Optimal Design of Transfers

ECON 3003
Advanced Public Economics

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GOALS OF PAST AND TODAY'S LECTURES

1) Understand the core **optimal income tax model**: linear and nonlinear taxes in the Saez (2001) framework

- Understand the equity-efficiency trade-off
- Revenue-maximizing tax rate (Laffer curve)
- Optimal linear tax rate formula
- Optimal top tax rate

2) Study the **optimal design of transfer** programs

- With only intensive margin responses
- Introduce extensive margin responses
- Tagging and in-kind programs

OPTIMAL DESIGN OF TRANSFERS

(based on Piketty and Saez, 2013)

OPTIMAL DESIGN OF TRANSFERS

Transfers naturally integrated with taxes in optimal tax problem. What's the optimal way to redistribute to the less affluent?

Should govt provide **means-tested cash transfers**? And if so, how (e.g., NIT or in-work)?

Intensive vs extensive margin responses play a critical role in the **optimal profile of transfers (bottom rate formula)**

Key trade-off: US chooses to reward work more than most European countries (such as France or the UK) but therefore provides smaller benefits to those with no earnings

Can we do better than means-tested cash transfers? For example, **Tagging** or **In-kind** transfers
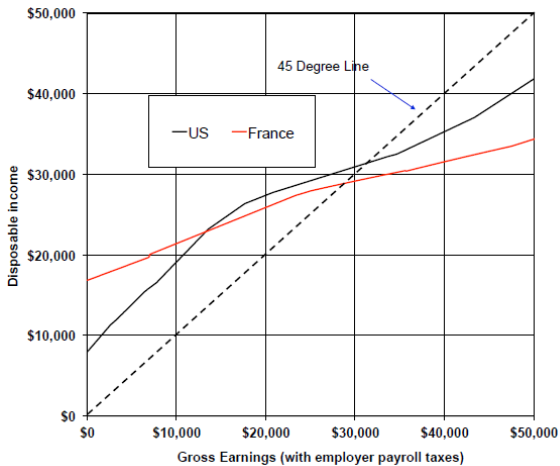
Source: Piketty, Thomas, and Emmanuel Saez (2012)

OPTIMAL TRANSFERS

(intensive responses)

If individuals respond to taxes only through **intensive margin** (how much they work rather than whether they work or not), optimal transfer at bottom takes the form of a "Negative Income Tax":

  1) Lumpsum grant $-T(0) > 0$ for those with no earnings
  2) High marginal tax rates (MTR) $T'(z)$ at the bottom to phase-out the lumpsum grant quickly

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Intuition: high MTR at bottom are efficient because:

(a) they target transfers to the most needy
(b) earnings at the bottom are low to start with $\Rightarrow$ intensive labor supply response does not generate large output losses

Caveat: if society sees non-workers as **less deserving** than average (free-loaders), then optimal phase-out rate is negative (subsidy) $\Rightarrow$ govt provides higher transfers for low-income earners rather than those out-of-work

OPTIMAL TRANSFERS

(intensive responses)

Simple graphical proof (discrete model; <u>intensive</u> margin responses)

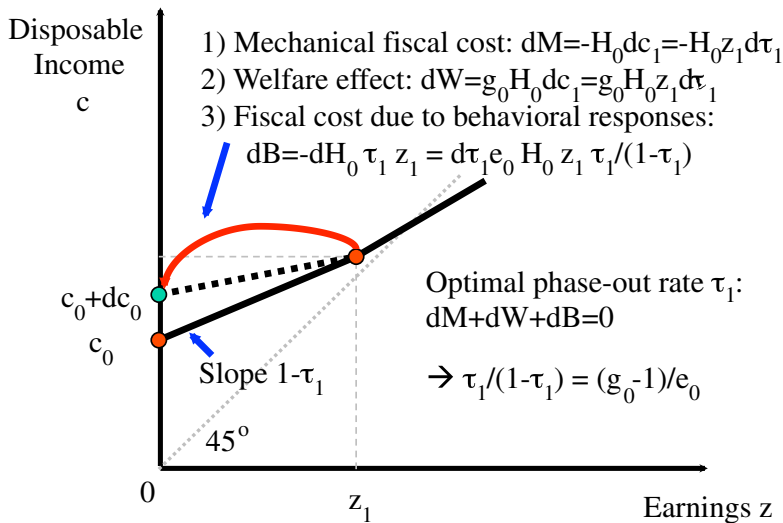Suppose that low ability individuals can choose to work and earn z_1 or not work and earn $z_0 = 0$

