Fiscal Policy and Inequality

13. Tax Inefficiencies & Optimal taxation

Elliott Ash

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Outline

Tax Distortions and Deadweight Loss

Optimal Taxation

Ramsey Model

Taxes and Labor Supply

Mirrlees (1971)

Laffer Curve

Saez (2001)

Distortionary Effects of Taxation

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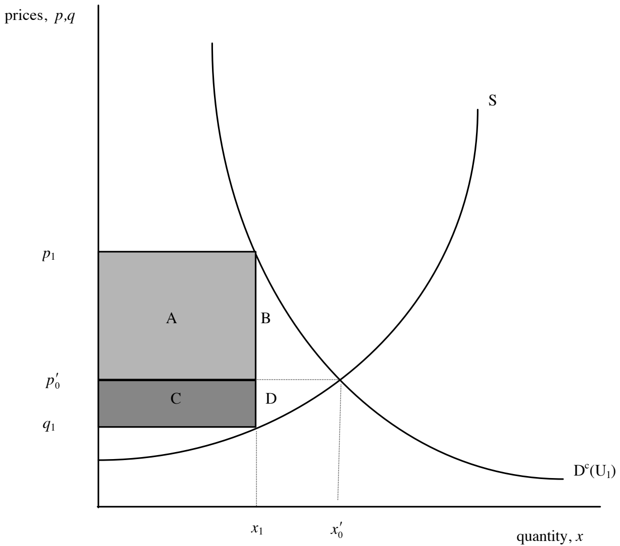
- While incidence analysis focuses on **prices**, efficiency analysis focuses on **quantities**

Deadweight Loss (DWL)



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- Let the consumer have income $Y = 1$

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- Budget constraint: $Y = p_x x + p_z z$
- Substitute optimal z into budget constraint:

$$x^* = \left(\frac{a}{a+b}\right)\frac{Y}{p_x}, \; z^* = \left(\frac{b}{a+b}\right)\frac{Y}{p_z}$$

Simple example: solution

$$u(x_1, x_2) = x_1 x_2, P_1 = 1, P_2 = c, Y = 1$$

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  - Consumption levels: $x_1 = \frac{1}{2}$; $x_2 = \frac{1}{2c}$
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- Note that

$$\frac{\partial \mathrm{DWL}}{\partial t} = \frac{t}{(2c+t)^3} > 0, \forall t > 0$$

  - increasing taxes has a small but accelerating positive effect on on deadweight loss.

Outline

Optimal Taxation

- "Optimal" tax theory must combine lessons from deadweight loss and tax incidence:
  - Optimal size of the pie? - **Efficiency**
  - How is the pie distributed? - **Equity**
- What is the best way to design taxes given equity and efficiency concerns?

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- **Equity perspective**: individualized lump-sum taxes
  - Tax higher-ability (higher earning power) individuals with larger lump sum
  - **Problem**: we cannot observe ability directly
    - Hence we tax outcomes, such as income or consumption
    - Creates distortions & inefficiency

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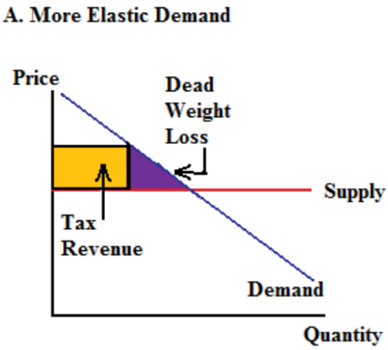
   - no redistributive concerns.
4. Cannot tax all commodities: x_0(leisure) untaxed

Ramsey (1927): Elastic vs Inelastic Demand



- **Intuition:** tax inelastic goods to minimize efficiency costs

Ramsey (1927): Inverse Elasticity Rule

- The (simplified) Ramsey tax formula for the linear tax on good i is
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where λ is a parameter summarizing the value of government spending, and ϵ_i is the elasticity of demand for good i.

