Labor Economics Tutor

- EconTutor offers elective courses tutoring in
  - Labor Economics
  - Urban Economics
  - International Economics
  - Public Economics
  - International Finance
  - Economic Development
  - Corporate Finance

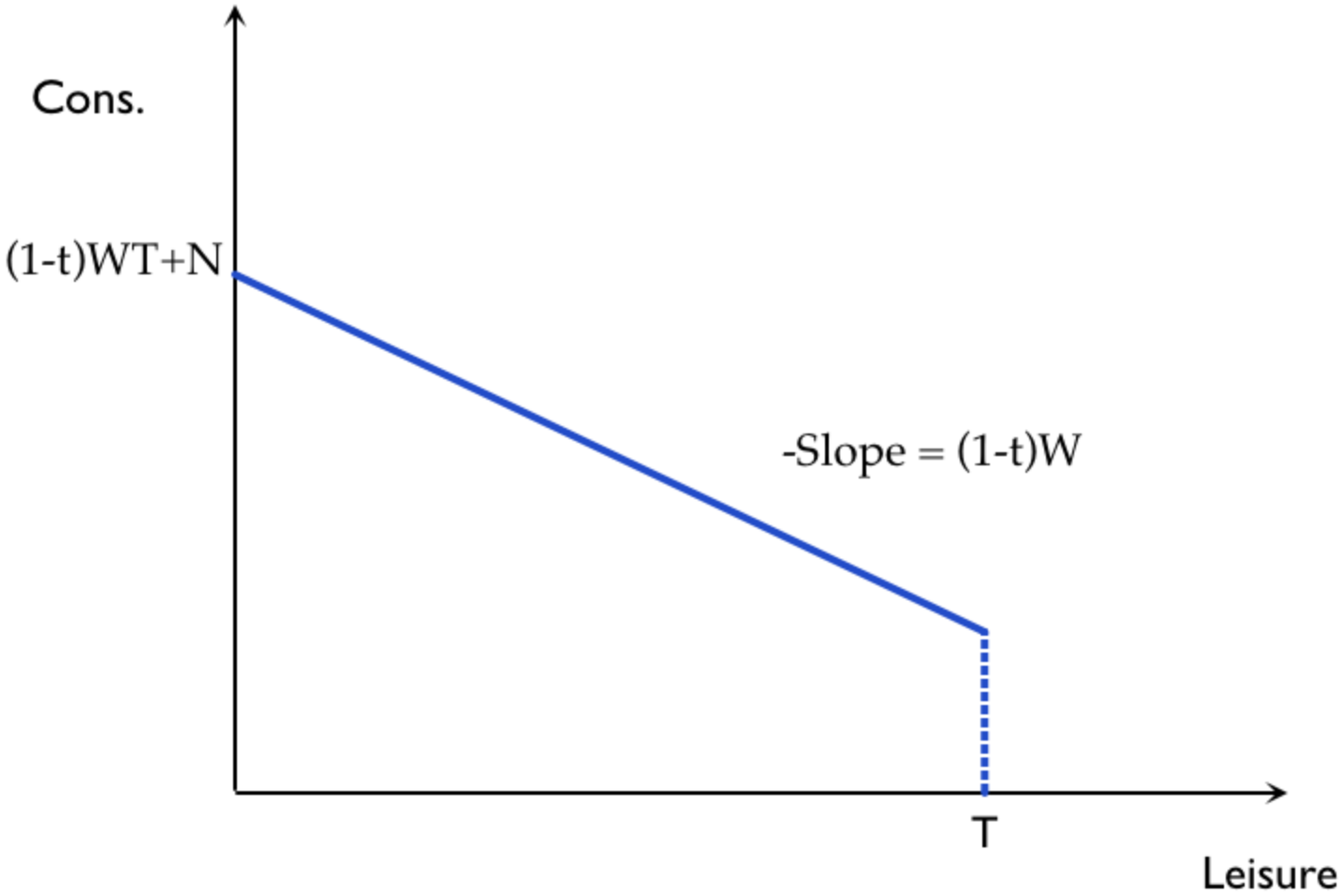
Labor Supply in the Face of Government Programs

- A Number of government programs alter the labor supply decisions of individuals.
  - Taxes
  - Transfer Programs (welfare, tax credits, etc)
  - Tuition subsidies
  - Retirement policies (more on this later)

Taxes and Labor Supply

- Suppose we lived in a world where the government's tax system was simple: there was a flat tax of t, so that if an individual made total income of Y, the government would collect tY.
- This would effectively change the wage rate to (1-t)W.
- An increase in the tax rate would effectively lower the wage that a person faces from (1-t)W to (1-t')W.
- This will have ambiguous effects, just like any other wage change because of competing income and substitution effects.

Taxes and Labor Supply



Goal 1-2: Flat Labor Income Tax

Taxes and Labor Supply

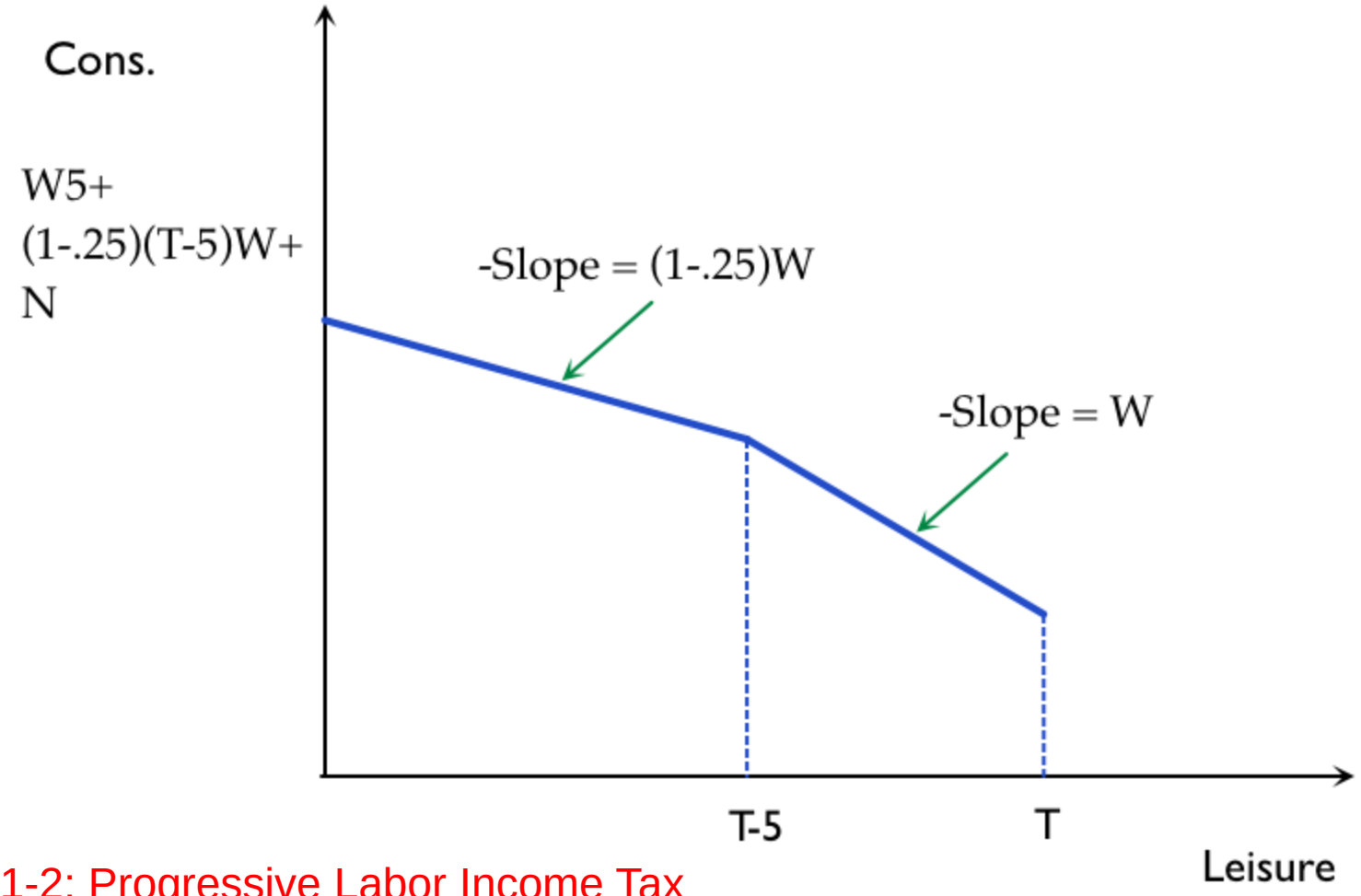
- One feature of most systems is ***progressivity***: The tax rate that applies to extra income (marginal tax rate) increases as an individual's income gets larger.

- Consider a simple system:

  - Individual faces a tax rate of 0 for income < 50 (some threshold)
  - Individual faces a tax rate of .25 for each dollar earned above 50

- In such a system, the budget constraint will have two segments, each with different slopes -W, and -(1-0.25)W.

- Consider a simple progressive system:
  - **W=10**
  - Individual faces a tax rate of 0 for income < 50 (some threshold)
  - Individual faces a tax rate of .25 for each dollar earned above 50



