

# Lecture 4: Optimal Labor Income Taxation

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## TAXATION AND REDISTRIBUTION

**Key question:** By how much should government reduce inequality using taxes and transfers?

- 1) Governments use **taxes** to raise revenue
- 2) This revenue funds **transfer** programs:
  - a) Universal Transfers: Public Education, Health Care Benefits (only 65+ in the US), Retirement and Disability Benefits, Unemployment benefits
  - b) Means-tested Transfers: In-kind (Medicaid, public housing, food stamps in the US) and cash benefits

Modern governments raise large fraction of GDP in taxes (30-45%) and spend significant fraction of GDP on transfers

## FACTS ON US TAXES AND TRANSFERS

**References:** Comprehensive description in:

<http://www.taxpolicycenter.org/taxfacts/>

**A) Taxes:** (1) individual income tax (fed+state), (2) payroll taxes on earnings (fed, funds Social Security+Medicare), (3) corporate income tax (fed+state), (4) sales taxes (state)+excise taxes (state+fed), (5) property taxes (state)

**B) Means-tested Transfers:** (1) refundable tax credits (fed), (2) in-kind transfers (fed+state): Medicaid, public housing, nutrition (SNAP), education, (3) cash welfare: TANF for single parents (fed+state), SSI for old/disabled (fed)

## FEDERAL US INCOME TAX

US income tax assessed on **annual family** income (not individual) [most other OECD countries have shifted to individual assessment]

Sum all cash income sources from family members (both from labor and capital income sources) = called **Adjusted Gross Income (AGI)**

Main exclusions: fringe benefits (health insurance, pension contributions and returns), imputed rent of homeowners, undistributed corporate profits, unrealized capital gains

⇒ AGI base is only 70% of national income

## FEDERAL US INCOME TAX

Taxable income = AGI - deductions

deduction is max of standard deduction or itemized deductions

Standard deduction is a fixed amount (\$12K for singles, \$24K for married couple)

Itemized deductions: (a) state and local taxes paid (up to \$10K), (b) mortgage interest payments, (c) charitable giving, various small other items

[about 10% of AGI lost through itemized deductions, called tax expenditures]

## FEDERAL US INCOME TAX: TAX BRACKETS

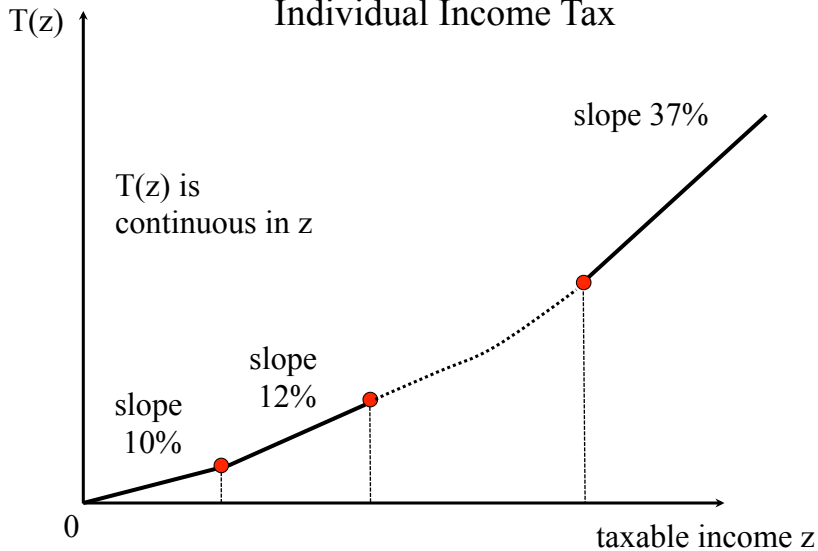
Tax  $T(z)$  is piecewise linear and continuous function of taxable income  $z$  with constant marginal tax rates (MTR)  $T'(z)$  by brackets

In 2018+, 6 brackets with MTR 10%,12%,22%,24%,32%,35%, 37% (top bracket for  $z$  above \$600K), indexed on price inflation

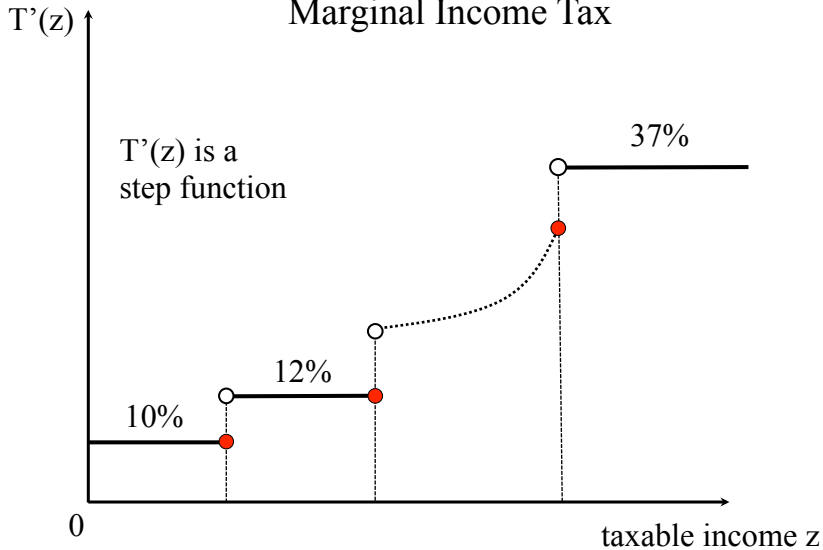
Lower preferential rates (up to a max of 20%) apply to dividends (since 2003), realized capital gains [in part to offset double taxation of corporate profits].

Tax rates change frequently over time. Top MTRs have declined drastically since 1960s (as in many OECD countries)

## Individual Income Tax

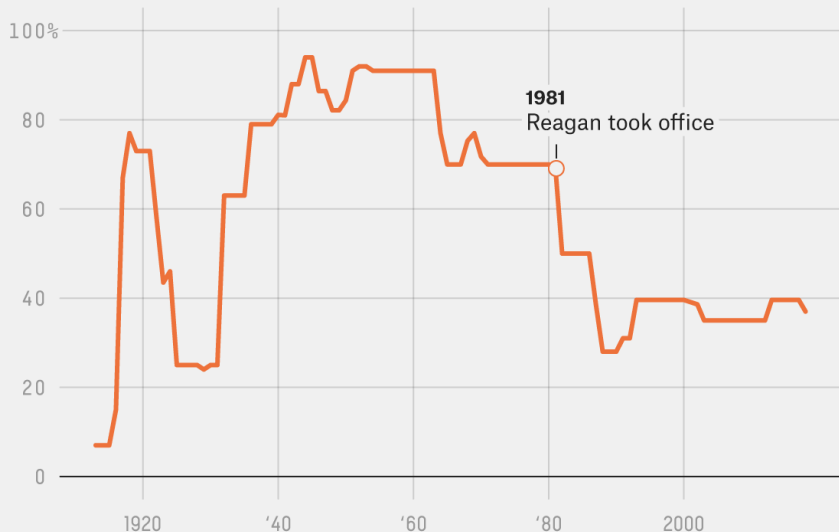


## Marginal Income Tax



# Historically, a 70 percent marginal tax rate is not unusual

The top marginal income tax rates from 1913 to 2018



## FEDERAL US INCOME TAX: TAX CREDITS

**Tax credits:** Additional reduction in taxes

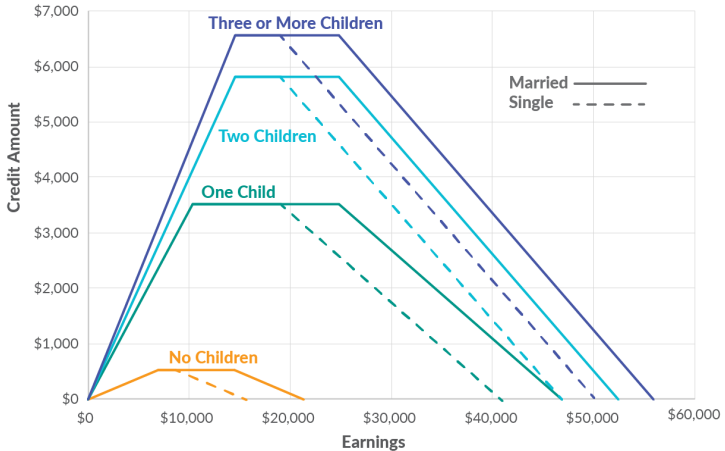
(1) **Non refundable** (cannot reduce taxes below zero): foreign tax credit, child care expenses, education credits, energy credits, and many others

(2) **Refundable** (can reduce taxes below zero, i.e., be net transfers): EITC (earned income tax credit, up to \$3.5K, \$5.7K, \$6.5K for working families with 1, 2, 3+ kids), Child Tax Credit (\$2K per kid, partly refundable)

Refundable tax credits are now the largest means-tested cash transfer for low income families

# The Phase-In and Phaseout of the EITC

Credit Amount by Marital Status and Number of Children



Source: Amir El-Sibaie, "2019 Tax Brackets," Tax Foundation, Nov. 28, 2018.

## FEDERAL US INCOME TAX: TAX FILING

Taxes on year  $t$  earnings are withheld on paychecks during year  $t$  (pay-as-you-earn)

Income tax return filed in Feb-April 15, year  $t + 1$  [filers use either software or tax preparers, huge private industry, most OECD countries provide pre-populated returns]

Most tax filers get a tax refund as withholdings larger than taxes owed in general

Payers (employers, banks, etc.) send income information to govt (3rd party reporting)

3rd party reporting + withholding at source is key for successful enforcement

## MAIN MEANS-TESTED TRANSFER PROGRAMS

1) **Traditional transfers:** managed by welfare agencies, paid on monthly basis, high stigma and take-up costs  $\Rightarrow$  low take-up rates (often only around 50%)

Main programs: Medicaid (health insurance for low incomes), SNAP (former food stamps), public housing, TANF (welfare), SSI (aged+disabled)

2) **Refundable income tax credits:** managed by tax administration, paid as an annual lumpsum in year  $t + 1$ , low stigma and take-up cost  $\Rightarrow$  high take-up rates

Main programs: EITC and Child Tax Credit [large expansion since the 1990s] for low income working families with children