Govt offers transfer $c_0 = -T(0)$ to non-workers phased-out at rate τ_1 so that those working receive on net $c_1 = (1 - \tau_1)z_1 + c_0$

$h_0(1 - \tau_1)$ is the fraction not working (fn of the net-of-tax rate); $e_0 = -\frac{1-\tau_1}{h_0} \frac{dh_0}{d(1-\tau_1)}$ is the elasticity of the fraction non-working h_0 with respect to the bottom net-of-tax rate $1 - \tau_1$

Consider a small reform around the optimum: govt $\uparrow c_0$ by dc_0 and $\uparrow \tau_1$ by $d\tau_1$ leaving the tax schedule unchanged for those with $z \geq z_1$ so that $dc_0 = z_1 d\tau_1$. The reform has 3 effects:

Reform: Increase τ_1 by $d\tau_1$ and c_0 by $dc_0 = z_1 d\tau_1$

1) Mechanical fiscal cost: $dM = -H_0 dc_1 = -H_0 z_1 d\tau_1$
2) Welfare effect: $dW = g_0 H_0 dc_1 = g_0 H_0 z_1 d\tau_1$
3) Fiscal cost due to behavioral responses:
$$dB = -dH_0 \tau_1 z_1 = d\tau_1 e_0 H_0 z_1 \tau_1/(1-\tau_1)$$

Disposable Income c

$c_0 + dc_0$
c_0

Slope $1-\tau_1$

Optimal phase-out rate τ_1:
$$dM + dW + dB = 0$$

$\rightarrow \tau_1/(1-\tau_1) = (g_0-1)/e_0$

45°

0

z_1

Earnings z

OPTIMAL TRANSFERS

(intensive responses)

The **fiscal cost** is $dM = -h_0 dc_0$ but the **welfare benefit** is $dW = h_0 g_0 dc_0$ where g_0 is the social welfare weight on non-workers

Labor supply of those above z_1 is not affected by the reform

By definition of e_0, a number $dh_0 = d\tau_1 e_0 h_0 / (1 - \tau_1)$ of low-income workers stop working creating a revenue loss due to **behavioral responses** of $dB = -dh_0 z_1 \tau_1 = -d\tau_1 e_0 h_0 z_1 \tau_1 / (1 - \tau_1)$

At the optimum, fiscal+welfare+behavioral effects sum zero ($dM + dW + dB = 0$) leading to the **optimal bottom rate formula**:
$\tau_1 = \frac{g_0 - 1}{(g_0 - 1 + e_0)}$

$\star$ Under standard redistributive preferences, g_0 is large (>1) implying that $\tau_1 > 0$ is large [E.g., with $g_0 = 3$ and $e_0 = 0.5$ then $\tau_1 = 80\%$]

$\star$ But $g_0 < 1$ with $\tau_1 < 0$ is conceivable if society considers non-workers as free-loaders $\Rightarrow$ EITC (or WTC) is optimal

Math for optimal bottom rate formula

$dM + dW + dB = 0$

$-h_0 dc_0 + h_0 g_0 dc_0 - d\tau_1 e_0 h_0 z_1 \tau_1 / (1 - \tau_1) = 0$

$(g_0 - 1) \cancel{h_0} \cancel{dc_0} = \cancel{d\tau_1} e_0 \cancel{h_0} \cancel{z_1} \tau_1 / (1 - \tau_1)$

Cancel out h_0. Noting that $dc_0 = z_1 d\tau_1$, we can cancel this out too.

$(g_0 - 1) = e_0 \tau_1 / (1 - \tau_1)$

$(1 - \tau_1) / \tau_1 = e_0 / (g_0 - 1)$

$\frac{1}{\tau_1} = \frac{e_0}{(g_0 - 1)} + 1 = \frac{(e_0 + g_0 - 1)}{(g_0 - 1)}$

$\tau_1 = \frac{g_0 - 1}{(g_0 - 1 + e_0)}$

OPTIMAL TRANSFERS
(participation responses)

Empirical literature shows that participation labor supply responses [whether to work or not] are large at the bottom [much larger and clearer than intensive responses]

Key result: in-work subsidies (i.e., $T'(z) < 0$) are optimal when labor supply responses are concentrated along the extensive margin and govt cares about low-income workers [Saez QJE'02]

Simple graphical proof (discrete model; <u>extensive</u> margin responses)

