Labor Income Taxation

Stefanie Stantcheva

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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

$\Rightarrow$ 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 ($12.5K for singles, $25K 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

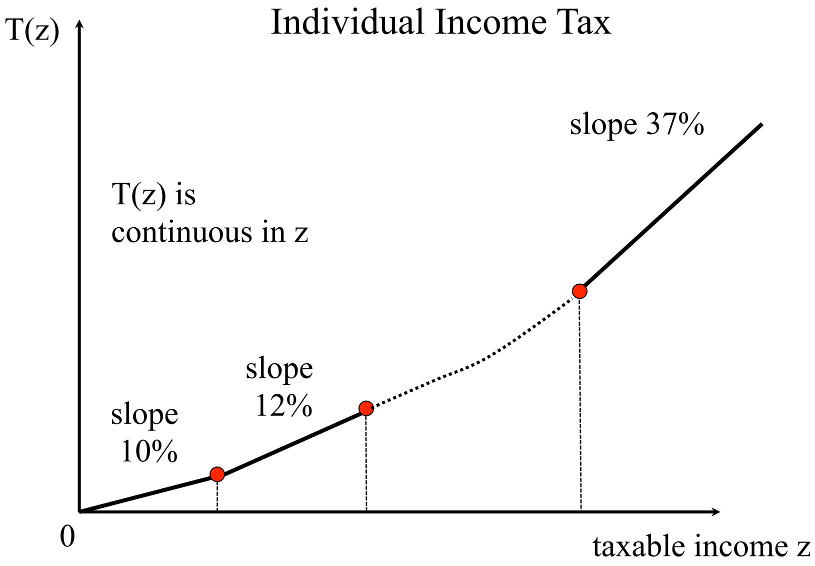
Tax $T(z)$ is piecewise linear and continuous function of taxable income z with constant marginal tax rates (MTR) $T'(z)$ by brackets

In 2018+, 7 brackets with MTR 10%,12%,22%,24%,32%,35%, 37% (top bracket for z above $600K), indexed on price inflation

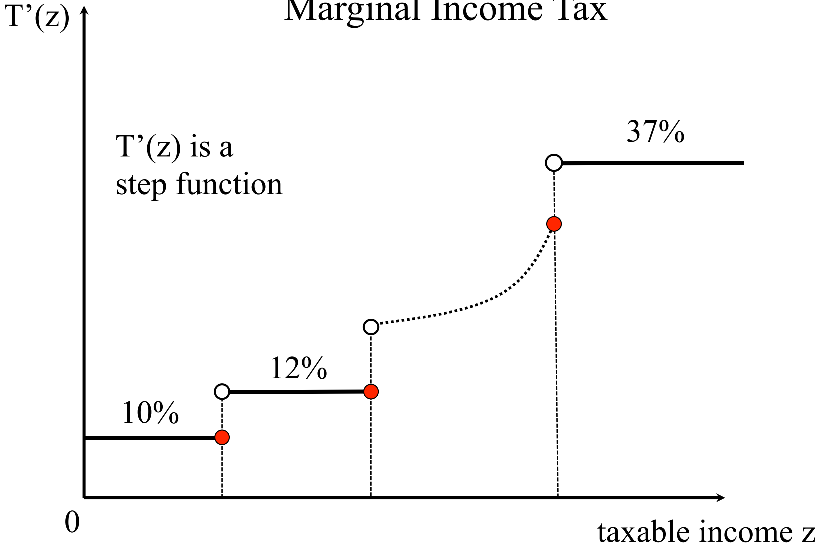
Lower preferential rates (up to a max of 20%) apply to dividends (since 2003), realized capital gains [in part to offset double taxation of corporate profits].

20% of business profits are exempt since 2018

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

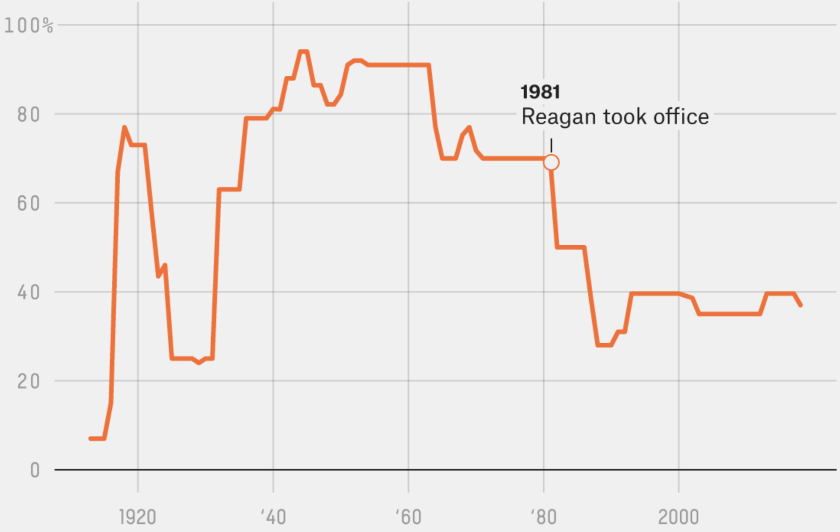

Individual Income Tax
T(z)
slope 37%
T(z) is
continuous in z
slope
12%
slope
10%
0
taxable income z

Marginal Income Tax



Historically, a 70 percent marginal tax rate is not unusual

The top marginal income tax rates from 1913 to 2018



FiveThirtyEight

SOURCE: TAX POLICY CENTER

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

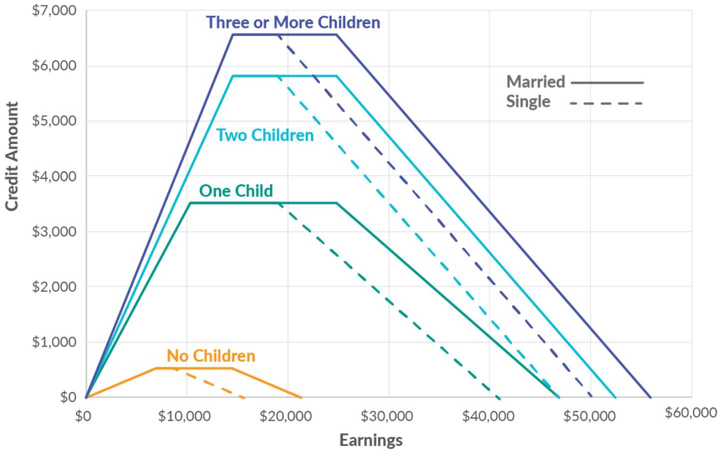
(2) **Refundable** (can reduce taxes below zero, i.e., be net transfers): EITC (earned income tax credit, up to $3.5K, $5.7K, $6.5K for working families with 1, 2, 3+ kids), Child Tax Credit ($2K per kid, partly refundable)

2021: CTC expanded to $3K per kid and fully refundable.