## KEY CONCEPTS FOR TAXES/TRANSFERS

Draw budget  $(z, z - T(z))$  which integrates taxes and transfers

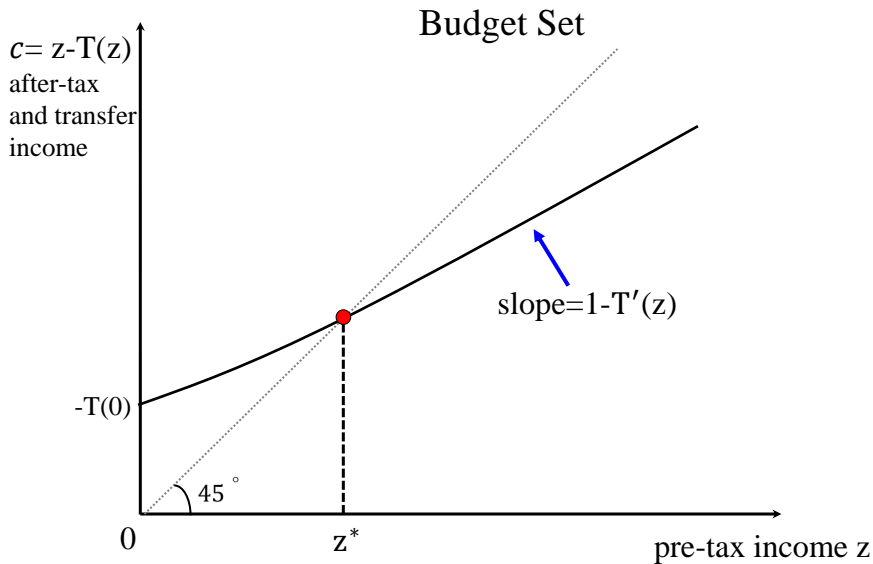
1) Transfer benefit with zero earnings  $-T(0)$  [sometimes called demogrant or lumpsum grant]

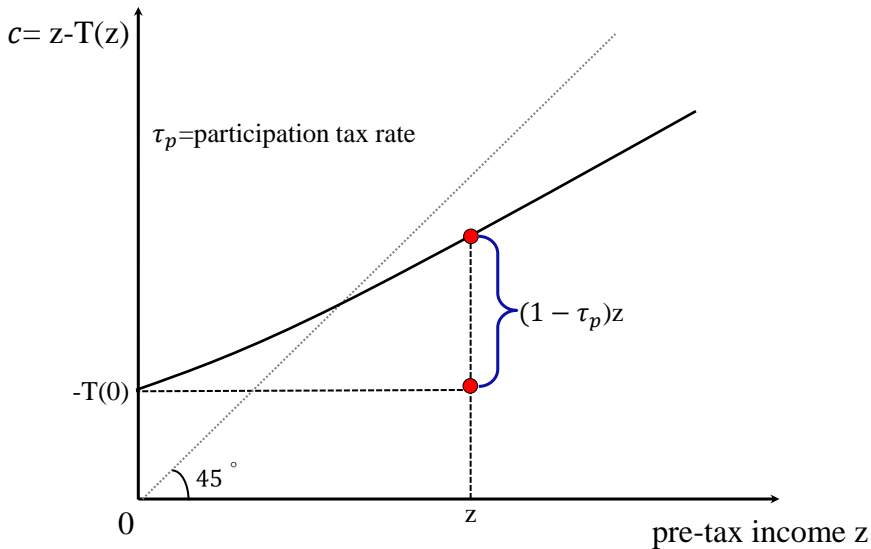
2) Marginal tax rate (or phasing-out rate)  $T'(z)$ : individual keeps  $1 - T'(z)$  for an additional \$1 of earnings (intensive labor supply response)

3) Participation tax rate  $\tau_p = [T(z) - T(0)]/z$ : individual keeps fraction  $1 - \tau_p$  of earnings when moving from zero earnings to earnings  $z$  (extensive labor supply response):

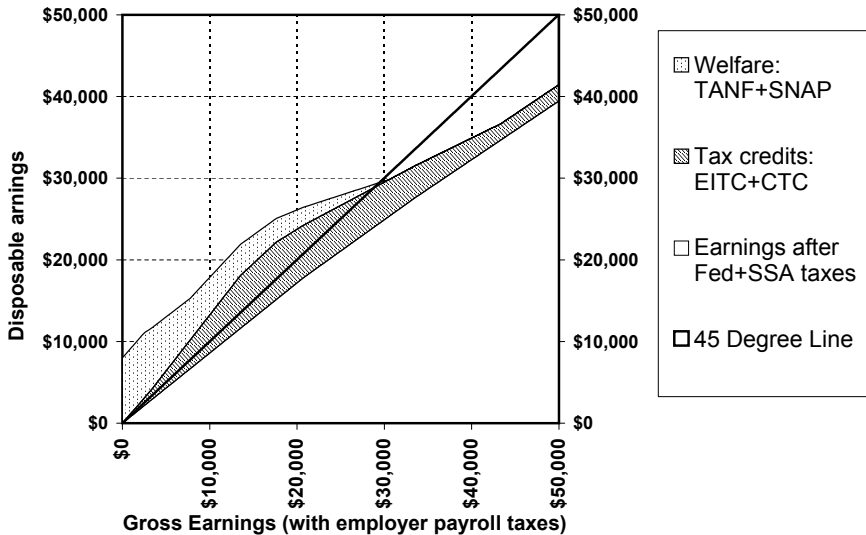
$$z - T(z) = -T(0) + z \cdot (1 - \tau_p)$$

4) Break-even earnings point  $z^*$ : point at which  $T(z^*) = 0$

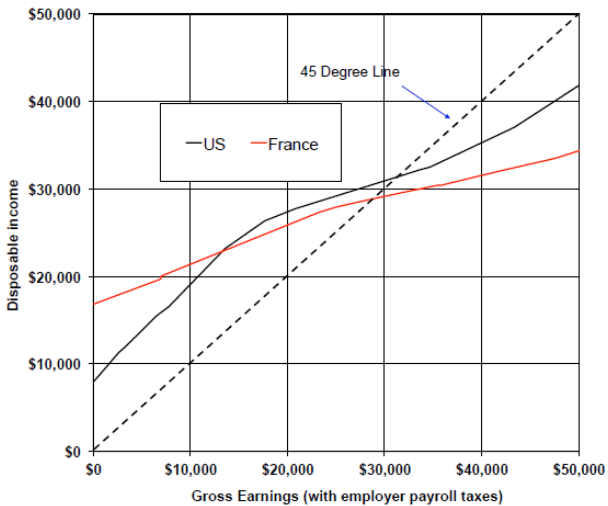




## US Tax/Transfer System, single parent with 2 children, 2009



Source: Computations made by Emmanuel Saez using tax and transfer system parameters



Source: Piketty, Thomas, and Emmanuel Saez (2012)

## Profile of Current Means-tested Transfers

Traditional means-tested programs reduce incentives to work for low income workers

Refundable tax credits have significantly increased incentive to work for low income workers

However, refundable tax credits cannot benefit those with zero earnings

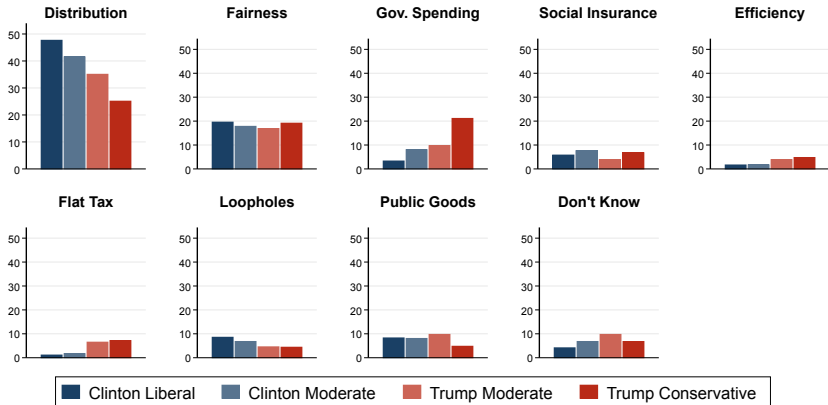
Trade-off: US chooses to reward work more than most European countries (such as France) but therefore provides smaller benefits to those with no earnings

## **For Some Fun: What Do People Actually Know and How do they Think about Taxes?**

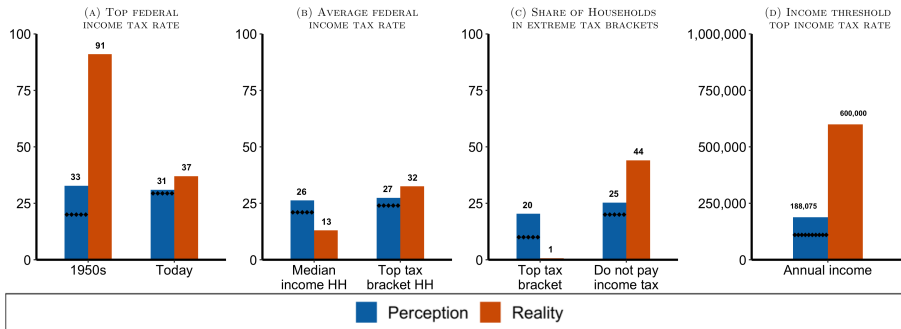
... Some brand new evidence from the Social Economics Lab and [understandingeconomics.org](http://understandingeconomics.org)



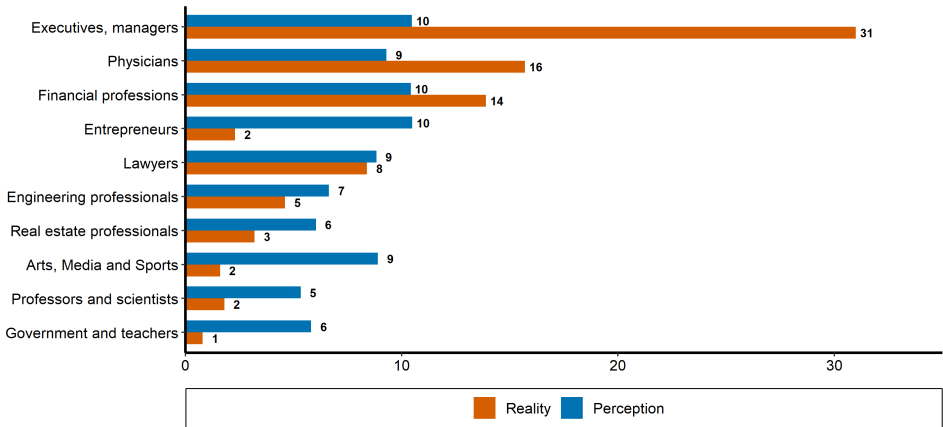
## What are your Main Considerations about the Income Tax? Relative Frequency of Topics by Political Views



## People believe top bracket starts much lower, inflate extremes, and “schmedule”



## Perceived Composition of the Top 1%: so many entrepreneurs, scientists, government, teachers, arts, media & sports!



## Who Knows More?

Republicans tend to view taxes as higher and more progressive than Democrats (the “Polarization of Reality”).

Higher-income respondents more aware of what’s going on at the top.

Those with more self-reported knowledge: more accurate, and also more willing to pay for information.

