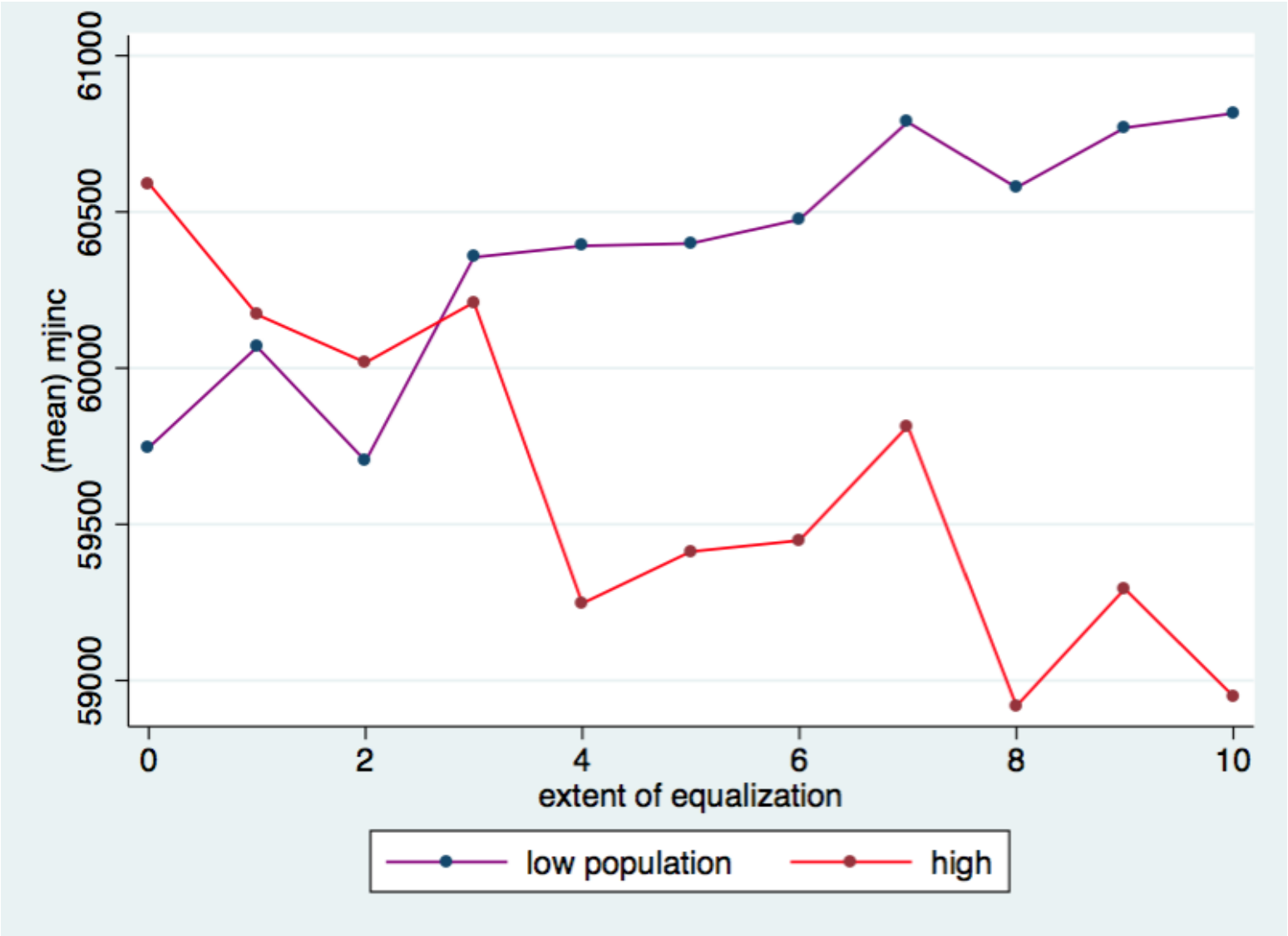
Optimal Hybrid: Overview

- Taxes
- Population
- Public Goods
- Utility
- Efficiency

Optimal Hybrid: Taxes

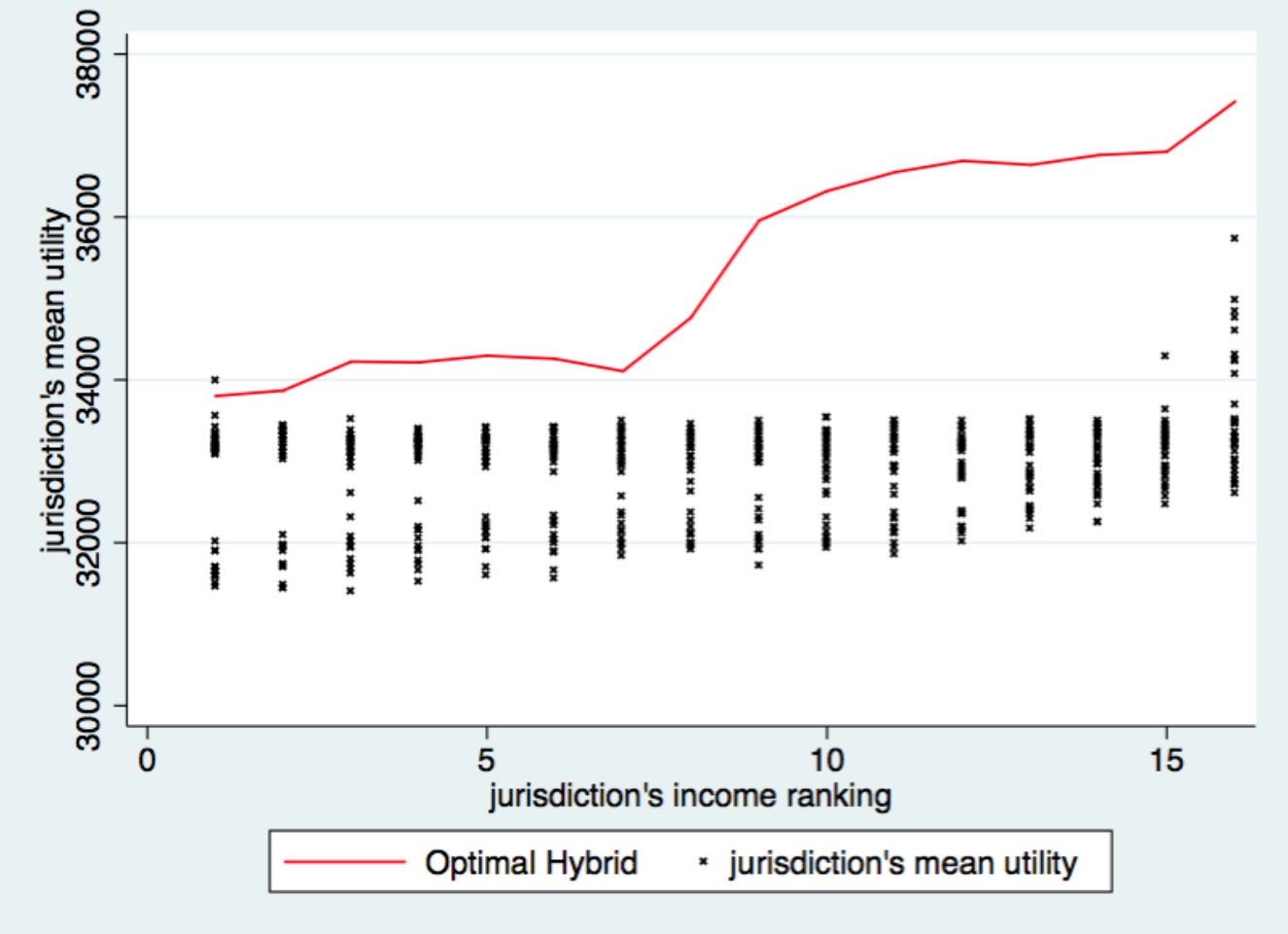


Optimal Hybrid: Population



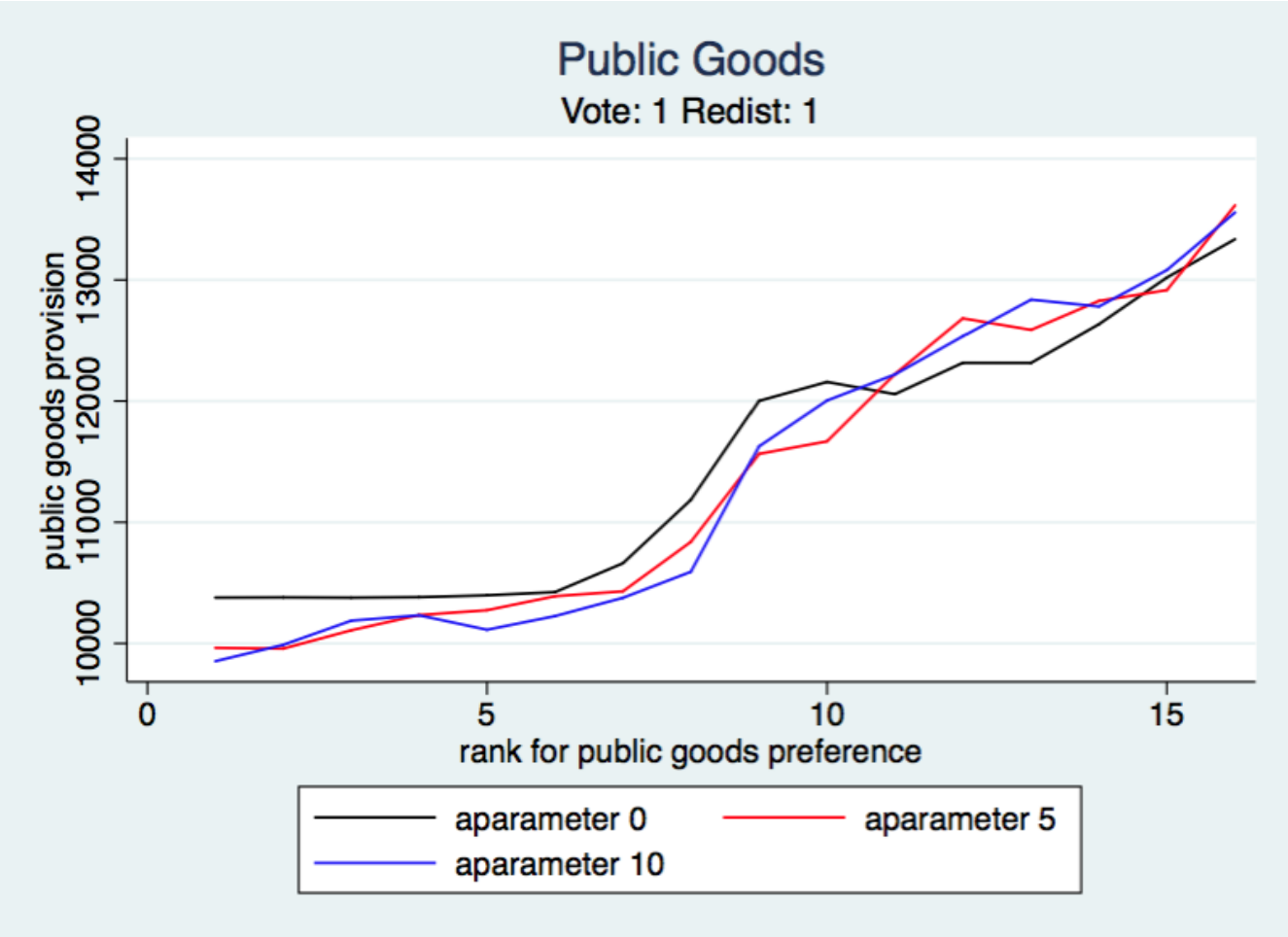
Optimal Hybrid: Public goods

Optimal Hybrid: Utility



- Policy maximizes utility in all jurisdictions
- The rich have higher utilities at all equalization levels

Optimal Hybrid: Efficiency



Optimal Hybrid: Summary

- Taxes
  - Primarily federal, local are regressive
- Population
  - Shifts with equalization from rich to poor areas
- Public Goods
  - Rich consume less at all levels of equalization
- Utility
  - All groups achieve optimal utility
- Efficiency
  - Significant gains from preference sorting

A moderately segregated society with regressive taxation and efficient public goods provision, yielding Pareto and Rawlsian optimal utilities

Conclusion

- A simple model of using exit and voice *might* explain
  - Economic segregation
  - Constrained spending under federalism
  - Lower flatter taxes in rich areas
  - Less public goods consumption among the wealthy
  - Applied regressive taxation
- Policy can generate
  - Tyranny of the majority
  - Wealthy flight
  - Efficient and (somewhat) fair public goods provision

Thank You

Appendix: Caveats

1. Model Assumptions
   - Results stem from the exogenous income and preference
   - Different distributions might yield different results
2. Real World
   - “Loyalty”, or a lack of mobility, would temper these effects