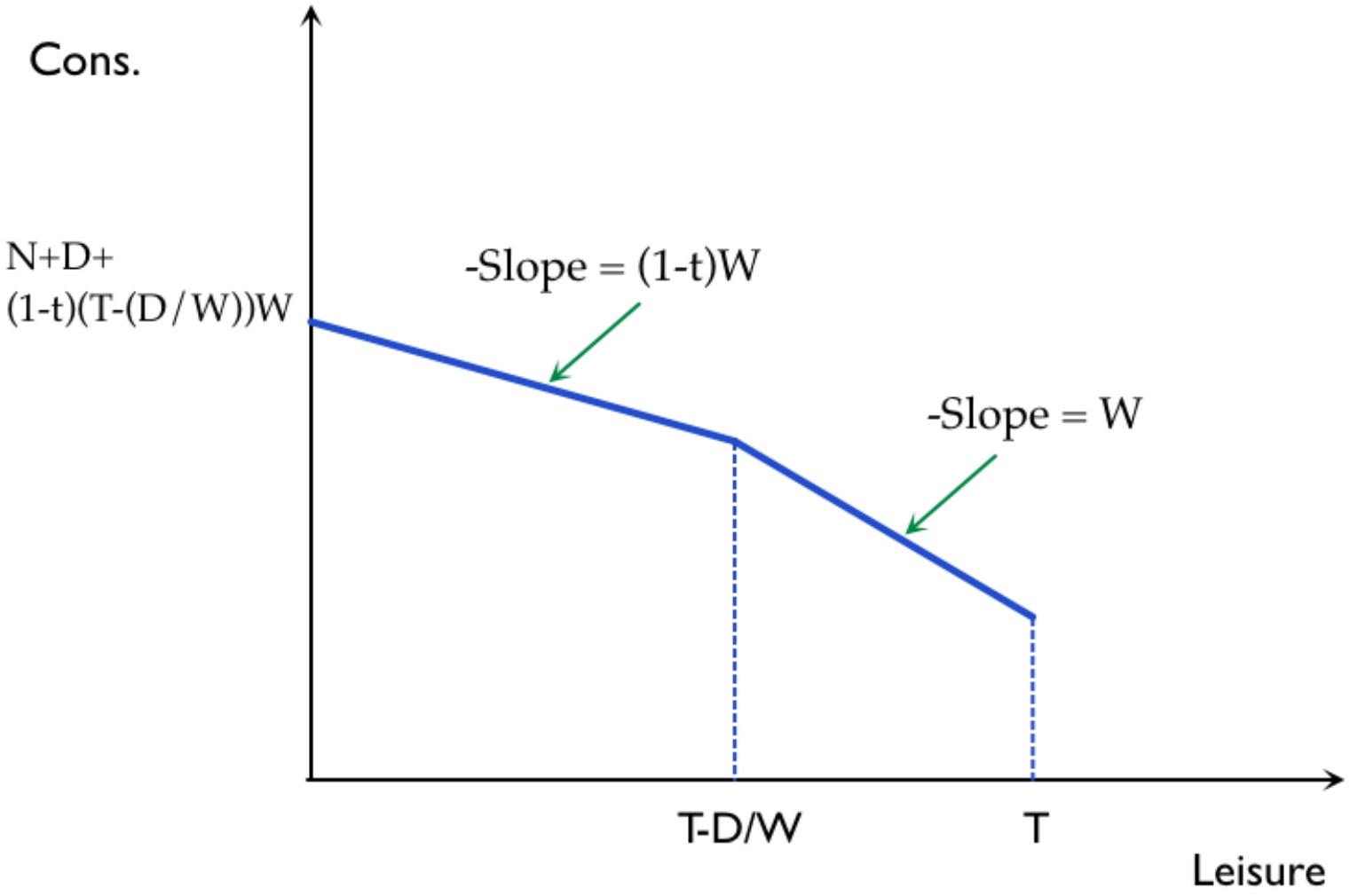
Goal 1-2: Progressive Labor Income Tax

Taxes and Labor Supply

- More generally, imagine a progressive system where the individual faces a market wage of W, and the tax system is set up as:
  - Marginal tax rate of 0 for income < D (some threshold)
  - Marginal tax rate of t for income > D

- Starting at point (N,T) in Consumption-Leisure space we have:
  - Negative slope of W going backwards until we reach D/W hours of work. At this point, working an extra hour only adds (1-t) extra units of income, so the slope becomes flatter (going backwards).

  - If the individual spends all their time working, they receive total income of $N^*=N+D+(1-t)W(T-(D/W))$



Goal 1-2: Progressive Labor Income Tax

Taxes and Labor Supply

Tax systems typically specify a set of income brackets, along with *marginal tax rates* that apply to income within those brackets.
Suppose we had two brackets:

- Bracket 1: 0-\$50,000, Marginal Rate: 10%
- Bracket 2: >\$50,000, Marginal Rate: 25%

Let Y_i be individual $i's$ taxable income. Then if $Y_i < 50,000$, the individual pays $(.10)Y_i$ in total income taxes.

If $Y_i \geq 50,000$, the individual pays $(.10)50,000 + (.25)(Y_i - 50,000)$ in total taxes.

In this sense, the tax rate in the individual's bracket is a marginal rate because it indicates the tax rate applicable to an extra (marginal) dollar of income.

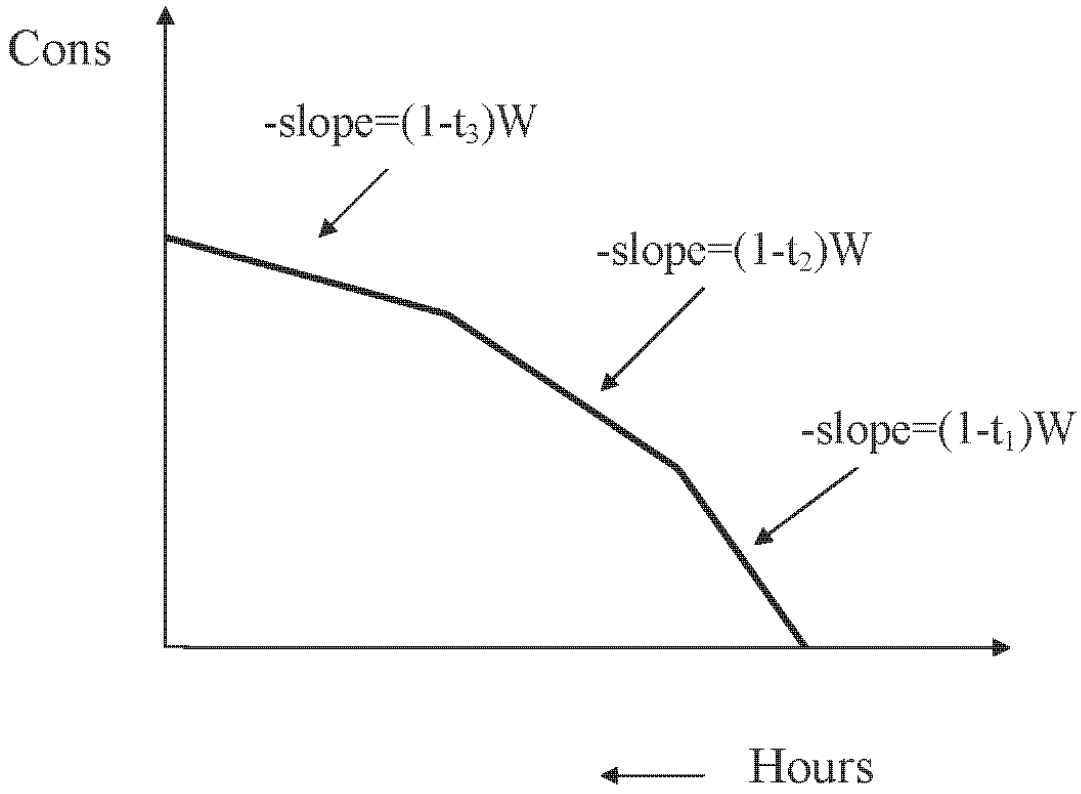
- Currently in the US tax code, there are 7 tax brackets. Here are the tax brackets and marginal tax rates for single filers:
- From forbes.com, for 2017:

Individual Taxpayers

If Taxable Income Is Between:	The Tax Due Is:
0 - $9,325	10% of taxable income
$9,326- $37,950	$932.50 + 15% of the amount over $9,325
$37,951 - $91,900	$5,226.25 + 25% of the amount over $37,950
$91,901 - $191,650	$18,713.75 + 28% of the amount over $91,900
$191,651 - $416,700	$46,643.75 + 33% of the amount over $191,650
$416,701 - $418,400	$120,910.25 + 35% of the amount over $416,700
$418,401 +	$121,505.25 + 39.6% of the amount over $418,400

- https://www.forbes.com/sites/kellyphillipserb/2016/10/25/irs-announces-2017-tax-rates-standard-deductions-exemption-amounts-and-more/#50b4ed675701

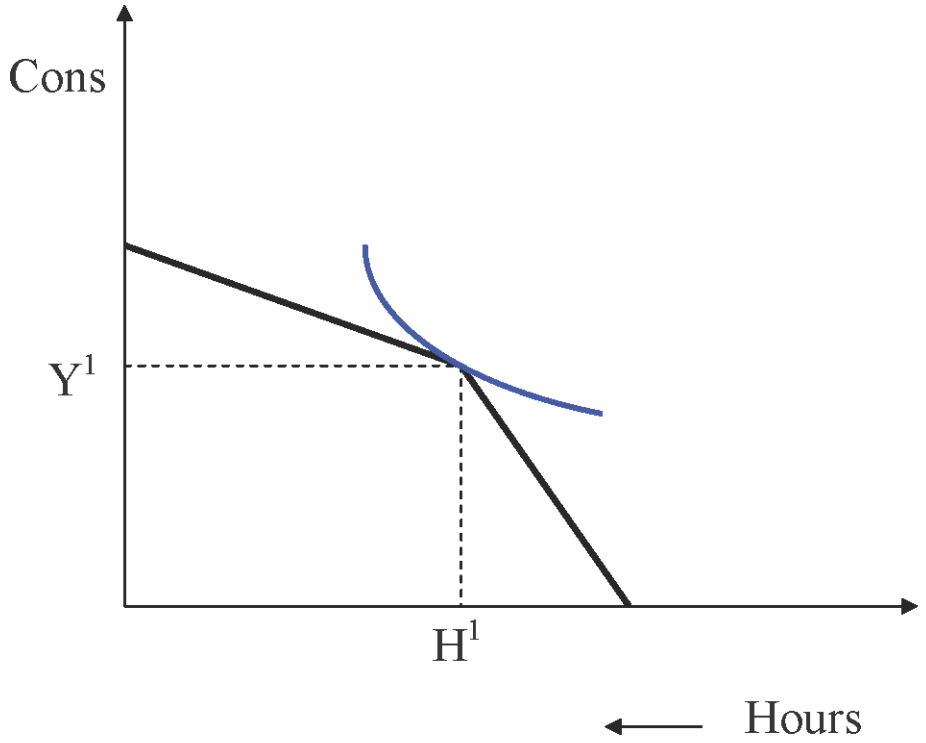
- Obviously adding in more brackets adds in more segments of the budget constraint and more “kinks”, or places where the budget constraint is not smooth:



Goal 4:Understand what we mean by kinks

Taxes and Labor Supply

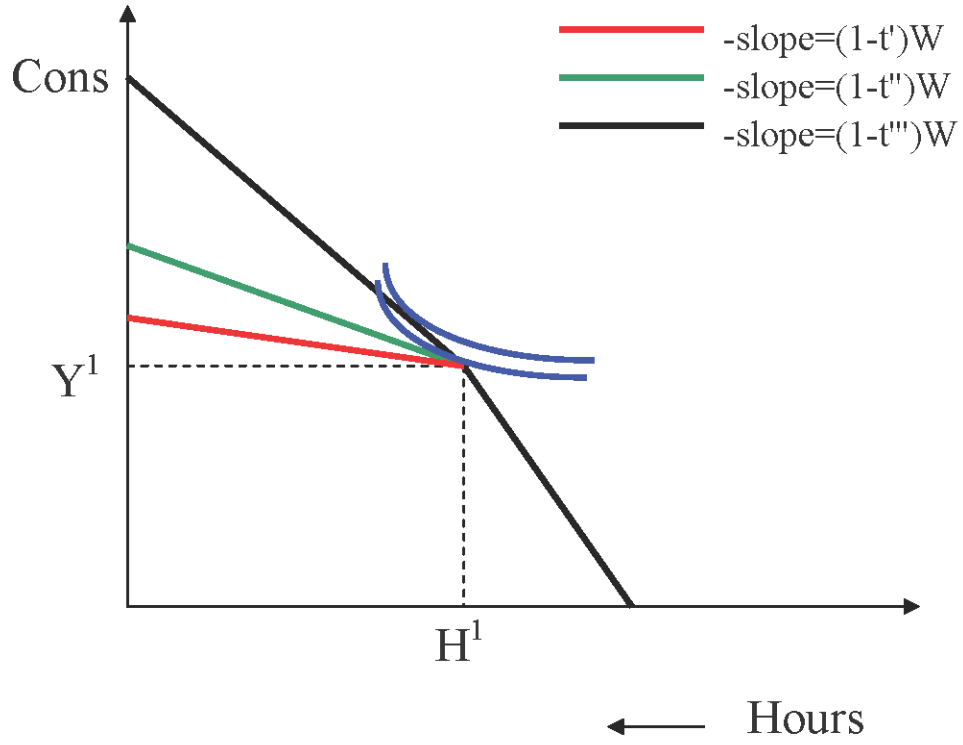
- A progressive tax system complicates our analysis of optimal labor supply. Individuals could find it optimal to supply exactly H1 hours of labor (amount of hours that puts them right between two tax brackets).
- Note, this optimum ***will not*** necessarily involve MRS=W or MRS=(1-t)W



Goal 3:Implications of Tax System for Behavior

Taxes and Labor Supply

- Raising taxes in a given segment will have ambiguous effects on labor supply (just as it always does). However, it may also increase the likelihood that an individual optimizes by picking hours at the "kink" between the current bracket and the next lowest bracket.

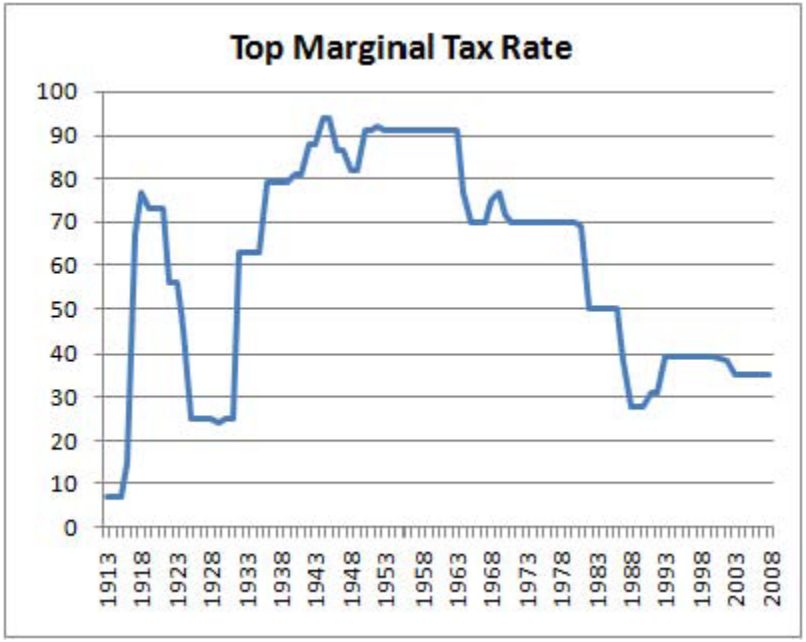


Goal 3: Ambiguous effects of raising taxes

Taxes and Labor Supply

- The levels of marginal tax rates are subject to frequent political debates.

- Here is a look at how the top marginal tax rate has evolved with policy changes:



Taxes and Labor Supply

- What about transfer policies? That is welfare or safety-net policies that provide payments to poor or unemployed individuals.

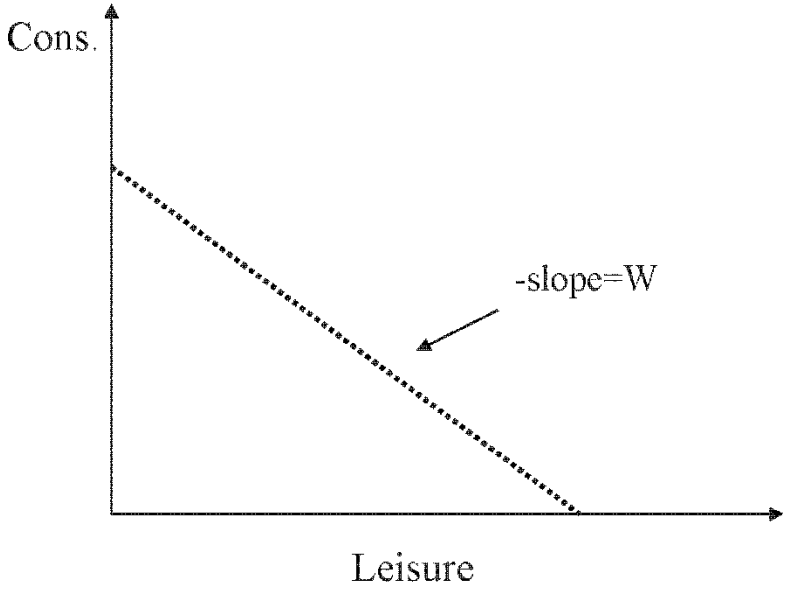
- Important Policy Trade-off:
  - Want to provide a safety net for disadvantaged or unlucky individuals.
  - Do not want to provide dis-incentives to work.

- Number of different options:

  - Income guarantees
  - Negative Income Taxes
  - Earnings Subsidy.

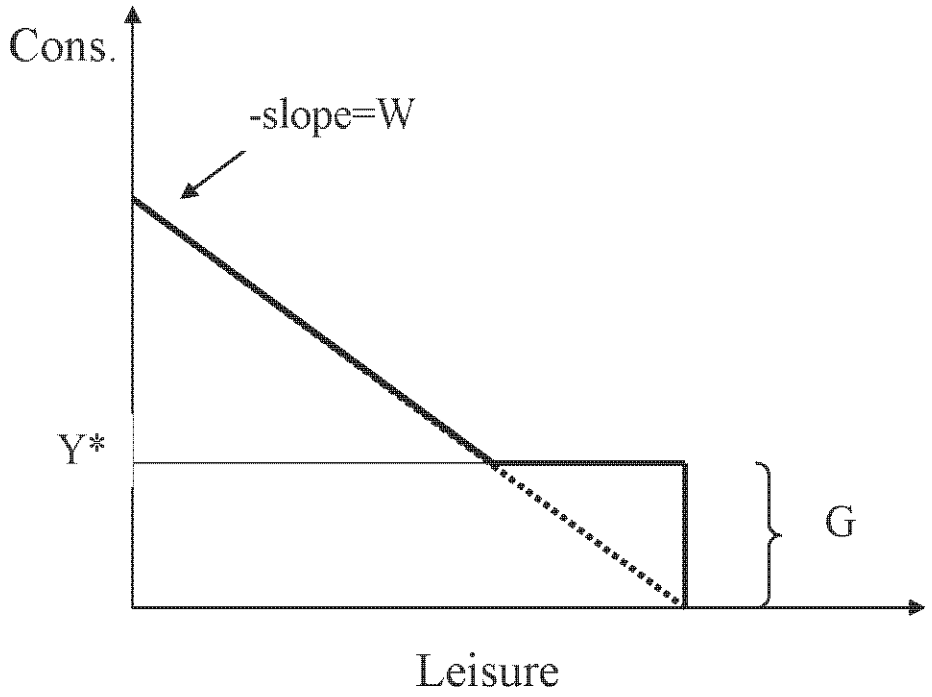
Income Guarantees

- Government guarantees a certain level of income Y*
- If labor income falls short of the floor (WH*<Y*), then government pays individual G=(Y*-WH*).
- Imagine that we start with no other non-labor income, so without the government program, we have the following:



Income Guarantees

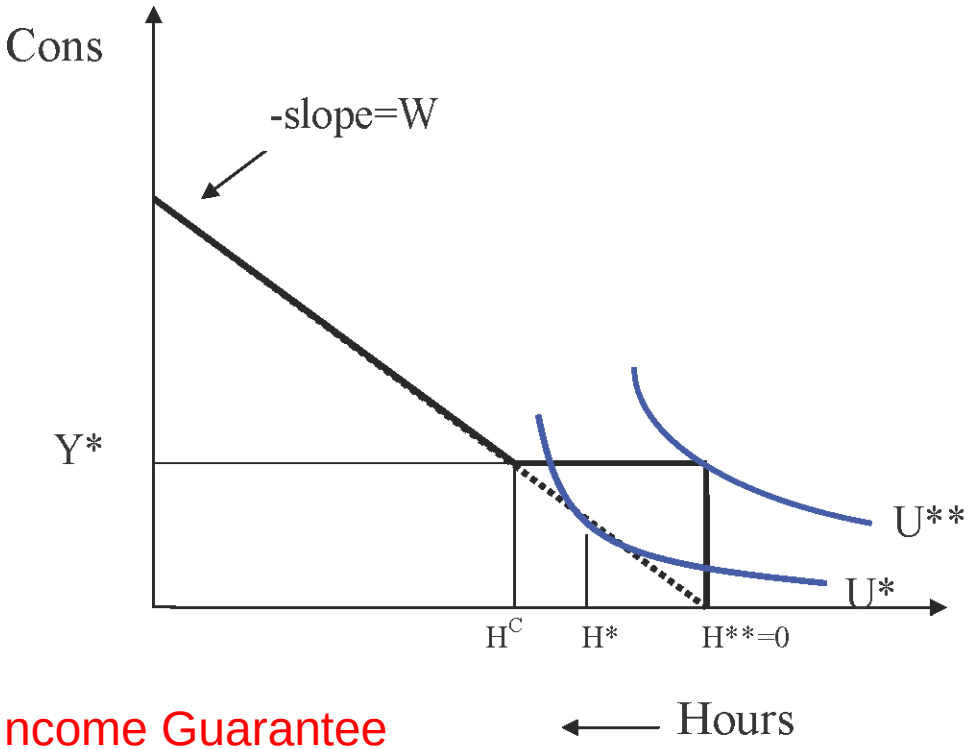
- An income guarantee (guarantee of Y*) creates a budget constraint that looks like the following (in solid black)



Goal 1-2: Income Guarantee

Income Guarantees

- Notice that this creates strong work disincentives. It does increase N, (and increases the utility of recipients) but then this effectively puts a tax of 100% on labor market earnings up until Y*.



