Contemporary Labor Economics 11th edition McConnell Solutions Manual

SKU: 9781259290602-SOLUTIONS

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CHAPTER 2
The Theory of Individual Labor Supply

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LEARNING OBJECTIVES

After learning the material in Chapter 2 of *Contemporary Labor Economics*, the student should be able to:

1. graph an indifference map for a person who values leisure and income
2. explain how the slope of the indifference curve relates to the marginal rate of substitution of leisure for income
3. explain why there is a diminishing marginal rate of substitution of leisure for income, which results in convex indifference curves
4. explain why indifference curves farther from the origin represent higher levels of utility
5. relate personal differences in work-leisure preferences to personal differences in the shapes of indifference curves
6. graph an income-leisure budget constraint and explain how its slope relates to the wage rate
7. identify, using the basic income-leisure model, an individual's optimal combination of income and leisure
8. distinguish between the income effect and substitution effect of a wage change and isolate each on a graph
9. explain, in terms of income and substitution effects, the rationale for a backward-bending labor supply curve
10. Correctly define and calculate the wage elasticity of labor supply
11. explain why a person with non-labor income may choose not to participate in the labor force, relating this decision to the concept of the reservation wage
12. explain why a person may choose to "moonlight" or to work part-time
13. show in a graph how unpaid absenteeism may be related to requirements that people work a standard 40-hour week
14. show graphically that a person's utility-maximizing number of work hours may increase in response to a premium wage for overtime work
15. examine an income maintenance plan and determine the basic benefit, the benefit-reduction rate, and the break-even level of income
16. show, using the income-leisure model, why an income maintenance plan may reduce incentives to work
17. Relate provisions of the Temporary Assistance for Needy Family program to the drop in welfare caseloads over the past 10 years

ANSWERS TO SELECTED END-OF-CHAPTER QUESTIONS

2. Work more hours in (a) and (b); fewer hours in (c) and (d).

4. The outcome assumes the substitution effect is stronger than the income effect. The statement reflects empirical evidence that the substitution effect strongly dominates the income effect for females, but they roughly offset each other for males.

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5. She will choose the high-wage option. She will feel underemployed, but this option will allow her to reach a higher indifference curve (a higher level of utility.)

6. The lump-sum tax increases work effort through a pure income effect; the proportional tax may either increase or reduce work effort depending on the relative strengths of the opposing income and substitution effects.

11. The subsidy is $2400 ($3000 – .3 x $2000). The total income is $4400 ($2000 + the $2400 subsidy.) The break-even level of income is $10,000 ($3000 / .30).

12. HBW' entails a zero benefit-reduction rate and the weakest disincentives to work. In contrast, HBYW entails a 100% benefit-reduction rate and the strongest disincentives to work.

15. An increase in the minimum wage may either increase or decrease desired work hours for those already in the labor market depending on the relative strengths of the substitution and income effects. The substitution effect of the higher wage will increase desired hours of work while the income effect will decrease desired hours of work. For those not in the labor force, there is only an income effect, encouraging participation. A direct grant of nonlabor income has only an income effect, reducing desired hours of work.

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Chapter 2
The Theory of Individual Labor Supply

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After reading this chapter, you should be able to:

- **LO 02-01: Use the basic income–leisure model to determine an individual's optimal combination of income and leisure.**
- **LO 02-02: Apply and extend the basic work–leisure model.**

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1. The Work-Leisure Decision: Basic Model

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Assumptions

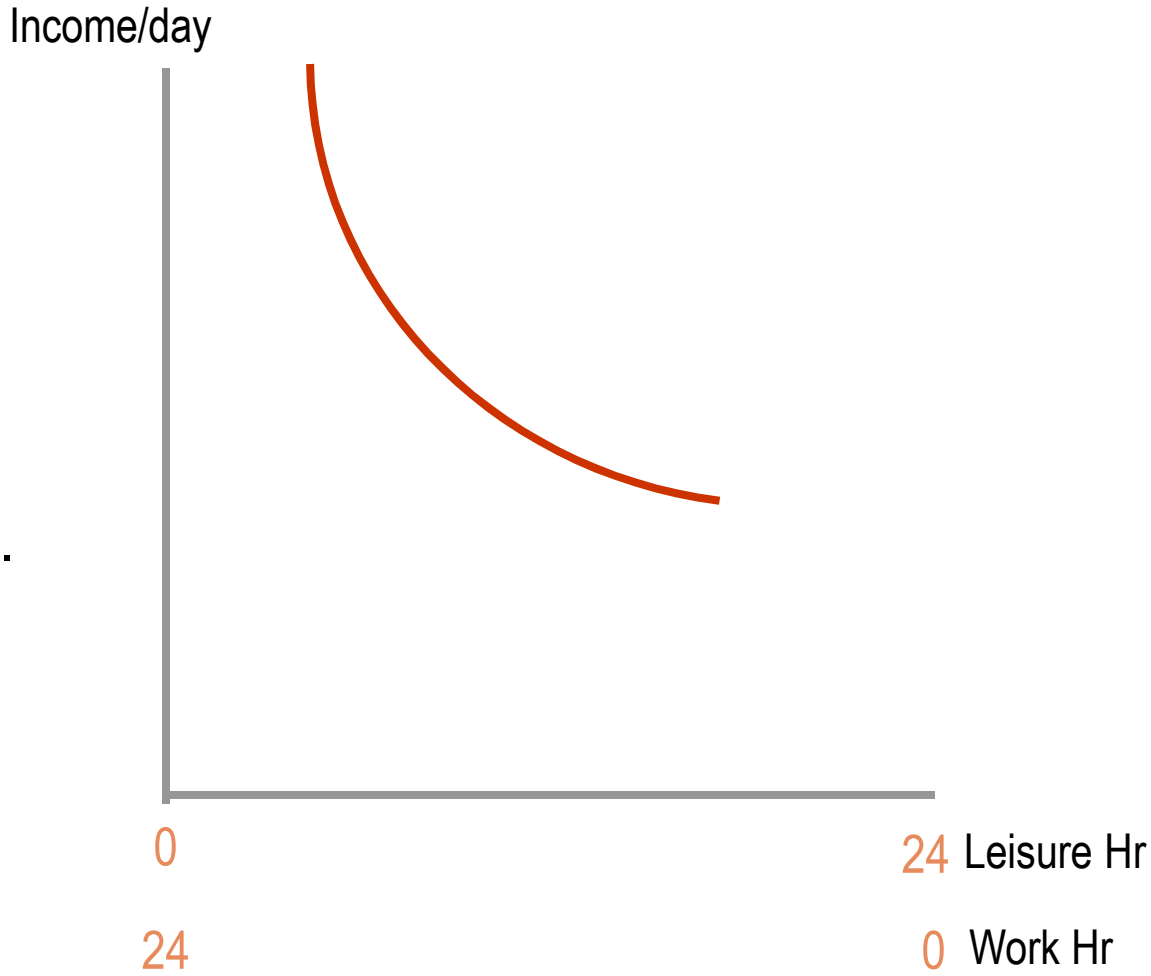
- **Individuals choose between *work* and *leisure*.**
  - Work is time spent on a paying job.
  - Leisure includes activities where one is not paid.
    - Education
    - Rest
    - Work within the household

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Indifference Curve

- The indifference curve shows work and leisure combinations that yield the same amount of total utility.