Behavioral responses only take place through the extensive margin; earnings when working do not respond to MTRs
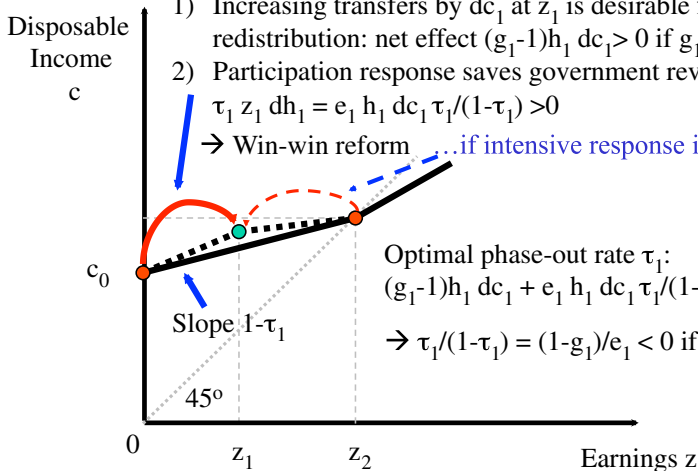
Govt starts from a transfer scheme with a positive phase-out rate $\tau_1 > 0$ and introduces an additional small in-work benefit dc_1 that increases net transfers to low-income workers earning z_1

Starting from a positive phasing-out rate $\tau_1 > 0$:
1) Increasing transfers by dc_1 at z_1 is desirable for redistribution: net effect $(g_1-1)h_1\,dc_1 > 0$ if $g_1 > 1$
2) Participation response saves government revenue
$\tau_1 z_1\,dh_1 = e_1 h_1\,dc_1\,\tau_1/(1-\tau_1) > 0$
$\rightarrow$ Win-win reform ...if intensive response is small

Disposable Income c

c_0

Slope $1-\tau_1$

45°

0   z_1 z_2 Earnings z

Optimal phase-out rate τ_1:
$(g_1-1)h_1\,dc_1 + e_1 h_1\,dc_1\,\tau_1/(1-\tau_1) = 0$

$\rightarrow \tau_1/(1-\tau_1) = (1-g_1)/e_1 < 0$ if $g_1 > 1$

OPTIMAL TRANSFERS
(participation responses)

Let h_1 be the fraction of low-income workers with earnings z_1; $e_1 = \frac{1-\tau_1}{h_1} \frac{dh_1}{d(1-\tau_1)}$ is the elasticity of h_1 with respect to the participation net-of-tax rate $1 - \tau_1$. The reform has again 3 effects:

1) A mechanical fiscal cost $dM = -h_1 dc_1$ for the government

2) A social welfare gain $dW = g_1 h_1 dc_1$ where g_1 is the marginal social welfare weight on low-income workers with earnings z_1
(Note: $dM + dW = (g_1 - 1)h_1 dc_1 > 0$ when $g_1 > 1$)

3) A tax revenue gain due to behavioral responses
$dB = \tau_1 z_1 dh_1 = e_1[\tau_1/(1 - \tau_1)]h_1 dc_1$. Intuition: reform induces some non-workers to start working to take advantage of the in-work benefit

Optimal bottom rate formula τ_1 is such that $dM + dW + dB = 0$:
$\tau_1 = \frac{1-g_1}{1-g_1+e_1}$ which implies that $\tau_1 < 0$ when $g_1 > 1$ (i.e., when £1 to low paid workers is more valued than £1 distributed to all)

Saez QJE'02: Intuition for EITC (or WTC)

Two types: doctors (wage w_h) and plumbers (wage w_l). Both can choose whether to work, but doctors cannot become plumbers

Transfer to 0-income individuals $\rightarrow$ help plumbers but distort doctors' incentives to work

Transfer to those with income of w_l $\rightarrow$ still help plumbers, but do not distort doctors' incentives

Therefore better to have a larger transfer to w_l than those with 0 income, i.e. have a subsidy for work = EITC

Pure extensive-margin model: transfer T_1 only distorts type-1 behavior
- Higher types don't move down
- But transfer T_0 distorts behavior of all types on extensive margin

OPTIMAL PROFILE OF TRANSFERS: SUMMARY

1) If society views **low-income workers** as more deserving than average [typically bipartisan view] and labor supply responses concentrated along extensive margin (work vs. not) then low phasing-out rate at bottom is optimal

2) Generous lumpsum grant with high MTR at bottom justified only if society views **non-workers** as deserving and no strong response along the extensive margin (work vs. not)