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  - Low $\epsilon_i \rightarrow$ high τ_i
  - Taxes on all goods, unless perfectly elastic demand
  - The ratio of the taxes on two goods is the inverse ratio of their demand elasticities:
$$\frac{\tau_i}{\tau_j} = \frac{\epsilon_j}{\epsilon_i}$$

Ramsey (1927): Limitations

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- Restricted to linear taxes
- Does not take into account redistributive motives
  - Necessities usually more inelastic than luxuries
  - Thus, optimal Ramsey tax system is regressive

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- In April 2010, the British government raised the top income tax rate from 40% to 50%
- Assuming that taxable income had remained constant after the reform, tax revenues would have increased by **6.8 billion** pounds (0.46% of GDP)
- Before the reform, the Treasury projected this reform to increase tax revenues by
  - £8.5 billion?
  - £6.8 billion?
  - £2.7 billion?
  - £0.68 billion?

Labor supply model

- The individual solves

$$\max_{\{c,h\}} u(c,h)$$

  subject to $c = wh + R$

  - c = consumption
  - h = hours worked (supply of labor)
  - $u(c,h)$ = utility function, with $u_c > 0$ and $u_h < 0$
    - people like consumption but don't like working
  - w = **after-tax** hourly wage
  - R = non-labor income

Labor supply elasticity

- Substituting for consumption:

$$\max_h u(wh + R, h)$$

- Solve with FOC's to get labor supply function, $h(w, R)$.
- Differentiate h with respect to wages/taxes to get labor supply elasticity

$$\varepsilon = \frac{\partial h}{\partial w} \frac{w}{h}$$

  - "a 1% increase in wages (or decrease in taxes) will change hours by ϵ%."

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- Overall effect of wage increases (tax decrease) on hours worked:
  - could be positive or negative.

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Individual Problem

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subject to $c = wh - T\left(wh\right)$
  - $T(wh)$ is the tax imposed on person with wage w.
- Individual optimization:
$$w\left(1 - T'(\cdot)\right)\frac{\partial u}{\partial c} = \frac{\partial u}{\partial h}$$
  - marginal benefit of working equals marginal cost of working.

Government Problem

- Government chooses $T(wh)$ to maximize:

$$\sum_{w} G(u(wh - T(wh), h)$$

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- Government budget constraint:

$$\sum_w T(wh) = E$$

- Incentive compatibility constraint (taxpayer will optimize):

$$w\left(1 - T'(\cdot)\right) \frac{\partial u}{\partial c} = \frac{\partial u}{\partial h}$$

Overview

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- With equal weights and diminishing marginal utility, we would equalize everyone's income
  - Utilitarianism leads to communism!
- Is maximizing total ex-post utility the right objective function?
  - Deep debate dating back to Rawls, Nozick, Sen...

Main Results

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  3. $T'(\cdot) = 0$ at the bottom of the skill distribution (assuming everyone works)
  4. $T'(\cdot) = 0$ at the top of the skill distribution (if skill distribution is bounded)

Mirrlees (1971): Results

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- But little impact on **practical tax policy**
- Recently, connected to empirical tax literature:
  - Diamond (AER, 1998), Saez (REStud, 2001)
  - Sufficient statistic formulas in terms of elasticities

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Laffer Curve: Revenue Maximizing Rate

- Useful benchmark for optimal rate
- Let tax revenue be $R(\tau) = \tau \cdot z((1-\tau))$
  - Notice: reported income $z(\cdot)$ is a *function* of net-of-tax rate $(1-\tau)$

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- Let tax revenue be $R(\tau) = \tau \cdot z((1-\tau))$
  - Notice: reported income $z(\cdot)$ is a *function* of net-of-tax rate $(1-\tau)$
- $R(\tau)$ has an inverse-U shape:
  - No taxes: $R(\tau = 0) = 0$
  - Confiscatory taxes: $R(\tau = 1) = 0$