   - People are not that rational

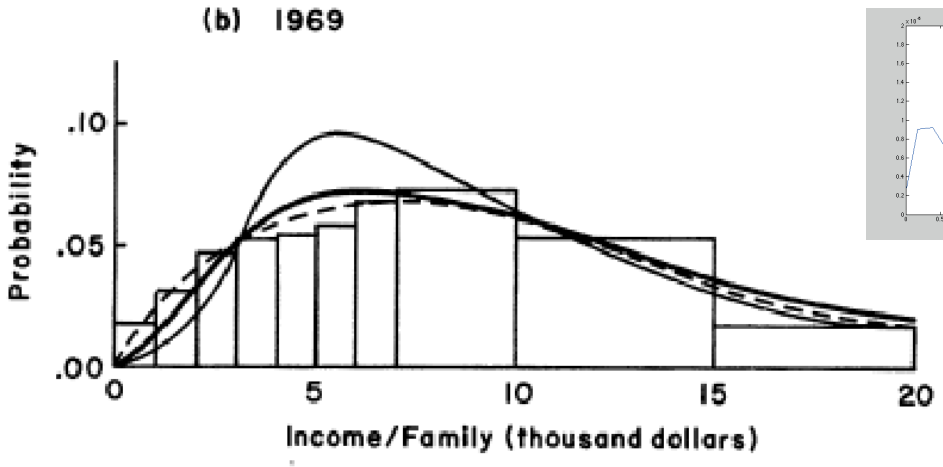
Future Work

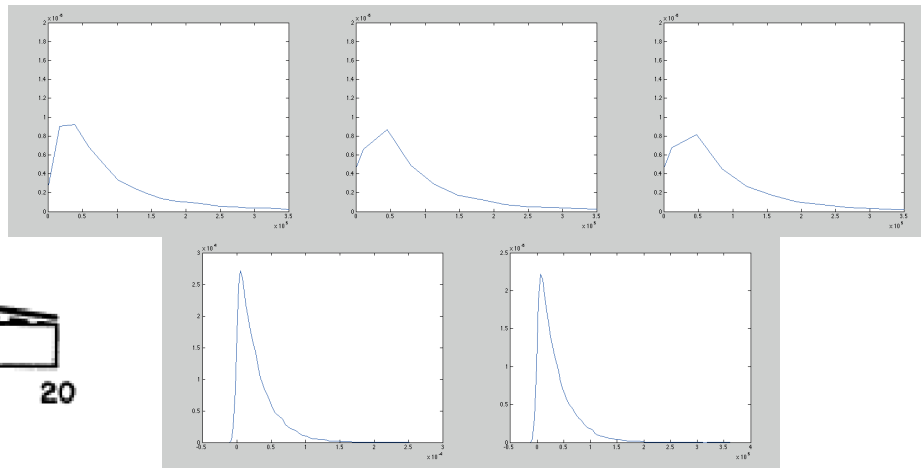
- Framing current results, targeting an audience
- Varied income distributions and preference distributions
- Model validation with empirical data

Method Appendix: Income

Currently using
$e^{normal(\mu=11,\sigma^2=.1)}$

Testing
$x * -ln(uniform(0 to 1))$





- Empirical literature
  - Pareto- fits the high end better
  - Lognormal - fits the low end better
  - Weibull, hybrid exponential decay with power decay, (generalized) beta, gamma (Singh & Maddala, Nirei, Thorow, Salem & Mount, McDonald)

Method Appendix: Cobb Douglas Utility

$$u_\ell = \underbrace{\left(\frac{g_j}{n_j} + \frac{1}{n_j}\sum_i (y_i * t_i)\right)^{\alpha_\ell}}_{\text{public goods}} * \underbrace{(y_\ell * (1 - t_\ell) - h_\ell)^{1-\alpha_\ell}}_{\text{private goods}}$$

ℓ	household
y_ℓ	income of householdℓ
t_ℓ	tax of householdℓ
h_ℓ	housing cost of household ℓ
i	index of households
j	jurisdiction
g_j	grant to jurisdiction j
n_j	number of households in jurisdiction j
α_ℓ	preference for public goods of household ℓ
$1 - \alpha_\ell$	preference for private goods of household ℓ

Method Moving

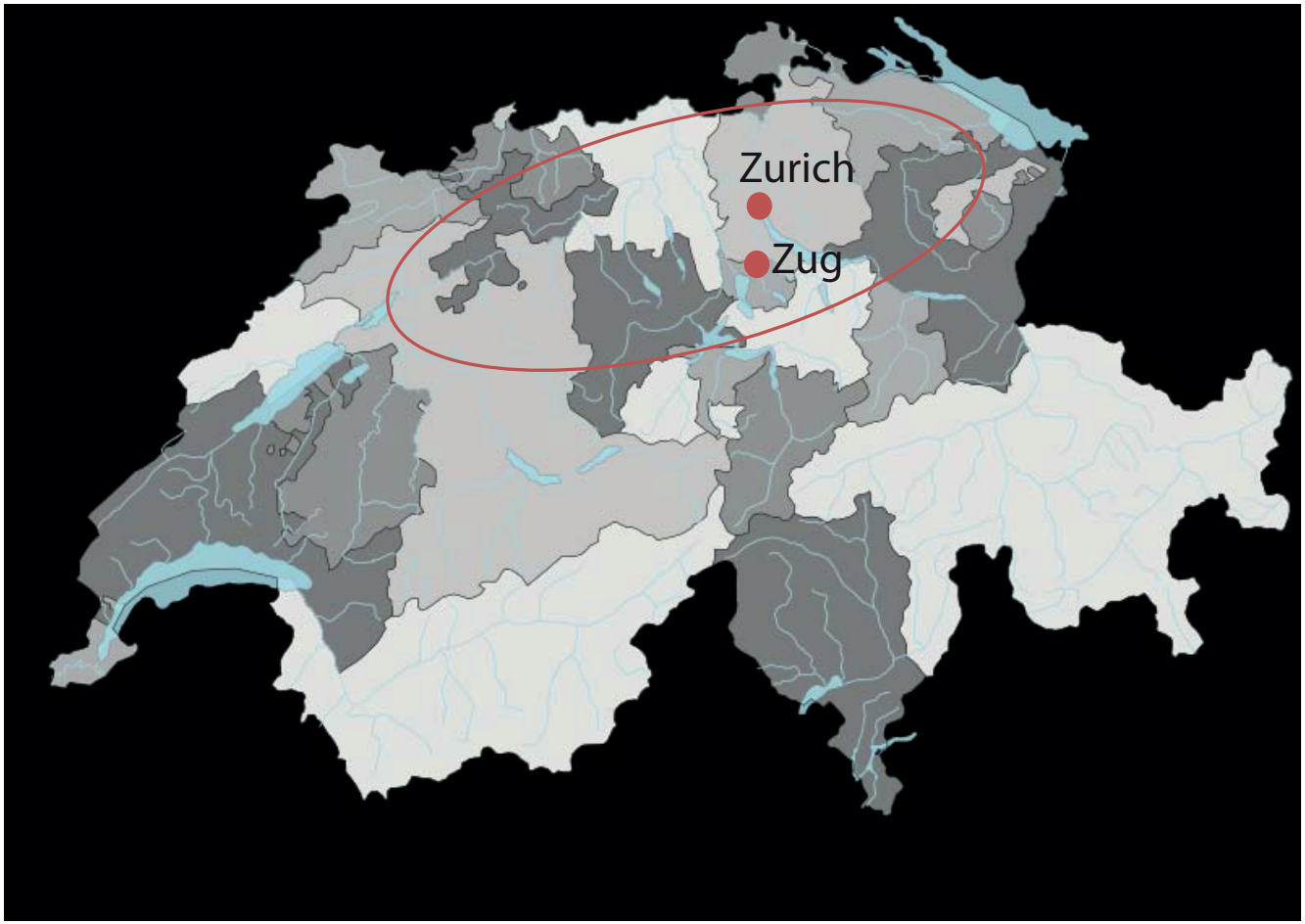
- Pick an empty parcel
- Calculate price that would yield current utility
- Offer a bid of 1 franc less

$$h_2 = y - t_2 - \left(\left(\frac{p_1}{p_2} \right)^{\alpha} \left(y - t_1 - h_1 \right)^{1-\alpha} \right)^{\frac{1}{1-\alpha}} - 1$$