- More hours of leisure implies fewer hours of work.



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Indifference Curve Properties

- **Negative slope**
  - To keep the level of utility the same, if one gets more leisure, some amount of income must be given up.
- **Convex to origin**
  - With *low* hours of leisure, individuals are willing to give up a *large* amount of income to get 1 more leisure hour.

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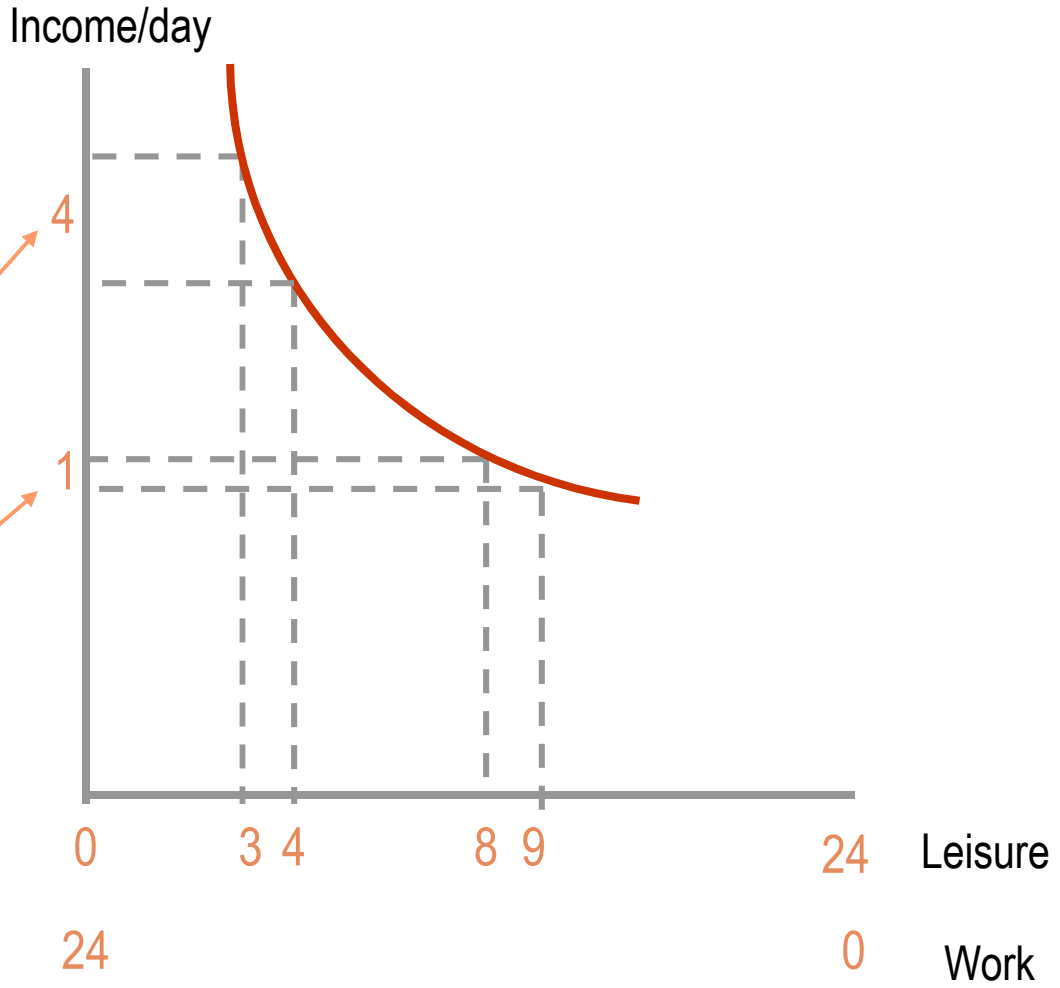
Indifference Curve Properties

- With *high* hours of leisure, individuals are willing to give up a *small* amount of income to get 1 more leisure hour.

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Marginal Rate of Substitution

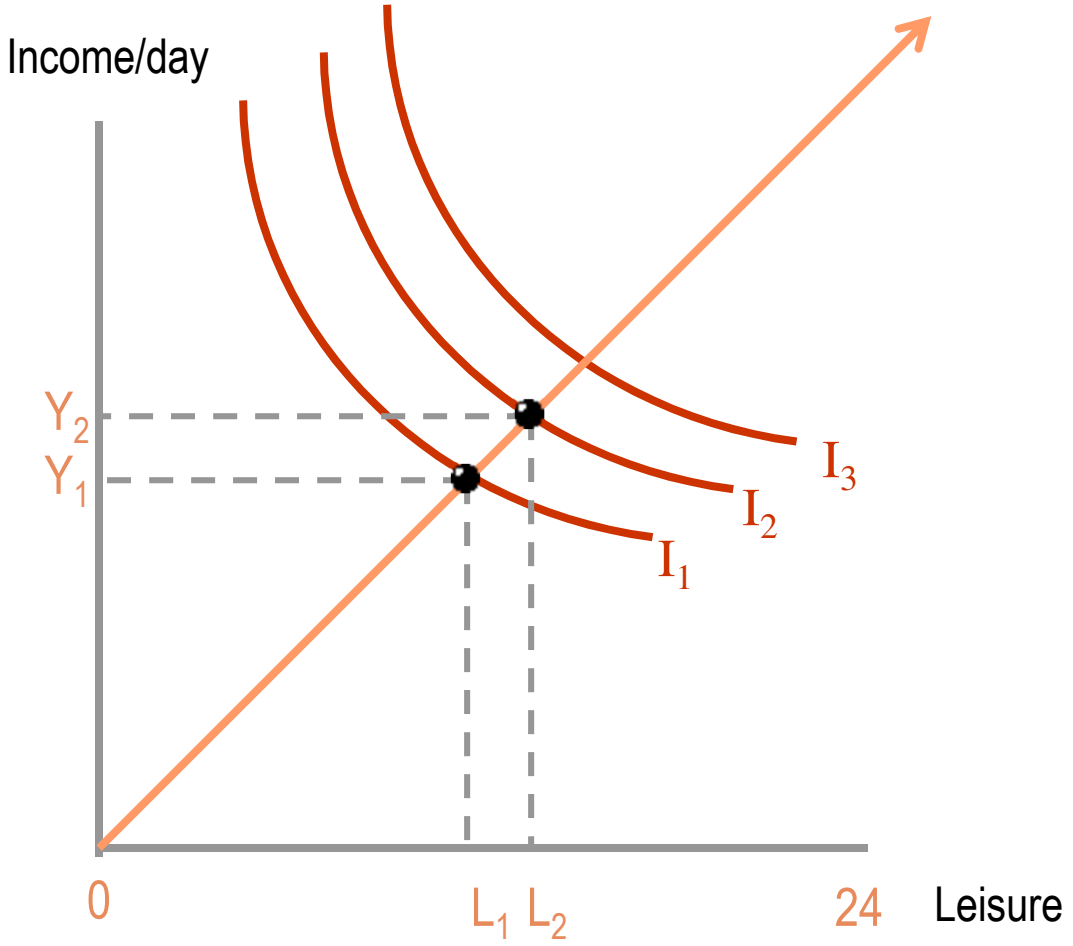
- The marginal rate of substitution (MRS) is the amount of income one must give up to compensate for 1 more hour if leisure.
- At 3 hours of leisure (21 hours of work), one must give up 4 units of income to compensate for 1 more hour of leisure.
- At 8 hours of leisure (16 hours of work), one must give up 1 unit of income to compensate for 1 more hour of leisure.
- The MRS falls as one moves southeast along an indifference curve.