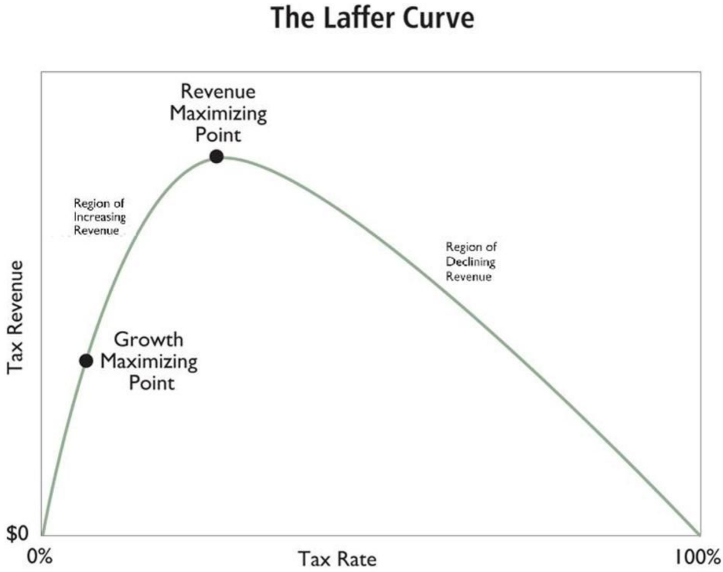
Laffer Curve: Revenue Maximizing Rate

- Revenue maximizing rate, τ^*:

$$
\begin{aligned}
R'(\tau^*) &= 0 \\
z - \tau \frac{\partial z}{\partial (1-\tau)} &= 0 \\
z\left[\frac{(1-\tau)}{z}\right] - \tau \underbrace{\frac{\partial z}{\partial (1-\tau)}\left[\frac{(1-\tau)}{z}\right]}_{\varepsilon} &= 0 \\
1 - \tau - \tau\varepsilon &= 0 \\
\Rightarrow \tau^* &= \frac{1}{1+\varepsilon}
\end{aligned}
$$

  - **Strictly** inefficient to have $\tau > \tau^*$ (Why?)

Laffer Curve: Revenue Maximizing Rate



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Using Elasticities to Derive Optimal Tax Rates

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  - N individuals above earnings z^*
    - Let $z^m((1-\tau))$ be average income function of these individuals

Effect of increasing top-brakcey tax rate

- Three effects of small $\Delta\tau > 0$ reform above z^*:
  1. **Mechanical increase** in tax revenue:

$$\Delta M = N \cdot [z^m - z^*] \, \Delta\tau$$

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  3. **Welfare effect**:
  $$\Delta W = -\bar{g} \Delta M$$
  where $\bar{g} \in [0,1]$ is government value on rich consumption (relative to value of government expenditure, or value of lump sum transfers to everyone else)

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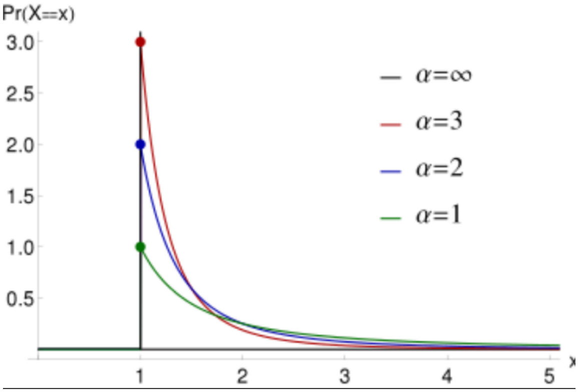
    - $\uparrow \frac{z^m}{z^*}$: higher income inequality

Pareto Distribution



- Assume income follows a Pareto distribution with parameter a
  - Then $\frac{z^{m}}{z^{*}}$ is approximated by $\left(\frac{a}{a-1}\right)$

Saez (2001): Optimal Income Tax Rate

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  - Society decides value of $\bar{g}$ (relative weight of rich on SWF)

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  - Utilitarian social welfare function: $\bar{g} = u_c(z^m) \to 0$ when $z^* \to \infty$

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  - Utilitarian social welfare function: $\bar{g} = u_c(z^m) \to 0$ when $z^* \to \infty$
- If $\bar{g} = 0$, we obtain $\tau^{*top} = \tau^{max} = \frac{1}{1+\bar{\varepsilon}a}$

Connection to Revenue Maximizing Tax Rate

- How to set $\bar{g}$?
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- Assuming $a = 1.5$:

	$\varepsilon = 0.2$	$\varepsilon = 0.5$	$\varepsilon = 1$
$\bar{g} = 0$	0.77	0.57	0.40
$\bar{g} = 0.5$	0.62	0.40	0.25