- Parcel offered to the highest bidder at the end of the round
- Only positive bids are taken
- With one jurisdiction, all bids are -1 and no one moves

Method Appendix: Commutability

Commutable Distances



11 cantons wtihin commuting distance of Zurich

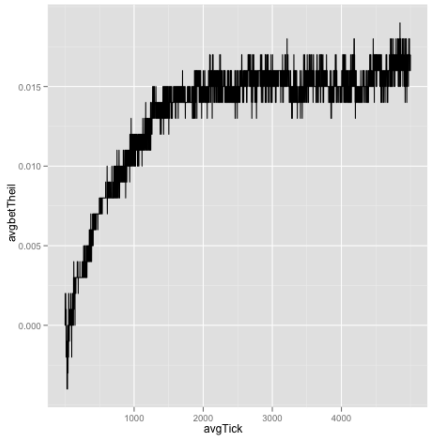
Method Appendix: Equalization formulae

baseline	horizontal NF	horizontal	vertical
r_j	$r_j + \underbrace{\theta_h N_j(\bar{x} - x_j)}_{\text{horizontal grant}}$	$\frac{N_j}{N} R^f + r_j + \underbrace{\theta_h N_j(\bar{x} - x_j)}_{\text{horizontal grant}}$	$r_j + \underbrace{R^f \frac{N_j(1/c_j)^{\theta_v}}{\sum_i N_i(1/c_i)^{\theta_v}}}_{\text{vertical grant}}$

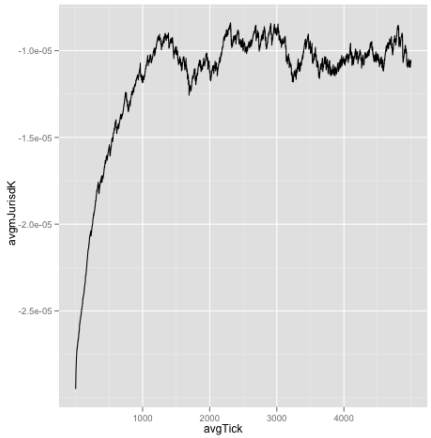
N_j	population in j
N	total population
R_f	total federal revenue
r_j	revenue collected in j
θ_h	horizontal redistribution parameter
x_j	jurisdiction's per capita tax capacity
$\bar{x}$	national per capita tax capacity
θ_v	vertical redistribution parameter
c_j	jurisdiction j's relative per capita revenue ($c_j = \frac{x_j}{\bar{x}_j}$)

Appendix: Convergence (rich voice, horizontal, no federal, .3)

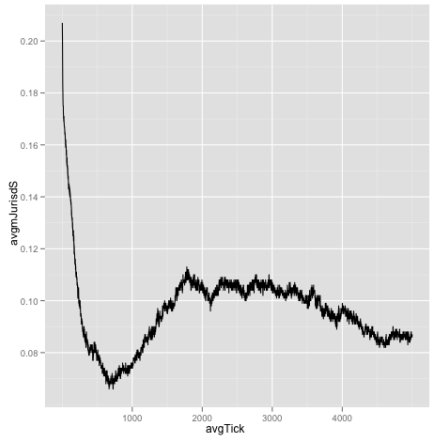
Federal level convergence



economic segregation

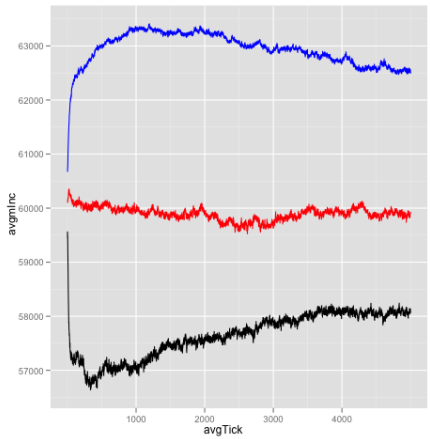


tax progression

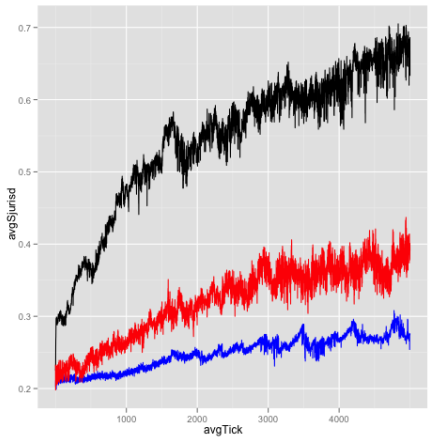


maximum tax

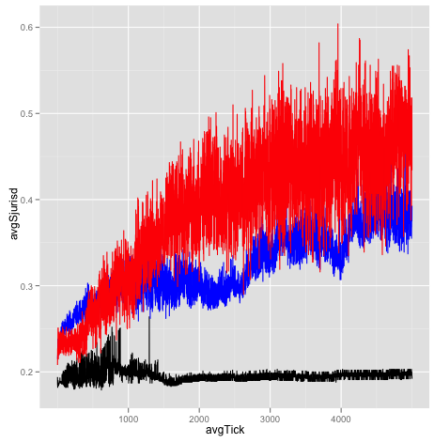
Jurisdiction level convergence



average income for rich, poor, middle



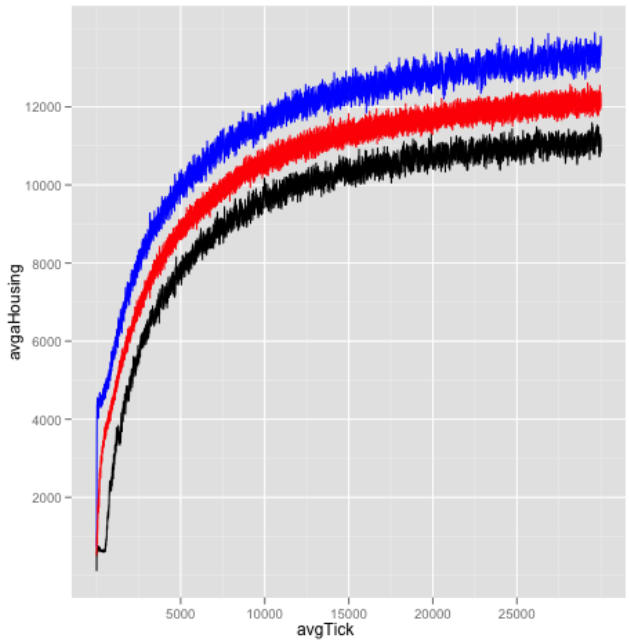
average max tax for rich, poor,middle



average maximum tax by preferences

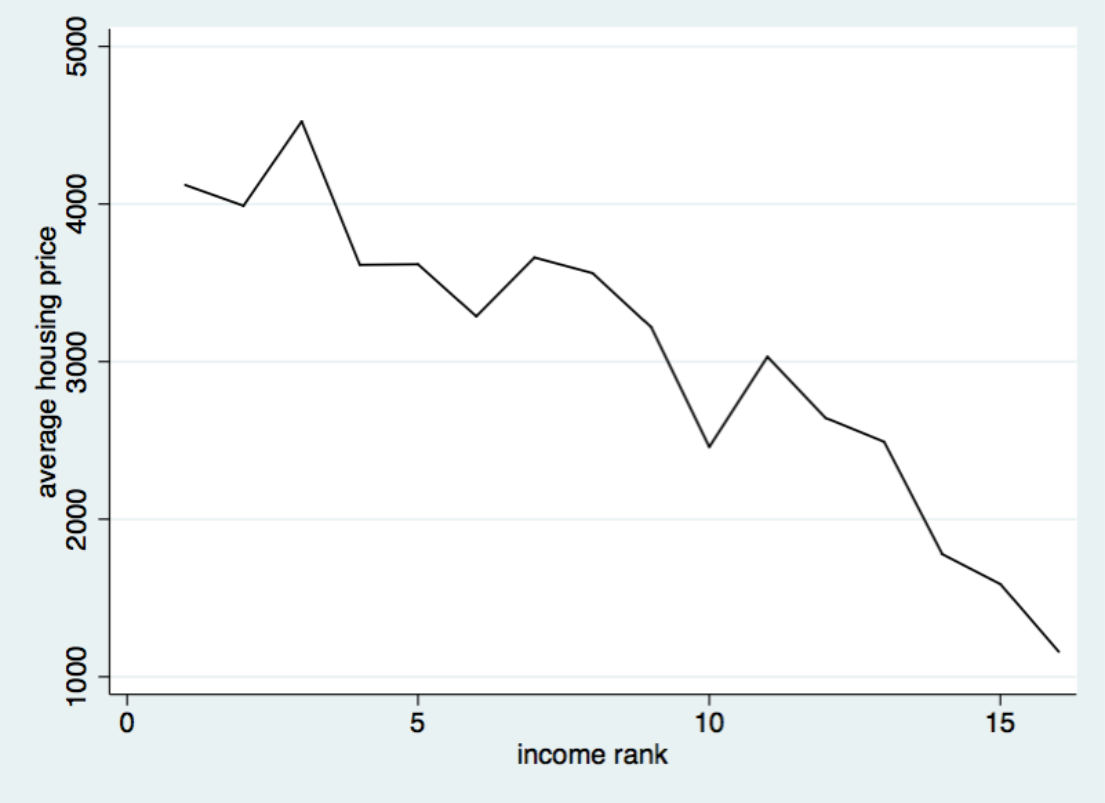
Appendix: Housing Prices Problem 1, Convergence