## EQUITY-EFFICIENCY TRADE-OFF

Taxes can be used to raise revenue for transfer programs which can reduce inequality in disposable income

⇒ Desirable if society feels that inequality is too large

Taxes (and transfers) reduce incentives to work

⇒ High tax rates create economic inefficiency if individuals respond to taxes

Size of behavioral response limits the ability of government to redistribute with taxes/transfers

⇒ Generates an equity-efficiency trade-off

Empirical tax literature estimates the size of behavioral responses to taxation

## Labor Supply Theory

Individual has utility over labor supply  $l$  and consumption  $c$ :  $u(c, l)$   
**increasing** in  $c$  and **decreasing** in  $l$  [= increasing in leisure]

$$\max_{c, l} u(c, l) \quad \text{subject to} \quad c = w \cdot l + R$$

with  $w = \bar{w} \cdot (1 - \tau)$  the net-of-tax wage ( $\bar{w}$  is before tax wage rate and  $\tau$  is tax rate), and  $R$  non-labor income

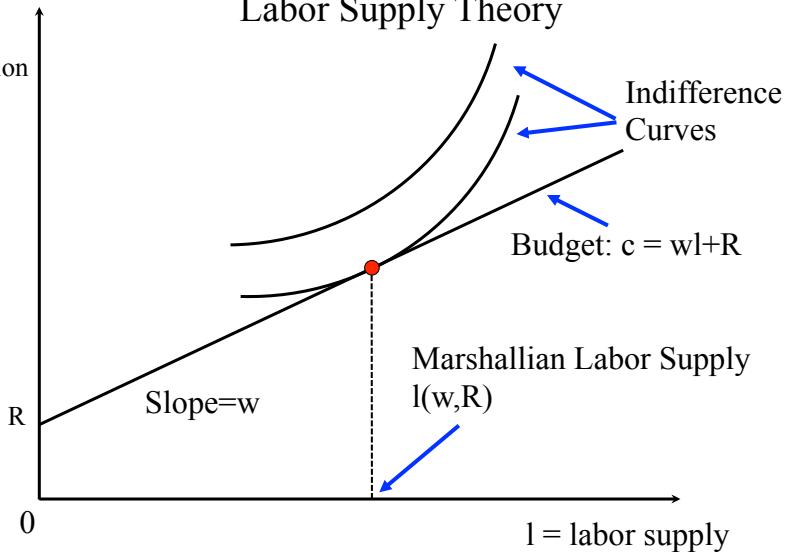
FOC  $w \frac{\partial u}{\partial c} + \frac{\partial u}{\partial l} = 0$  defines Marshallian labor supply  $l = l(w, R)$

**Uncompensated labor supply elasticity:**  $\varepsilon^u = \frac{w}{l} \cdot \frac{\partial l}{\partial w}$

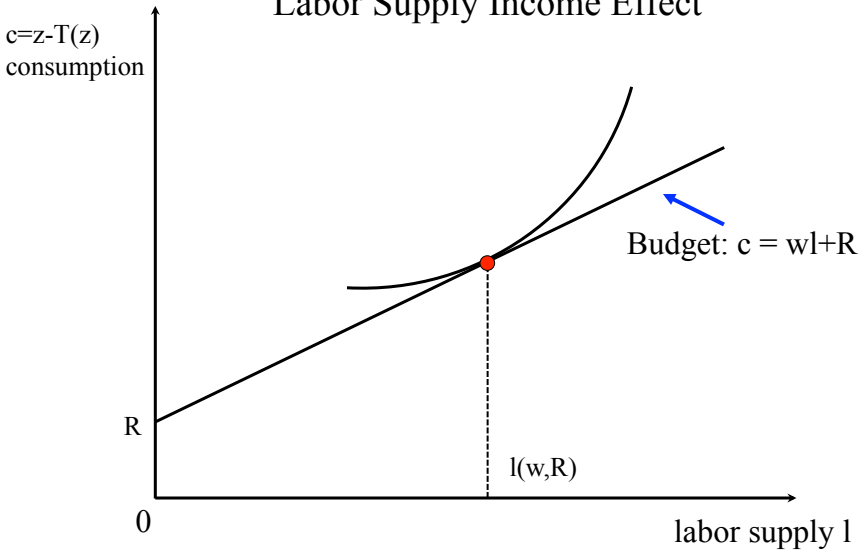
**Income effects:**  $\eta = w \frac{\partial l}{\partial R} \leq 0$  (if leisure is a normal good)

# Labor Supply Theory

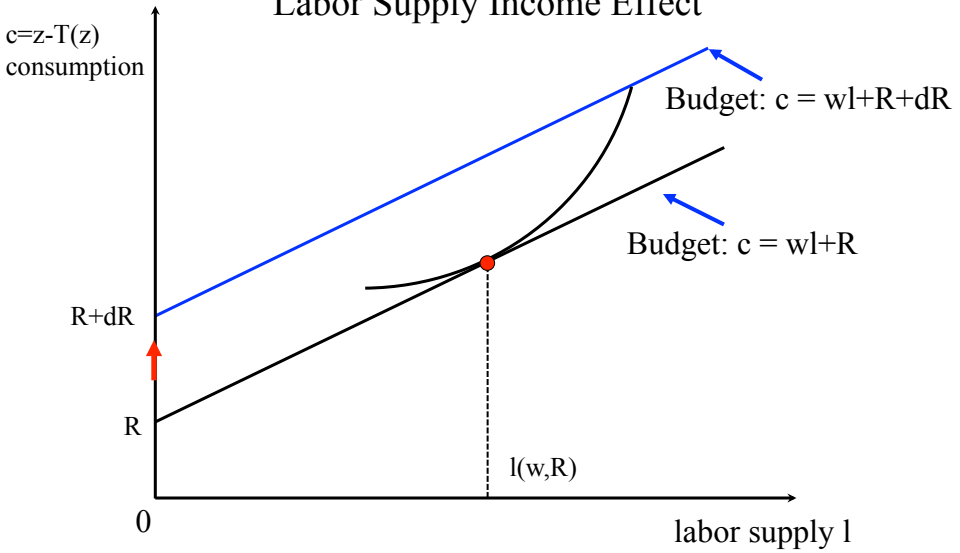
$c = z - T(z)$   
consumption



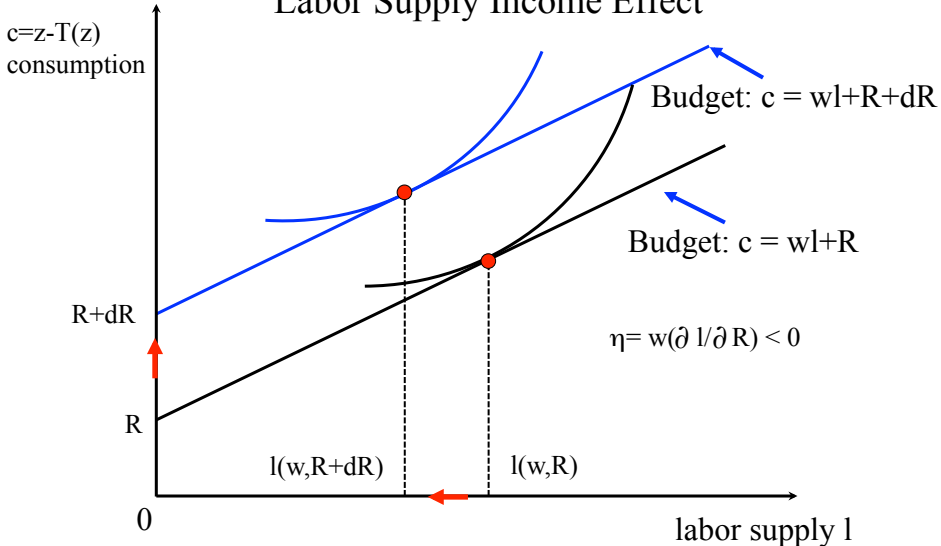
# Labor Supply Income Effect



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## Labor Supply Theory

**Substitution effects:** Hicksian labor supply:  $I^c(w, u)$  minimizes cost needed to reach  $u$  given slope  $w \Rightarrow$

$$\text{Compensated elasticity } \varepsilon^c = \frac{w}{I} \cdot \frac{\partial I^c}{\partial w} > 0$$

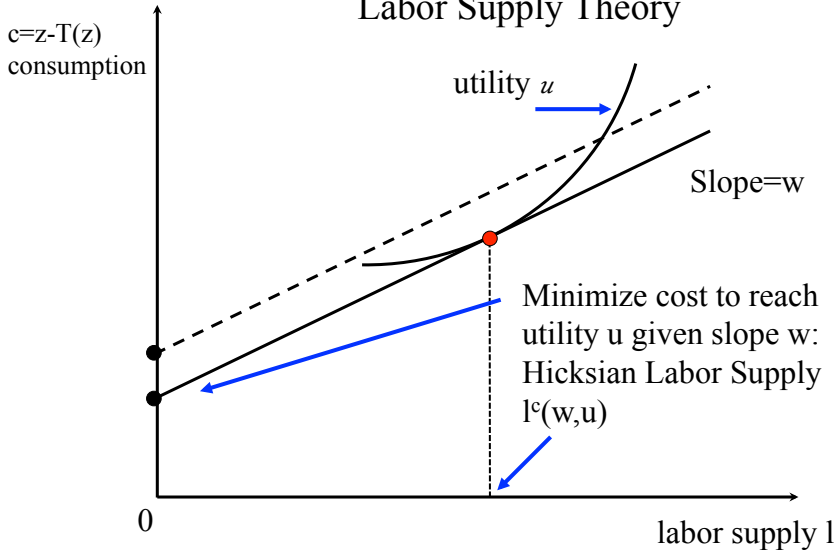
$$\text{Slutsky equation } \frac{\partial I}{\partial w} = \frac{\partial I^c}{\partial w} + I \frac{\partial I}{\partial R} \Rightarrow \varepsilon^u = \varepsilon^c + \eta$$

Tax rate  $\tau$  discourages work through substitution effects (work pays less at the margin)

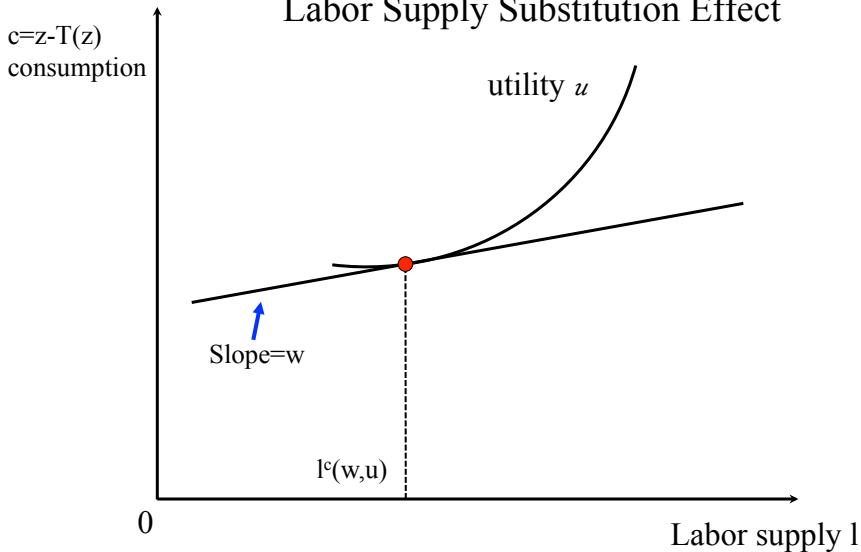
Tax rate  $\tau$  encourages work through income effects (taxes make you poorer and hence in more need of income)

