Redistributive Taxation in a Partial-Insurance Economy

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Redistributive taxation

Three principles that instruct the policy debate:

1. Distortions to labor supply
   Feldstein (1973), Sandmo (1976), Prescott (2002), Rogerson (2008)

2. Insurance against earnings shocks
   Eaton-Rosen (1980), Floden-Linde (2001), Krueger-Perri (2007)

3. Public good provision
   Citation (2001)

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- Normative: what is the optimal rate of progressivity? How does it depend upon...
  1. The elasticity of labor supply
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  3. The taste for public goods
- Our contribution:
  - Tractable framework that delivers insights on the trade-offs

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  4. government redistribution via progressive tax/transfer system

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- Aggregate technology linear in effective labor:

$$Y = \int w_i h_i di \equiv \int y_i di$$

- Resource constraint:

$$Y = \int c_i di + G$$

Demographics and preferences

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- Preferences over sequences of cons., hours, and public good:

$$U(\mathbf{c}_i, \mathbf{h}_i, \mathbf{G}) = \mathbb{E}_0 \sum_{t=0}^{\infty} (\beta\delta)^t u(c_{it}, h_{it}, G_t)$$

  - with period-utility:

$$u(c_{it}, h_{it}, G_t) = \frac{c_{it}^{1-\gamma} - 1}{1-\gamma} - \widetilde{\varphi}\,\frac{h_{it}^{1+\sigma}}{1+\sigma} + \chi \frac{G_t^{1-\rho} - 1}{1-\rho}$$

Individual endowments

- Agents born with zero initial financial wealth
- Individual endowments of efficiency units of labor:

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    $\alpha_{it} = \alpha_{i,t-1} + \omega_t$ with $\omega_{it} \sim F_\omega$ and $\alpha_{i0} \sim F_{\alpha_0}$

  - ε_{it} component is transitory

    ε_{it} i.i.d. with $\varepsilon_{it} \sim F_\varepsilon$

Financial and insurance markets

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- Market structure
  - $v_{\varepsilon} = 0 \Rightarrow$ bond economy
  - $v_{\alpha} = 0 \Rightarrow$ full insurance
  - In between: "partial insurance"

Government

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- Post-government (disposable) earnings:

$$\tilde{y}_i = \lambda y_i^{1-\tau}$$

- Government budget constraint (no debt):

$$G = \int \left[y_i - \lambda y_i^{1-\tau} \right] di$$

- Given (G, τ), λ balances the budget in equilibrium

Our model of fiscal redistribution

- The parameter τ measures the rate of progressivity:

$$\log(\tilde{y}_i) = const + (1 - \tau)\log(y_i)$$

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- Then, if $\tau > 0$:

1. The system is progressive
2. The system generates a transfer for low earnings

Empirical content of our model for fiscal redistribution

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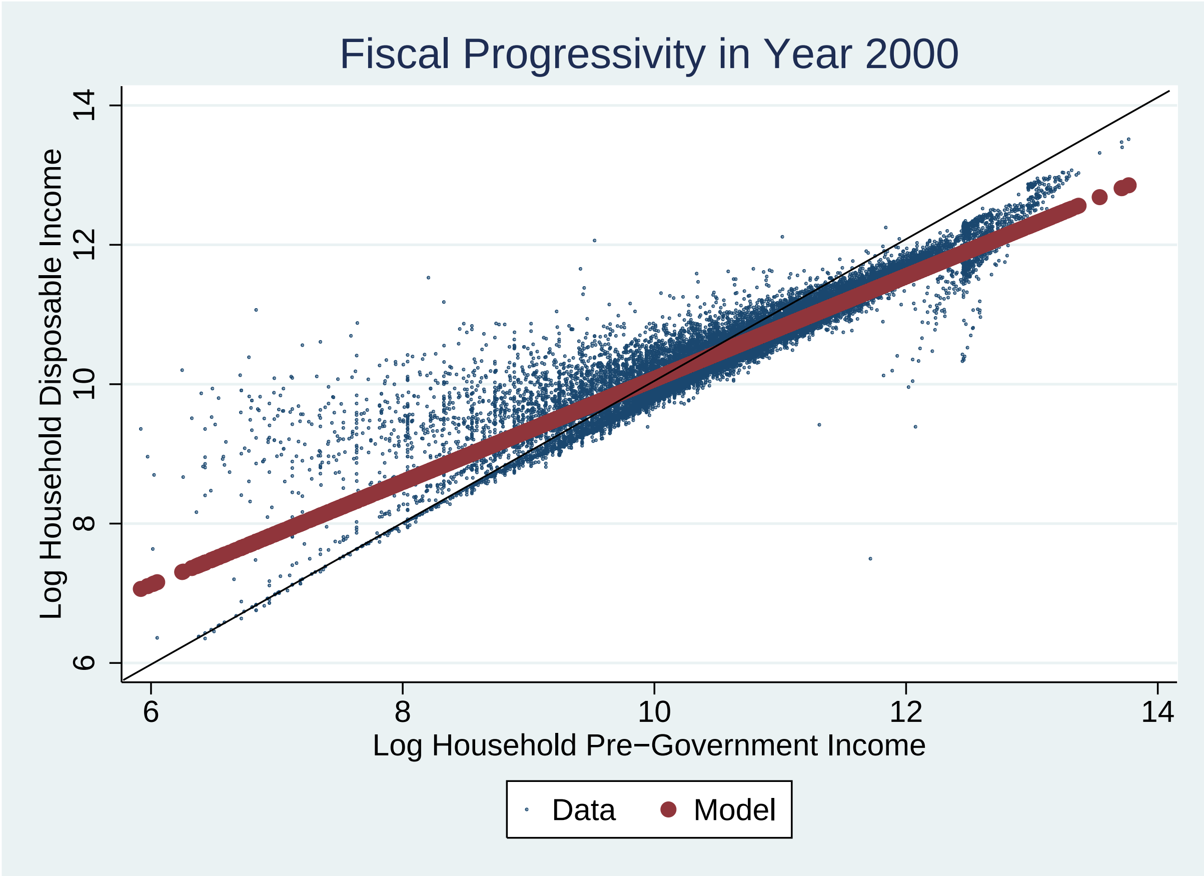

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- There exists a bond price $q^* > \beta$ s.t. the intertemporal dissaving motive equals the precautionary saving motive, for all agents

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- In equilibrium: ε shocks insured, α shocks uninsured by markets

Equilibrium allocations: hours worked

$$\ln h^*(\alpha,\varepsilon) = \underbrace{\frac{1}{(1-\tau)(\widehat{\sigma}+\gamma)}\left[(1-\gamma)\ln\lambda^* + \ln(1-\tau) - \varphi\right]}_{\text{Representative agent}}$$

$$- \underbrace{M_h(v_\varepsilon)}_{\text{Wealth effect}} + \underbrace{\frac{1-\gamma}{\widehat{\sigma}+\gamma}\alpha}_{\text{Unins. shock}} + \underbrace{\frac{1}{\widehat{\sigma}}\varepsilon}_{\text{Insurable shock}}$$

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- Tax-modified Frisch elasticity (decreasing in τ):

$$\frac{1}{\widehat{\sigma}} \equiv \frac{1-\tau}{\sigma+\tau}$$

- γ measures the relative strength of income vs. substitution effect

Equilibrium allocations: consumption

$$\ln c^*(\alpha) = \underbrace{\frac{1}{\widehat{\sigma} + \gamma}\left[(1+\widehat{\sigma})\ln\lambda^* + \ln(1-\tau) - \varphi\right]}_{\text{Representative agent}}$$

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- The transmission coefficient of a permanent uninsured shock:

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- Quantitatively:

$$0.60 = \quad 0.74 \times 1.07 = 0.79 \quad \times \quad 0.75$$

Optimal progressivity and public good provision

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Roadmap on normative analysis

- Assume shocks are log-normal
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- Assume log-utility over private and public consumption $(\gamma = \rho = 1)$

1. Case I: no utility from public goods ($\chi = 0$)
2. Case II: utility from public goods, but no heterogeneity $(\chi > 0, v_\alpha = v_\varepsilon = 0)$
3. Case III: utility from public goods and heterogeneity $(\chi > 0, v_\alpha > 0, v_\varepsilon > 0)$