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Indifference Map

- Curves further from the origin indicate higher utility.
- Combination L_2Y_2 is preferred to combination L_1Y_1 since one gets both more income and more leisure.
- A person will maximize utility by getting to the highest *attainable* indifference curve.

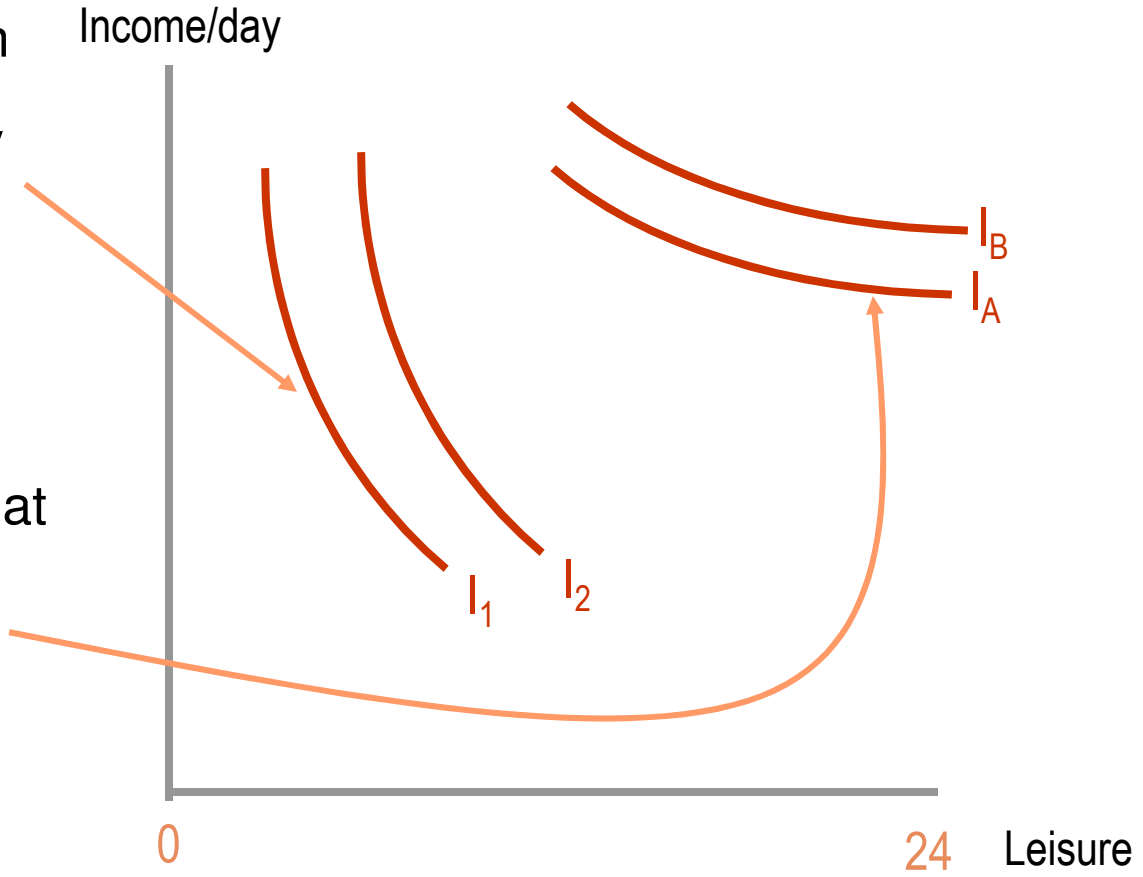


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Work-Leisure Preferences

- "Leisure lovers" place a high value on leisure. The have a steep indifference curve. They are willing to sacrifice a large amount of income to get a small increase in leisure.

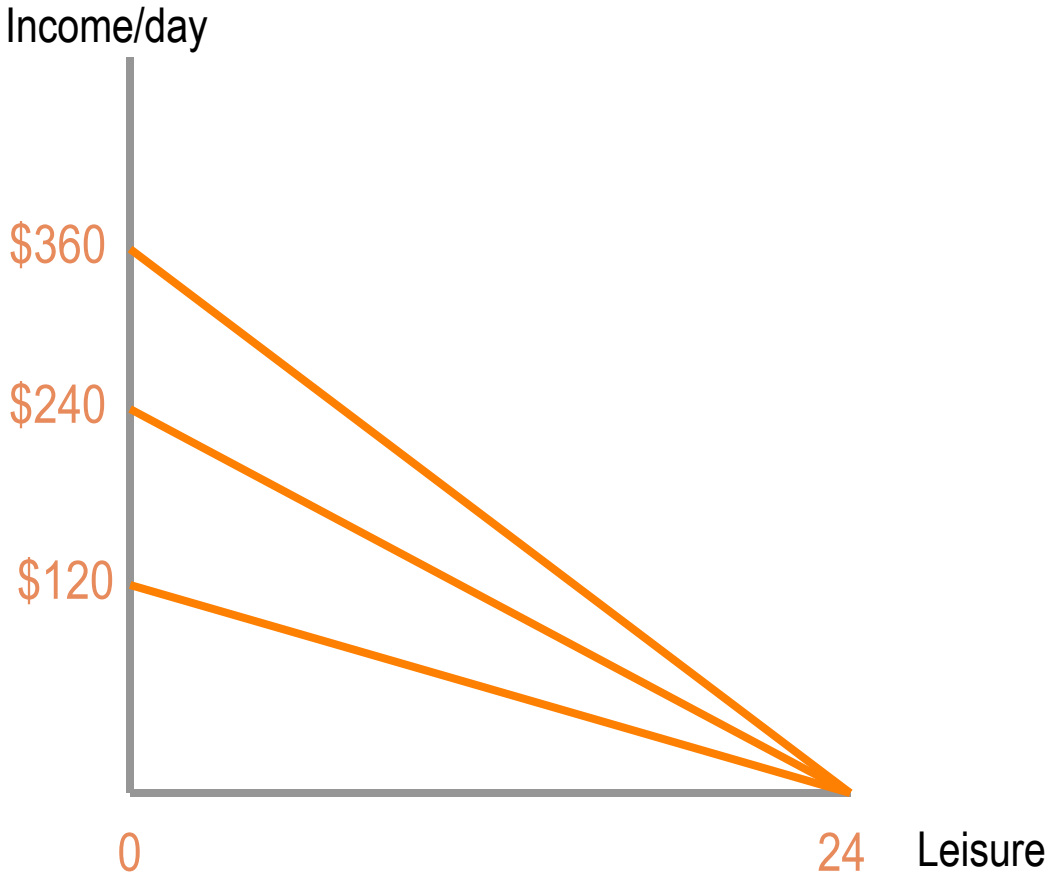
- "Workaholics" place a low value on leisure. The have a flat indifference curve. They must be given a large increase in leisure to compensate for a small decrease in income.



