Empirical Research on Economic Inequality
Top tax rates and optimal taxation

Maximilian Kasy

Harvard University, fall 2015

Redistribution through taxation

- Important policy tool to deal with inequality
- How to choose a tax and transfer system, tax rates?
- $\Rightarrow$ Theory of optimal taxation
- Key assumptions:
  1. Evaluate individual welfare in terms of utility.
  2. Take welfare weights as given.
  3. Impose government budget constraint.

Feasible policy changes

- Consider small change in tax rates.
- Has to respect government budget constraint
  $\Rightarrow$ zero effect on revenues.
- Total revenue effect:
  1. Mechanical part: accounting; holding behavior (tax base) fixed.
  2. Behavioral responses: changing tax base.

When are taxes optimal?

- Optimality: no feasible change improves social welfare.
- This implies:
  zero effect on social welfare for any feasible small change
- $\approx$ first order condition
- Effect of change on social welfare:
  1. Individual welfare: equivalent variation
  2. Social welfare: sum up using welfare weights

Effect on social welfare *SWF*

- Small change $d\tau$ of some tax parameter
- Effect on social welfare:

$$dSWF = \sum_i \omega_i \cdot EV_i$$

- ω_i: value of additional \$ for person i
- EV_i: equivalent variation - cf. last class
- By the envelope theorem:
  EV_i is mechanical effect on i's budget,
  holding all choices constant.
- e.g., $EV_i = -x_i \cdot d\tau$ for tax τ on x_i

Effect on government budget G

- Mechanical effect plus behavioral effect
- For instance for a tax τ on x_i,

$$dG = \sum_i x_i \cdot d\tau + dx_i \cdot \tau.$$

- Estimating dx_i part is difficult, the rest is accounting.
- Possible complication: effect of tax change on market prices.
- This complication is often ignored.

Top income taxes

- Optimal top income taxes?
- Suppose welfare weights (value of additional \$) are very small for the very rich, relative to the average.
- Then optimal top income taxes maximize revenue – simpler problem.
- Tax rate τ for incomes above cut-off $\underline{y}$
- Tax revenues from top bracket, per tax payer:

$$G(\tau) = \tau \cdot \left(E[Y|Y \geq \underline{y}] - \underline{y}\right)$$

First order condition for maximizing revenue

- Mechanical and behavioral effect:

$$\partial_\tau G(\tau) = \left(E[Y|Y \geq \underline{y}] - \underline{y}\right) + \tau \cdot E[\partial_\tau Y|Y \geq \underline{y}] \stackrel{!}{=} 0$$

- Remember the Pareto distribution?

$$P(Y > y|Y \geq \underline{y}) = \left(\underline{y}/y\right)^\alpha$$
$$E[Y|Y \geq \underline{y}] = \frac{\alpha}{\alpha - 1} \cdot \underline{y}.$$

Tax elasticity of income

- Elasticity notation:

$$\eta = \frac{\partial \log(Y)}{\partial \log(1-\tau)} = -\frac{\partial Y}{\partial \tau} \cdot \frac{1-\tau}{Y}$$

- Elasticity of income with respect to net-of-tax rate $(1-\tau)$
- In this notation:

$$E[\partial_\tau Y | Y \geq \underline{y}] = -\frac{\eta}{1-\tau} E[Y | Y \geq \underline{y}]$$

Questions for you

Solve for the optimal τ, using

1. The first order condition

$$\left(E[Y|Y \geq \underline{y}] - \underline{y}\right) + \tau \cdot E[\partial_\tau Y|Y \geq \underline{y}] \stackrel{!}{=} 0,$$

2. the property of the Pareto distribution that

$$E[Y|Y \geq \underline{y}] = \frac{\alpha}{\alpha - 1} \cdot \underline{y},$$

3. and the elasticity notation,

$$E[\partial_\tau Y|Y \geq \underline{y}] = -\frac{\eta}{1-\tau} E[Y|Y \geq \underline{y}].$$

Solution

- Plugging 2 and 3 into the FOC:

$$\partial_\tau G(\tau) = \left(E[Y|Y \geq \underline{y}] - \underline{y}\right) - \frac{\tau}{1-\tau} \cdot \eta \cdot E[Y|Y \geq \underline{y}]$$
$$= \underline{y} \cdot \left(\frac{\alpha}{\alpha - 1} \cdot \left(1 - \frac{\tau}{1-\tau} \cdot \eta\right) - 1\right) \stackrel{!}{=} 0 \qquad (1)$$

- After some algebra,

$$\tau^* = \frac{1}{1 + \alpha \cdot \eta}.$$

Questions for you

How do optimal tax rates depend on the amount of income inequality, and on the elasticity of taxable income?

Plugging in some numbers

- Reasonable estimate of the Pareto parameter: $\alpha = 2$ (cf. Atkinson et al. 2011)
- Reasonable estimate of the elasticity: $\eta = 0.25$
- Then
$$\tau^* = \frac{1}{1+\alpha \cdot \eta} = \frac{1}{1+0.5} = 67\%.$$

References

Saez, E. (2001). Using elasticities to derive optimal income tax rates. The Review of Economic Studies*, 68(1):205–229.*

Chetty, R. (2009). Sufficient statistics for welfare analysis: A bridge between structural and reduced-form methods. Annual Review of Economics*, 1(1):451–488.*