Refundable credits have become the largest means-tested cash transfer in the US

The Phase-In and Phaseout of the EITC

Credit Amount by Marital Status and Number of Children

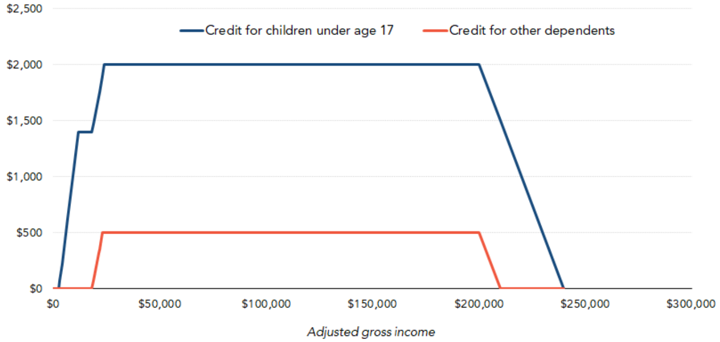


Source: Amir El-Sibaie, "2019 Tax Brackets," Tax Foundation, Nov. 28, 2018.

TAX FOUNDATION @TaxFoundation

FIGURE 1

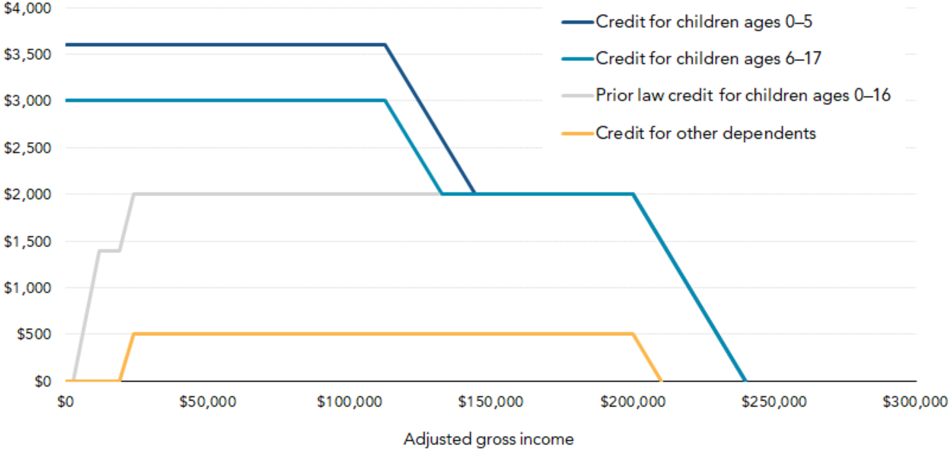
Child Tax Credit, Single Parent
For one child, tax year 2020



Source: Urban-Brookings Tax Policy Center calculations.
Notes: Assumes all income comes from earnings, and child meets all tests to be a CTC-qualifying dependent. Credit for married parents begins to phase out at $400,000 of income. Only citizen children qualify for the $2,000 CTC for children under 17. Noncitizens under age 17 who meet the dependency tests of eligibility can qualify for the credit for dependents over age 17.

FIGURE 1

Child Tax Credit, Single Parent
For one child, tax year 2021



Source: Urban-Brookings Tax Policy Center calculations.
Notes: Assumes all income comes from earnings, and child meets all tests to be a CTC-qualifying dependent. $3,000 and $3,600 credits are fully refundable; prior law limited refunds to $1,400 out of the maximum $2,000 credit. Credit for married parents first phases out at $150,000 of income until credit reaches pre-2021 level; begins second phase out at $400,000 of income. Only citizen children qualify for the $3,000 and $3,600 credits for children under 18. Noncitizens under age 18 who meet the dependency tests of eligibility can qualify other dependent credit.

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

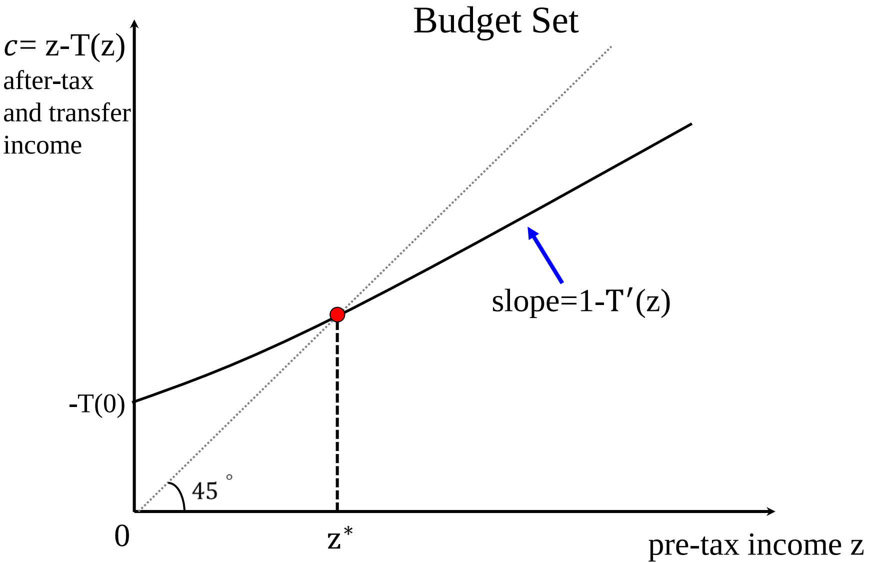
1) Transfer benefit with zero earnings $-T(0)$ [sometimes called demogrant or lumpsum grant]

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)

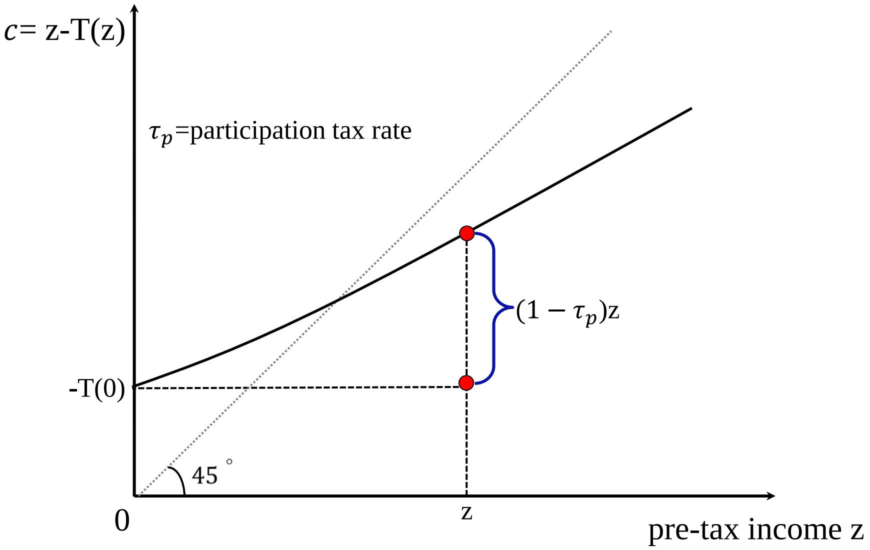
3) Participation tax rate $\tau_p = [T(z) - T(0)]/z$: individual keeps fraction $1 - \tau_p$ of earnings when moving from zero earnings to earnings z (extensive labor supply response):