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Budget Constraint

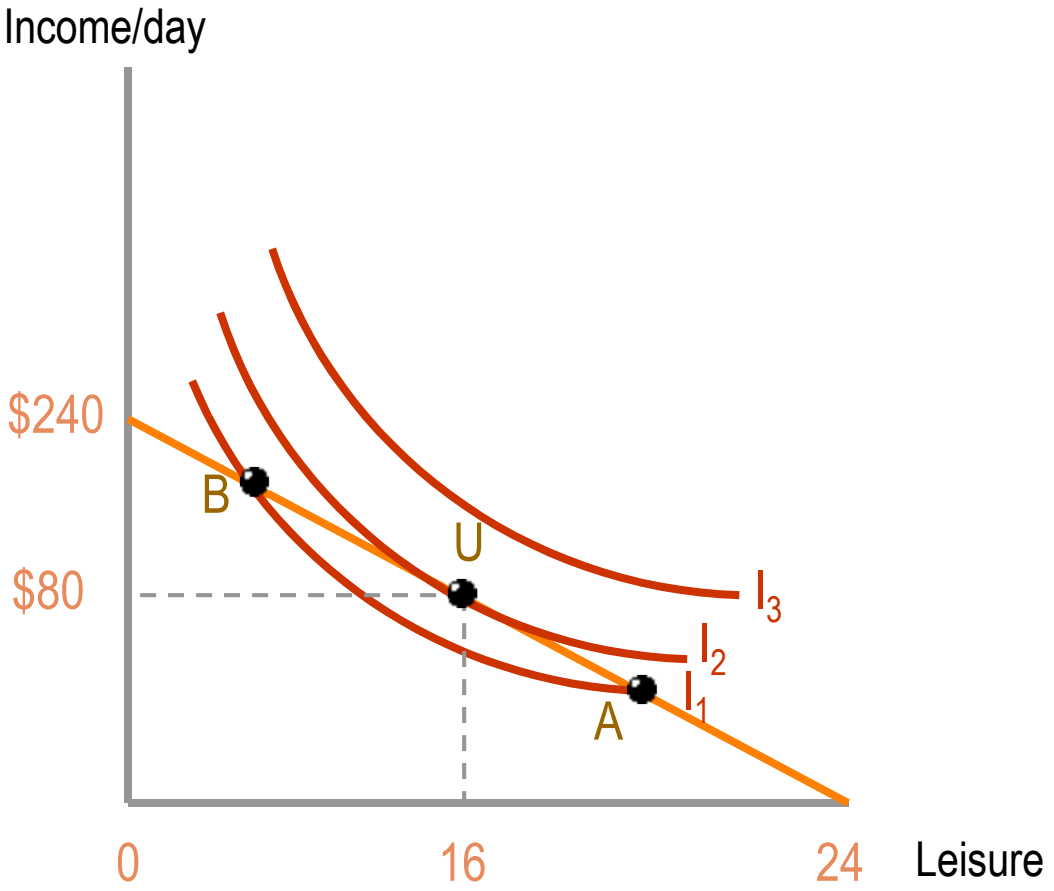
- The budget constraint shows the combinations of income and leisure that a worker could get given a wage rate.
- At a wage rate of $5, a worker could get a maximum income of $120 per day ($5/hour * 24).
- At a wage rate of $10, a worker could get a maximum income of $240 per day.
- At a wage rate of $15, a worker could get a maximum income of $360 per day.
- The slope of the budget constraint is–wage rate.



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Utility Maximization

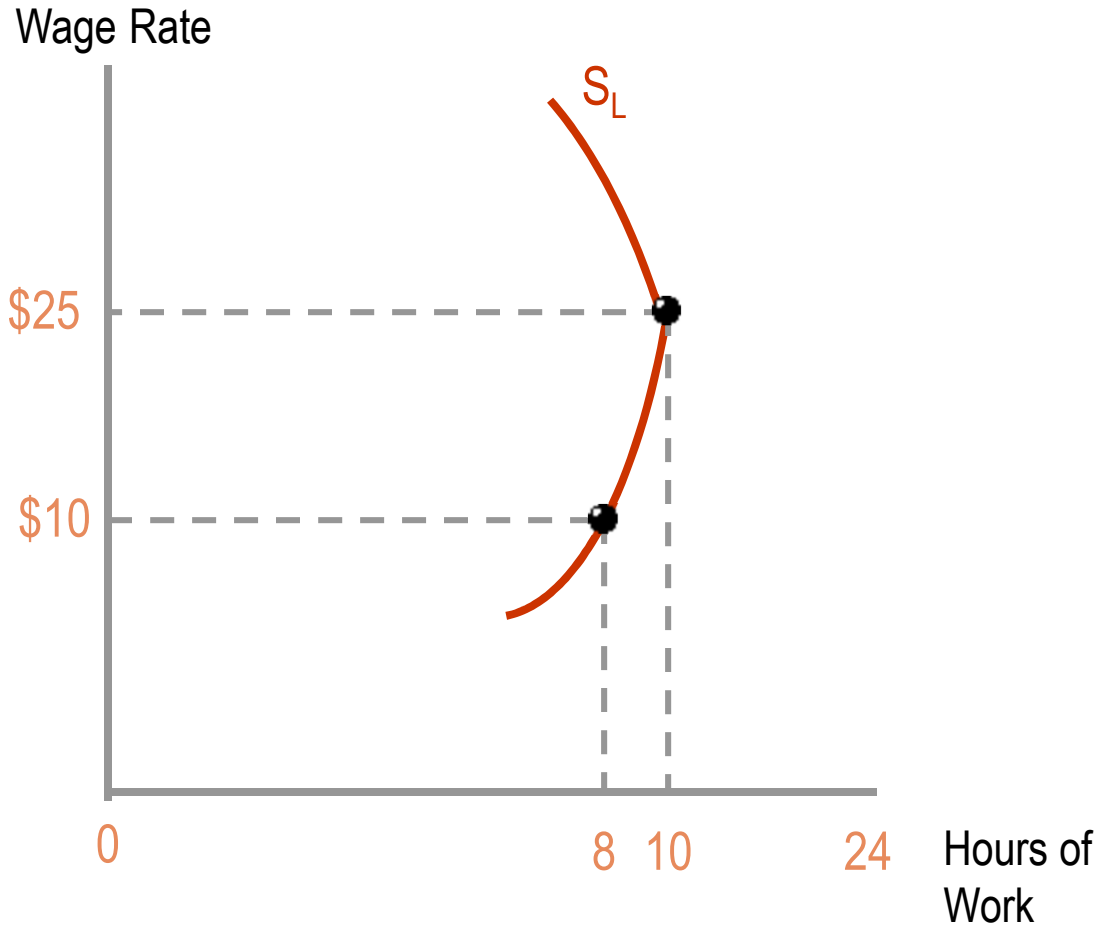
- The optimal or utility maximizing point is where the budget constraint is tangent to the highest *attainable* indifference curve (U).
- At U, the MRS (slope of the indifference curve) is the equal to the wage rate (slope of the budget constraint)
- At B, the MRS is greater than the wage rate. The individual values leisure more than the wage rate.
- At A, the MRS is less than the wage rate. The individual values leisure less than the wage rate.



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Backward Bending Labor Supply Curve

- For a given person, hours of work may increase as the wage rate rises.
- If the wage rate rises from $10 to $25 per hour, hours of work rises from 8 to 10 hours per day.
- Above $25 per hour, hours of work fall.
- The backward bending labor supply curve is the result of the income and substitution effects of a wage change.