- Prices converge very slowly if at all
- A simulation of 30,000 ticks (vs 5,000)
  (equal voice, horizontal redistribution, equalization 0)



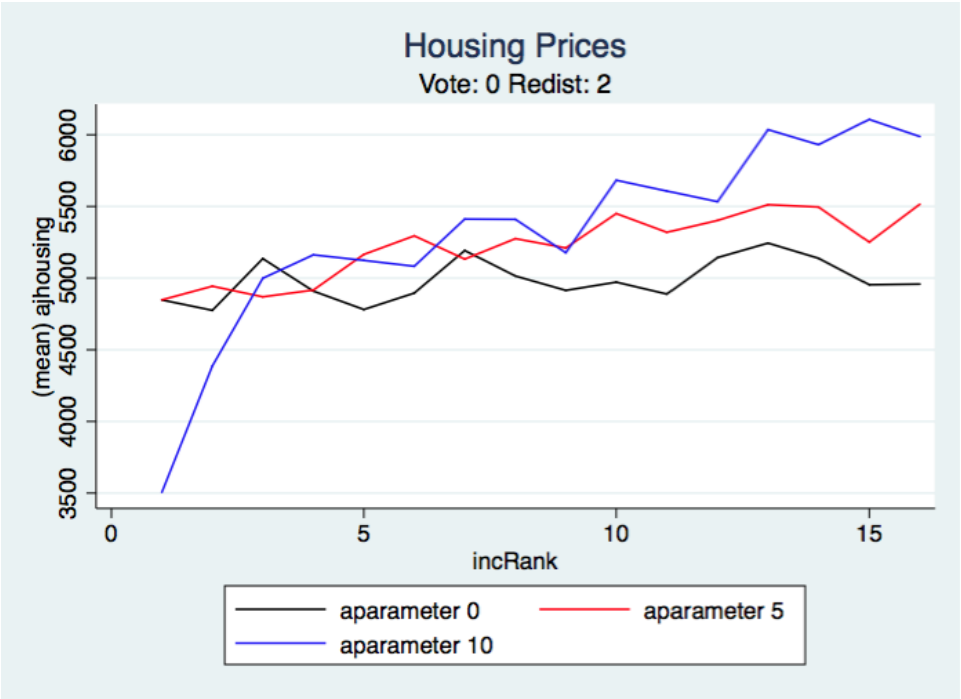
Appendix: Housing Prices Problem 2, Housing Prices and Jurisdiction Attractiveness

- Ayn Rand Paradise
  - Rich jurisdictions pay less for housing
  - When they have more control and rich areas are more attractive



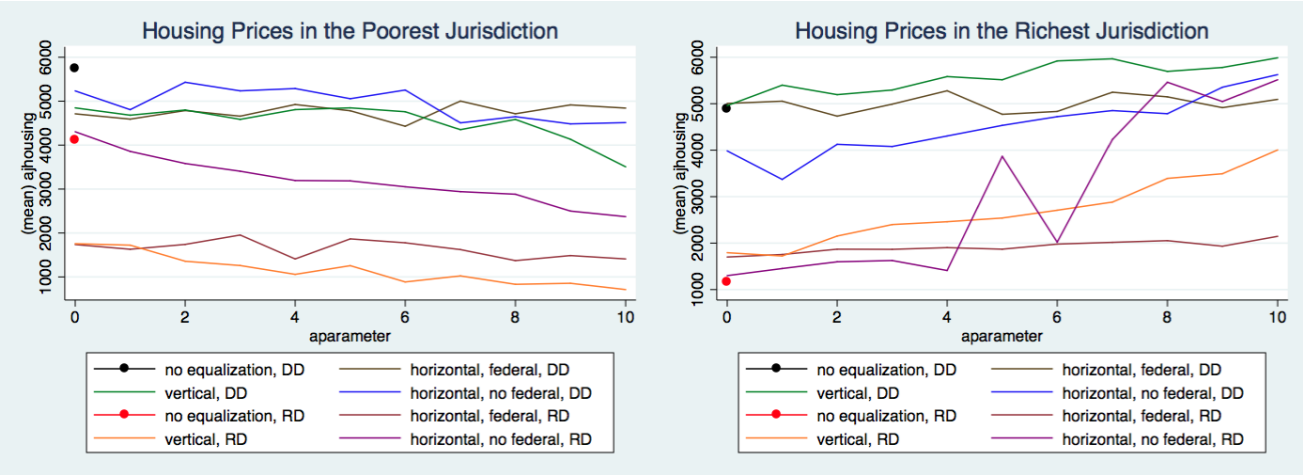
Appendix: Housing Prices Problem 2, cont.

- Ayn Rand Nightmare
  - Rich pay more for housing
  - When they have less control and their areas are unattractive!



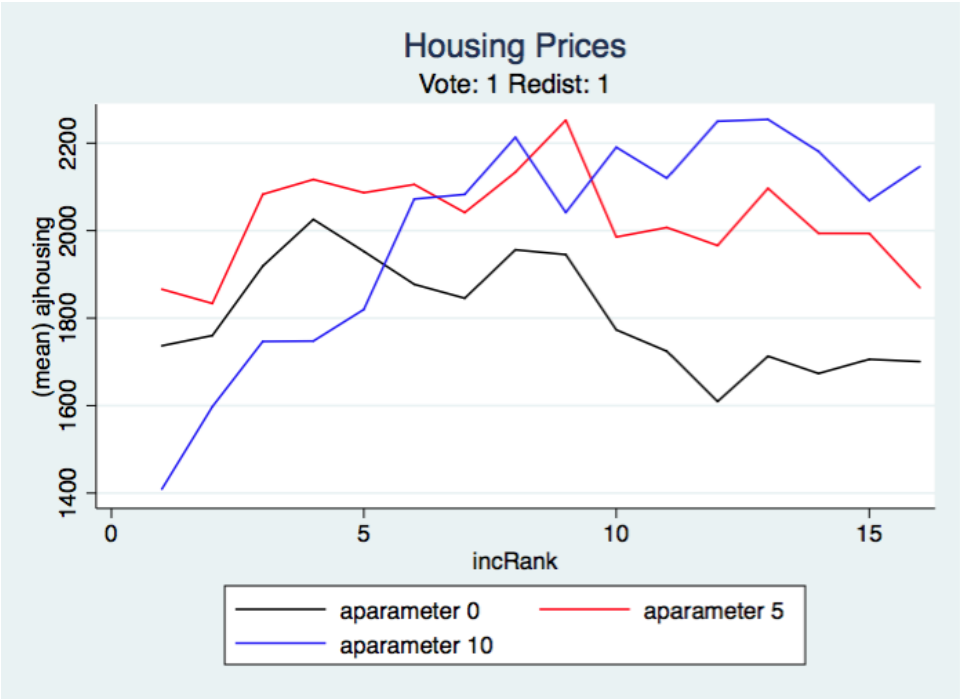
Appendix: Housing Prices Problem 3

- Equalization increases housing prices for the rich!
- Even though equalization makes these areas less attractive for the average agent