Goal 3: Effects of Income Guarantee

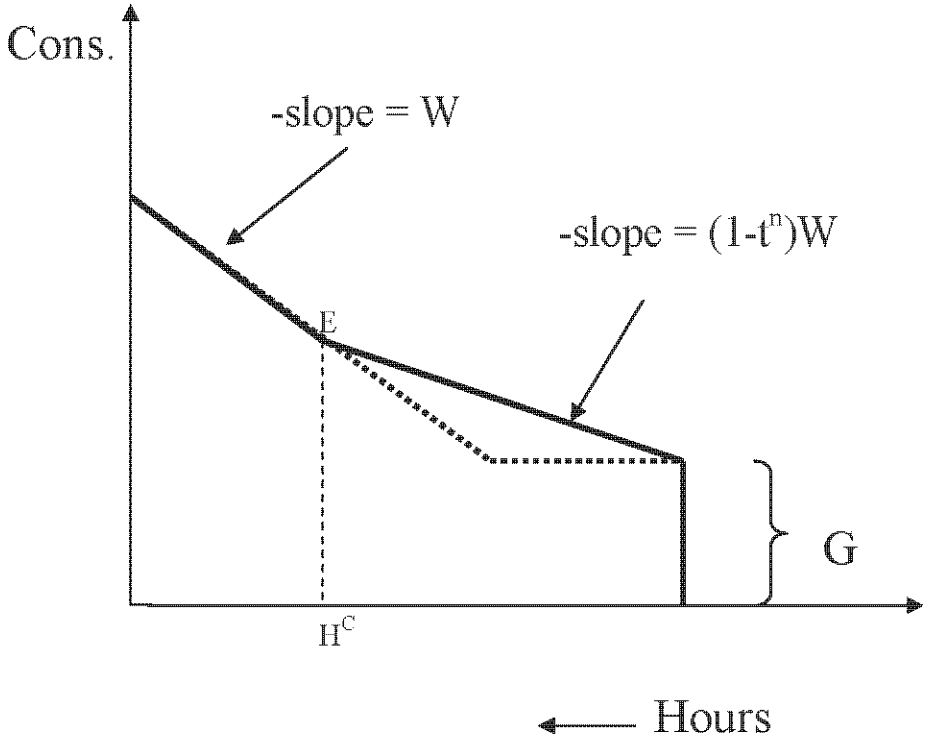
Negative Income Tax

- Movement in the 1960s to reduce the disincentives to work in welfare programs.
- Idea of a Negative Income Tax was championed by economists like Milton Friedman.
- Individuals would be given a benefit, B. This would be taxed away at a rate less than 100%.
- One of the main advantages: This would be administered through the tax system instead of a welfare

Negative Income Tax

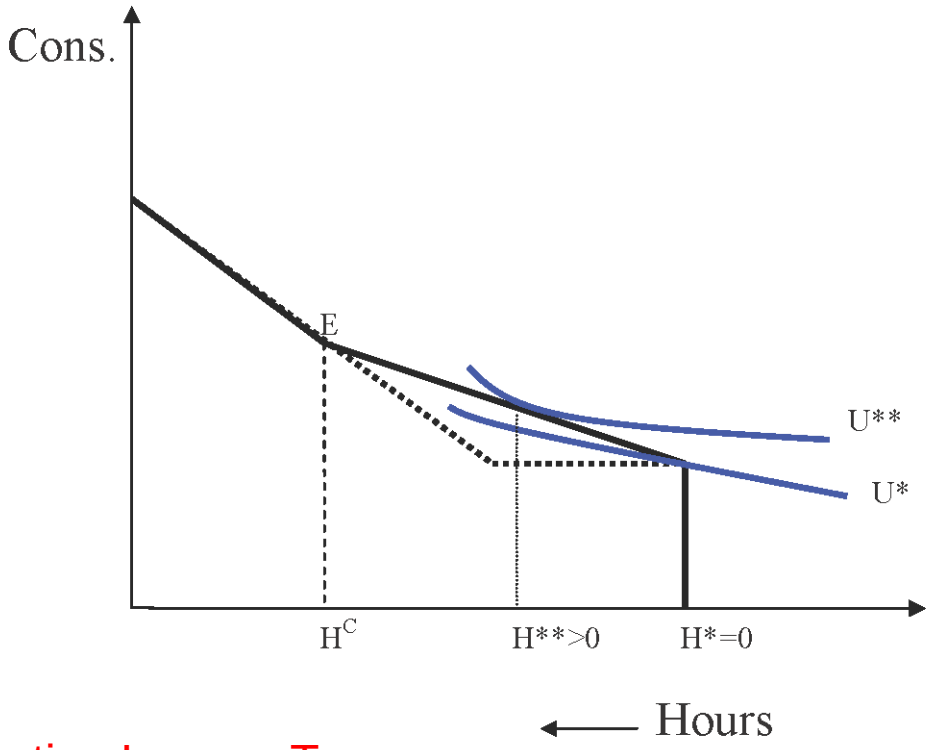
- The program would effectively involve the following:
  - Individuals receive a benefit of B
  - Benefit is reduced at a rate of t for every dollar of labor income earned until the benefit is exhausted, but (t<1)
  - We can think of these individuals as receiving non-labor income of B, but then facing a tax rate of t on their earned income.
  - Benefit is gone, and tax is eliminated when an individual works H^C =B/(tW) hours. (At this point the "tax" collected is equal to the benefit: tWH=tW(B/tW)=B

Negative Income Tax



Negative Income Tax

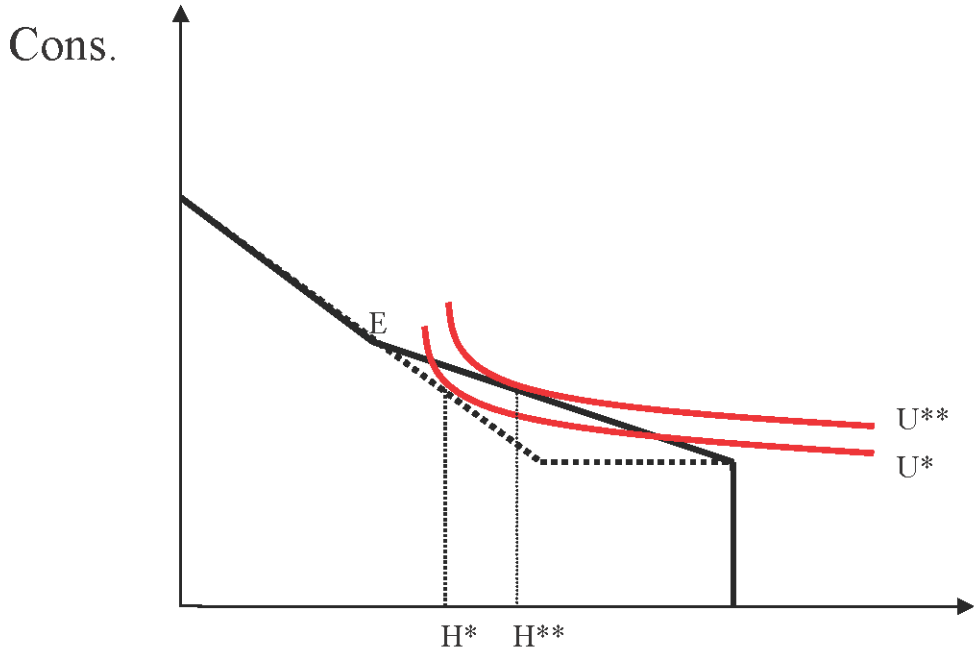
- Compared to a policy that guarantees income at the level B, the Negative Income tax will increase the incentives to work for some individuals:



Goal 3: Effects of Negative Income Tax

Negative Income Tax

- Compared to a policy that guarantees income at the level B, the Negative Income tax will increase the incentives to work for some individuals … but it might also decrease the incentives to work for other individuals.



Goal 3: Effects of Negative Income Tax

Negative Income Tax

- Compared to a policy that guarantees income at the level B, the Negative Income tax will increase the incentives to work for some individuals … but it might also decrease the incentives to work for other individuals.

- The net effect of the program will depend on the ***distribution of preferences*** in the population. Do we have more people affected by the first case or the second case?

Negative Income Tax

- Period of great interest in the 1960s and 1970s in testing and evaluating the effects of Negative Income Taxes.
- Several “Negative Income Tax Experiments”:
  - New Jersey Income Maintenance Experiment (1968-1972)
  - Rural Income Maintenance Experiment (1969-1973)
  - Gary Negative Income Tax Experiment (1971-1974)
  - Experiments in Seattle / Denver (1971-1982)
- Literature tends to find small effects on labor supply.

Wage Subsidies

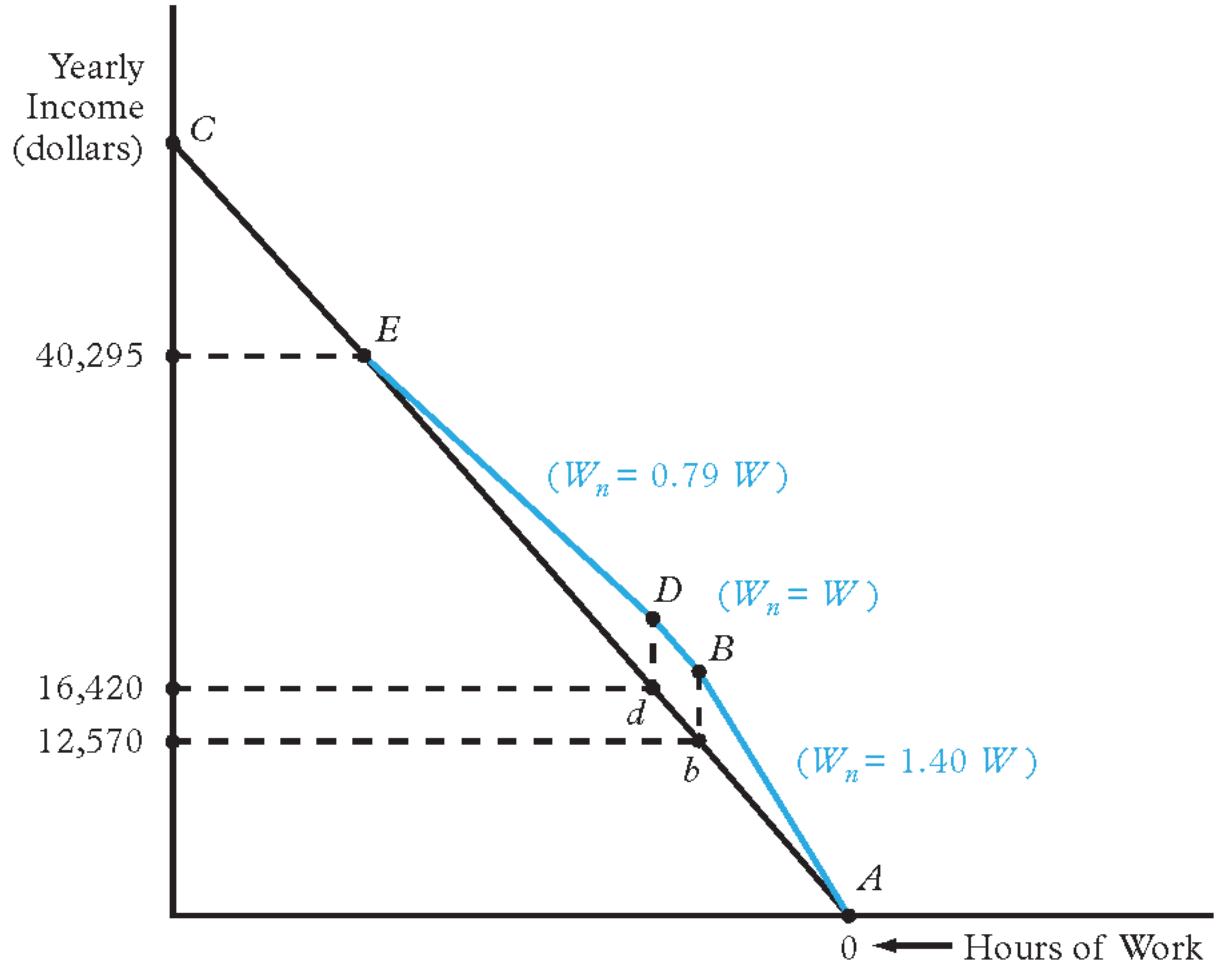
- Alternate approach: Instead of giving a benefit and taxing that benefit away, one could subsidize earnings.
- Starting at labor income of 0, suppose the government subsidized wages at a rate of s per dollar.
- This actually makes the slope of the budget line **steeper**.
- Then, stop subsidizing wages once the individual has made some threshold level Y1. Once they exceed some other threshold level Y2, reduce the benefit at a rate of t per dollar of extra earned income.