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Income Effect

- **Income Effect**
  - The change in desired hours of work resulting from a change in income, holding the wage constant.
    - Leisure is a normal good, so higher income implies a desire for more leisure (fewer hours of work).
    - For a wage *increase*, income is raised and so the income effect lowers desired work hours.

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Substitution Effect

- **Substitution Effect**
  - The change in desired hours of work resulting from a change in the wage rate, holding income constant.
    - A higher wage rate raises the relative price of leisure.
    - For a wage *increase*, the substitution effect raises desired work hours.

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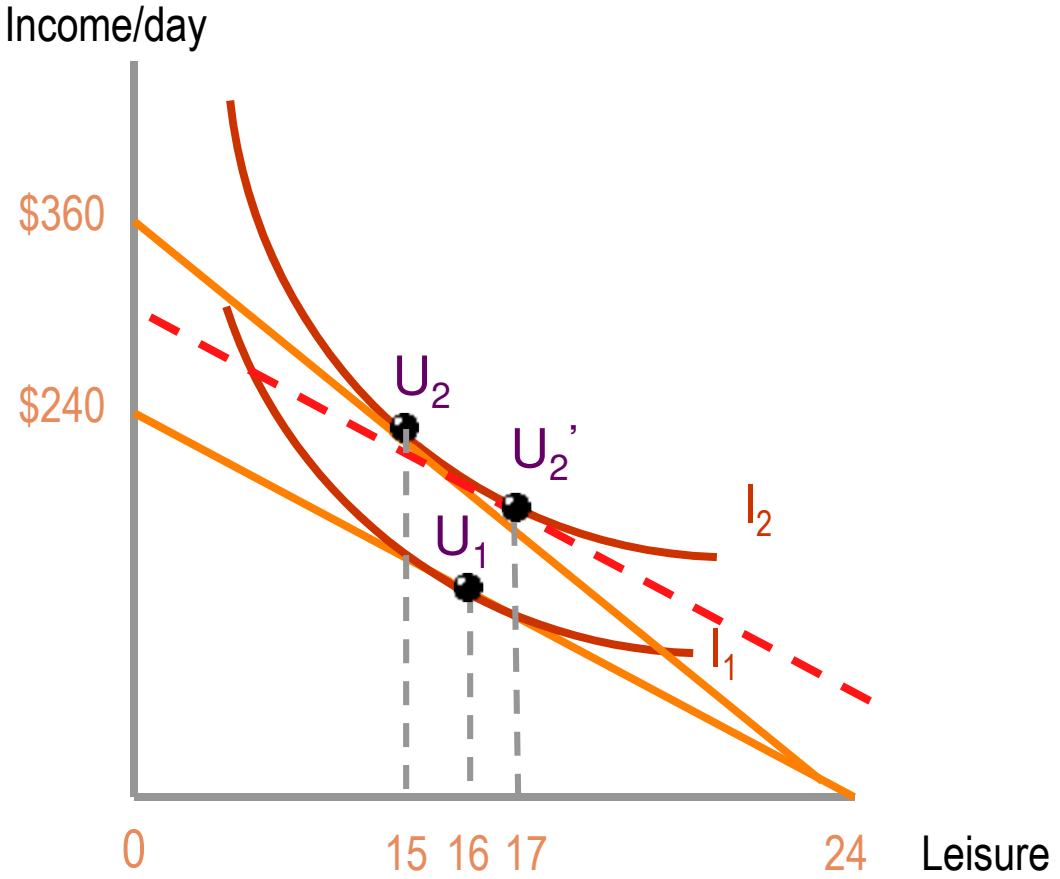
Net Effect

- **For Wage Increases**
  - If substitution effect > income effect, then hours of work rise.
  - If income effect > substitution effect, then hours of work fall.
- **For Wage Decreases**
  - If substitution effect > income effect, then hours of work fall.
  - If income effect > substitution effect, then hours of work rise.

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Income and Substitution Effects

- At a wage rate of $10/hour, the optimal hours of leisure is 16 (8 hours of work) at point U_1.
- If the wage rate rises to $15/hour, the optimal hours of leisure is 15 at point U_2.
- The income effect (IE) is measured through a parallel shift of the old budget constraint. The IE is from U_1 to U_2' (from 16 to 17 hours of leisure).
- The substitution effect (SE) is measured by movement along I_2. The SE is from U_2' to U_2 (from 17 to 15 hours of leisure).
- The net effect is an increase of hours of work by 1 hour.



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Backward Bending Labor Supply Rationale

- **The substitution effect dominates at low wage rates.**
  - The MRS is low because income is scarce relative to leisure.
- **The income effect dominates at higher wage rates.**
  - The MRS is high because leisure is scarce relative to income.

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Empirical Evidence

- **The labor supply curve is slightly backward bending for men.**
  - The income effect is slightly greater than the substitution effect.

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Empirical Evidence

- **The labor supply curve is positive for women.**
  - If substitution effect is greater than the income effect.
    - ∞Women substitute between work at home and market work more than men.

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Elasticity of Labor Supply

- **The elasticity of labor supply measures the responsiveness of desired hours of work to the wage rate.**

$$\text{Elasticity of Labor Supply} = \frac{\%\ \text{Change in quantity of labor supplied}}{\%\ \text{Change in the wage rate}}$$

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Elasticity of Labor Supply

- If the elasticity is zero, it is perfectly inelastic.
- If the elasticity is negative, it is backward bending.
- If the elasticity is positive and less than 1, it is relatively inelastic.
- If the elasticity is positive and more than 1, it is relatively elastic.

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Questions for Thought

1. Show the effect of a wage decrease on an individual's income-leisure choices. Isolate the income and substitution effects. Is the worker on the forward-rising or backward bending portion of the labor supply curve?

2. Indicate in each of the following instances whether specified events would cause a worker to want to work more or fewer hours:

(a) The wage rates rises and the substitution effect is greater than the income effect.

(b) The wage rate falls and the income effect is greater than the substitution effect.