Social welfare function $(\chi = 0)$

- Plugging (c^*, h^*, λ^*) into expected utility yields:

$$\ln \mathcal{W}(\tau) = \underbrace{-\varphi + \frac{\ln(1-\tau) - (1-\tau)}{1+\sigma}}_{\text{Indirect utility of RA}} + \underbrace{\frac{1}{\hat{\sigma}} v_\varepsilon}_{\log(Y/H)}$$

$$\underbrace{-(1-\tau)^2 \frac{v_\alpha}{2}}_{var(\log c)} - \sigma \underbrace{\left(\frac{1}{\hat{\sigma}^2}\right) \frac{v_\varepsilon}{2}}_{var(\log h)}$$

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$$\underbrace{-(1-\tau)^2 \frac{v_\alpha}{2}}_{var(\log c)} - \underbrace{\sigma \left(\frac{1}{\hat{\sigma}^2} \right) \frac{v_\varepsilon}{2}}_{var(\log h)}$$

- $\mathcal{W}(\tau)$ is globally concave in τ if $\sigma > 2$

- $\frac{\partial \mathcal{W}(\tau)}{\partial \tau}|_{\tau=0} > 0$ iff $v_\alpha > 0 \Rightarrow$ interior solution for τ^*

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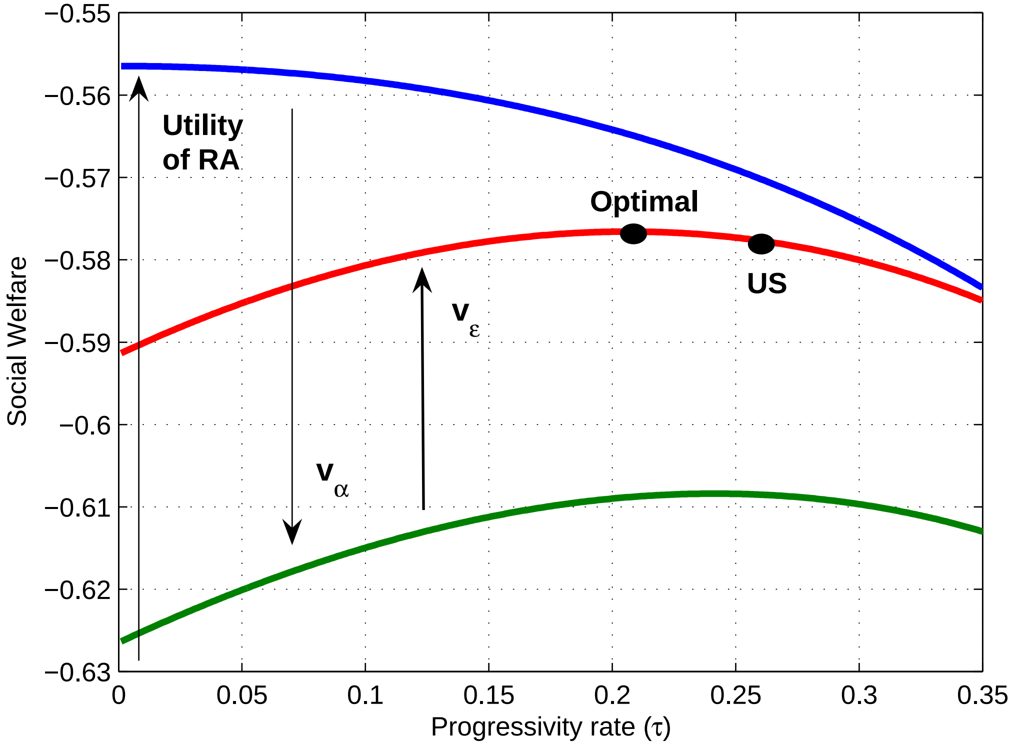
- $\frac{\partial \tau^*}{\partial \varphi} = 0$: independent of the disutility of work