Goal 1-2: Wage Subsidy

Wage Subsidies

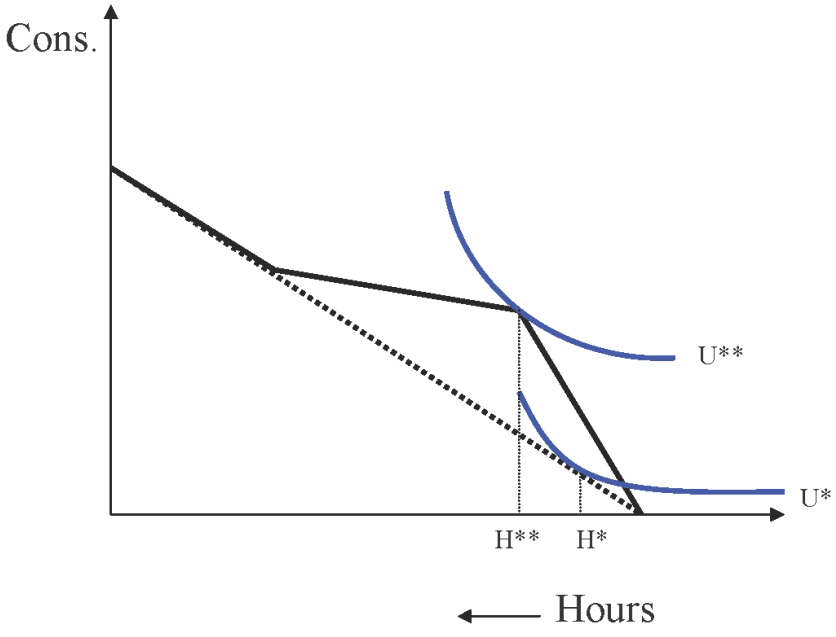
- In the US, on policy which implements this idea is the EITC, or Earned Income Tax Credit.
- EITC – Started in 1970s, but has been expanded greatly with various reforms to federal welfare policies.
- Specifics of the policy in 2009 for an unmarried worker with 2 children:
  - Subsidy rate of 0.40 for income up to 12,570.
  - Once an individual is earning 12,570, they have attained maximum benefit size of (.40 x 12,570) = 5,028.
  - Keep benefit fixed at 5,028 for incomes between 12,570 and 16,420.
  - Once the individual earns more than 16,420, reduce benefit at a rate of t=0.21 for every extra dollar of labor income earned.

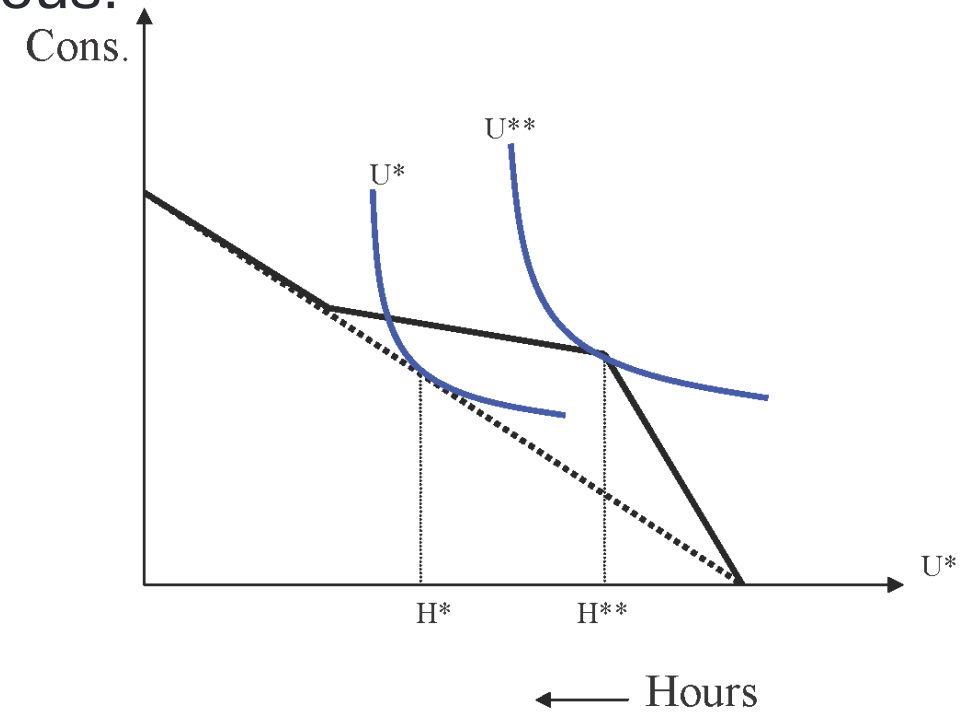
Wage Subsidies



Wage Subsidies

- As before, the effects the work subsidy (relative to no program) will be ambiguous:





Goal 3: Effects of Wage Subsidy

Wage Subsidies

- With all of these benefits programs, a major challenge is the following: If you want to means test a benefit (give it to low income people and not give it to higher income people), you need to have some rule for reducing eligibility for the benefit with income.

- This reduction in eligibility functions as a tax on earnings. Earning more in the market reduces the benefit, and so the effective wages for these individuals are lower than market wages.

Wage Subsidies

- In California in the mid 1990s, poor individuals faced very high effective marginal tax rates due to the phasing out of benefits:

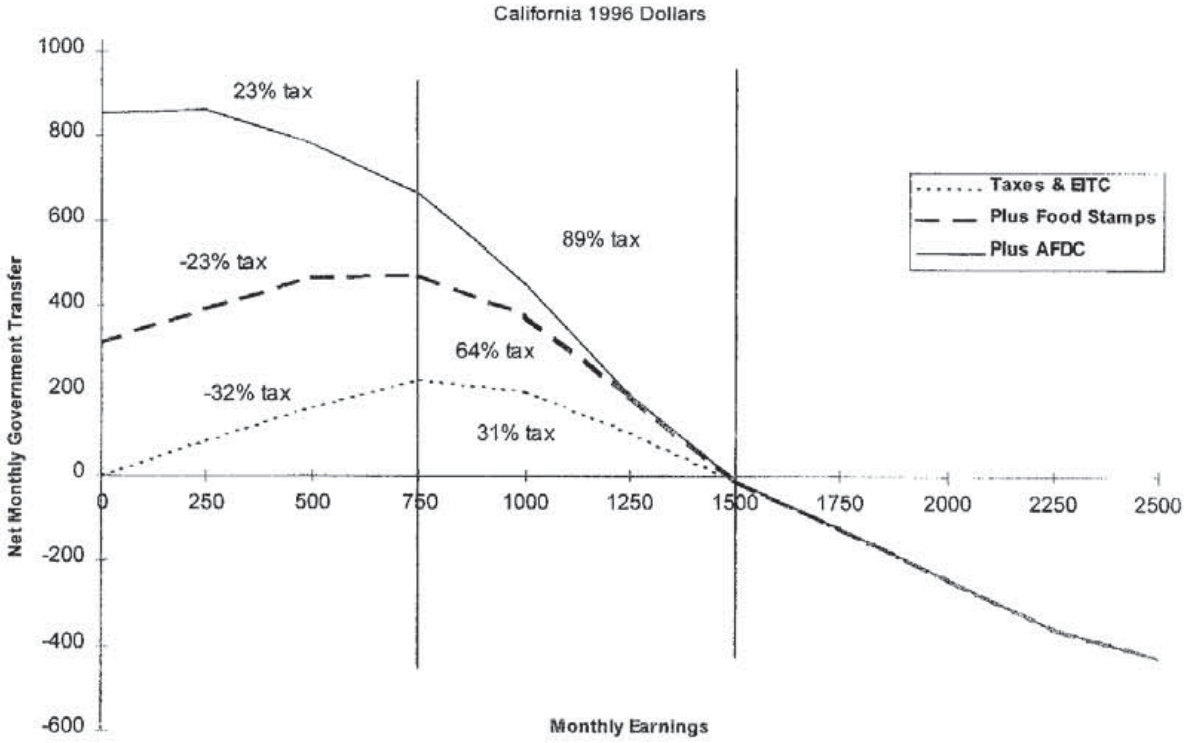


Fig. 1. Net transfers/taxes for California in 1996.