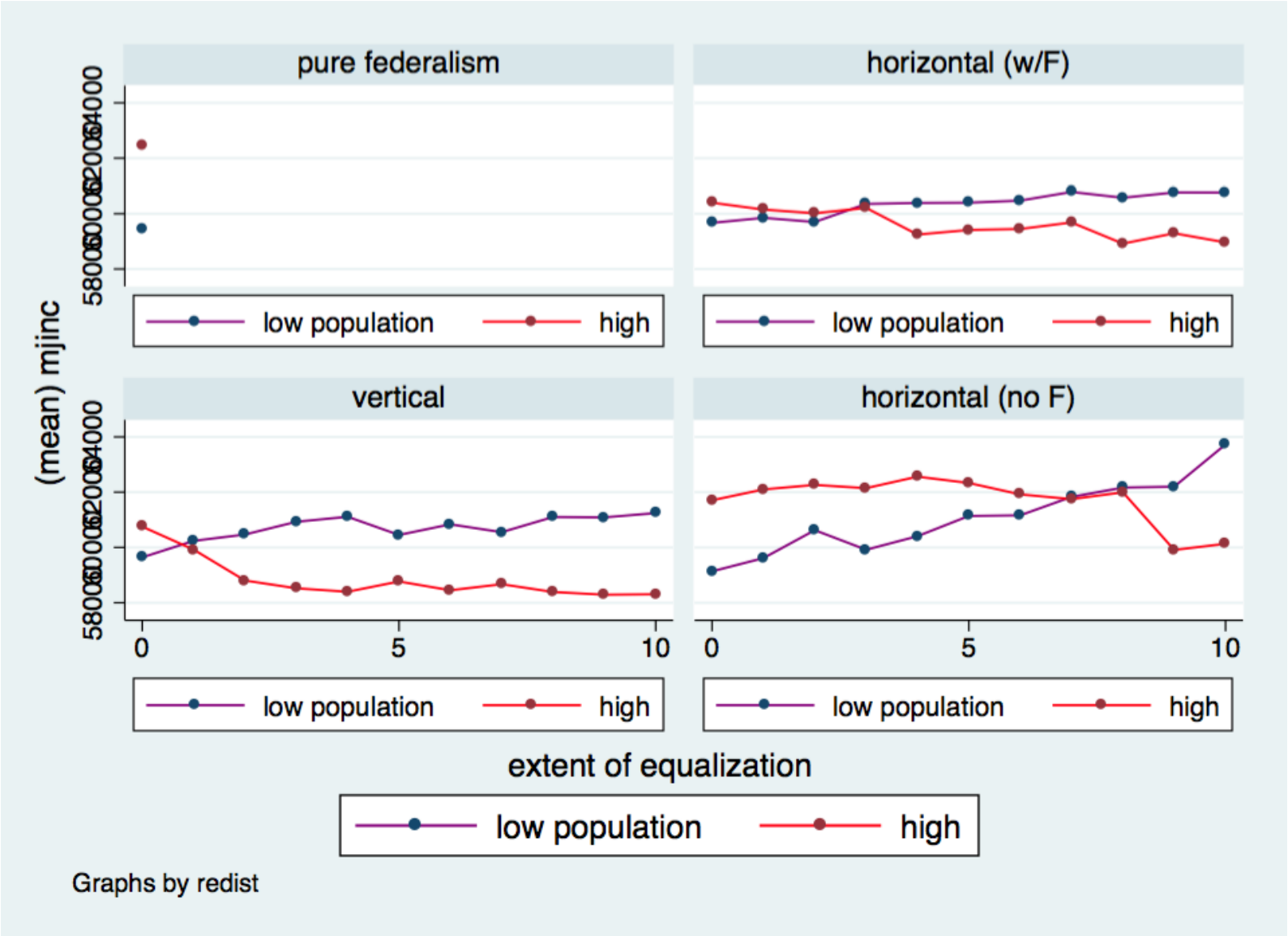


Appendix: Housing Prices

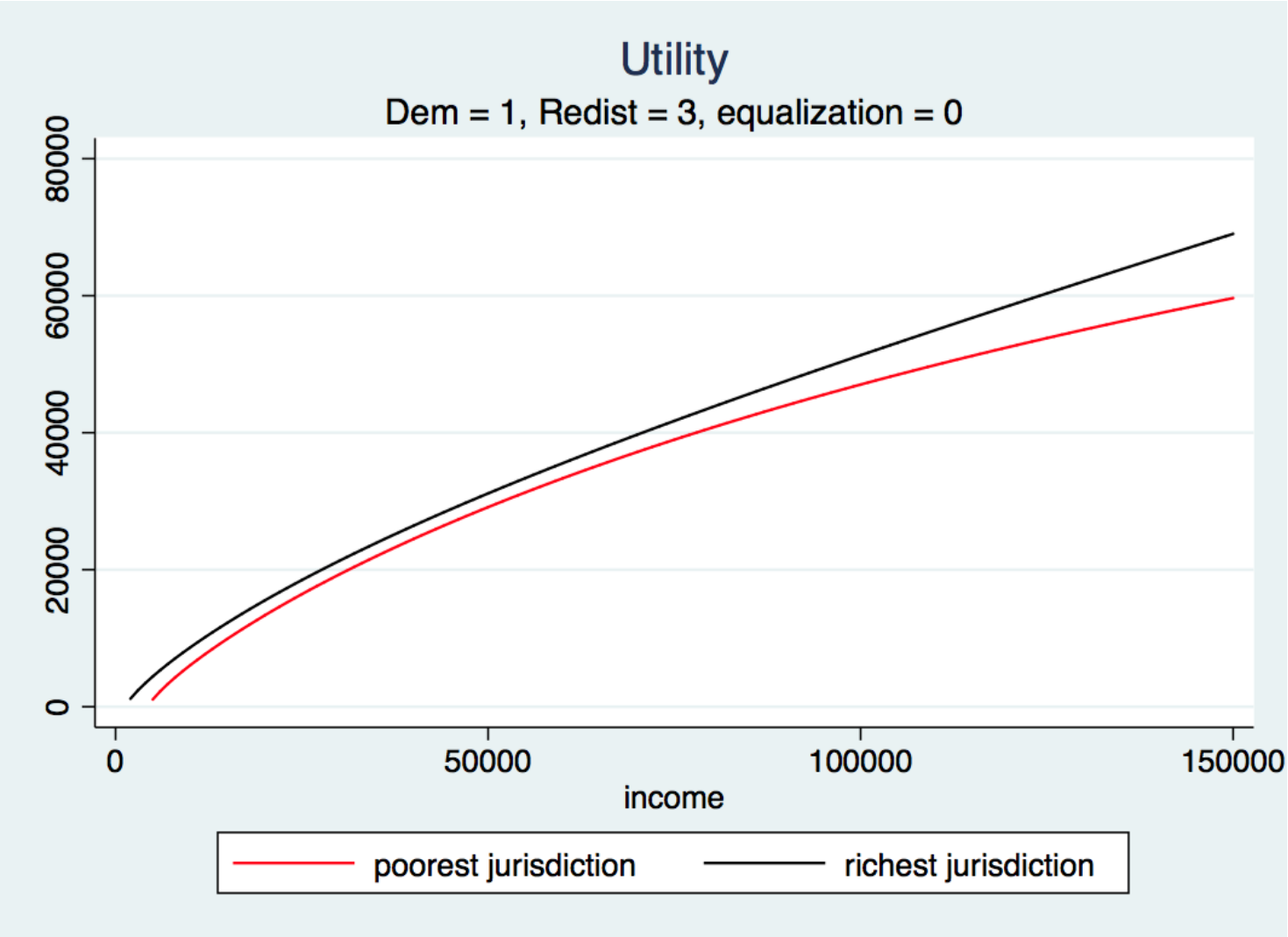
- Optimal Scenario
  - Rich pay same for housing at low equalization, more at high equalization



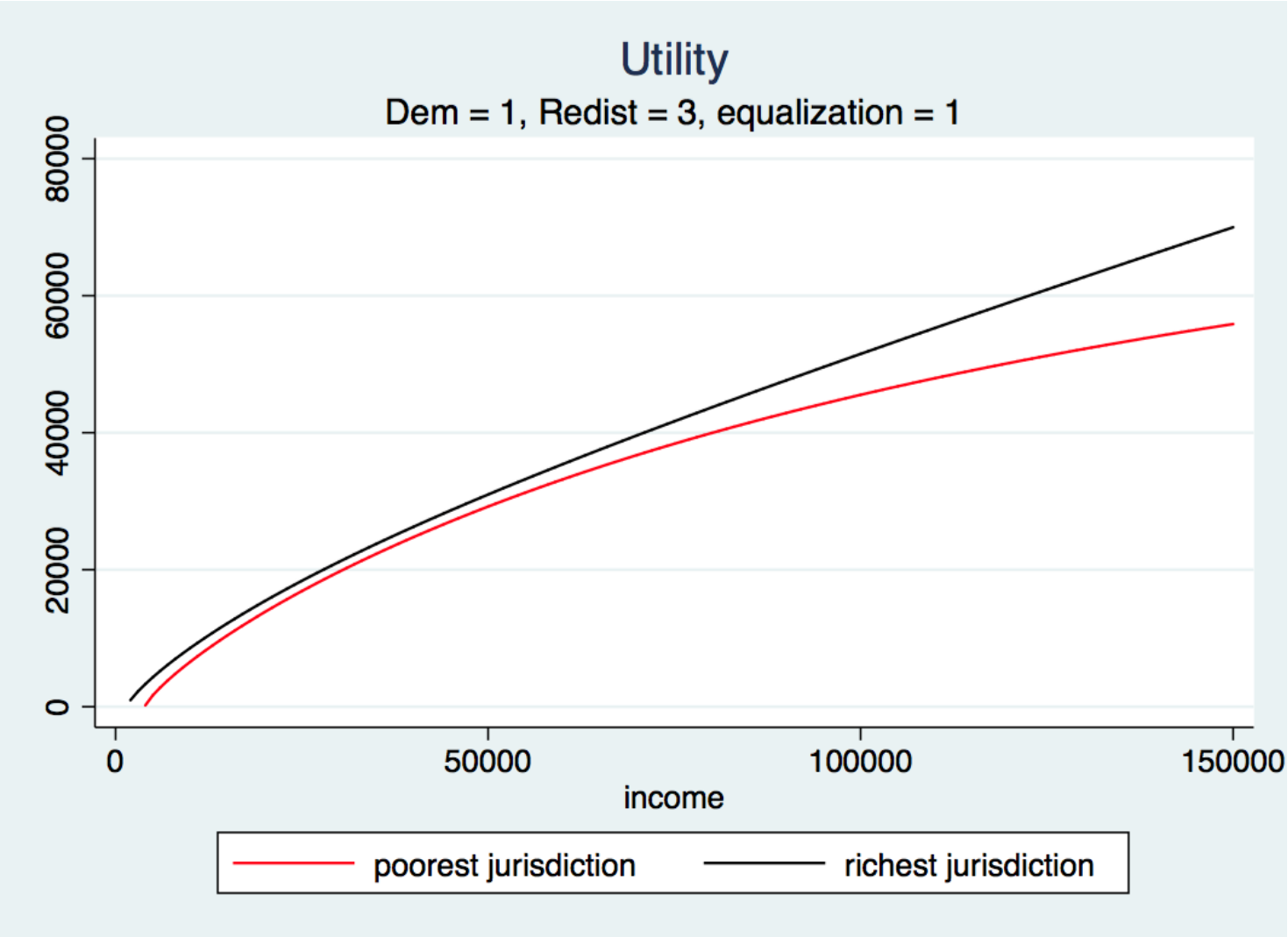
Appendix: Population swaps as equalization shifts