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

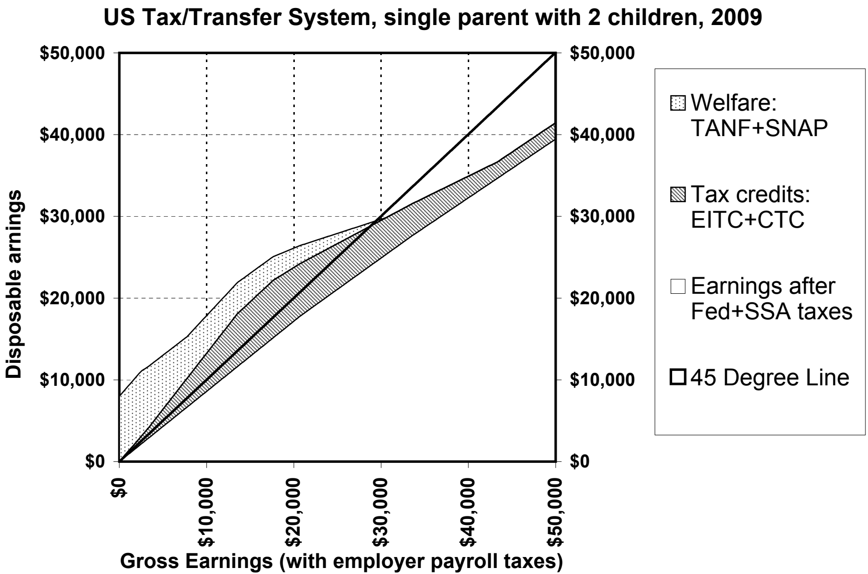
4) Break-even earnings point z^*: point at which $T(z^*) = 0$



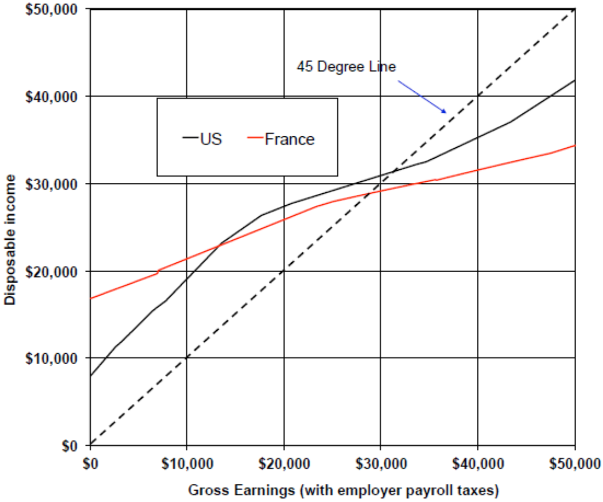
Budget Set
c= z-T(z)
after-tax
and transfer
income
slope=1-T′(z)
-T(0)
45 °
0
z*
pre-tax income z



c= z-T(z)
τ_p=participation tax rate
$(1-\tau_p)$z
-T(0)
45 °
0
z
pre-tax income z



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

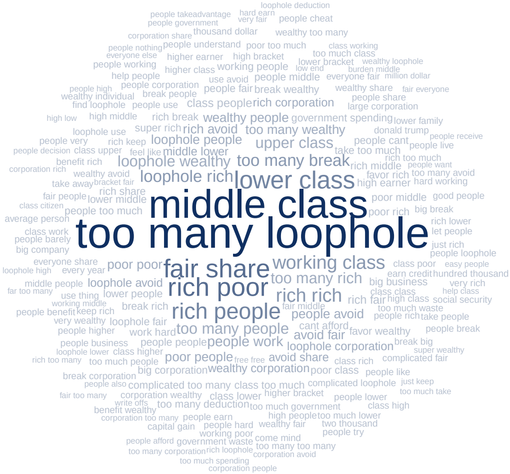
However, refundable tax credits cannot benefit those with zero earnings

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

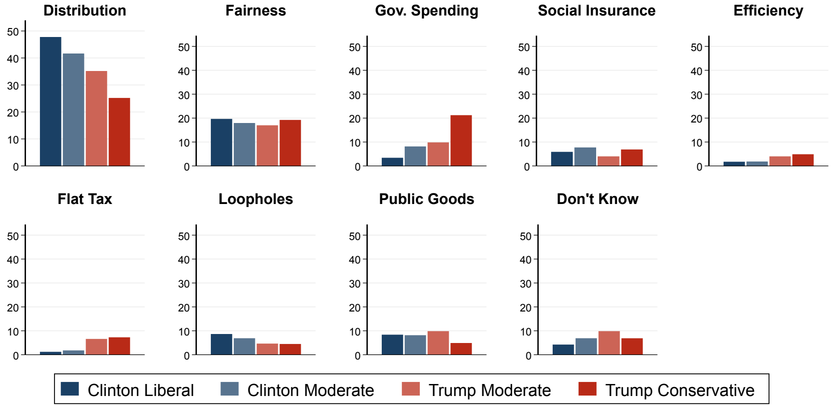
For Some Fun: What Do People Actually Know and How do they Think about Taxes?

... Some brand new evidence from the Social Economics Lab and `understandingeconomics.org`

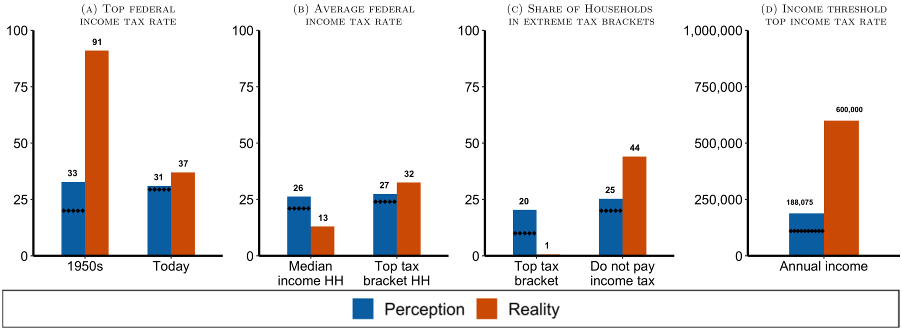
What are the Shortcomings of the Income Tax System?



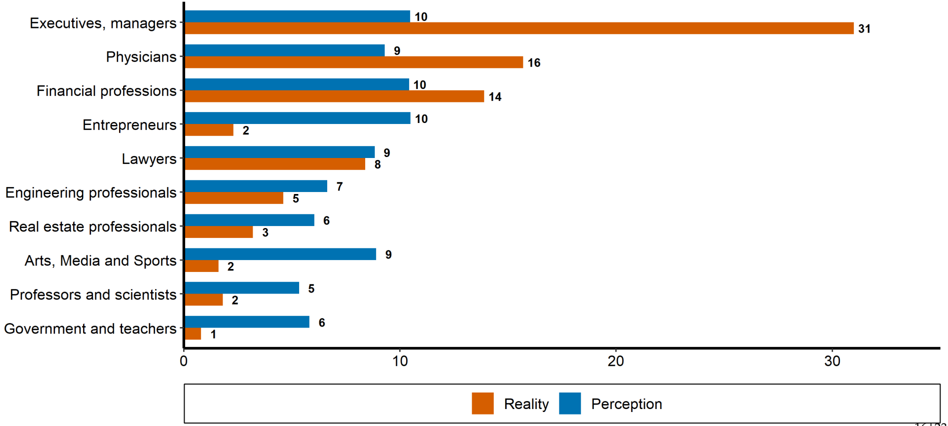
What are your Main Considerations about the Income Tax?
Relative Frequency of Topics by Political Views