3) If society views **non-workers** as less deserving than average [conservative view that substantial fraction of zero earners are "free loaders"] then low lumpsum grant combined with low phasing out rate at bottom is optimal

ACTUAL TAX/TRANSFER SYSTEMS

1) Means-tested transfer programs used to be of the traditional form with high phasing-out rates (sometimes above 100%) $\Rightarrow$ No incentives to work (even with modest elasticities)

Initially designed for groups not expected to work [widows in the US] but later attracting groups who could potentially work [single mothers]

2) In-work benefits have been introduced and expanded in OECD countries since 1980s (US EITC, UK Family Credit, etc.) and have been politically successful
$\Rightarrow$ (a) Redistribute to low income workers
$\Rightarrow$ (b) improve incentives to work

INCREASING TARGETING EFFICIENCY

Can we do better than means-tested cash transfers?

1) Means-tested vs **Tagging** [Akerlof (1978)]

2) Cash vs **In-kind** programs [Nichols-Zeckhauser (1982)]

⇒ E.g., Gadenne et al (2021): In-kind transfers provide insurance against price risk (welfare improving for Indian households)

TAGGING: $T(z, X)$

If we can identify individual characteristics X that are

1) **Observable** to the government
2) **Negatively correlated with earnings capacity**
3) **Immutable** for the individual (unresponsive to incentives)

Then targeting benefits to such characteristics is **optimal**.

Criteria 1 makes this form of targeting feasible, criteria 2 ensures that it redistributes from high- to low-ability, and criteria 3 ensures no moral hazard associated with this redistribution.

Potential candidates: (i) disability, (ii) gender, (iii) race, (iv) height, (v) single motherhood [widely used as a tagging device, but accused by conservatives of destroying the traditional family]

IN-KIND REDISTRIBUTION

Most means-tested transfers are in-kind and often rationed (health care, childcare, public educ, public housing, nutrition subsidies)

1) **Rational Individual perspective:**

(a) If in-kind transfer is **tradeable** at market price $\Rightarrow$ in-kind equivalent to cash

(b) If in-kind transfer **non-tradeable** $\Rightarrow$ in-kind inferior to cash

Cash transfer preferable to in-kind transfer from individual perspective

IN-KIND REDISTRIBUTION

2) **Social perspective:** 4 justifications:

(a) Commodity Egalitarianism: some goods (education, health, shelter, food) seen as **rights** and ought to be provided to all in a just society

(b) Paternalism: society imposes its preferences on recipients [recipients prefer cash]

(c) Behavioral: Recipients do not make choices in their best interests (self-control, myopia) [recipients understand that in-kind is better for them]

(d) Efficiency: It could be efficient to give in-kind benefits if it can prevent those who don't really need them from getting them (i.e., force people to queue to get free soup kitchen)

INVESTING IN INFANTS:
THE LASTING EFFECTS OF CASH TRANSFERS TO NEW FAMILIES

(Barr, Eggleston, and Smith, QJE 2022)

Long-Term Effects of Aid for Children in Low-Income Families

They track the impact of tax refunds in the first year of a firstborn's life

Families w/ incomes < EITC cutoff receive substantially more refunds during the first year of life $\Rightarrow$ Firstborns do better as adults

- Use IRS tax return data for low-income families going back to 1979 and educational data from North Carolina

- They compare firstborn children born in Dec vs. Jan, whose parents were similar in *observable* characteristics

- A December birth makes a family eligible for an additional tax deduction and for a higher EITC

- Strategy: regression discontinuity (RD) design at eligibility cutoff

Long-Term Effects of Aid for Children in Low-Income Families

- **First stage:** The extra benefits averaged 10% of family income (about $1,300)

- Transfer in infancy increases young adult earnings: In their twenties, the Dec-born children were in households that earned 1–2% more than those born in Jan (larger for males)

- Dec-born children performed better on math and reading tests and were more likely graduate high-school than Jan-born peers

- Longer-term effects on child earnings are large enough $\rightarrow$ transfer pays for itself through subsequent increases in income tax revenue