We should expect to see many people at the “kinks”

- One implication of our basic model with taxes and transfers is that we should expect to see many people choosing a combination of (C,L) that puts them “at the kink”

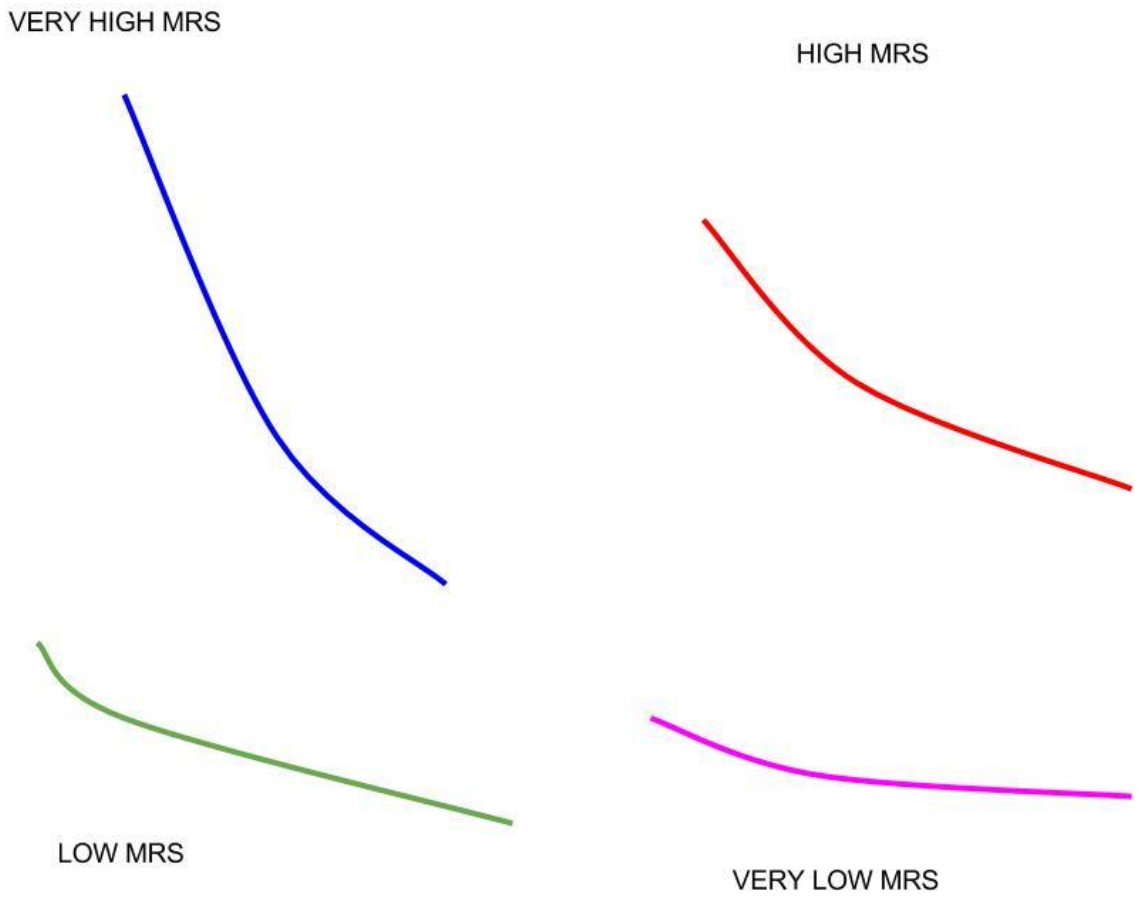
- We know that people are different and that there is **heterogeneity** in key parameters in the utility function.

- Not everyone will feel the same about the trade-off between consumption and leisure.

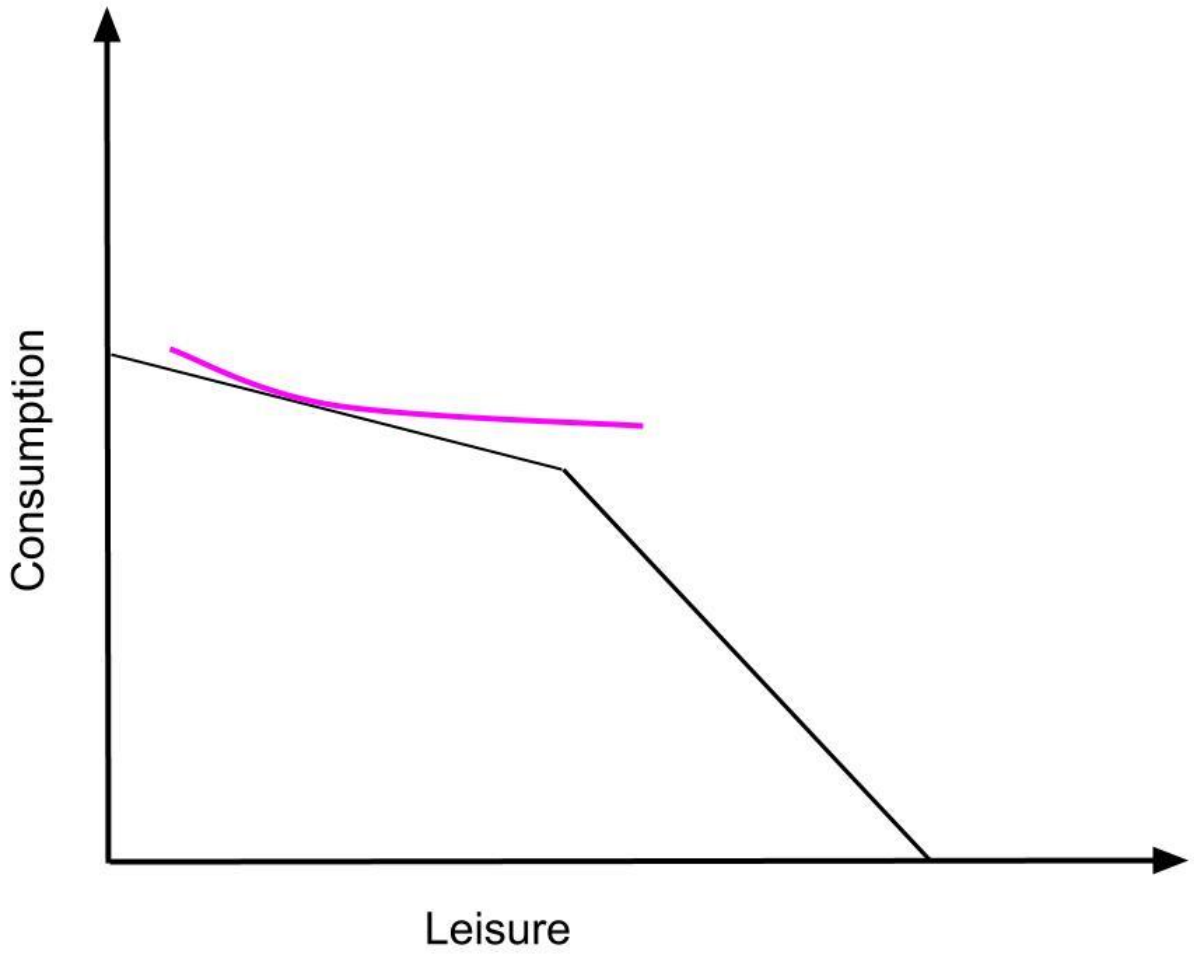
Goal 4: We should expect to see many people choosing income at the “kinks”

Heterogeneity in Preferences

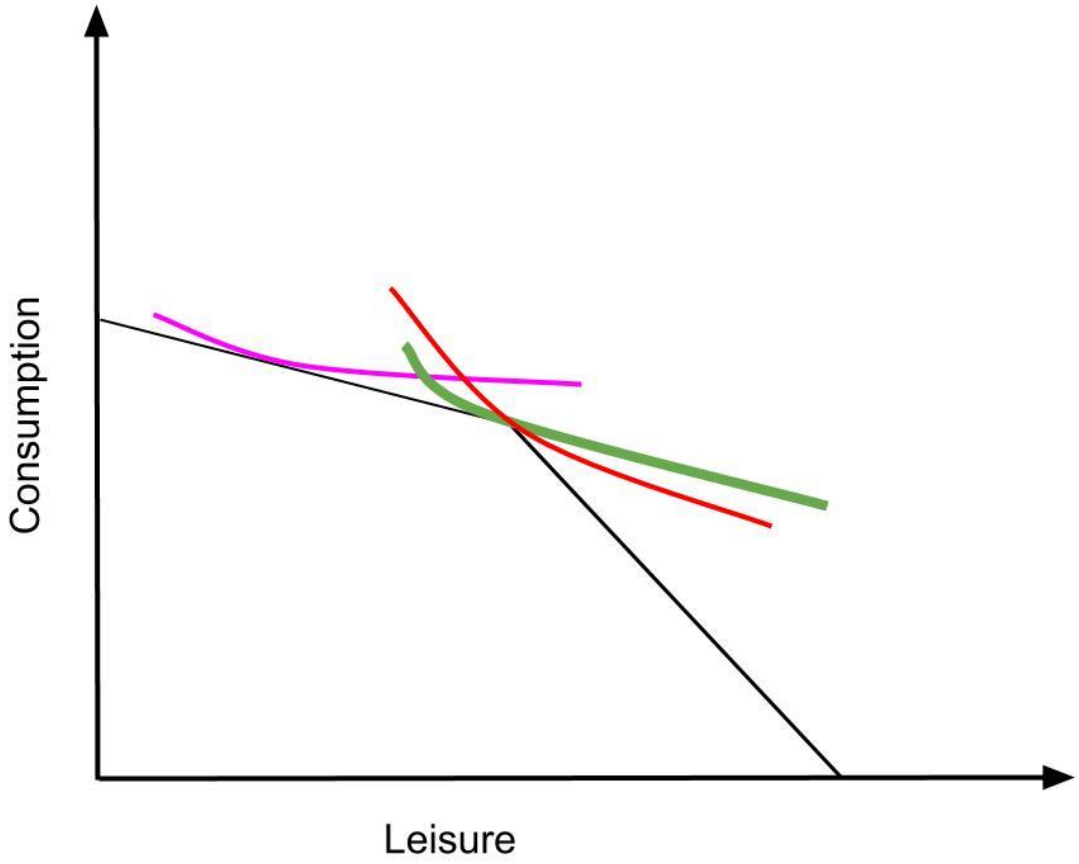
- Different preferences will produce different indifference curves