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]

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

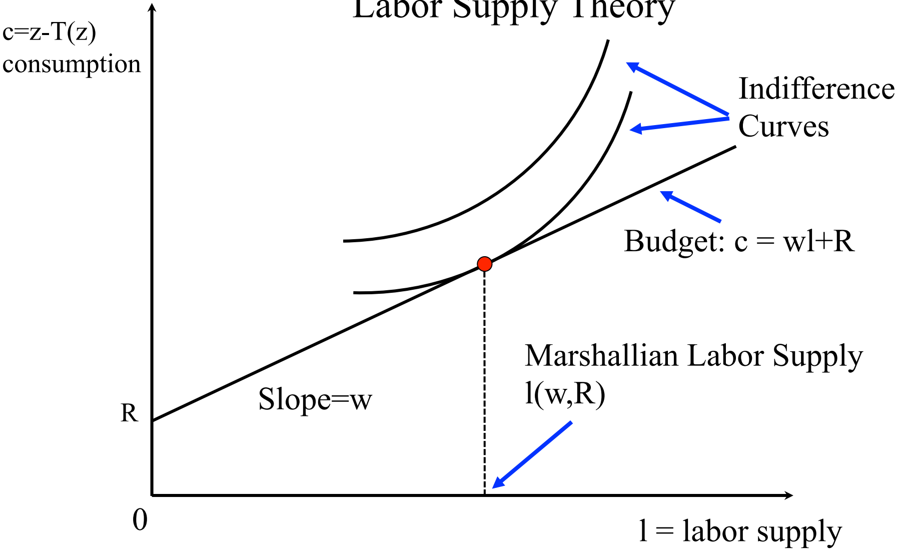
with $w = \bar{w} \cdot (1 - \tau)$ the net-of-tax wage ($\bar{w}$ is before tax wage rate and τ is tax rate), and R non-labor income

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

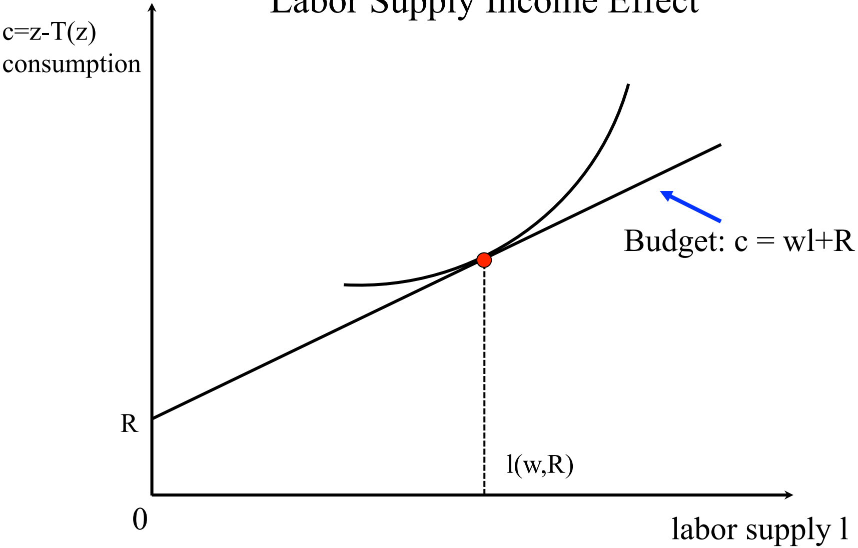
$$\textbf{Uncompensated labor supply elasticity:} \quad \varepsilon^u = \frac{w}{l} \cdot \frac{\partial l}{\partial w}$$

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

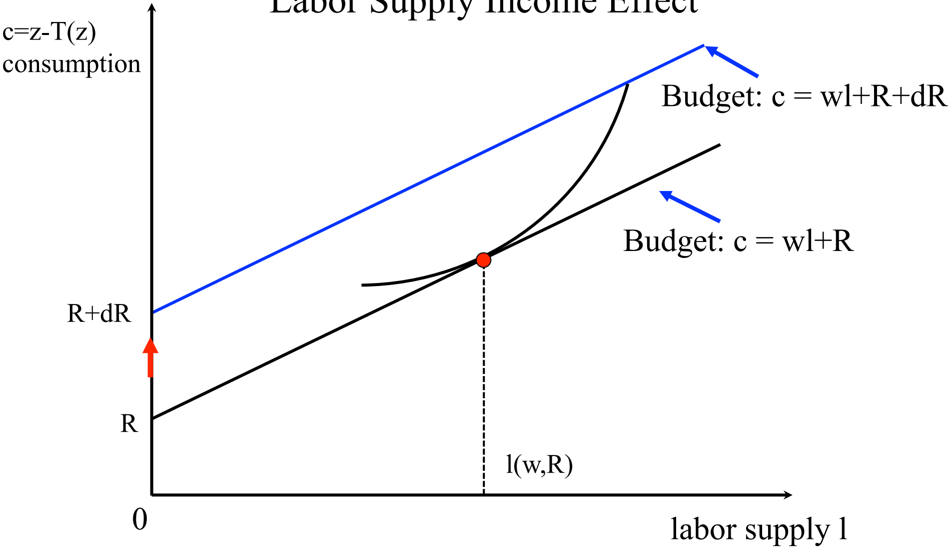
Labor Supply Theory



Labor Supply Income Effect



Labor Supply Income Effect



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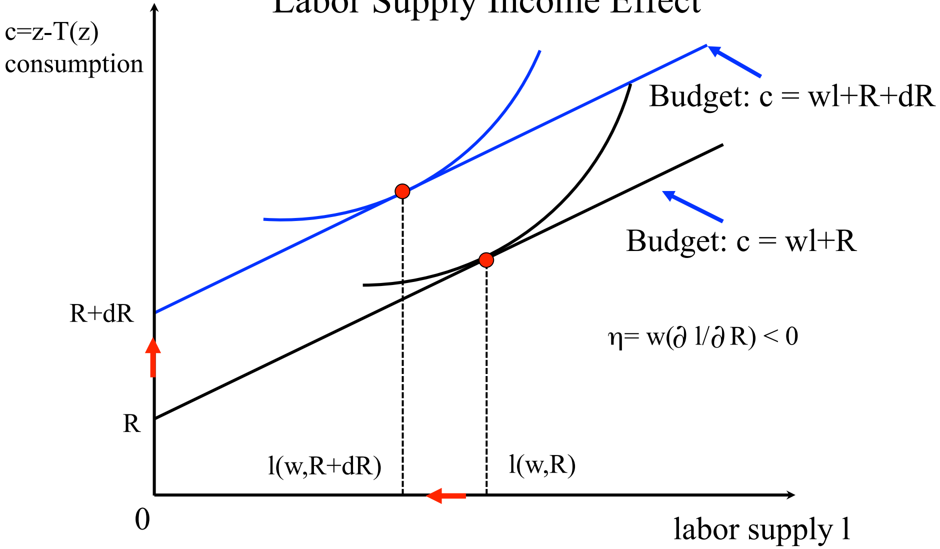