Net effect ambiguous (captured by sign of  $\varepsilon^u$ )

# Labor Supply Theory

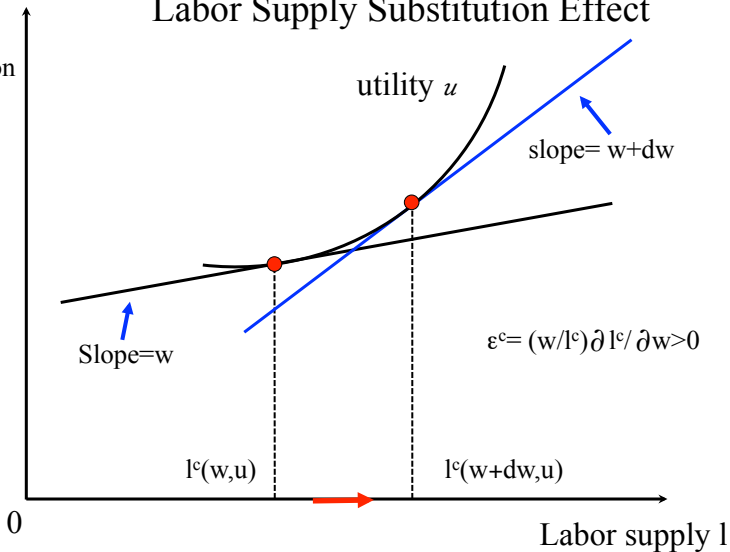


## Labor Supply Substitution Effect

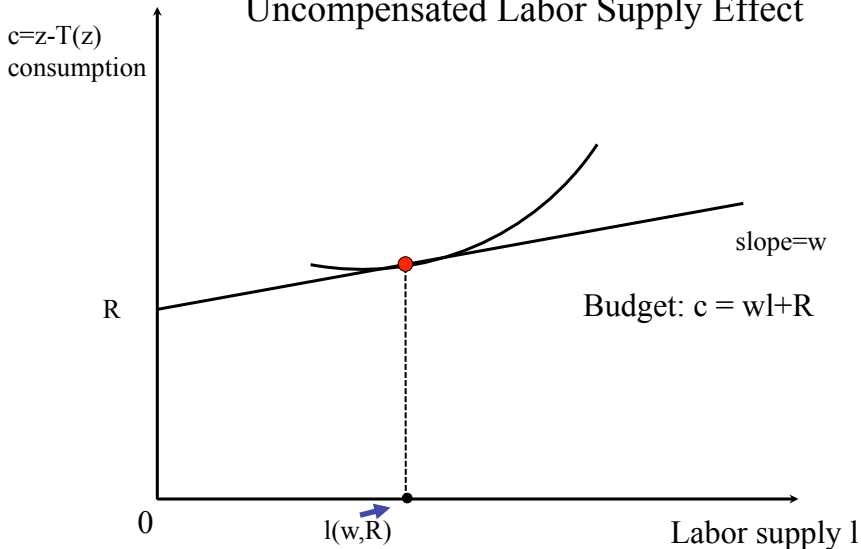


# Labor Supply Substitution Effect

$c = z - T(z)$   
consumption

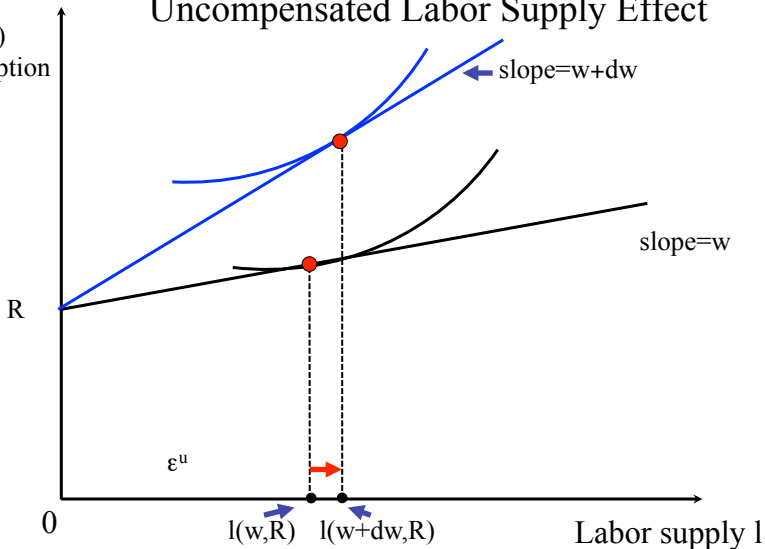


## Uncompensated Labor Supply Effect



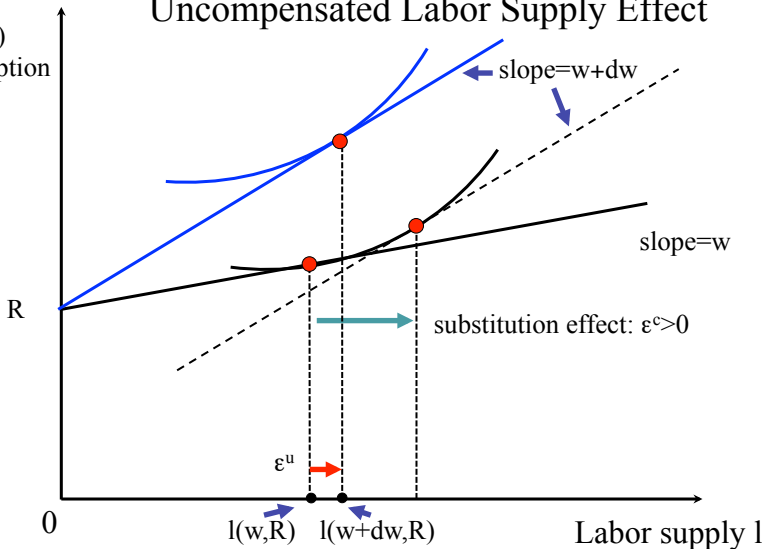
# Uncompensated Labor Supply Effect

$c = z - T(z)$   
consumption



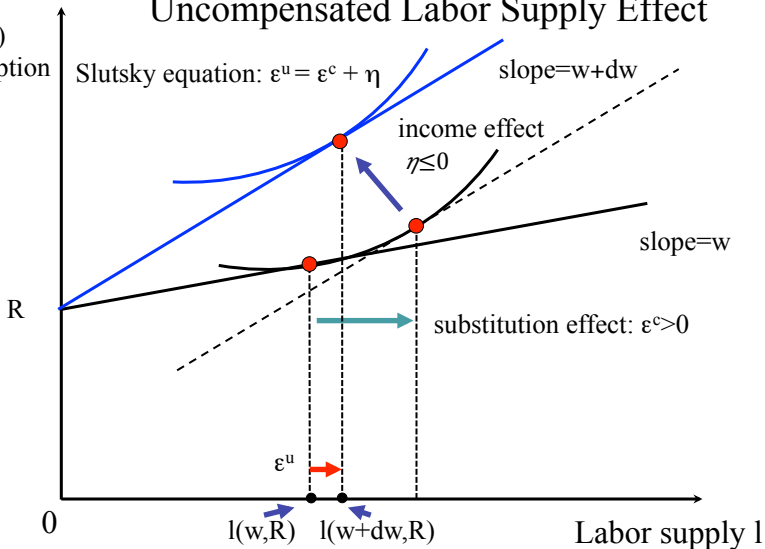
# Uncompensated Labor Supply Effect

$c=z-T(z)$   
consumption



# Uncompensated Labor Supply Effect

$c=z-T(z)$   
consumption



## General nonlinear income tax [draw graph]

With no taxes:  $c = z$  (consumption = earnings)

With taxes  $c = z - T(z)$  (consumption = earnings - net taxes)

$T(z) \geq 0$  if individual pays taxes on net,  $T(z) \leq 0$  if individual receives transfers on net

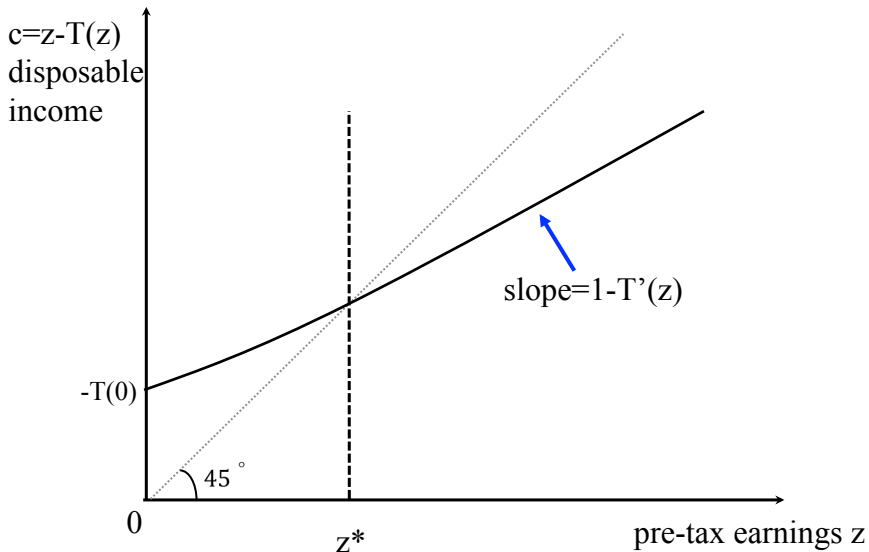
$T'(z) > 0$  reduces net wage rate and reduces labor supply through substitution effects

$T(z) > 0$  reduces disposable income and increases labor supply through income effects

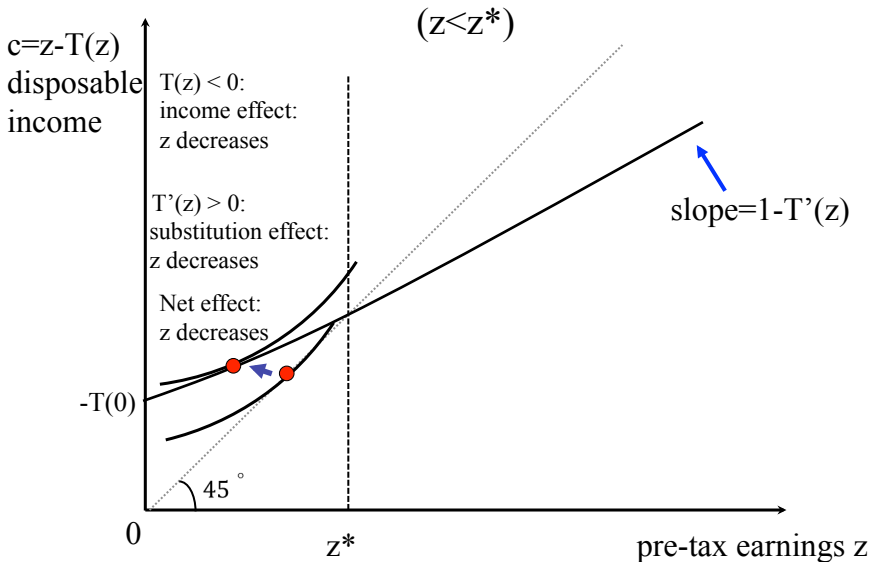
$T(z) < 0$  increases disposable income and decreases labor supply through income effects