First Stage: More resources during infancy for those children born to the left of the threshold
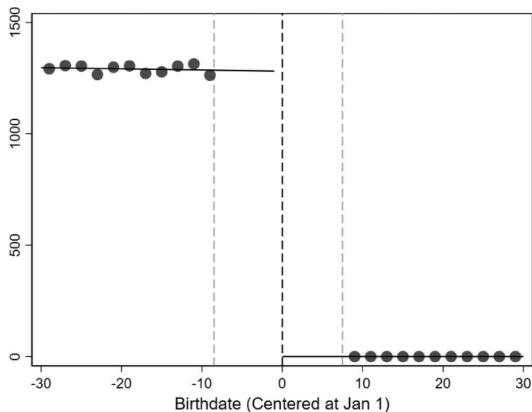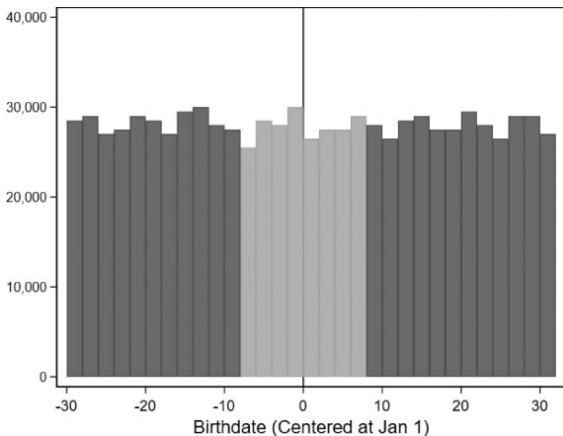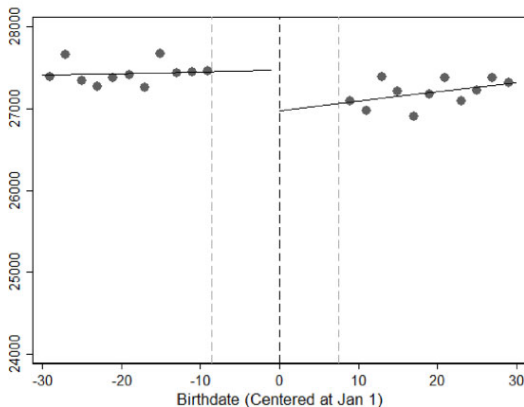

FIGURE I

Effect of Cash Transfer Eligibility on Additional Resources Received during Infancy

Little evidence of manipulation of date birth of children: The distribution is largely smooth

(A) Tax Data (EITC-Eligible Families)

Eligibility for additional resources during the first year of life generates a \$456 increase in average annual earnings
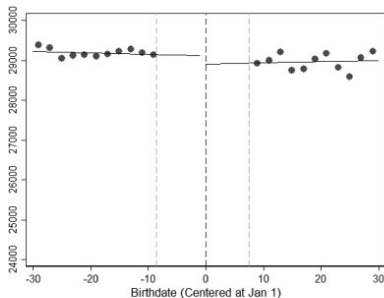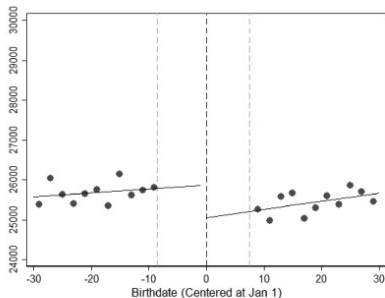

(B) Earnings (26 to 28)

FIGURE III

Effect of Cash Transfer Eligibility on Adult Earnings

Effects are larger for men

(C) Female Earnings (26 to 28)

(D) Male Earnings (26 to 28)

FIGURE IV

Heterogeneity by Sex in the Effect of Cash Transfer Eligibility on Adult Earnings

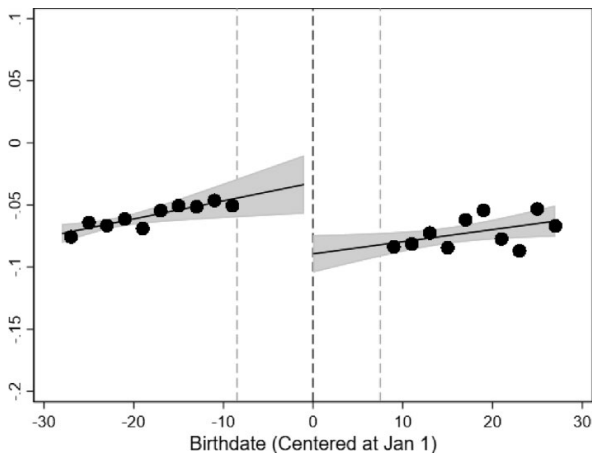# Eligibility for additional cash during the first year of life generates an increase in test scores

FIGURE VII

Effect of Cash Transfer Eligibility on Student Outcome Index (North Carolina)

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