Labor Supply Theory

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

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

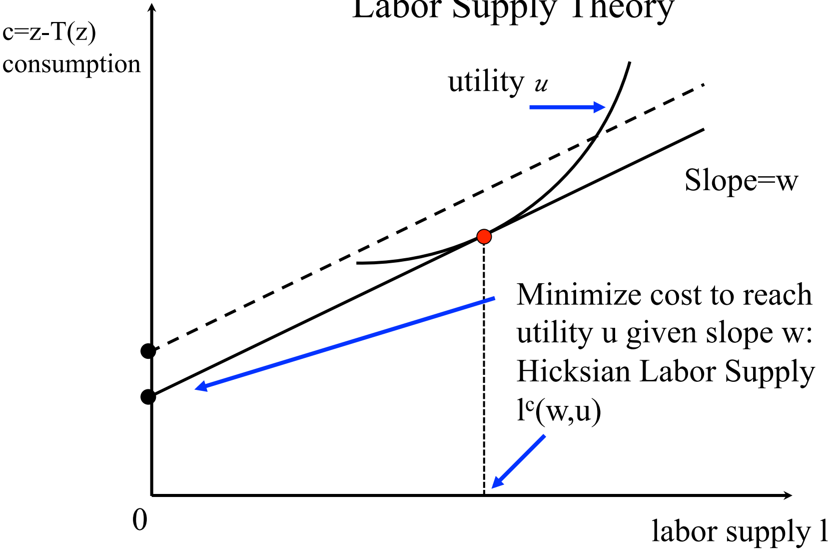
$$\text{Slutsky equation} \quad \frac{\partial l}{\partial w} = \frac{\partial l^c}{\partial w} + l \frac{\partial l}{\partial R} \Rightarrow \varepsilon^u = \varepsilon^c + \eta$$

Tax rate τ discourages work through substitution effects (work pays less at the margin)

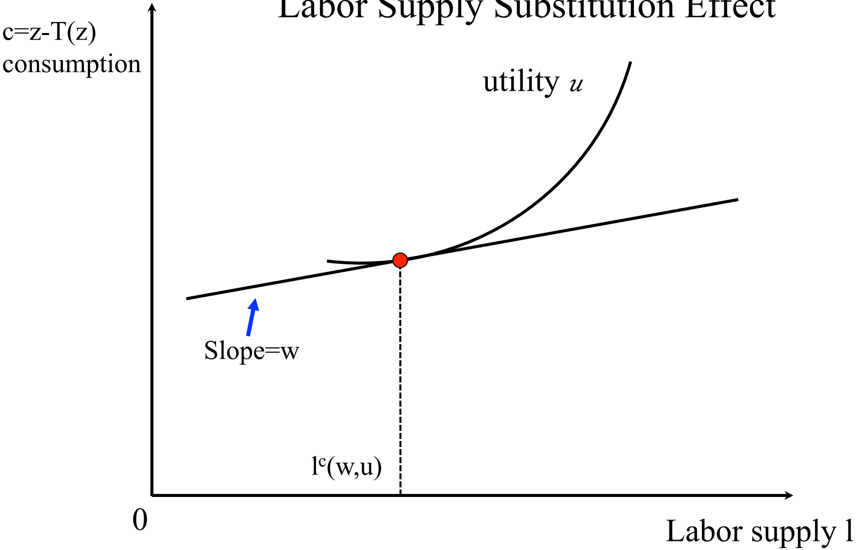
Tax rate τ encourages work through income effects (taxes make you poorer and hence in more need of income)

Net effect ambiguous (captured by sign of ε^u)