Optimal progressivity in US $(\sigma = 2, v_\alpha = v_\varepsilon = 0.14)$



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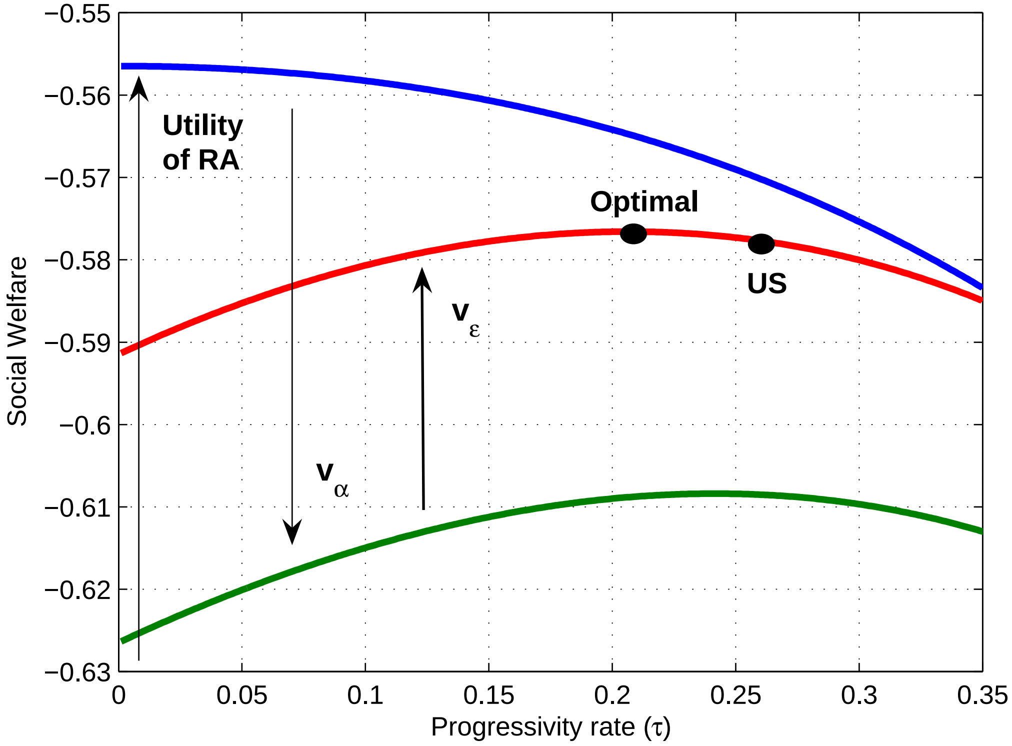
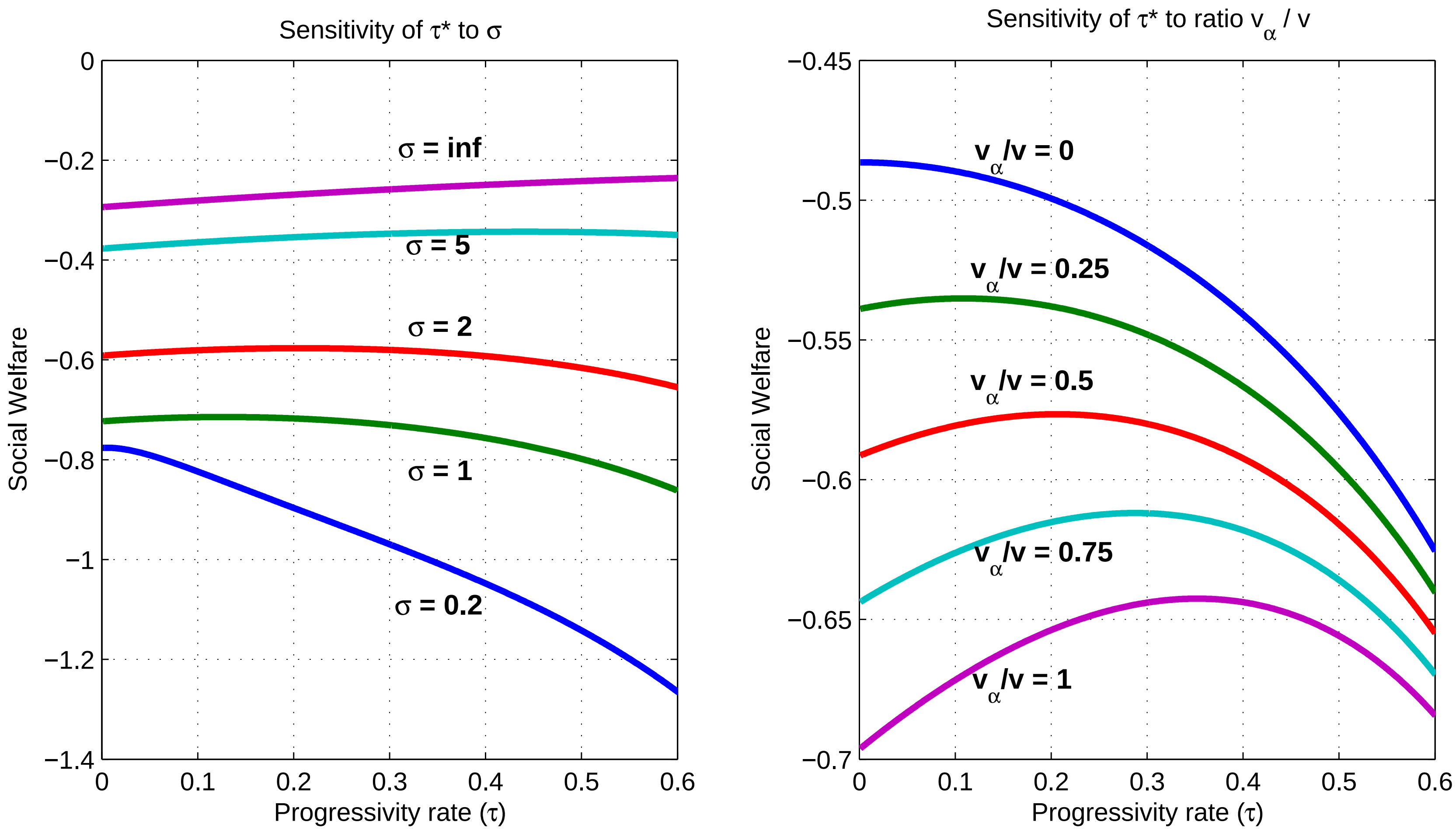