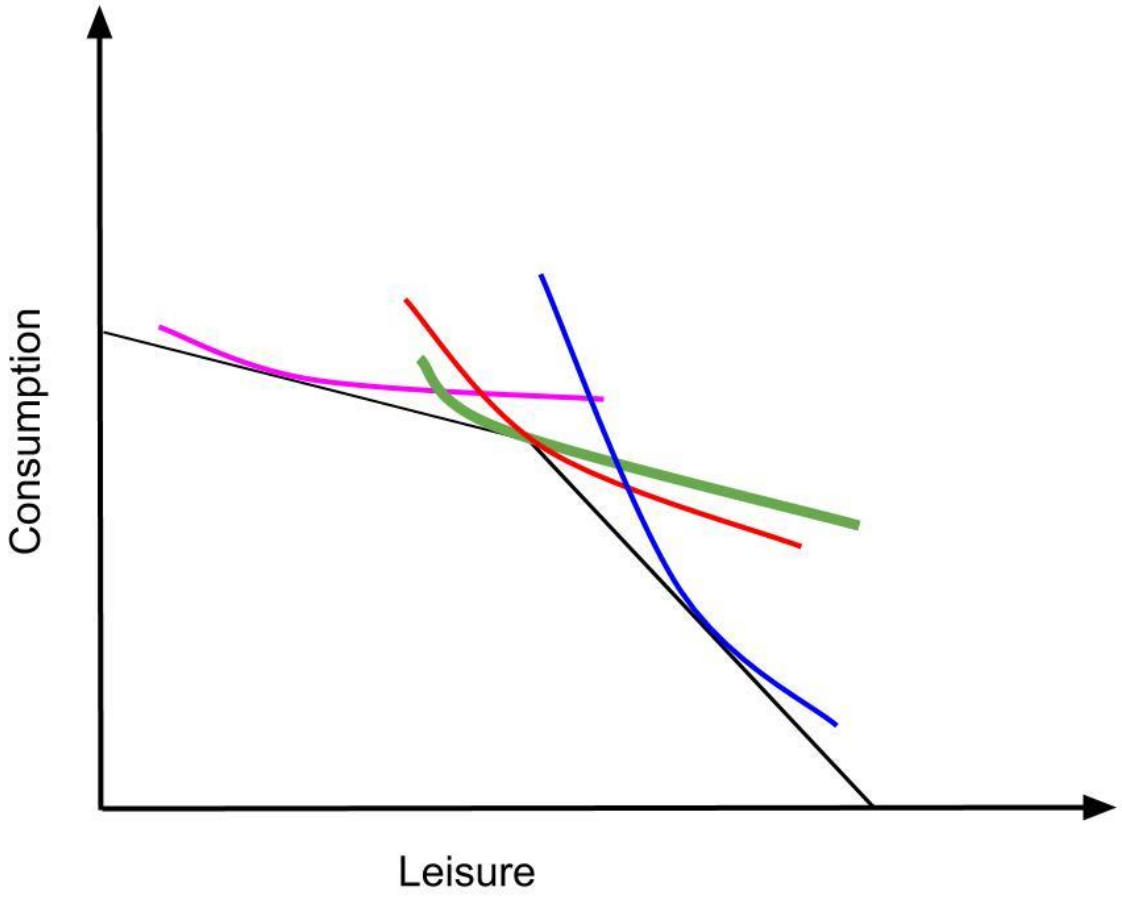
- Workers with a low MRS will choose to work more hours than the number at the kink, pushing them into the upper tax bracket.



- Workers with a intermediate values of the MRS will locate at the kink. Note that optimizing at the kink does not require MRS=W … rather, there are many different values of the MRS that could get "caught" at the kink.



- Workers with a very High MRS will tend to work lower hours, on the part of the budget constraint that corresponds to the lower tax bracket.



- New Topic – The Difference in Differences Method

Difference in Differences

- Suppose that a policy goes into place in the year 2000 that specifically targets single mothers. (Tax break for working mothers).
- I want to learn about how change in the tax policy affected the labor supply of single mothers.
- How could I test this econometrically?
- Note – this is all hypothetical (slides 38-46) … we will discuss actual empirical results soon!

Difference in Differences

- I could get data on the hours worked for single mothers and estimate the following:

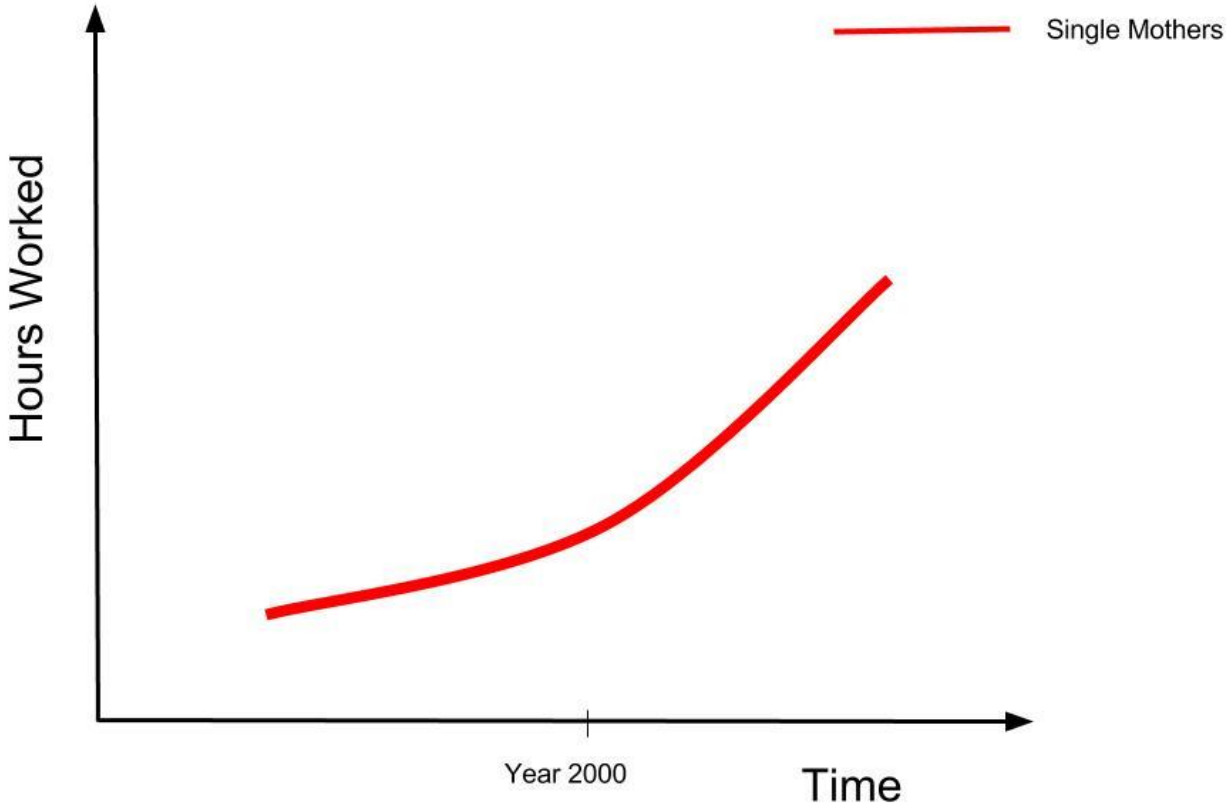
$$H_{it} = \beta_0 + \beta_1 Reform_t + \epsilon_{it}$$

- Where Reform takes a value of 1 after 2000 and a value of 0 before.

- Basically I am comparing differences in the average hours of worked for single mothers before and after 2000

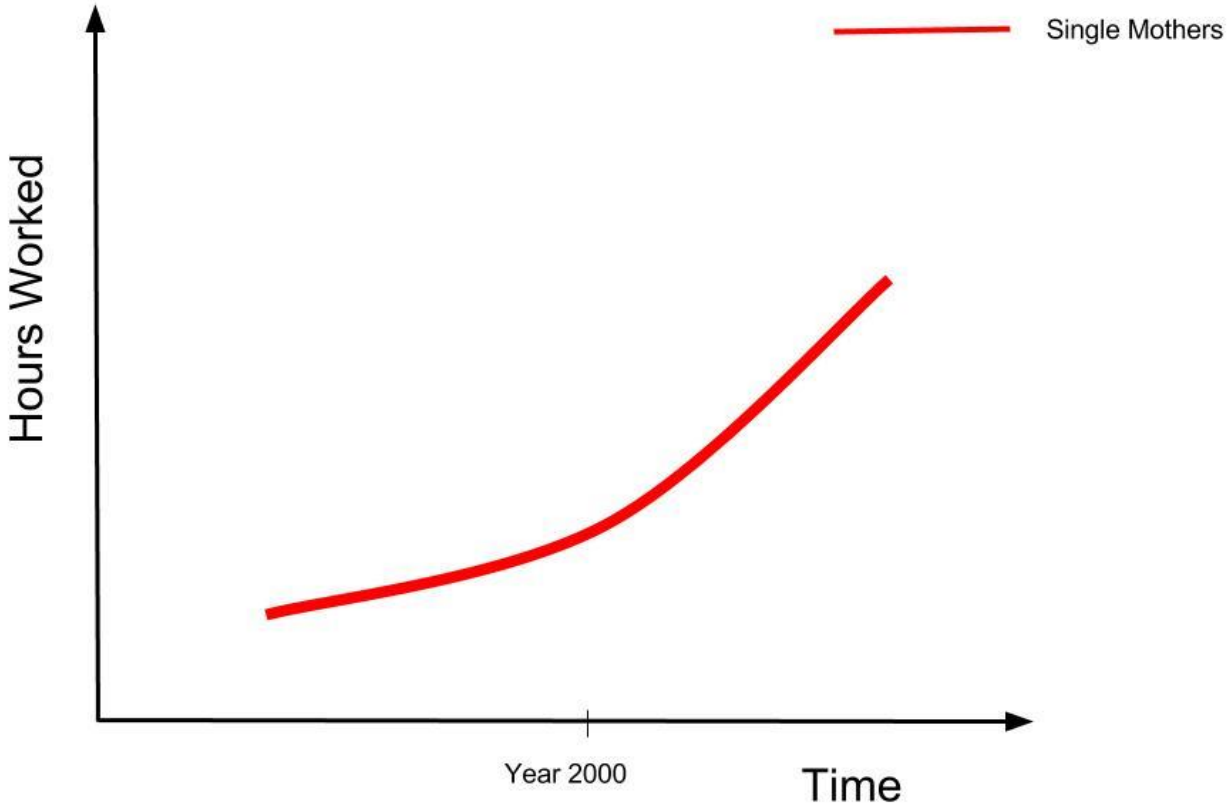
- Why might this be a problem?

$$H_{it} = \beta_0 + \beta_1 Reform_t + \epsilon_{it}$$



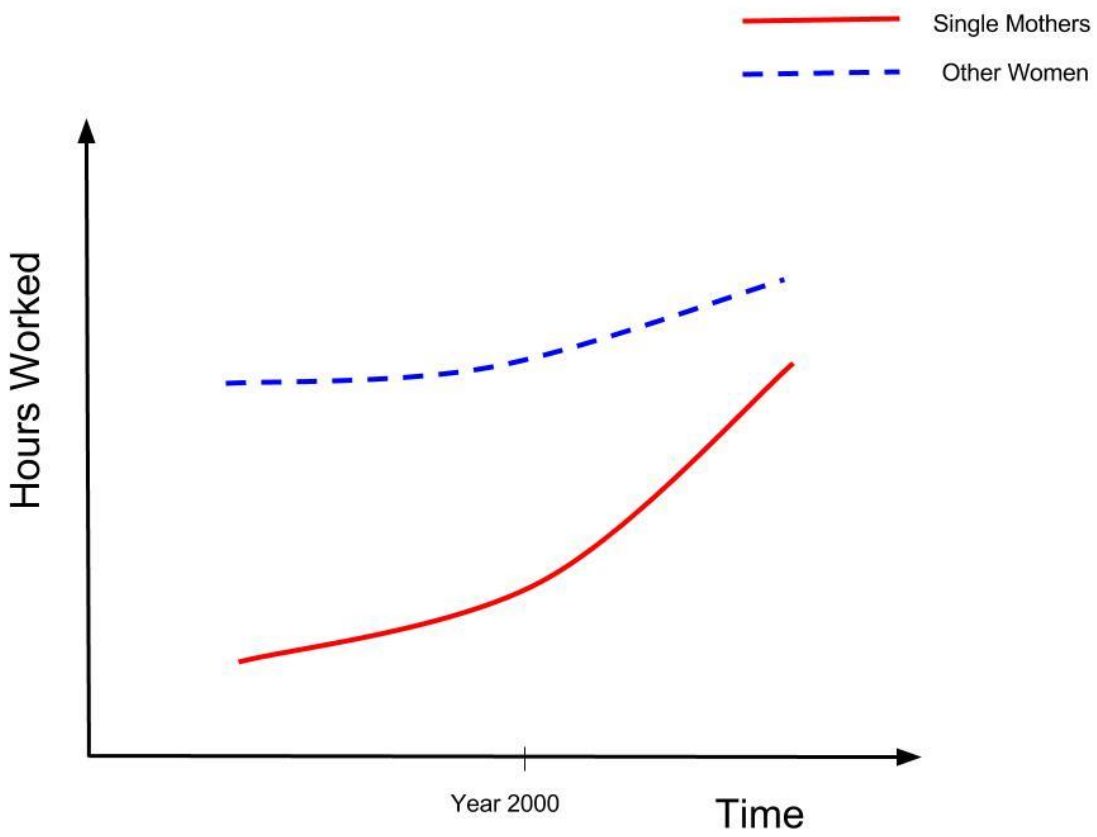
- B0 gives us the average hours worked before the reform
- (B0+B1) gives us the average hours worked after the reform
- B1 gives us one (flawed) estimate of the effect of the reform