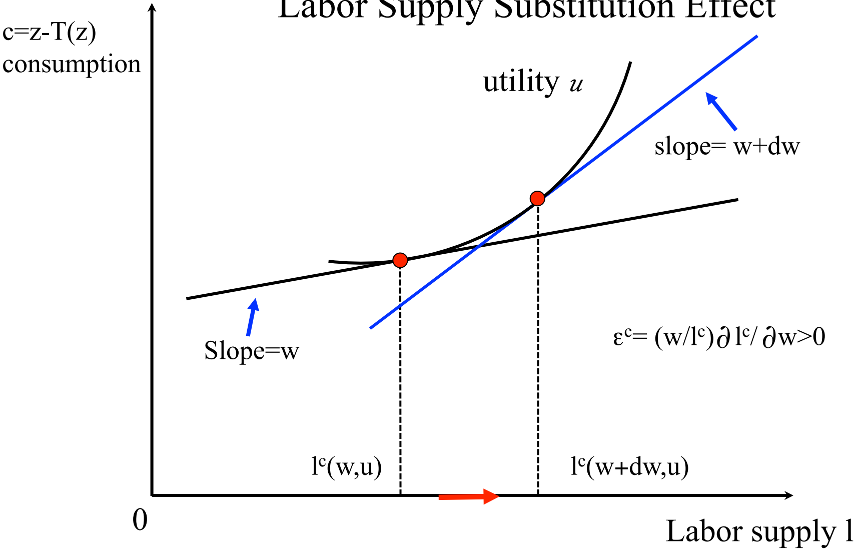
Labor Supply Theory



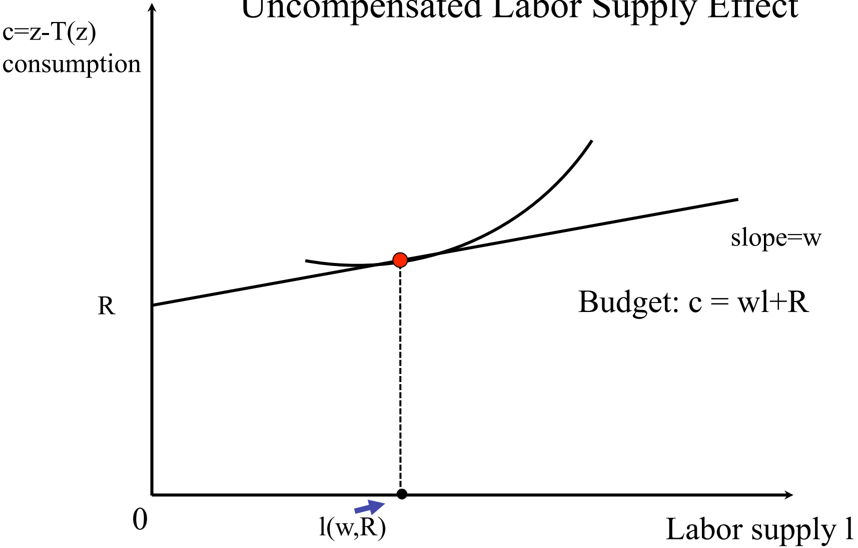
Labor Supply Substitution Effect



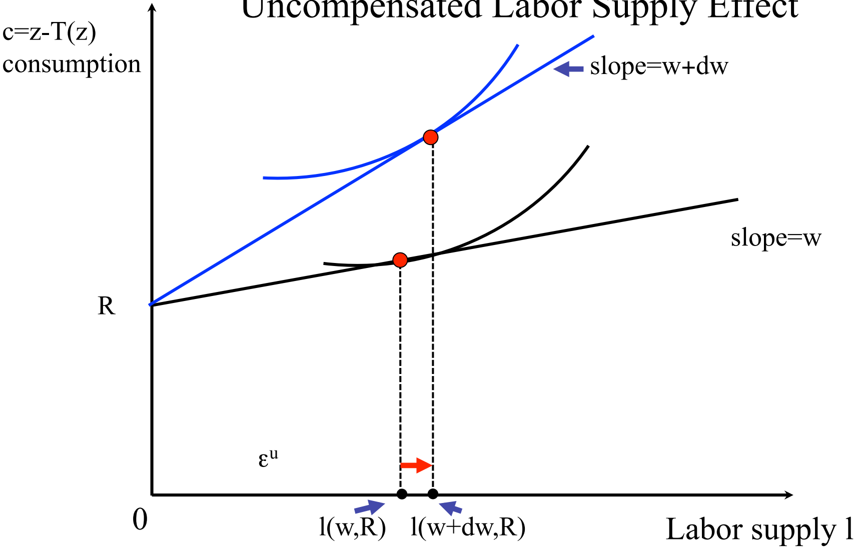
Labor Supply Substitution Effect



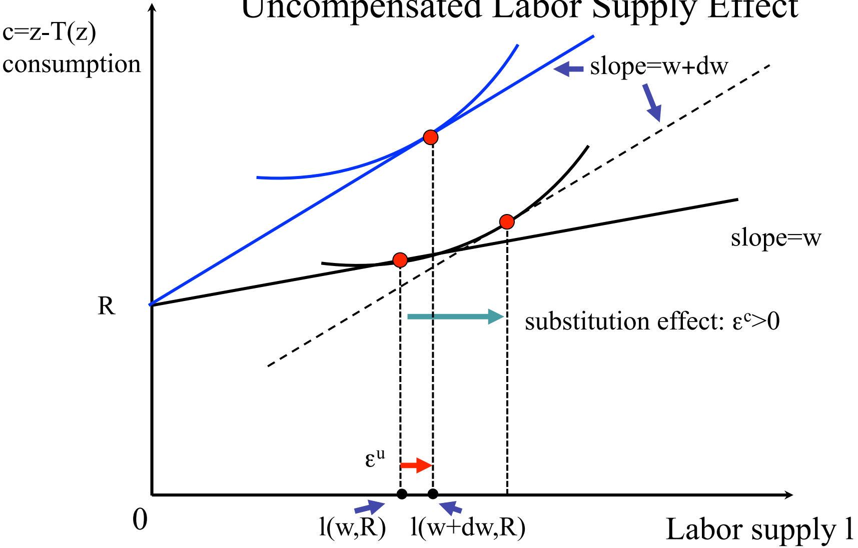
Uncompensated Labor Supply Effect



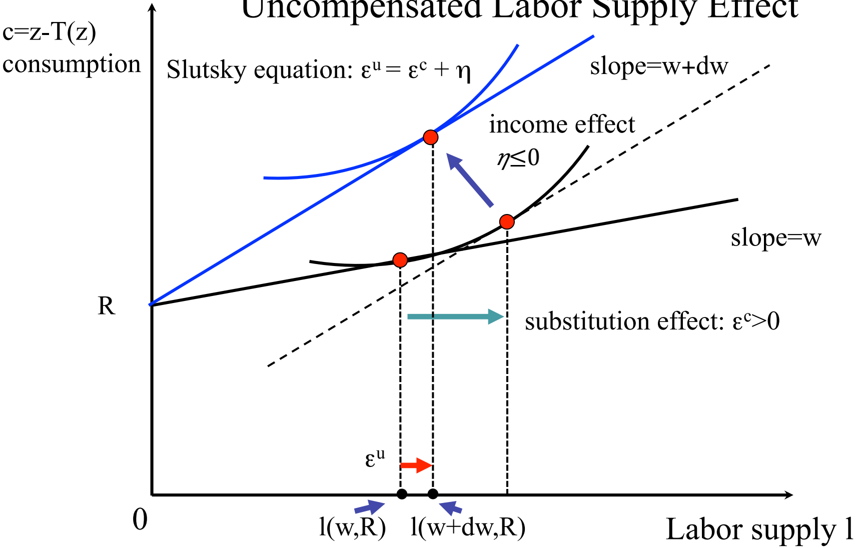
Uncompensated Labor Supply Effect



Uncompensated Labor Supply Effect



Uncompensated Labor Supply Effect



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

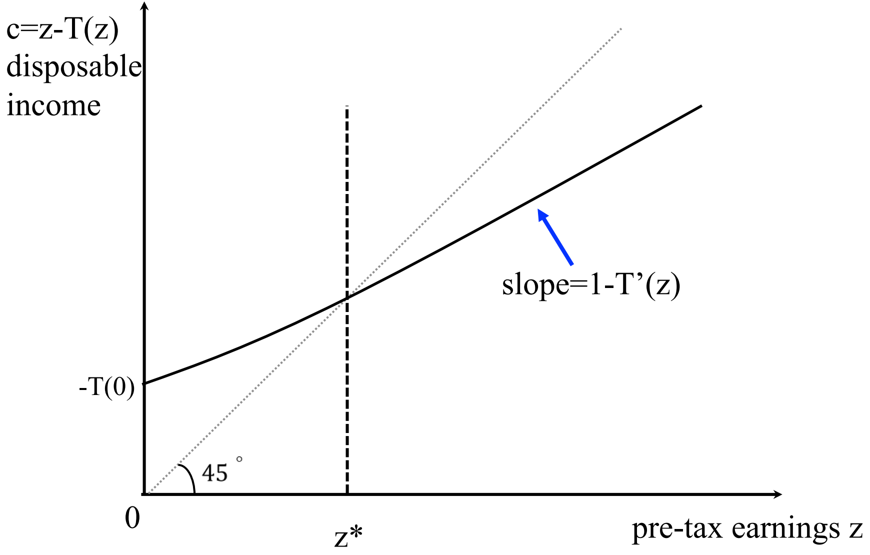
$T'(z) > 0$ reduces net wage rate and reduces labor supply through substitution effects

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

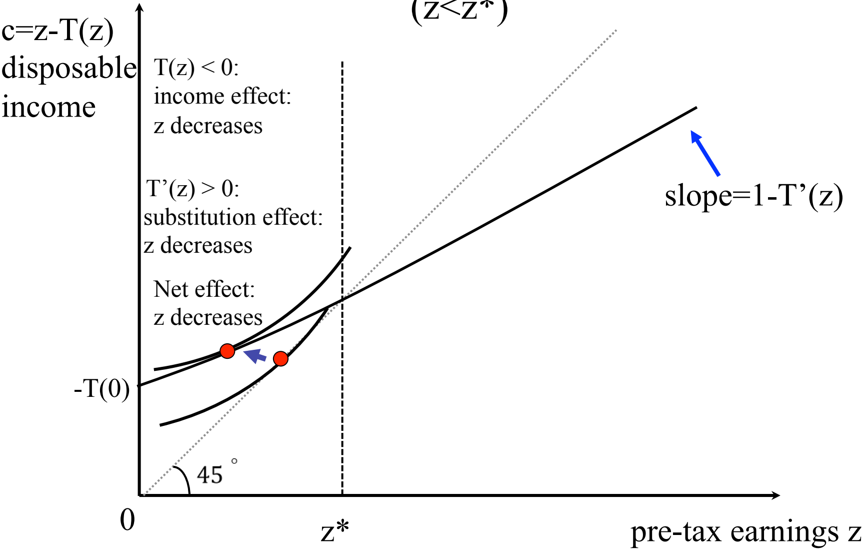
$T(z) < 0$ increases disposable income and decreases labor supply through income effects