Transfer program such that  $T(z) < 0$  and  $T'(z) > 0$  always discourages labor supply

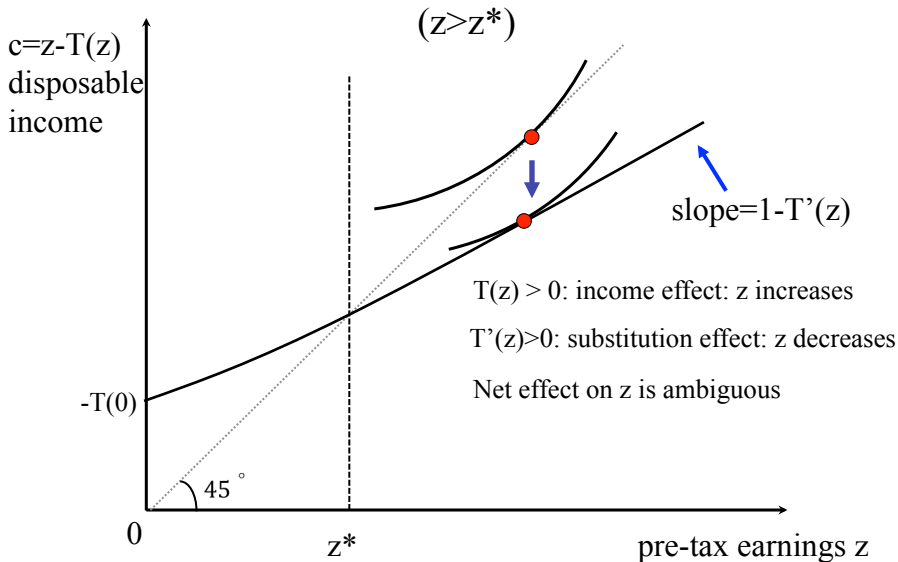
## Effect of Taxes/Transfers on Labor Supply



# Effect of Taxes/Transfers on Labor Supply



# Effect of Taxes/Transfers on Labor Supply



## HOW SHOULD TAXES BE SET? OPTIMAL LINEAR TAX RATES (SEE VIDEO)

Let's now solve formally for what the (linear) taxes should be under two different objectives:

- 1) If we simply want to maximize revenues (the Laffer tax rate). This will be the optimal tax rate for the Rawlsian objective, i.e., if we want to maximize the utility of the lowest income person.
- 2) If we want to maximize social welfare.
- 3) In Appendix plus recording: Optimal linear revenue-maximizing top tax rate (maximizes the revenues raised from the top).

## OPTIMAL LINEAR TAX RATE THAT MAXIMIZES REVENUES: LAFFER CURVE (SEE VIDEO)

$c = (1 - \tau) \cdot z + R$  with  $\tau$  linear tax rate and  $R$  fixed universal transfer funded by taxes  $R = \tau \cdot Z$  with  $Z$  average earnings

Individual  $i = 1, \dots, N$  chooses  $l_i$  to max  $u^i((1 - \tau) \cdot w_i l_i + R, l_i)$

Labor supply choices  $l_i$  determine individual earnings  $z_i = w_i l_i \Rightarrow$  Average earnings  $Z = \sum_i z_i / N$  depends (positively) on net-of-tax rate  $1 - \tau$ . We will write this as  $Z(1 - \tau)$  (this is a function, not a multiplication).

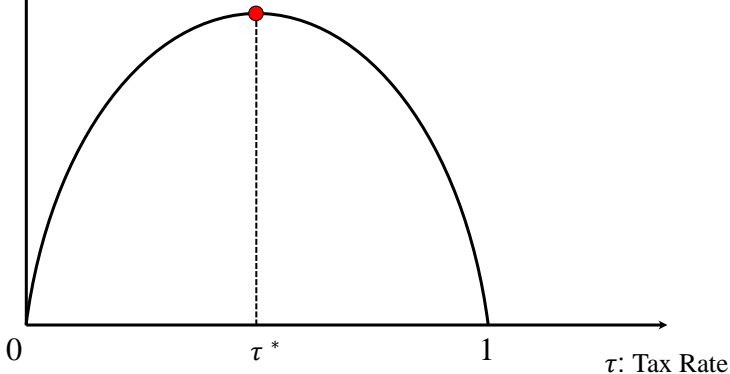
Tax Revenue per person  $R(\tau) = \tau \cdot Z(1 - \tau)$  is inversely U-shaped with  $\tau$ :  $R(\tau = 0) = 0$  (no taxes) and  $R(\tau = 1) = 0$  (nobody works): called the Laffer Curve. See next slide for illustration.

## Laffer Curve

Tax  
Revenue  
R

$$R = \tau \cdot Z(1 - \tau)$$

$$\tau^* = \frac{1}{1 + e} \text{ with } e = \frac{1 - \tau}{Z} \cdot \frac{dZ}{d(1 - \tau)}$$



## OPTIMAL LINEAR TAX RATE THAT MAXIMIZES REVENUES: LAFFER CURVE (SEE VIDEO)

Top of the Laffer Curve is at  $\tau^*$  maximizing tax revenue, so FOC needs to be zero at  $\tau^*$ .

$$0 = R'(\tau^*) = Z - \tau^* \frac{dZ}{d(1 - \tau^*)}$$

Use the definition of average income  $Z$  elasticity:  $e := \frac{dZ}{d(1 - \tau^*)} \frac{1 - \tau^*}{Z}$ . Note that we typically define elasticities to be positive, so we use the net-of-tax rate  $1 - \tau^*$  rather than  $\tau^*$ .  $e$  can be estimated in the data

Divide all by  $Z$ , and multiply and divide again by  $1 - \tau^*$  to make the elasticity appear. Note that  $dZ/d(1 - \tau^*) = eZ/(1 - \tau^*)$ . Hence the FOC becomes:

$$\Rightarrow \frac{\tau^*}{1 - \tau^*} \cdot \frac{1 - \tau^*}{Z} \frac{dZ}{d(1 - \tau)} = 1$$

Rearrange to bring  $\tau^*$  to one side:

$$\text{Revenue maximizing tax rate: } \tau^* = \frac{1}{1 + e} \text{ with } e = \frac{1 - \tau^*}{Z} \frac{dZ}{d(1 - \tau^*)}$$

## OPTIMAL LINEAR TAX RATE THAT MAXIMIZES REVENUES: LAFFER CURVE (SEE VIDEO)

Revenue maximizing tax rate:  $\tau^* = \frac{1}{1+e}$  with  $e = \frac{1-\tau^*}{Z} \frac{dZ}{d(1-\tau^*)}$

Inefficient to have  $\tau > \tau^*$  because decreasing  $\tau$  would make taxpayers better off (they pay less taxes) and would increase tax revenue for the government [and hence univ. transfer  $R$ ]

If government is **Rawlsian** (maximizes welfare of the worst-off person with no earnings) then  $\tau^* = 1/(1+e)$  is optimal to make transfer  $R(\tau)$  as large as possible

## GENERAL OPTIMAL LINEAR TAX RATE: FORMULA (SEE VIDEO)

Government chooses  $\tau$  to maximize **utilitarian** social welfare

$$SWF = \sum_i u^i((1 - \tau)w_i l_i + \tau \cdot Z(1 - \tau), l_i)$$

We have already substituted for consumption using each agent's budget constraint:  $c_i = (1 - \tau) \cdot w_i l_i + R$  and using the fact that the revenue per person  $R = \tau Z(1 - \tau)$ . You need to take into account that labor supply  $l_i$  responds to taxation and hence that this affects the tax revenue per person  $\tau \cdot Z(1 - \tau)$  that is redistributed back as transfer to everybody. Recall also that  $z_i = w_i l_i$ .

Government first order condition: (using the envelope theorem as  $l_i$  maximizes  $u^i$ ):

$$0 = \frac{dSWF}{d\tau} = \sum_i \frac{\partial u^i}{\partial c} \cdot \left[ -z_i + Z - \tau \frac{dZ}{d(1 - \tau)} \right],$$

## Note on the envelope theorem: SEE VIDEO

The agent maximizes their utility by choosing  $l_i$ . Hence, they solve:

$$\max_{l_i} u^i((1 - \tau)w_i l_i + \tau \cdot Z(1 - \tau), l_i)$$

The FOC for this maximization tells us that:

$$\frac{\partial u_i}{\partial c_i} [(1 - \tau)w_i] + \frac{\partial u_i}{\partial l_i} = 0$$

Recall the government's maximization from the previous slide. The full FOC is equal to:

$$0 = \sum_i \frac{\partial u^i}{\partial c} \cdot \left[ -z_i + Z - \tau \frac{dZ}{d(1 - \tau)} \right] + \sum_i \frac{\partial l_i}{\partial \tau} \underbrace{\left[ \frac{\partial u_i}{\partial c_i} [(1 - \tau)w_i] + \frac{\partial u_i}{\partial l_i} \right]}_A$$

But we just showed that  $A = 0$  if the agent is choosing their labor supply optimally (maximizing their utility with respect to labor supply). This is called the “envelope theorem.” You do not need to learn this theorem, just remember that you can ignore the effects of taxes on utility *through* the labor supply channel, because agents are already maximizing their utility by choosing labor supply.

## GENERAL OPTIMAL LINEAR TAX RATE: FORMULA (SEE VIDEO)

Hence, we have the following optimal linear income tax formula

$$\tau = \frac{1 - \bar{g}}{1 - \bar{g} + e} \quad \text{with} \quad \bar{g} = \frac{\sum_i z_i \cdot \frac{\partial u^i}{\partial c}}{Z \cdot \sum_i \frac{\partial u^i}{\partial c}}$$

$0 \leq \bar{g} < 1$  as  $\frac{\partial u^i}{\partial c}$  lower when income  $z_i$  is high (marginal utility falls with consumption)

$\tau$  decreases with elasticity  $e$  [efficiency] and with  $\bar{g}$  [equity]

Formula captures the **equity-efficiency trade-off**

$\bar{g}$  is low and  $\tau$  close to Laffer rate  $\tau^* = 1/(1 + e)$  when

(a) inequality is high

(b) marginal utility decreases fast with income

## Recap: General Optimal Linear Tax Rate and Revenue-Maximizing Tax Rate (SEE VIDEO)

General Optimal Linear Tax Rate:

$$\tau = \frac{1 - \bar{g}}{1 - \bar{g} + e} \quad \text{with} \quad \bar{g} = \frac{\sum_i z_i \cdot \frac{\partial u^i}{\partial c}}{Z \cdot \sum_i \frac{\partial u^i}{\partial c}}$$

Revenue Maximizing (Laffer) Tax Rate (special case of general tax rate with  $\bar{g} = 0$ ).

$$\tau^{\text{Revenue Maximizing}} = \frac{1}{1 + e}$$

## REAL VS. TAX AVOIDANCE RESPONSES

Behavioral response to income tax comes not only from reduced labor supply but from tax avoidance or tax evasion

Tax avoidance: legal means to reduce tax liability (exploiting tax loopholes)

Tax evasion: illegal under-reporting of income

Labor supply vs. tax avoidance/evasion distinction matters because:

- 1) If people work less when tax rates increase, there is not much the government can do about it
- 2) If people avoid/evade more when tax rates increase, then the govt can reduce tax avoidance/evasion opportunities [closing tax loopholes, broadening the tax base, increasing tax enforcement, etc.]