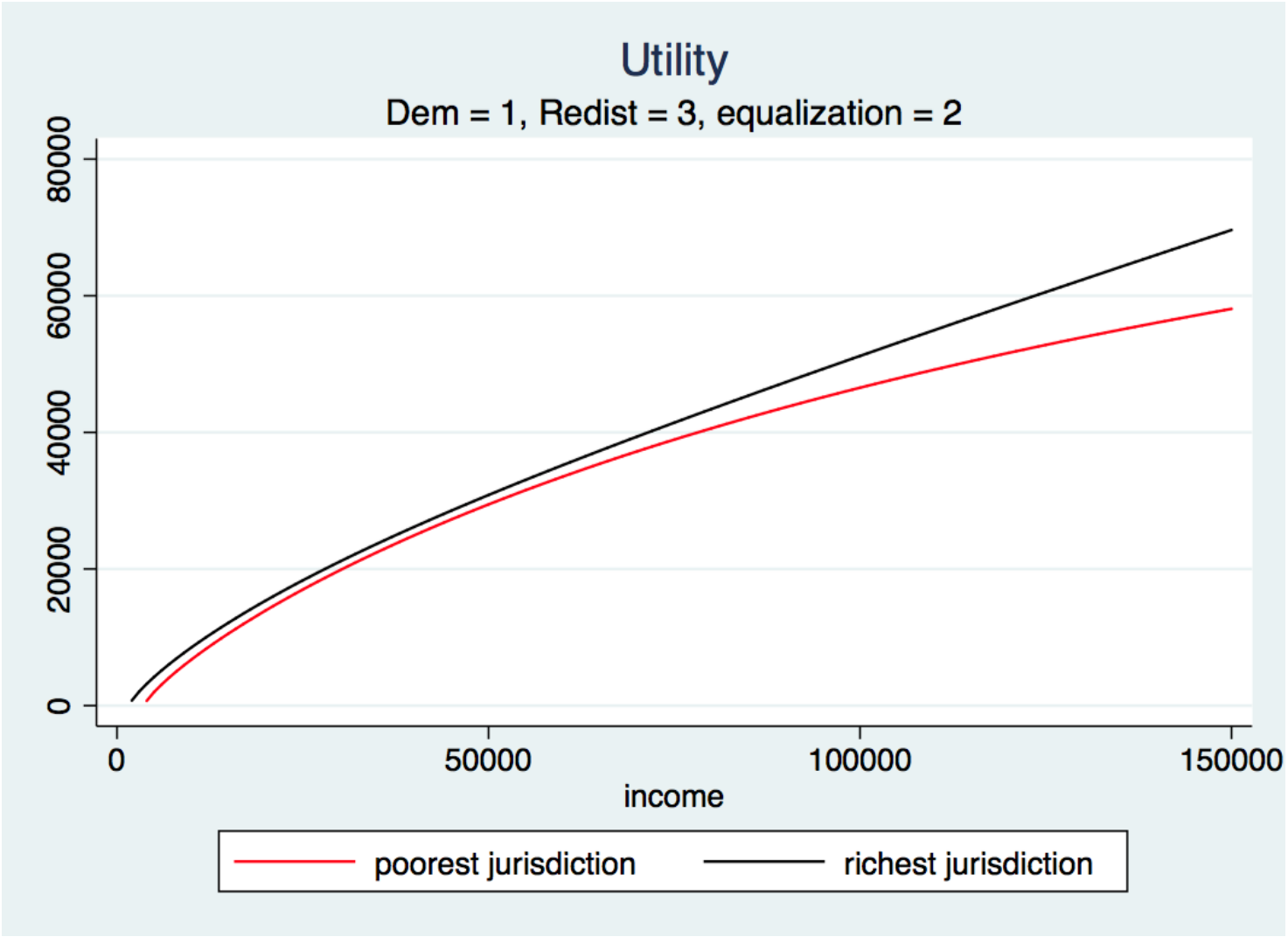
Why population swaps as equalization shifts: Utility curves



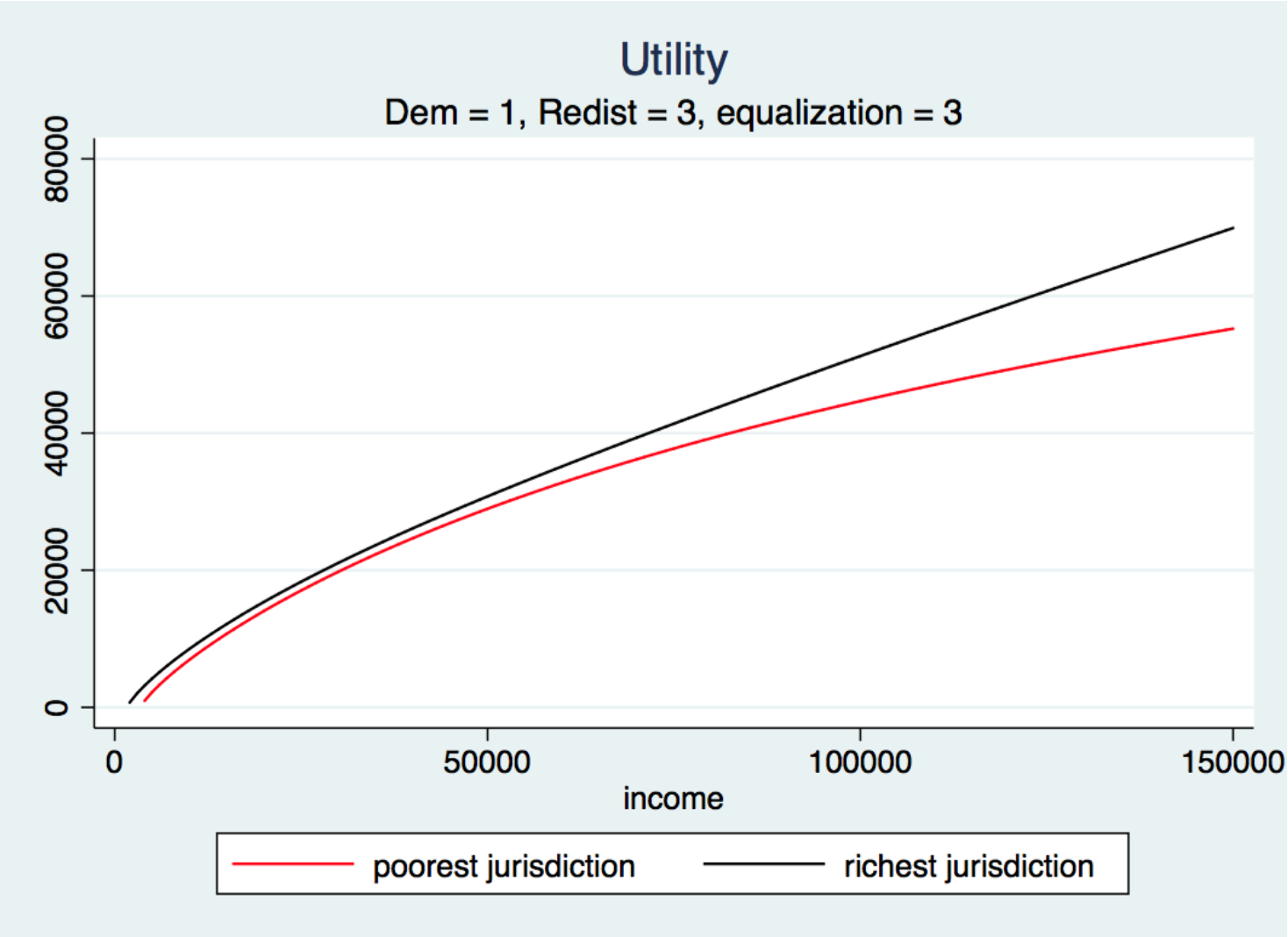
Why population swaps as equalization shifts: Utility curves



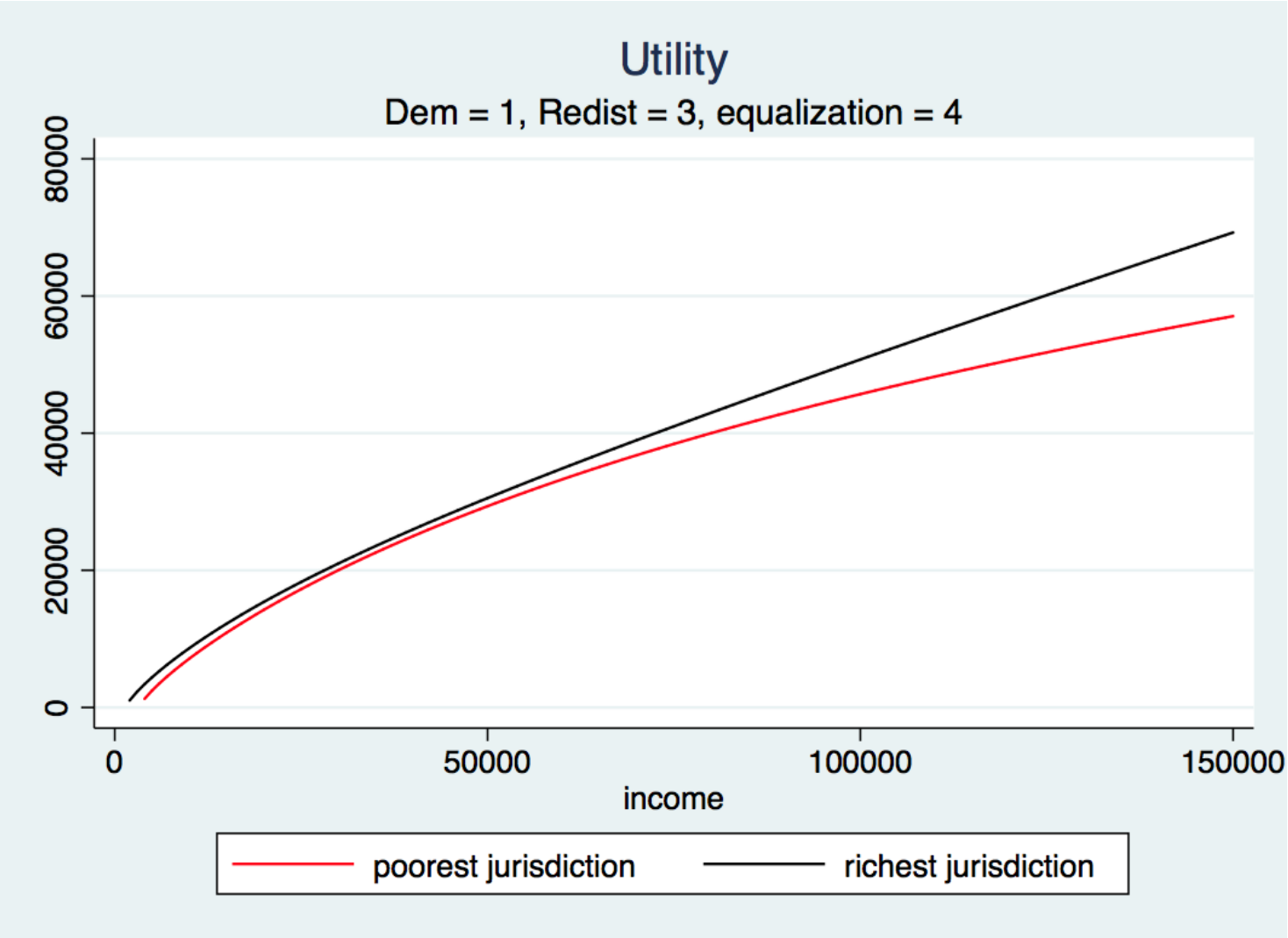
Why population swaps as equalization shifts: Utility curves