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

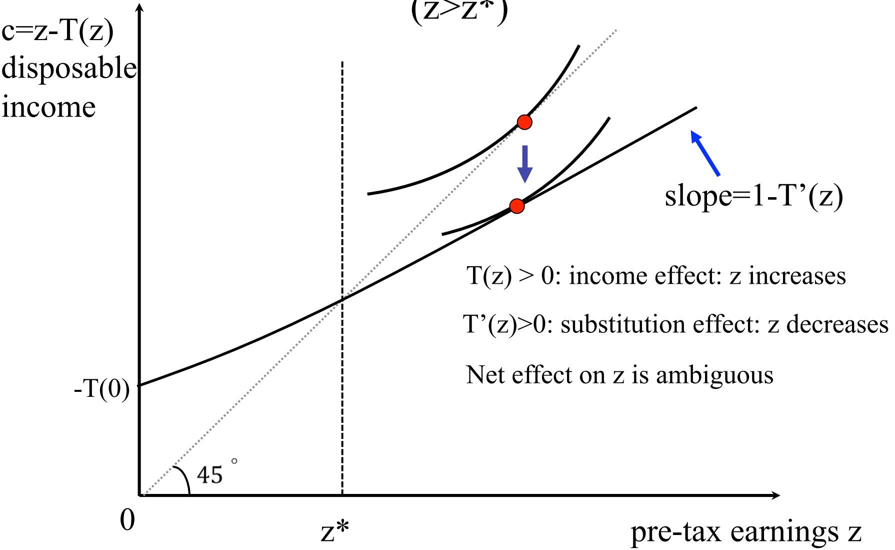
Effect of Taxes/Transfers on Labor Supply



Effect of Taxes/Transfers on Labor Supply (z<z*)



Effect of Taxes/Transfers on Labor Supply (z>z*)



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 $z_1 < ... < z_N$

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 $j = 2, .., N$:

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

$u'(z_j - T(z_j)) = u'(z_1 - T(z_1)) \Rightarrow z_j - T(z_j) =$ constant across $j = 1, .., N$

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 $T(z_2)$:

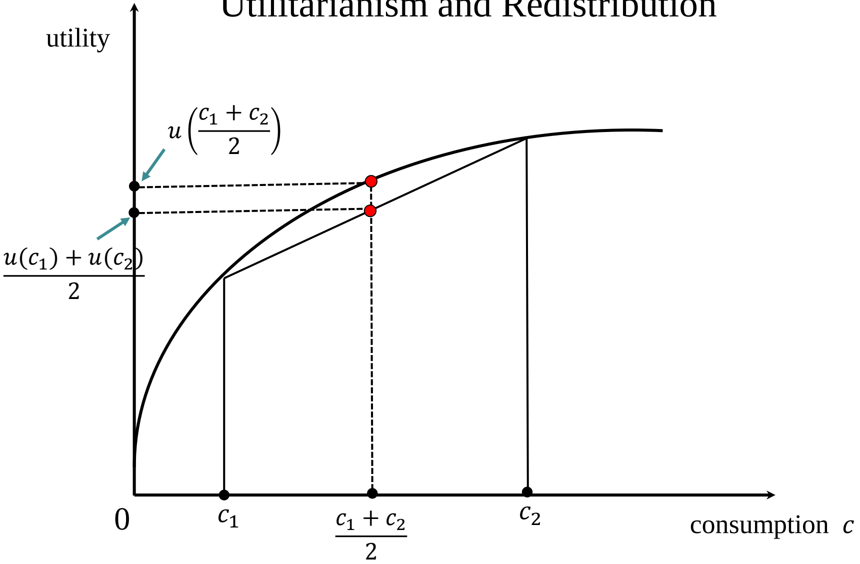
$$0 = \frac{dSWF}{dT(z_2)} = u'(z_1 + T(z_2)) - u'(z_2 - T(z_2)) = 0 \Rightarrow$$

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

$\Rightarrow z_1 - T(z_1) = z_2 - T(z_2)$ 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

$\Rightarrow$ 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]

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

HOW SHOULD TAXES BE SET? OPTIMAL LINEAR TAX RATES

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) Optimal linear revenue-maximizing top tax rate (maximizes the revenues raised from the top).

OPTIMAL LINEAR TAX RATE THAT MAXIMIZES REVENUES: LAFFER CURVE

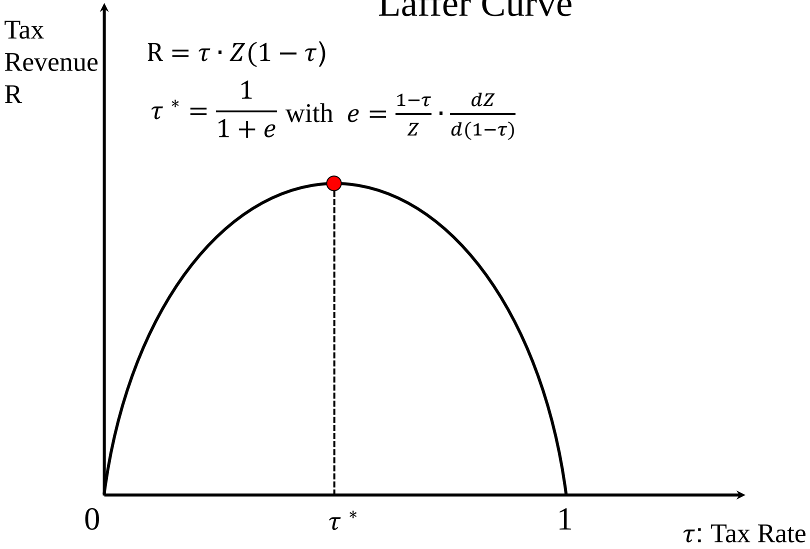
$c = (1 - \tau) \cdot z + R$ with τ linear tax rate and R fixed universal transfer funded by taxes $R = \tau \cdot Z$ with Z average earnings

Individual $i = 1, .., N$ 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 τ: $R(\tau = 0) = 0$ (no taxes) and $R(\tau = 1) = 0$ (nobody works): called the Laffer Curve. See next slide for illustration.