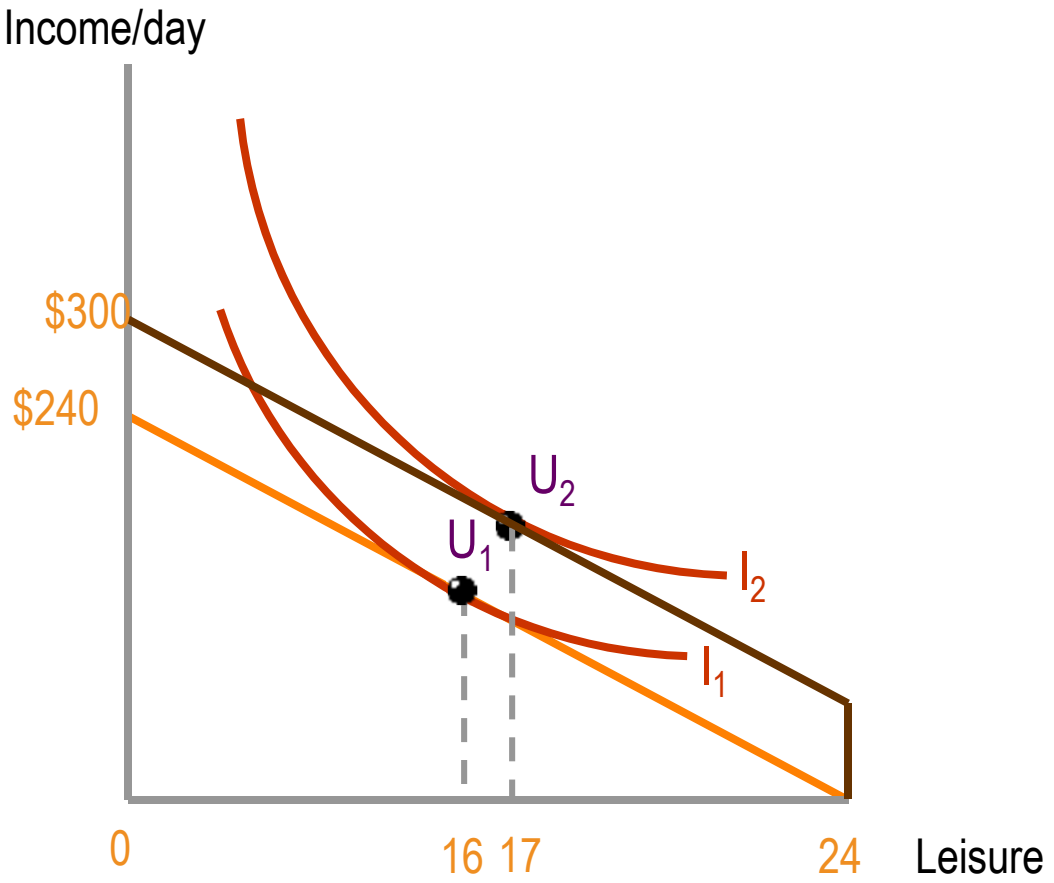
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2. Applying and Extending the Model

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Non-Labor Income

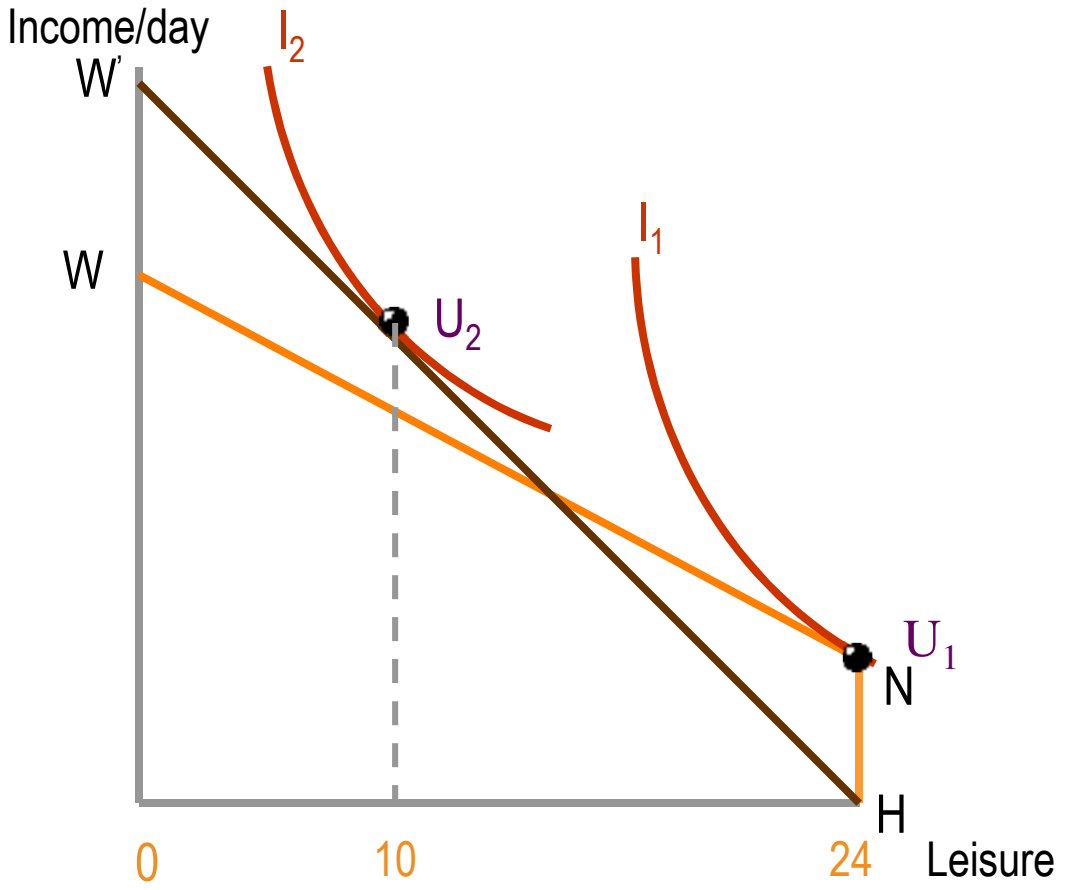
- At a wage rate of $10/hour with no other income, the optimal hours of leisure is 16 (8 hours of work) at point U_1.
- If the person gets an inheritance that generates $60 a day of non-labor income, the budget constraint has a parallel shift.
- The optimal hours of leisure rises to 17 at point U_2 .
- With an increase in non-labor income, only the income effect occurs and so hours work *must* fall.



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Non-Participants

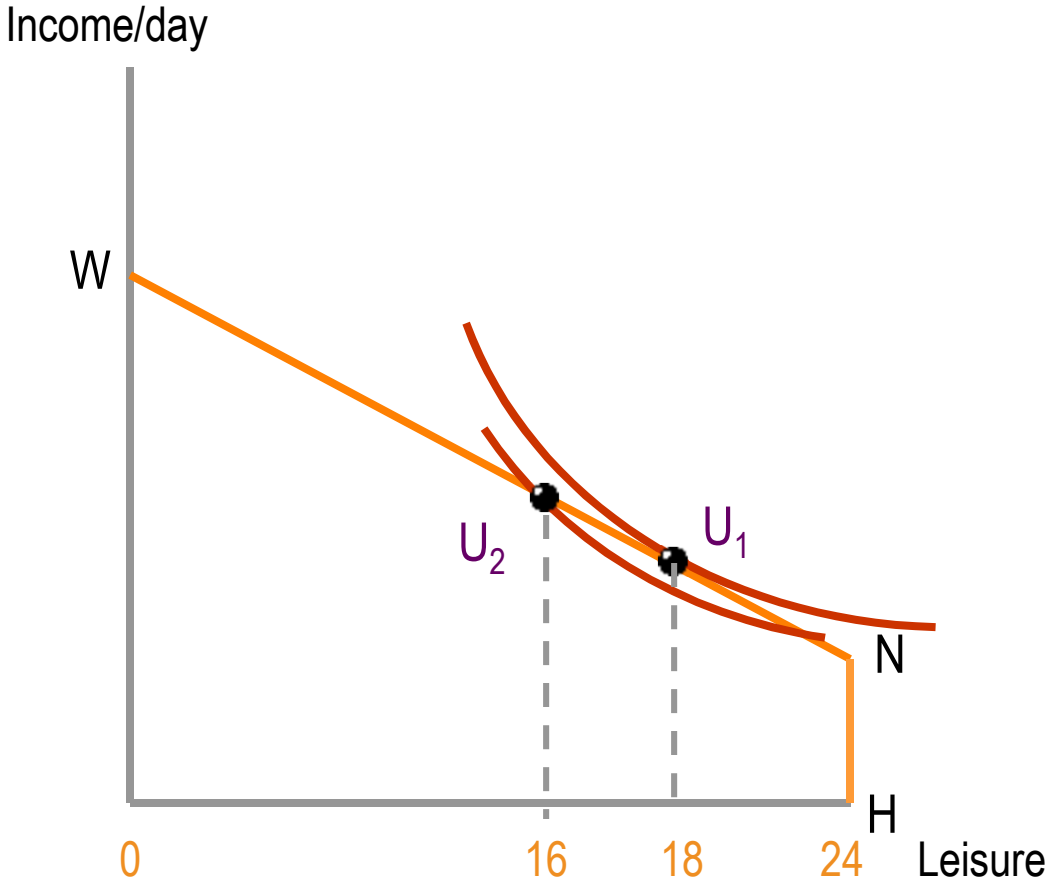
- If a person has a low wage rate (WN is flat), higher non-labor income (NH), or steep indifference curves (I_1), he is less likely to participate in the labor force (U_1).
- If a person has a high wage rate (HW'), low non-labor income (0), or flat indifference curves (I_2), she is more likely to participate (U_2).
- The *reservation wage* is the lowest wage necessary to induce someone to work.
- College students are less likely to participate in the labor force than other persons. Why?