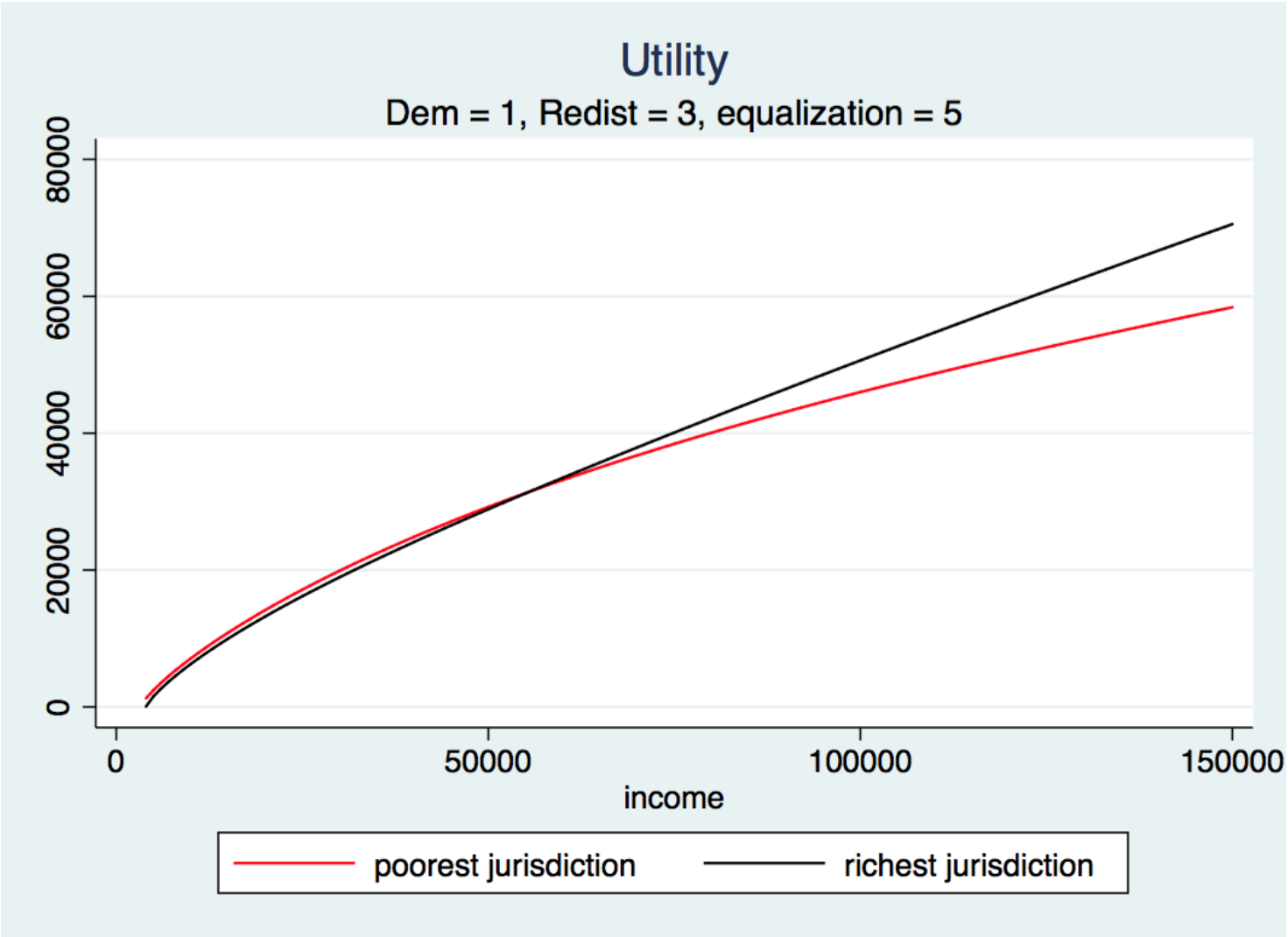
Why population swaps as equalization shifts: Utility curves



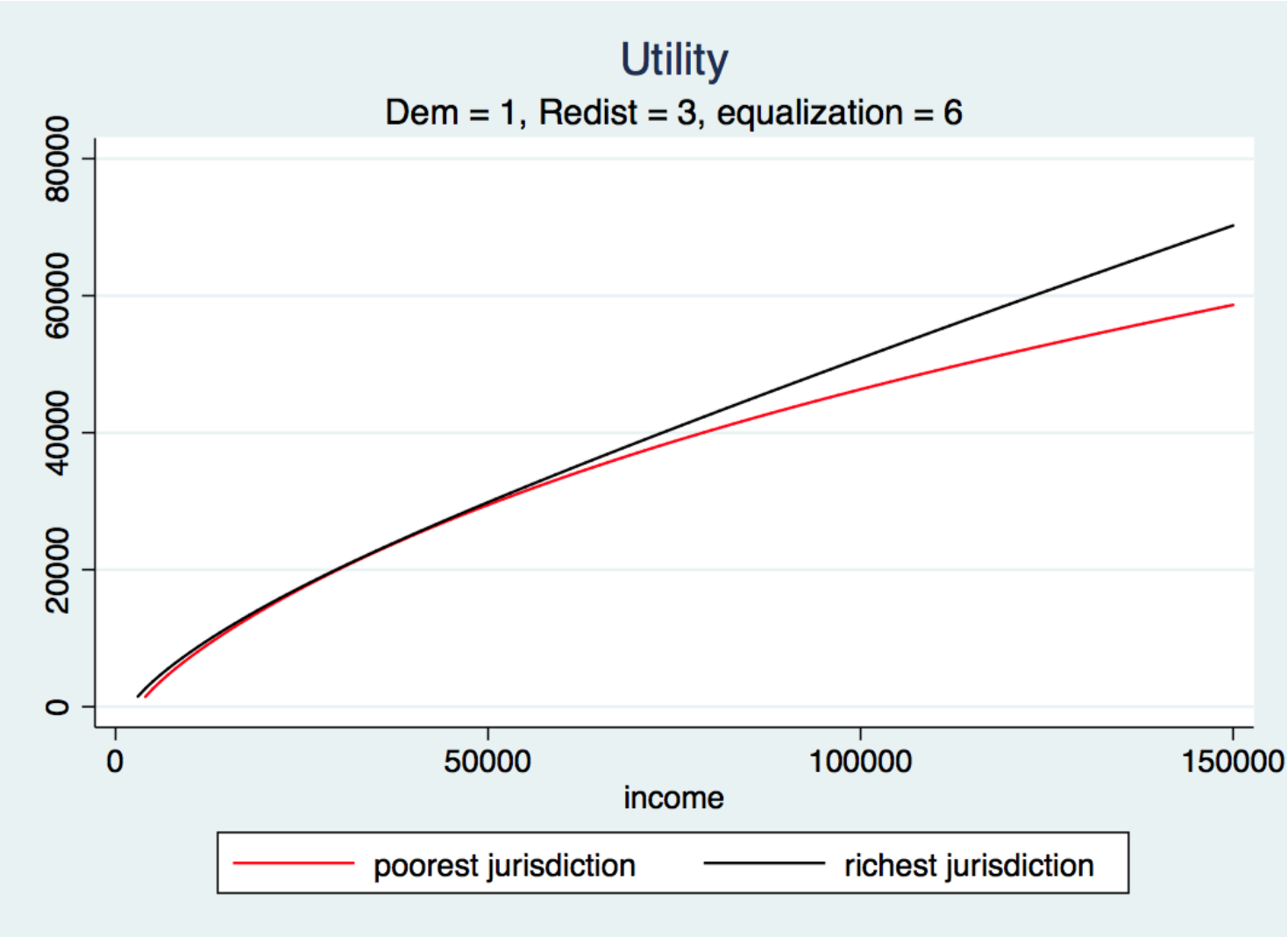
Why population swaps as equalization shifts: Utility curves