- The optimal rate is $\tau^* = 0.21$ vs. actual rate of 0.26
- Welfare gain (CEV) from actual to optimal: $+0.01\%$
- Welfare loss (CEV) from actual to no redistribution: -1.4%

Sensitivity analysis



Valued government consumption: $\chi > 0$

- Define $\phi \equiv G/Y$
- Representative agent version of the model $(v_\alpha = v_\varepsilon = 0)$
- Welfare-maximizing fiscal policy is given by the pair:

$$\phi^* = \frac{\chi}{1+\chi}$$

$$\tau^* = -\chi$$

- Optimal fiscal policy is regressive $(\tau^* < 0)$
- Stronger taste for public goods $\Rightarrow$ more regressive tax schedule

First best with regressive taxation

- Allocations (c^*, h^*, G^*) implied by the pair (ϕ^*, τ^*) are first best, i.e. they solve:

$$\begin{aligned}(c^*, h^*, G^*) &= \arg\max u(c,h,G) \\ &\text{s.t.} \\ c+G &= h\end{aligned}$$

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- Optimal degree of regressivity $(\tau^* = -\chi)$ achieves both:
  - desired average tax rate (to finance G)
  - zero marginal tax rate (h undistorted)
- Taxes are locally lump-sum

Valued govt. consumption and uninsurable risk

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- Trade-off in determining optimal rate of progressivity:
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  - More rigid labor supply (higher σ) $\Rightarrow$ more progressive taxation
  - Stronger taste for G (higher χ) $\Rightarrow$ more regressive taxation

Progressive or regressive taxation?

- Parameter space can be divided into regions where $\tau^* \lesseqgtr 0$:

$$\begin{array}{lcl} \chi > v_\alpha(1+\sigma) & \Rightarrow & \tau^* < 0 \\ \chi = v_\alpha(1+\sigma) & \Rightarrow & \tau^* = 0 \\ \chi < v_\alpha(1+\sigma) & \Rightarrow & \tau^* > 0 \end{array}$$

- Insurable risk v_ε unconsequential because at $\tau^* = 0$ labor supply response to insurable shocks is undistorted

- With $v_\alpha = v_\varepsilon = 0.14$, and $\chi = 0.25$ $\left(\frac{G}{Y} = 0.2\right)$

$$\begin{array}{lcl} \sigma = 0.8 & \Rightarrow & \tau^* = 0.00 \text{ (flat)} \\ \sigma = 2.0 & \Rightarrow & \tau^* = 0.07 \text{ (optimal)} \\ \sigma = 6.3 & \Rightarrow & \tau^* = 0.26 \text{ (actual US)} \end{array}$$

Average tax rate: actual US vs optimal