## REAL VS. AVOIDANCE RESPONSES

**Key policy question:** Is it possible to eliminate avoidance responses using base broadening, etc.? or would new avoidance schemes keep popping up?

- a) Some forms of tax avoidance are due to **poorly designed tax codes** (preferential treatment for some income forms or some deductions)
- b) Some forms of tax avoidance/evasion can only be addressed with **international cooperation** (off-shore tax evasion in tax havens)
- c) Some forms of tax avoidance/evasion are due to technological limitations of tax collection (impossible to tax informal cash businesses)

## OPTIMAL PROFILE OF TRANSFERS (SEE VIDEO)

If individuals respond to taxes only through **intensive** margin (how much they work rather than whether they work), optimal transfer at bottom takes the form of a “Negative Income Tax”:

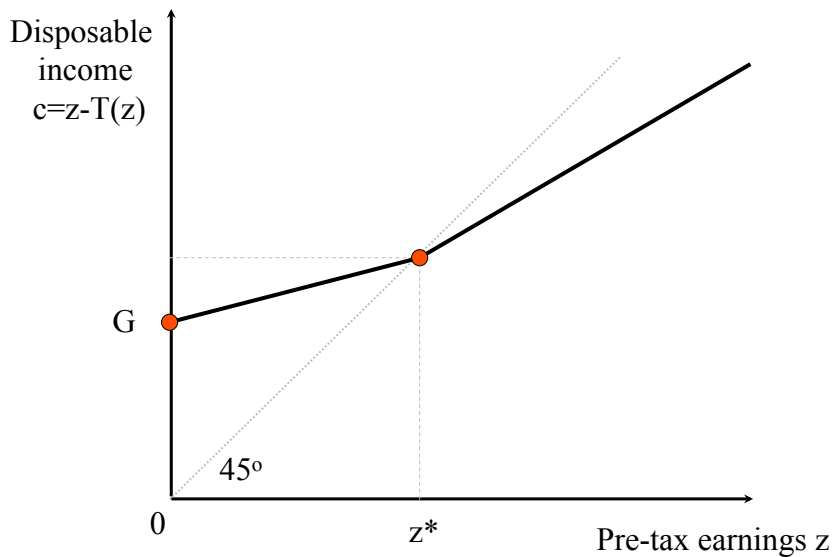
- 1) Lumpsum grant  $-T(0) > 0$  for those with no earnings
- 2) High marginal tax rates (MTR)  $T'(z)$  at the bottom to phase-out the lumpsum grant quickly

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

But US system with zero MTR at bottom justified if society sees people with zero income as **less deserving** than average

# Starting from a means-tested program

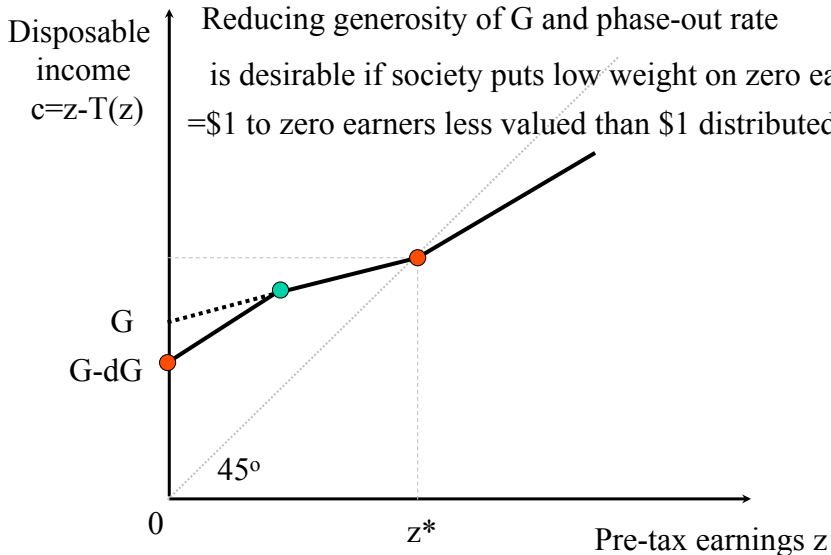


Starting from a means-tested program

Reducing generosity of  $G$  and phase-out rate

is desirable if society puts low weight on zero earners

= \$1 to zero earners less valued than \$1 distributed to all



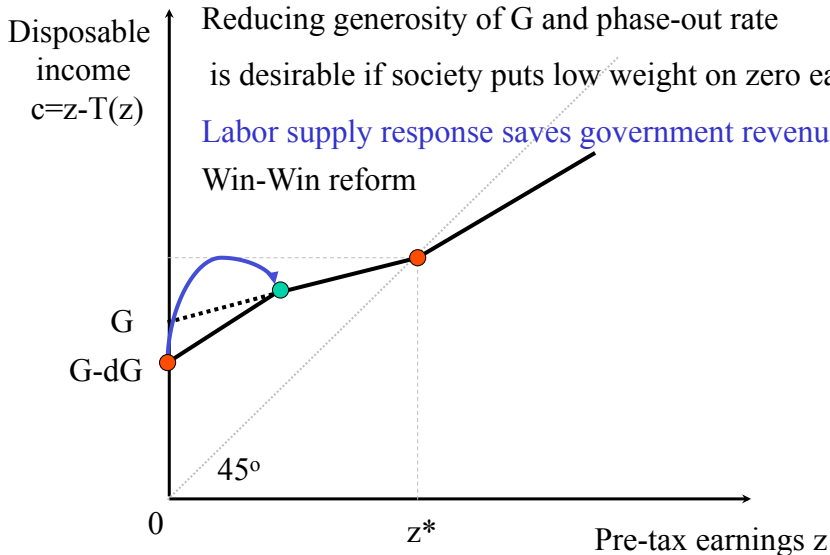
Starting from a means-tested program

Reducing generosity of  $G$  and phase-out rate

is desirable if society puts low weight on zero earners

Labor supply response saves government revenue

Win-Win reform



## Optimal Transfers: Participation Responses (SEE VIDEO)

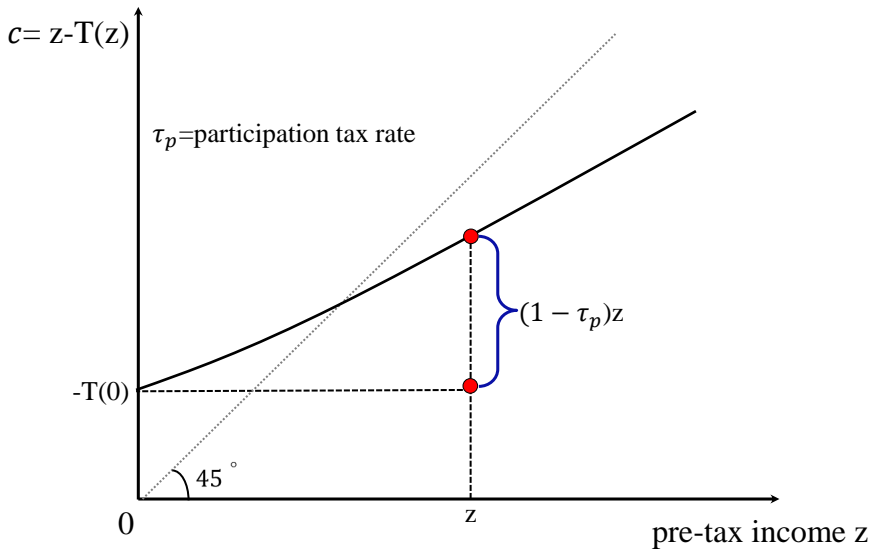
Empirical literature shows that participation labor supply responses [whether to work or not] are large at the bottom [much larger and clearer than intensive responses]

Participation depends on participation tax rate:

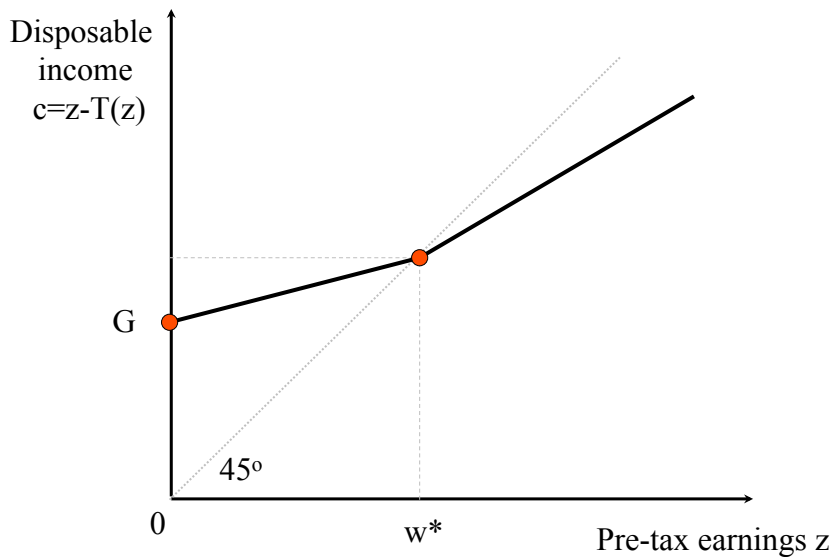
$$\tau_p = [T(z) - T(0)]/z$$

Individual keeps fraction  $1 - \tau_p$  of earnings when moving from zero earnings to earnings  $z$ :  $z - T(z) = -T(0) + z \cdot (1 - \tau_p)$

**Key result:** in-work subsidies with  $T'(z) < 0$  are optimal when labor supply responses are concentrated along extensive margin and govt cares about low income workers.