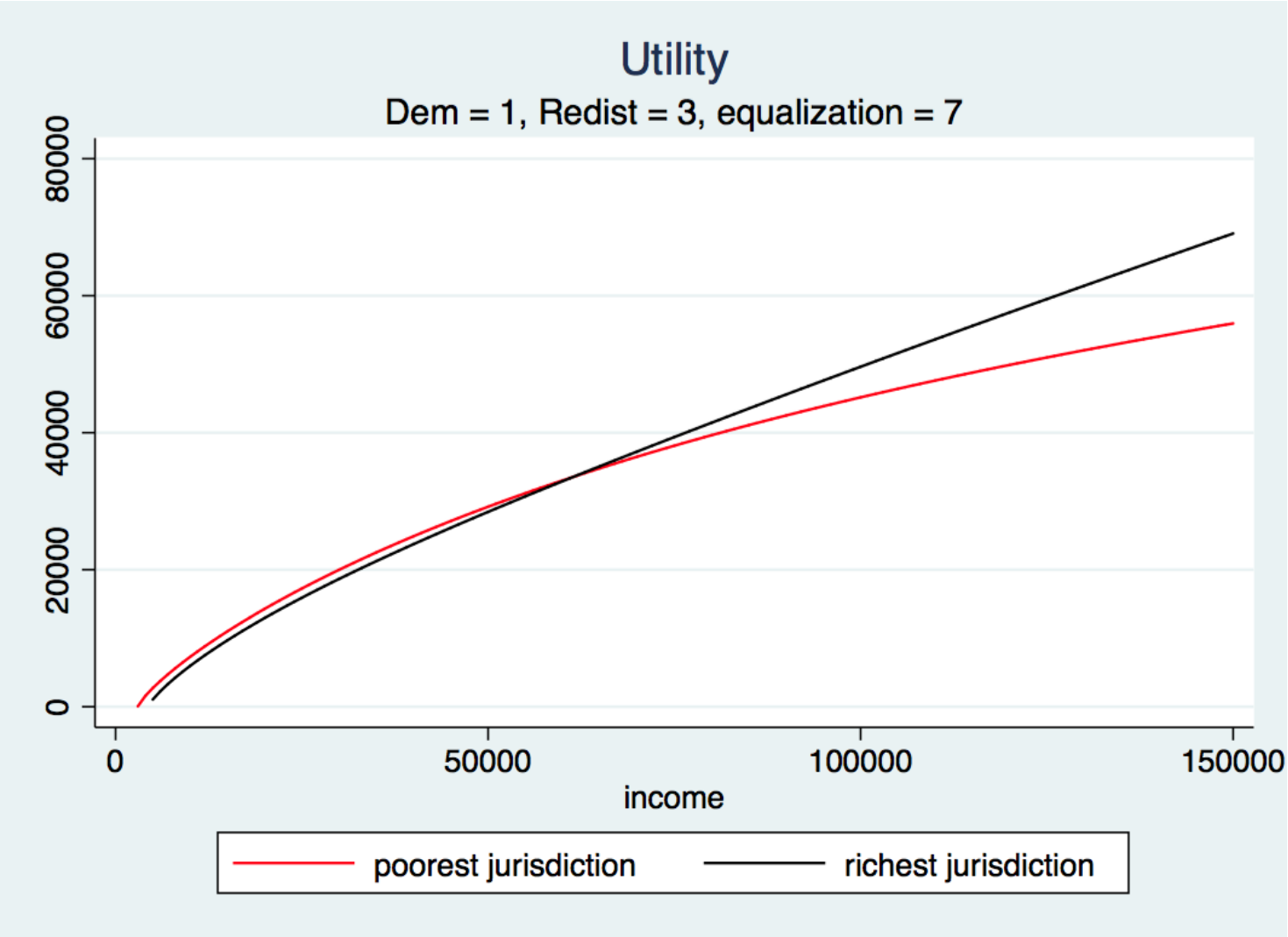
Why population swaps as equalization shifts: Utility curves



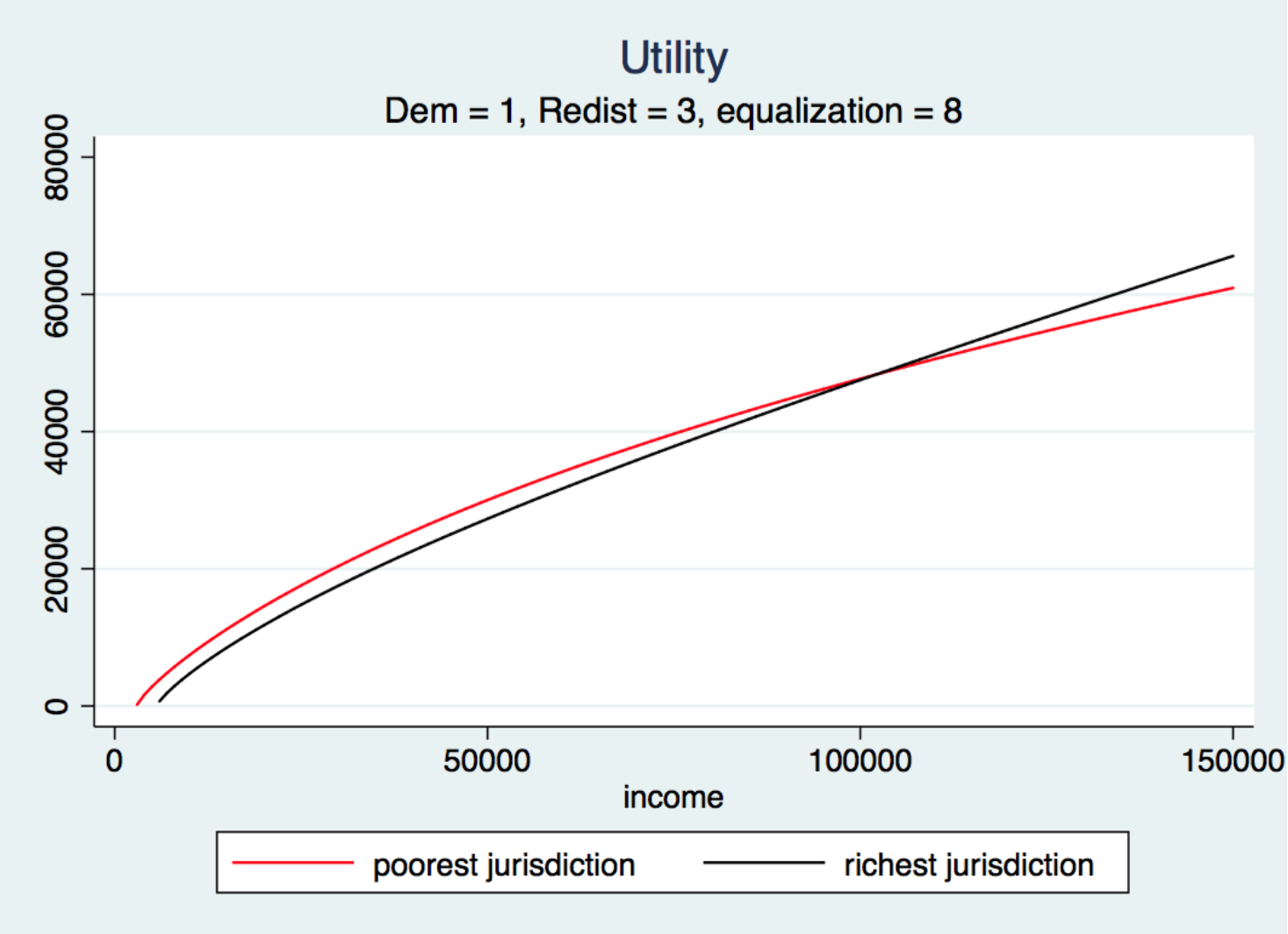
Why population swaps as equalization shifts: Utility curves



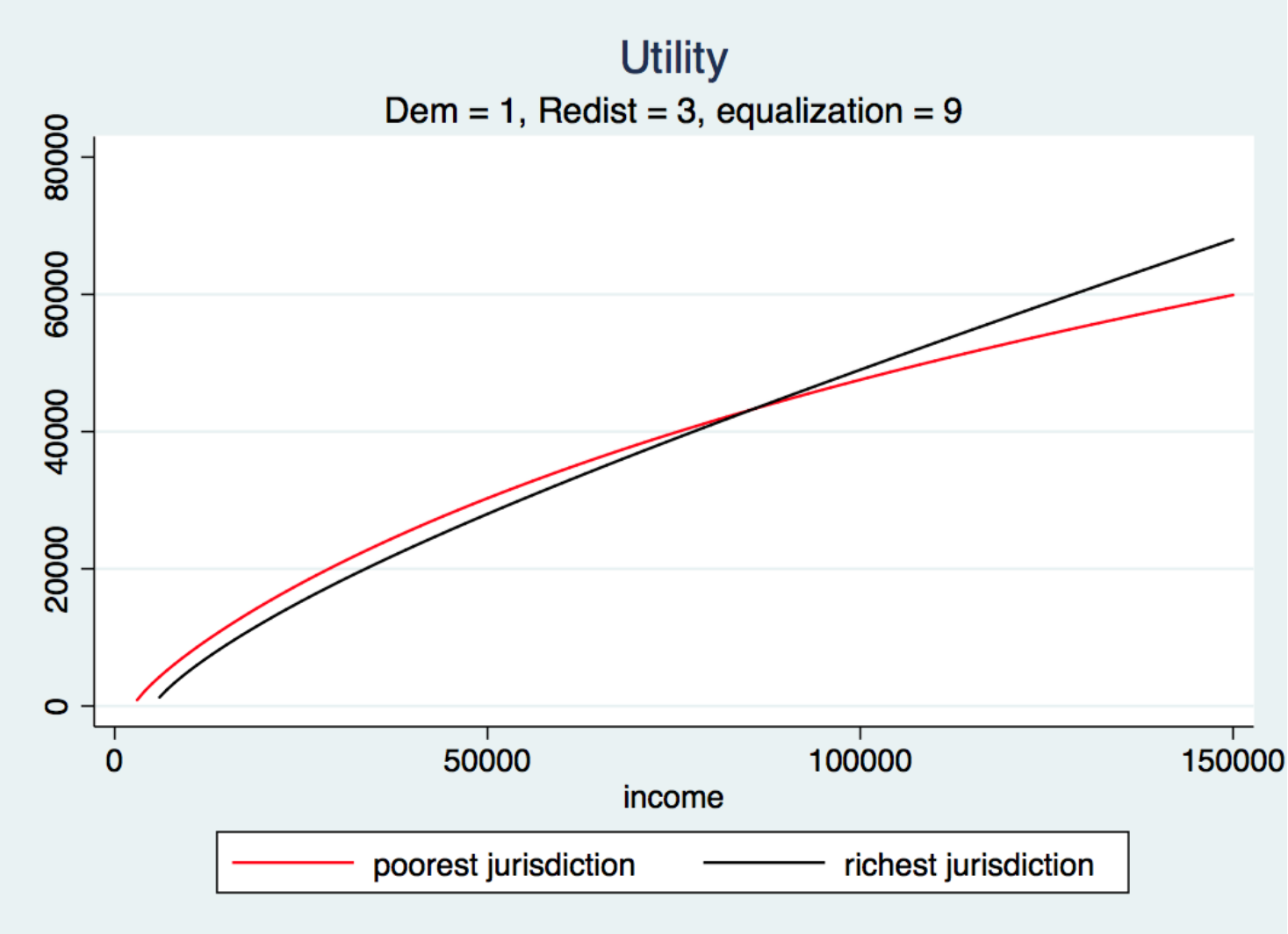
Why population swaps as equalization shifts: Utility curves



Why population swaps as equalization shifts: Utility curves



Why population swaps as equalization shifts: Utility curves



Why population swaps as equalization shifts: Utility curves