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Over-Employment

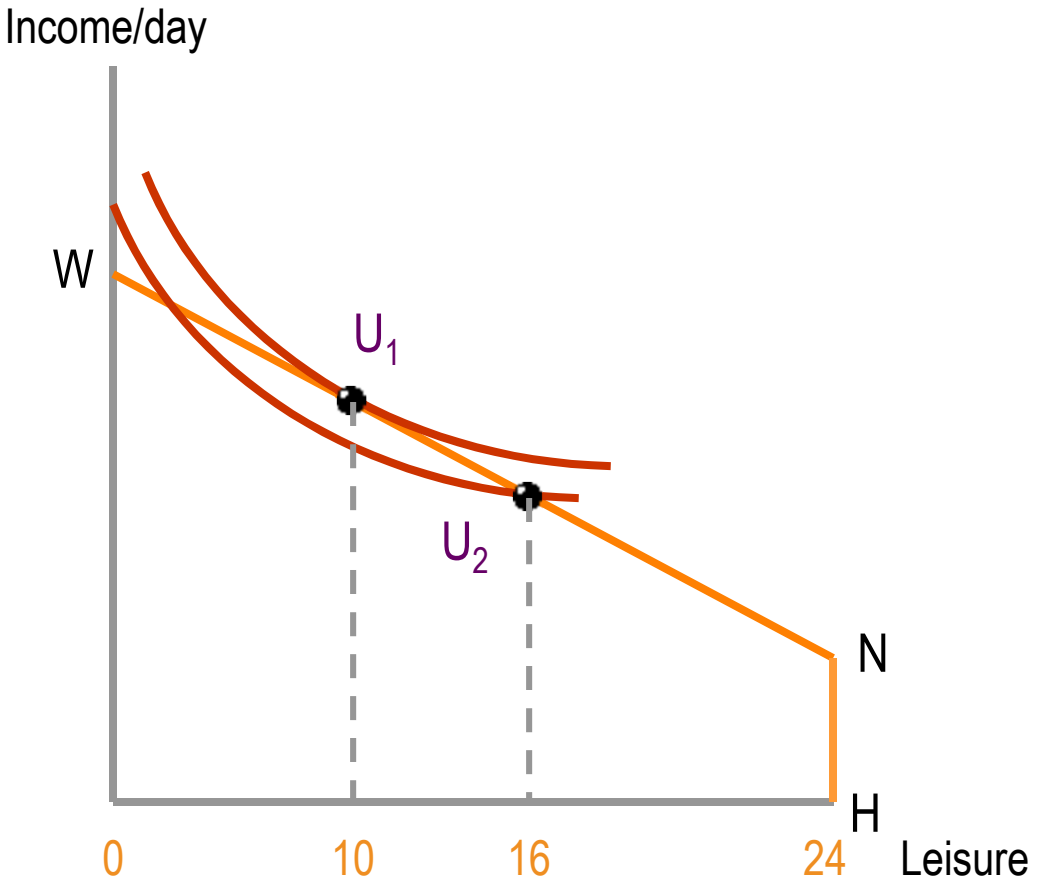
- If an individual is free to choose the number of hours of work, she would choose point U_1, with 18 hours of leisure and 6 hours of work.
- If the individual is constrained to work a standard workday of 8 hours or not all, she will choose point U_2.
- At U_2, her MRS is more than the wage rate and so she feels *overemployed*.
- What is a potential solution to her overemployment situation?



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Under-Employment

- If an individual is free to choose the number of hours of work, she would choose point U_1, with 14 hours of work and 10 hours of leisure.
- If the individual is constrained to work a standard workday of 8 hours or not all, she will choose point U_2.
- At U_2, her MRS is less than the wage rate and so she feels *underemployed*.
- What is a potential solution to her underemployment situation?



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Income Maintenance Programs

- There are a variety of income maintenance programs such as food stamps, Medicaid, Temporary Assistance to Needy Families.
- We will examine the work incentives of such programs.

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Income Maintenance Program Features

- ***Income Guarantee*** **(*B*)**
  - Benefit received if individual/family has no earned income.
- ***Benefit Reduction Rate*** **(*t*)**
  - Rate by which the benefit is reduced as income is increased.
    - At t=.50, benefits are reduced by $.50 for every dollar earned.

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Income Maintenance Program Features

- ***Break-Even Level of Income*** **(** Y_b **)**
  - The level of earned income at which the individual/family receives no benefit.

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Benefit Example

The *actual subsidy payment S* illustrates these concepts as shown below.

$$S = B - tY$$

If B = $80, t = .5, earned income (Y) = $60 then…

S = $80 - .5 * $60 =$50

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Benefit Example

The break-even level of income formula is shown below:

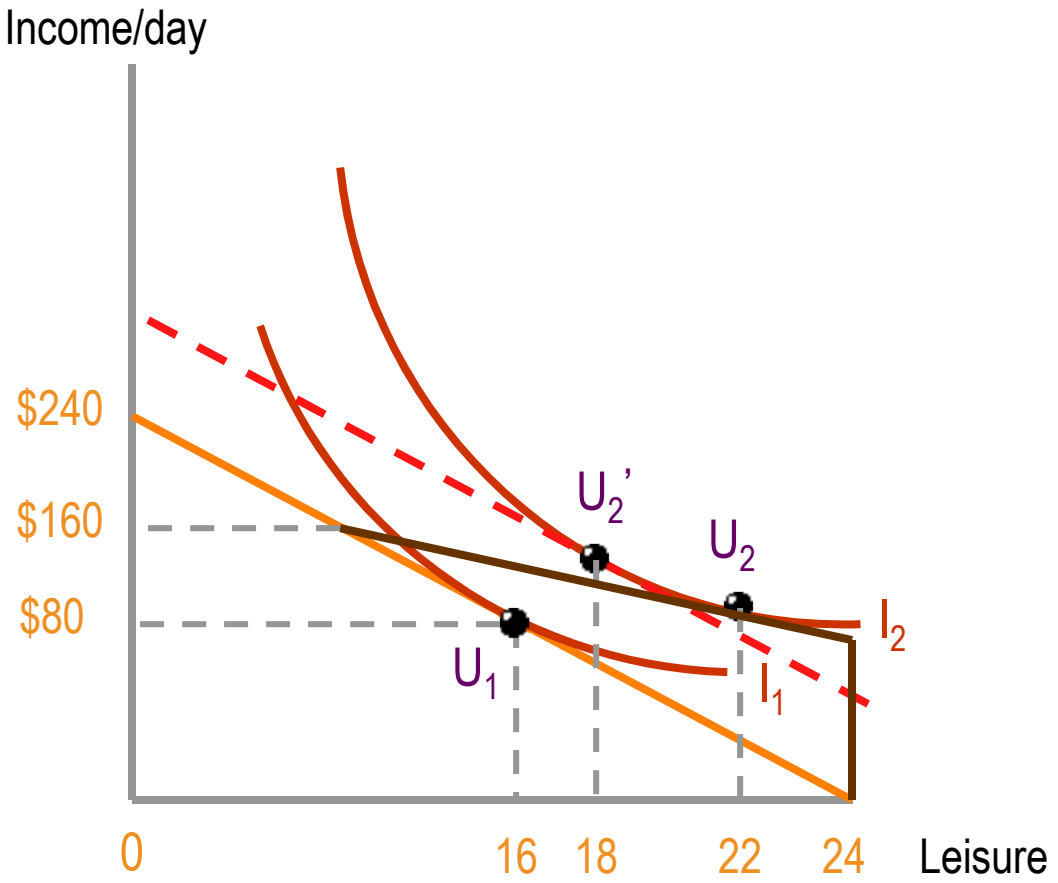
$$Y_b = B/t$$

If B = \$80, t = .5, then Y_b = \$160

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Income Maintenance Program

- At a wage rate of $10/hour, the optimal hours of leisure is 16 (8 hours of work) at point U_1.
- If there is a welfare program is started with a B of $80 a day, t = .5, then Y_b= $160.
- The income effect (IE) is measured through a parallel shift of the old budget constraint. The IE is from U_1 to U_2' (from 16 to 18 hours of leisure).
- The substitution effect (SE) is measured by movement along I_2. The SE is from U_2' to U_2 (from 18 to 22 hours of leisure). The tax lowers the "price" of leisure.
- In contrast to a wage change, both the IE and SE reduce desired hours of work.



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Welfare Reform

- **The main elements of the 1996 Welfare Reform Act are:**
  - Two-year time limit for receiving assistance.
  - Five-year lifetime time limit for collecting assistance.
  - Provisions to help enforce the collection of child support payments from fathers.

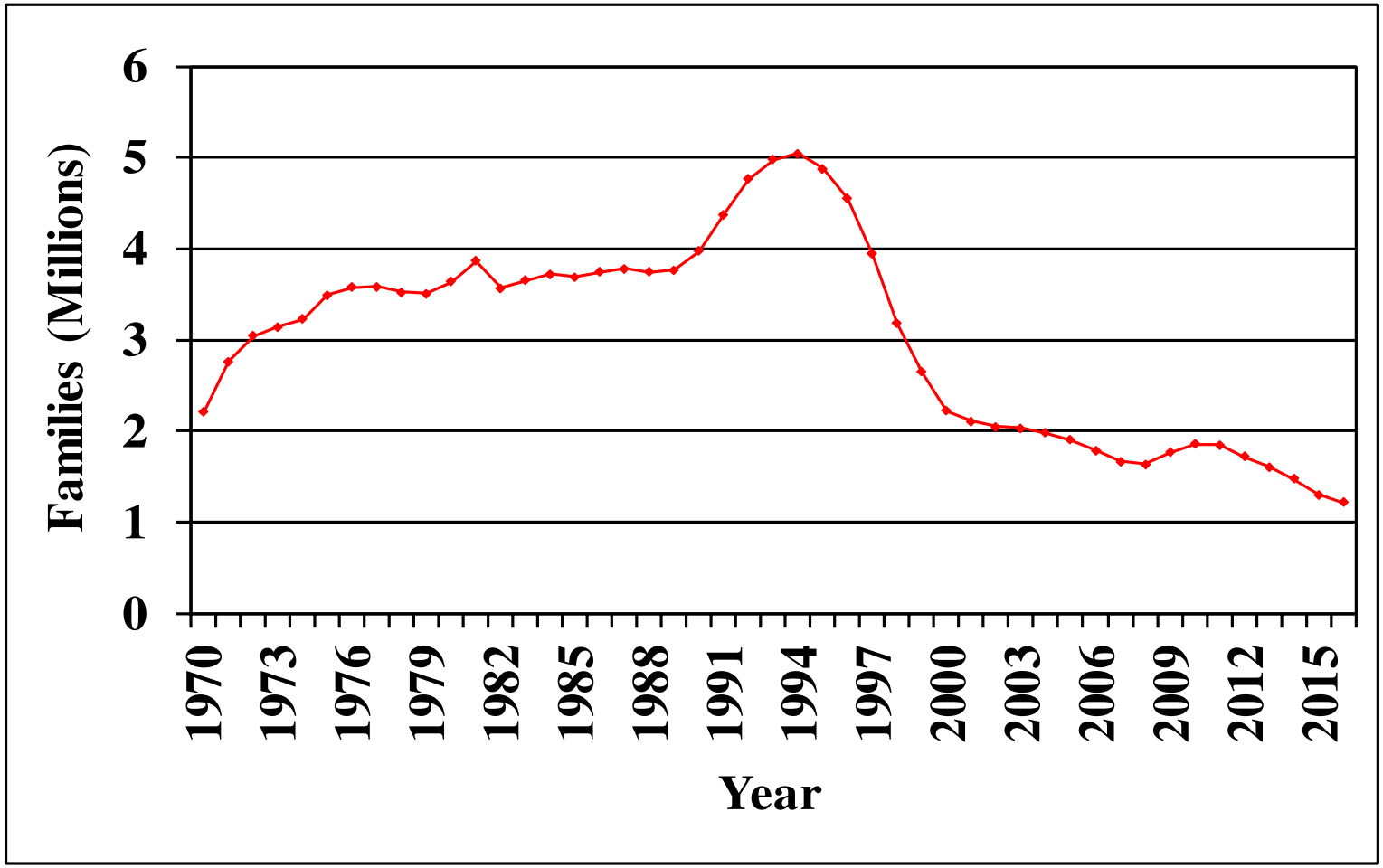
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Welfare Reform

- **There has been a large reduction in caseloads since 1996.**

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Welfare Caseloads



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Why Did Caseloads Fall?

- The economic boom of the 1990s helped the labor prospects of welfare recipients.
- The expansion of tax subsidies for *working* low income families encouraged recipients to seek jobs.

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Why Did Caseloads Fall?

- The benefit time limits encouraged recipients to conserve their benefits.
- Welfare benefit reductions, child care expansions, and changes in training programs also likely played a role.

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Questions for Thought

1. One way of aiding low-income families is to increase the minimum wage. An alternative is to provide a direct grant of non-labor income. Compare the impact of these two options on work incentives.

2. How would you expect each of the following factors to affect the probability someone chooses not to participate in the labor force?

(a) Education
(b) Presence of preschool children
(c) Level of spouse's income
(d) Marital status

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