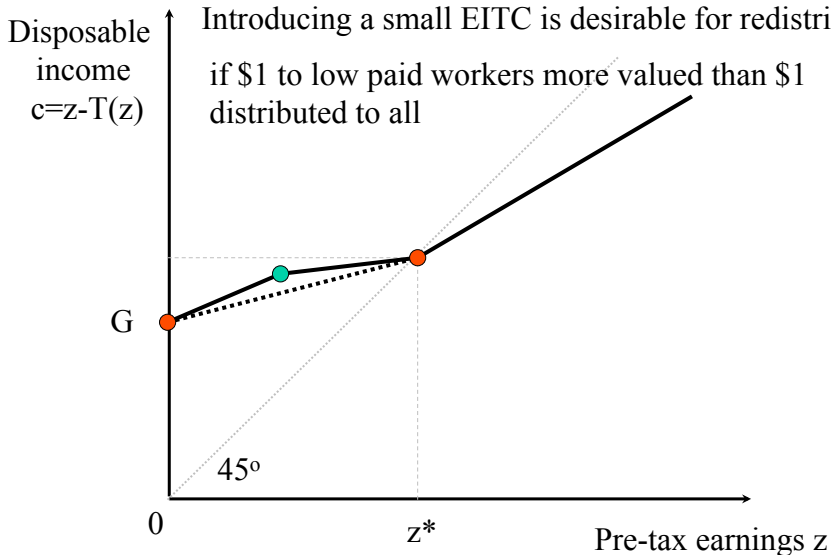


## Starting from a Means-Tested Program



## Starting from a Means-Tested Program

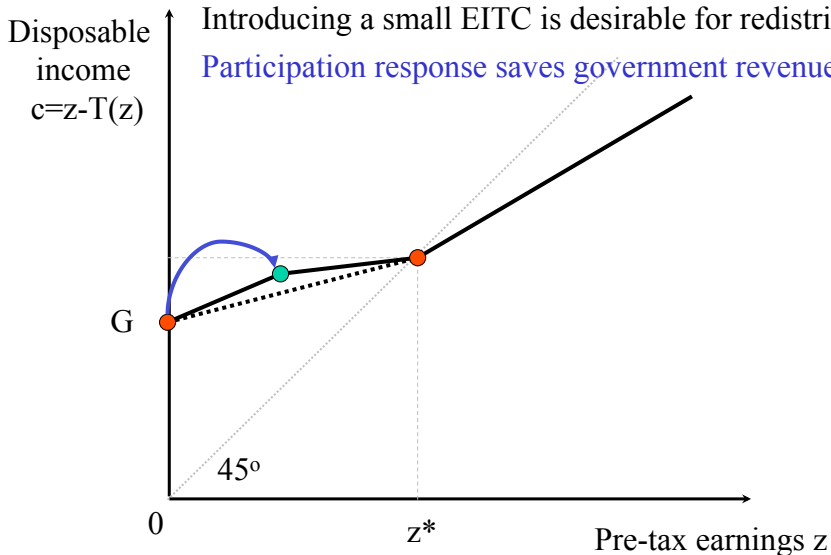
Introducing a small EITC is desirable for redistribution if \$1 to low paid workers more valued than \$1 distributed to all



## Starting from a Means-Tested Program

Introducing a small EITC is desirable for redistribution

Participation response saves government revenue



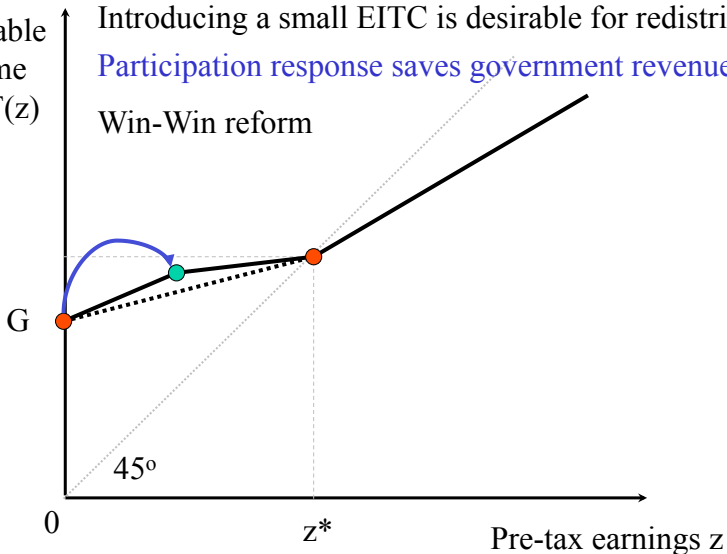
## Starting from a Means-Tested Program

Introducing a small EITC is desirable for redistribution

Participation response saves government revenue

Win-Win reform

Disposable  
income  
 $c=z-T(z)$

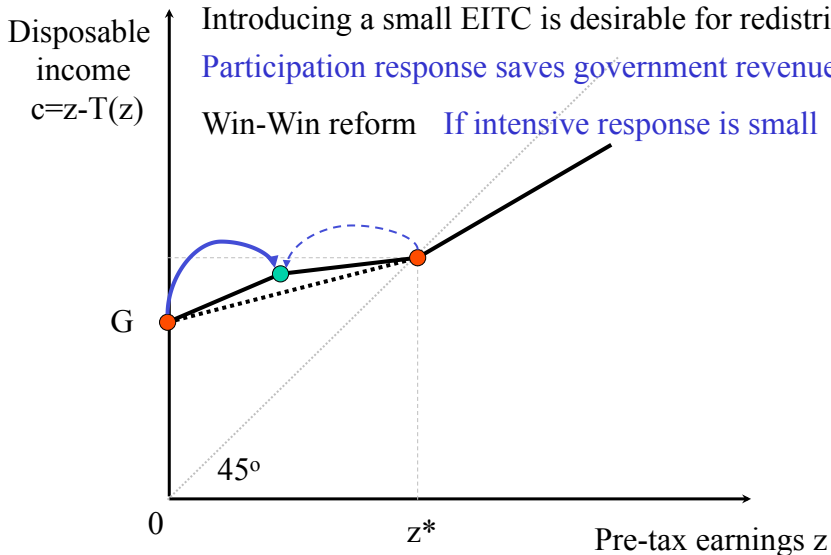


## Starting from a Means-Tested Program

Introducing a small EITC is desirable for redistribution

Participation response saves government revenue

Win-Win reform If intensive response is small



## OPTIMAL PROFILE OF TRANSFERS: SUMMARY (SEE VIDEO)

- 1) If society views **zero earners** 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
- 2) 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
- 3) 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)

## ACTUAL TAX/TRANSFER SYSTEMS (SEE VIDEO)

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, (b) improve incentives to work

## Basic Income vs. Means-tested transfer: Mankiw quizz

Consider an economy in which average income is \$50,000 but with much income inequality. To provide a social safety net, two possible policies are proposed.

A. A universal transfer of \$10,000 to every person, financed by a 20-percent flat tax on income.

B. A means-tested transfer of \$10,000. The full amount goes to someone without any income. The transfer is then phased out: You lose 20 cents of it for every dollar of income you earn. These transfers are financed by a tax of 20 percent on income above \$50,000.

Which would you prefer?

## Basic Income vs. Means-tested transfer

Basic income definition: all people receive an unconditional sum of money (every year) regardless of how much they earn

This is the  $R$  of the linear tax system  $c = (1 - \tau) \cdot z + R$

Or the  $-T(0) > 0$  of the nonlinear tax system  $c = z - T(z)$

Basic income for everybody + higher taxes to fund it is **economically equivalent** to means-tested transfer phased out with earnings

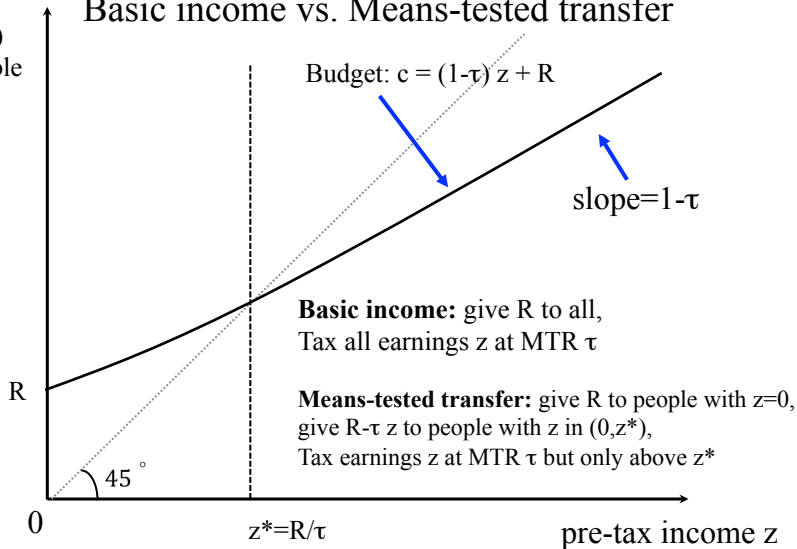
Pro basic income: less stigmatizing than means-tested transfer

Cons: basic income requires higher “nominal” taxes (that are then rebated back)

Countries provide “in-kind” basic income in the form of universal health care (not the US) and public education

## Basic income vs. Means-tested transfer

$c = z - T(z)$   
disposable  
income



## IN-KIND REDISTRIBUTION

Most means-tested transfers are in-kind and often rationed (health care, child care, public education, public housing, nutrition subsidies) [care not cash San Francisco reform]

### 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)

## **FAMILY TAXATION: MARRIAGE**

Two important issues in policy debate:

- 1) Marriage: What is the optimal taxation of couples vs. singles?
- 2) Children: What should be the net transfer (transfer or tax reduction) for family with children (as a function of family income and structure)?

## TAXATION OF COUPLES

Three potentially desirable properties:

- (1) income tax should be based on resources (i.e., family income if families fully share their income)
- (2) income tax should be marriage neutral: no higher/lower tax when two single individuals marry
- (3) income tax should be progressive (i.e., higher incomes pay a larger fraction of their income in taxes)

It is **impossible** to have a tax system that satisfies all 3 conditions simultaneously:

Income tax that is based on family income and marriage neutral has to satisfy:  $T(z^h + z^w) = T(z^h) + T(z^w)$  and hence be linear i.e.

$$T(z) = \tau \cdot z$$

## TAXATION OF COUPLES

(1) If couples share their incomes, then family taxation is better. If couples don't share their incomes, then individualized tax is better

(2) If marriage responds to tax/transfer differential  $\Rightarrow$  better to reduce marriage penalty, i.e., move toward individualized system

Particularly important when cohabitation is close substitute for marriage (as in Scandinavian countries)

(3) If labor supply of secondary earners more elastic than labor supply of primary earner  $\Rightarrow$  Secondary earnings should be taxed less (Boskin-Sheshinski JpubE'83)

Labor supply elasticity differential between primary and secondary earners is decreasing over time as earnings gender gap decreases (Blau and Kahn 2007)

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## APPENDIX SLIDES

(For your own reference only).

## Optimal Taxation: Case with No Behavioral Responses

Utility  $u(c)$  strictly increasing and concave

Same for everybody where  $c$  is after tax income.