Laffer Curve



OPTIMAL LINEAR TAX RATE THAT MAXIMIZES REVENUES: LAFFER CURVE

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

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

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 τ^*. e can be estimated in the data Use the definition of the elasticity to note that $dZ/d(1-\tau^*) = eZ/(1-\tau^*)$. Hence the FOC becomes:

$$Z - \frac{\tau^*}{1-\tau^*} eZ = 0$$

Divide all by Z (since the right side is just 0).

$$\Rightarrow 1 - \frac{\tau^*}{1-\tau^*} e = 0$$

Rearrange to bring τ^* 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

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

Inefficient to have $\tau > \tau^*$ because decreasing τ 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

Government chooses τ 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

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:

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

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

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

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

Starting from this FOC that we wrote one slide before:

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

Use the definition of the elasticity again to note that $dZ/d(1-\tau) = eZ/(1-\tau)$. So the equation becomes:

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

Divide all by Z (you can do that since the left side is set to 0) and develop the sum (open up the square brackets).

$$0 = -\frac{\sum_i \frac{\partial u^i}{\partial c} z_i}{Z} + \sum_i \frac{\partial u^i}{\partial c} - \sum_i \frac{\partial u^i}{\partial c} \frac{\tau}{1-\tau} e,$$

GENERAL OPTIMAL LINEAR TAX RATE: FORMULA

An important thing to note here is that some of these terms do NOT depend on i (i.e., they are aggregate variables, not individual ones). This means you can take them out of the summation. So the FOC becomes:

$$0 = -\frac{\sum_i \frac{\partial u^i}{\partial c} z_i}{Z} + \sum_i \frac{\partial u^i}{\partial c} - \frac{\tau}{1-\tau} e \sum_i \frac{\partial u^i}{\partial c},$$

Now divide all by $\sum_i \frac{\partial u^i}{\partial c}$ (which is a constant, since it's a sum over all agents).

$$0 = - \underbrace{\frac{\sum_i \frac{\partial u^i}{\partial c} z_i}{\sum_i \frac{\partial u^i}{\partial c} Z}}_{\text{Define this to be } \bar{g}} + 1 - \frac{\tau}{1-\tau} e,$$

Rearrange to bring τ to one side and you obtain the formula on the next page.

GENERAL OPTIMAL LINEAR TAX RATE: FORMULA

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)

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

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

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

(a) inequality is high

(b) marginal utility decreases fast with income

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 τ above fixed z^*. Goal is to derive optimal τ

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)

REVENUE MAXIMIZING TOP INCOME TAX RATE
(standard derivation)

If we want to maximize the revenue coming from the tax bracket, we need to max:

$$N \cdot \tau[z(1-\tau) - z^*]$$

where N is the number of tax payers in the top bracket. Without any loss of generality, assume $N = 1$.

Note: average income in the top bracket is a function of the net-of-tax rate (top earners react to taxes).

Take the FOC:

$$[z - z^*] - \tau \frac{dz}{d(1-\tau)} = 0$$

REVENUE MAXIMIZING TOP INCOME TAX RATE (standard derivation) (II)

Remember the definition of the elasticity:

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

From this definition, you know that $\frac{dz}{d(1-\tau)} = e\frac{z}{1-\tau}$. Replace this in the FOC:

$$[z - z^*] - \frac{\tau}{(1-\tau)}ez = 0$$

Divide by $[z - z^*]$:

$$1 - \frac{\tau}{(1-\tau)}\frac{z}{z-z^*}e = 0$$

Define the Pareto parameter: $a = \frac{z}{z-z^*}$, which measures the thinness of the tail of the income distribution.

REVENUE MAXIMIZING TOP INCOME TAX RATE (standard derivation) (III)

Define the Pareto parameter: $a = \frac{z}{z - z^*}$, which measures the thinness of the tail of the income distribution. The FOC becomes:

$$1 - \frac{\tau}{(1-\tau)} a \cdot e = 0$$

Rearranging:

$$\tau = \frac{1}{1 + a \cdot e}$$

REVENUE MAXIMIZING TOP INCOME TAX RATE

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

Optimal τ decreases with e [efficiency]

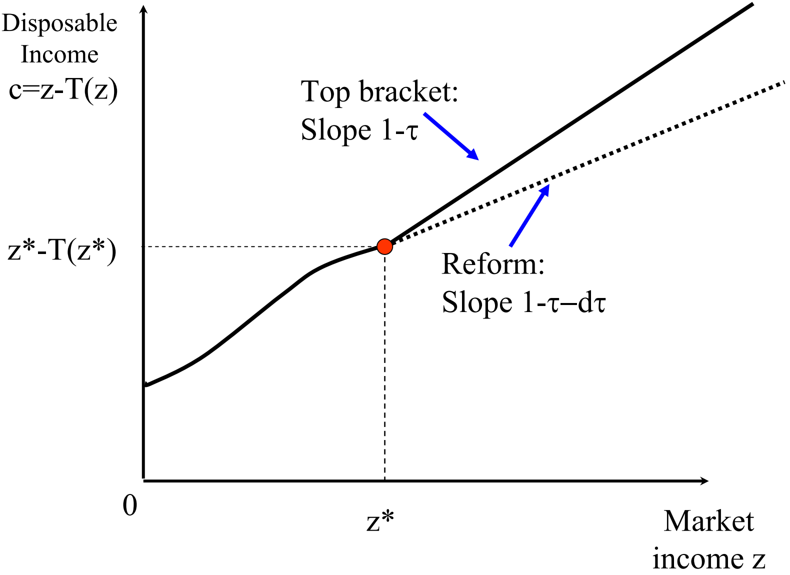
Optimal τ decrease with a [thinness of top tail]

Empirically $a \simeq 1.5$, easy to estimate using distributional data [mean income above $z^* = \$.5$m is about $1.5m in the US]

Empirically e is harder to estimate [controversial]

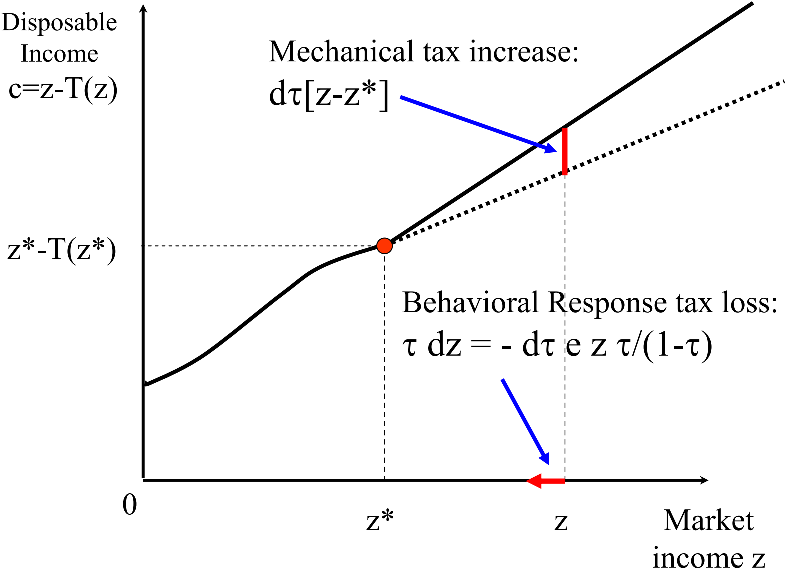
Example: If $e = .25$ then $\tau = 1/(1 + 1.5 \cdot 0.25) = 1/1.375 = 73\%$

Optimal Top Income Tax Rate (Mirrlees ’71 model)



Source: Diamond and Saez JEP'11

Optimal Top Income Tax Rate (Mirrlees ’71 model)



Source: Diamond and Saez JEP'11

REVENUE MAXIMIZING TOP INCOME TAX RATE (graphical argument)

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 τ such that $dM + dB = 0$

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

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 $\bar{g} = 0$).

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

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

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

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)

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