$$H_{it} = \beta_0 + \beta_1 Reform_t + \epsilon_{it}$$

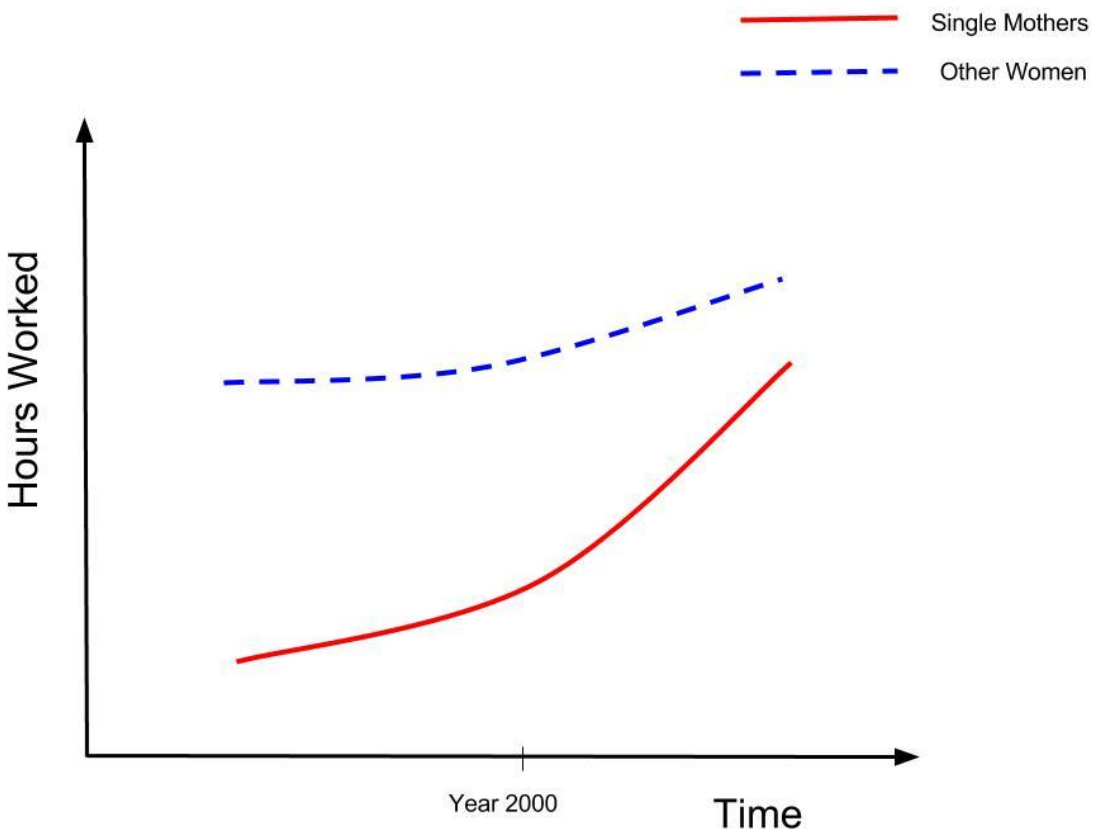


- This approach is flawed because hours worked could be going up over time for reasons other than the reform – for example – the economy may be generally improving.
- There may be time trends that are correlated with the implementation of the policy

- Now, suppose I could find a comparison group that is subject to the same common time trends as the single mothers – maybe all other female workers.



- I can use information from the “Other Women” to learn about the time trend.



THIS IS ALL HYPOTHETICAL – REAL DATA TO COME!!!!!!!

Avg Hours Worked	Other Women	Single Mothers
Before 2000	35	20
After 2000	40	32

- After the Reform, the hours worked by Single Mothers jumped from 20 to 32 (a difference of 12 hours on avg).
- But not all of this was the effect of the Reform.
- Other Women (who were not subject to the reform) saw their hours of work increase from 35 to 40 (a difference of 5 hours on average).
- We use the data on Other Women to correct for the effects of the time trend.

THIS IS ALL HYPOTHETICAL – REAL DATA TO COME!!!!!!!

Avg Hours Worked	Other Women	Single Mothers
Before 2000	35	20
After 2000	40	32

- Hours worked by Single Mothers jumped from 20 to 32 (a difference of 12 hours on avg).
- Hours worked by Other Women (who were not subject to the reform) increased from 35 to 40 (a difference of 5 hours on average).
- Difference in Differences estimate of the effect of the reform on single mothers: (12 – 5) = 7

THIS IS ALL HYPOTHETICAL – REAL DATA TO COME!!!!!!!

Avg Hours Worked	Other Women	Single Mothers
Before 2000	35	20
After 2000	40	32

- **Common Trends Assumption** – this procedure only works if it is true that single mothers and other women would face the **same time trend** in the absence of the policy.

- This means that we have to assume that an improving economy would affect both the treatment and control groups in exactly the same way … and that there aren't any other trends that might only affect the labor supply of single mothers (e.g. falling child care costs)

Difference in Differences

- Econometrically, in this hypothetical example, estimating the effect of the reform (on the eligible women) would mean estimating the following regression using data from all women:

$$H_{it} = \beta_0 + \beta_r Reform_t + \beta_e Eligible_i + \beta_{re} Reform_t \times Eligible_i + \epsilon_{it}$$

- The coefficient on (Reform x Eligible) gives us our difference-in-differences estimate of the effect of the reform.

Eissa and Liebman (1996)

- Look at the effects of the expansion of the EITC in the Tax Reform Act of 1986
- Single Women with Children – largest eligible group
- What happens in 1987 as a result of this reform:
  - Increased Subsidy from 11 percent to 14 percent
  - Increased maximum amount of income under the subsidy rate from $5000 to $6080
  - Increased maximum credit from $550 to $851
  - Phaseout rate was reduced from 12.22 percent to 10 percent

Eissa and Liebman (1996)

- ***Identification***: Compare the change in labor force participation (and hours worked) of single women with children before and after the reform relative to the change for single women without children.

- Treatment – Expansion of EITC benefits

- Treatment Group – Single women with children

- Control Group – Single women without children

- Use a strategy call “Difference-in-Differences”

Differences in Differences

- Let “Y” measure labor force participation (0 or 1).
- I want to econometrically test for the impacts of the EITC reform. Let “Reform” be a binary variable that takes a value of 1 for years after the reform and 0 otherwise.
- I could just look at women eligible for the reform and estimate the following equation:

$$Y_{it} = \beta_0 + \beta_1 Reform_t + \epsilon_{it}$$

- Why might our estimate of β_1 be a poor estimate for the effect of the program?

Differences in Differences

- OK, OK … so just using time variation might be misleading.

- Let "Eligible" represent a variable that takes value of 1 for women who are eligible for the program and 0 otherwise.

- Why don't I just use observations after the reform and estimate:

$$Y_{it} = \beta_0 + \beta_e Eligible_i + \epsilon_{it}$$

- Why might our estimate of β_e be a poor estimate for the effect of the program?

Differences in Differences

- Just looking at changes over time for eligible women will generate a bad estimate of the true effect if there are underlying time trends that serve as confounding variables.

- Just looking at differences between eligible and ineligible women after the reform will generate a bad estimate if there are underlying differences in the labor supply behavior of these groups for reasons other than the reform.

Differences in Differences

- Fundamental idea behind a Diff-in-Diff identification strategy: can get an estimate of the causal effect of a policy by comparing the ***change*** in behavior experienced by the treatment group to the ***change*** in behavior experienced by the control group. These changes are before and after the reform in question.

- In a regression, this means adding both "Reform" and "Eligible", as well as the interaction between the two "Reform x Eligible"

$$Y_{it} = \beta_0 + \beta_1 Eligible_i + \beta_2 Reform_t + \beta_3 Reform_t \times Eligible_i + \epsilon_{it}$$

Goal 5: Difference in Differences Methodology – Above is the Diff-in-Diff Specification

Differences in Differences

- β_1 reflects time invariant differences between the treatment and control groups. Women with children are almost certainly going to be less likely to supply labor regardless of the tax system, before and after the reform.

- β_2 reflects the common time trend – macroeconomic factors that shift the labor force participation of all women regardless of eligibility.

$$Y_{it} = \beta_0 + \beta_1 Eligible_i + \beta_2 Reform_t + \beta_3 Reform_t \times Eligible_i + \epsilon_{it}$$

Differences in Differences

- β_3 is our key coefficient of interest. This tells us about the difference in the change in Y between the treatment and control group. Our assumption is that any difference in this change is attributable to the effects of the reform.

$$Y_{it} = \beta_0 + \beta_1 Eligible_i + \beta_2 Reform_t + \beta_3 Reform_t \times Eligible_i + \epsilon_{it}$$

Differences in Differences

- What assumptions go into this?

- The key assumption is that Eligible and Ineligible women would be similarly affected by underlying macroeconomic trends.

- It is not clear that this should be true, and this might very well be false. But all econometric models rest on some assumptions that may be hard or impossible to test.

$$Y_{it} = \beta_0 + \beta_1 Eligible_i + \beta_2 Reform_t + \beta_3 Reform_t \times Eligible_i + \epsilon_{it}$$

Eissa and Liebman (1996)

- What do they find using a difference-in-differences strategy to estimate the impact of the EITC expansion?

- “Between 1984-1986 and 1988-1990, single women increased their relative labor force participation by up to 2.8 percentage points”

- No change in relative hours worked for those already in the labor force.

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