Income  $z$  is fixed for each individual,  $c = z - T(z)$  where  $T(z)$  is tax/transfer on  $z$  (tax if  $T(z) > 0$ , transfer if  $T(z) < 0$ )

$N$  individuals with fixed incomes  $z_1 < \dots < z_N$

Government maximizes **Utilitarian** objective:

$$SWF = \sum_{i=1}^N u(z_i - T(z_i))$$

subject to **budget constraint**  $\sum_{i=1}^N T(z_i) = 0$  (taxes need to fund transfers)

## Simple Model With No Behavioral Responses

Replace  $T(z_1) = -\sum_{i=2}^N T(z_i)$  from budget constraint:

$$SWF = u\left(z_1 + \sum_{i=2}^N T(z_i)\right) + \sum_{i=2}^N u(z_i - T(z_i))$$

First order condition (FOC) in  $T(z_j)$  for a given  $j = 2, \dots, N$ :

$$0 = \frac{\partial SWF}{\partial T(z_j)} = u'\left(z_1 + \sum_{i=2}^N T(z_i)\right) - u'(z_j - T(z_j)) = 0 \Rightarrow$$

$$u'(z_j - T(z_j)) = u'(z_1 - T(z_1)) \Rightarrow z_j - T(z_j) = \text{constant across } j = 1, \dots, N$$

Perfect equalization of after-tax income = 100% tax rate and redistribution [draw graph]

Utilitarianism with decreasing marginal utility leads to perfect egalitarianism [Edgeworth, 1897]

## Simpler Derivation with just 2 individuals

$$\max SWF = u(z_1 - T(z_1)) + u(z_2 - T(z_2)) \text{ s.t. } T(z_1) + T(z_2) = 0$$

Replace  $T(z_1) = -T(z_2)$  in  $SWF$  using budget constraint:

$$SWF = u(z_1 + T(z_2)) + u(z_2 - T(z_2))$$

First order condition (FOC) in  $T(z_2)$ :

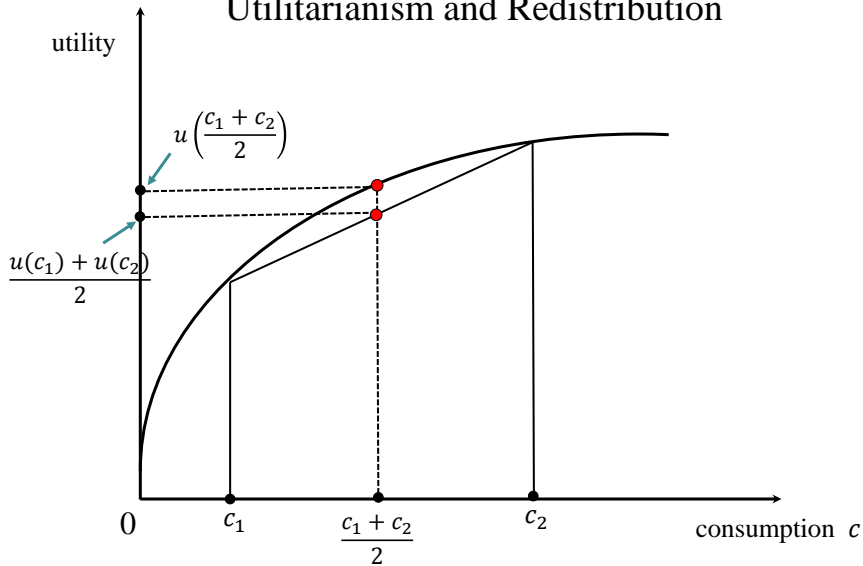
$$0 = \frac{dSWF}{dT(z_2)} = u'(z_1 + T(z_2)) - u'(z_2 - T(z_2)) = 0 \Rightarrow$$

$$u'(z_1 + T(z_2)) = u'(z_2 - T(z_2)) \Rightarrow u'(z_1 - T(z_1)) = u'(z_2 - T(z_2))$$

$\Rightarrow z_1 - T(z_1) = z_2 - T(z_2)$  constant across the 2 individuals

Perfect equalization of after-tax income = 100% tax rate and redistribution [see graph]

## Utilitarianism and Redistribution



## ISSUES WITH SIMPLE MODEL

1) **No behavioral responses:** Obvious missing piece: 100% redistribution would destroy incentives to work and thus the assumption that  $z$  is exogenous is unrealistic

⇒ Optimal income tax theory incorporates behavioral responses

2) **Issue with Utilitarianism:** Even absent behavioral responses, many people would object to 100% redistribution [perceived as confiscatory]

⇒ Citizens' views on fairness impose **bounds** on redistribution govt can do [political economy / public choice theory]

## REVENUE MAXIMIZING TOP INCOME TAX RATE (Diamond and Saez JEP'11)

In practice, individual income tax is progressive with brackets with increasing marginal tax rates. What is the optimal top tax rate?

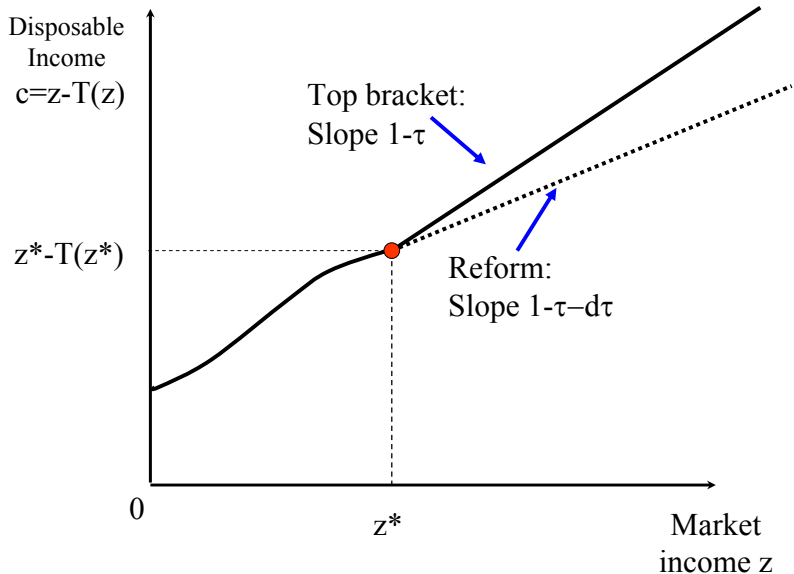
Consider constant MTR  $\tau$  above fixed  $z^*$ . Goal is to derive optimal  $\tau$

In the US in 2018+,  $\tau = 37\%$  and  $z^* \simeq \$600,000$  ( $\simeq$  top 1%)

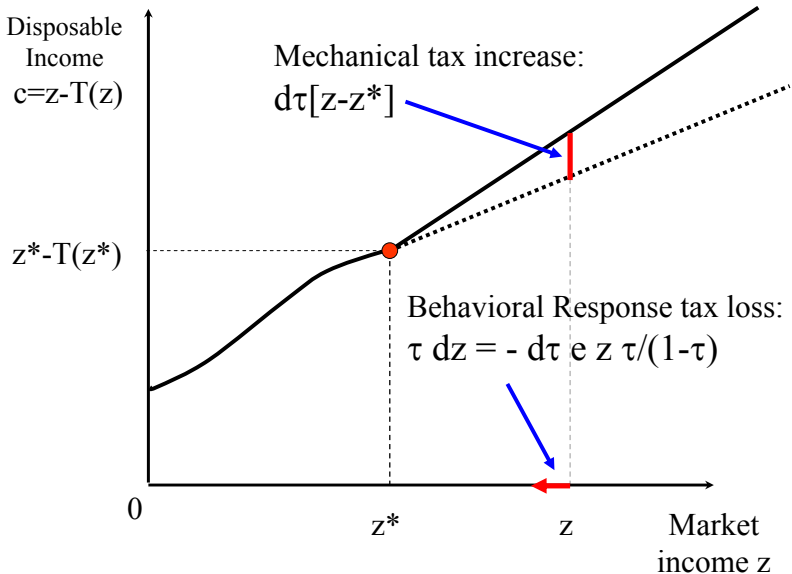
Denote by  $z$  average income of top bracket earners [depends on net-of-tax rate  $1 - \tau$ ], with elasticity  $e = [(1 - \tau)/z] \cdot dz/d(1 - \tau)$

Suppose the government wants to maximize tax revenue collected from top bracket taxpayers (marginal utility of consumption of top 1% earners is small)

# Optimal Top Income Tax Rate (Mirrlees '71 model)



# Optimal Top Income Tax Rate (Mirrlees '71 model)



## REVENUE MAXIMIZING TOP INCOME TAX RATE

Consider small  $d\tau > 0$  reform above  $z^*$ .

1) **Mechanical increase** in tax revenue:

$$dM = [z - z^*]d\tau$$

2) **Behavioral response** reduces tax revenue:

$$dB = \tau dz = -\tau \frac{dz}{d(1-\tau)} d\tau = -\frac{\tau}{1-\tau} \cdot e \cdot z \cdot d\tau$$

$$dM + dB = d\tau \left\{ [z - z^*] - e \frac{\tau}{1-\tau} z \right\}$$

Optimal  $\tau$  such that  $dM + dB = 0$

$$\Rightarrow \frac{\tau}{1-\tau} = \frac{1}{e} \cdot \frac{z - z^*}{z} \Rightarrow \tau = \frac{1}{1 + a \cdot e} \quad \text{with} \quad a = \frac{z}{z - z^*}$$

## REVENUE MAXIMIZING TOP INCOME TAX RATE

Revenue Maximizing top tax rate:  $\tau = \frac{1}{1 + a \cdot e}$  with  $a = \frac{z}{z - z^*}$

Optimal  $\tau$  decreases with  $e$  [efficiency]

Optimal  $\tau$  decrease with  $a$  [thinness of top tail]

Empirically  $a \simeq 1.5$ , easy to estimate using distributional data [mean income above  $z^* = \$0.5\text{m}$  is about  $\$1.5\text{m}$  in the US]

Empirically  $e$  is harder to estimate [controversial]

Example: If  $e = .25$  then  $\tau = 1/(1 + 1.5 \cdot 0.25) = 1/1.375 = 73\%$

## Recap of All Tax Rates

General Optimal Linear Tax Rate:

$$\tau = \frac{1 - \bar{g}}{1 - \bar{g} + e} \quad \text{with} \quad \bar{g} = \frac{\sum_i z_i \cdot \frac{\partial u^i}{\partial c}}{Z \cdot \sum_i \frac{\partial u^i}{\partial c}}$$

Revenue Maximizing (Laffer) Tax Rate (special case of general tax rate with  $\bar{g} = 0$ ).

$$\tau^{\text{Revenue Maximizing}} = \frac{1}{1 + e}$$

Revenue Maximizing Top Tax Rate (like the general tax rate with  $\bar{g} = 0$  and added term to scale for top income bracket,  $a$ ):

$$\tau^{\text{Revenue Maximizing Top}} = \frac{1}{1 + a \cdot e} \quad \text{with} \quad a = \frac{z}{z - z^*}$$