Chapter 2

The Theory of Individual Labor Supply
1. The Work-Leisure Decision: Basic Model
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
• 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.
Indifference Curve Properties

- Negative slope
  - To keep the level of utility the same, if one gets more leisure, some 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.
  - With high hours of leisure, individuals are willing to give up a small amount of income to get 1 more leisure hour.
The marginal rate of substitution (MRS) is the amount of income one must give up to compensate for 1 more hour of 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.
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.
“Leisure lovers” place a high value on leisure. They 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. They have a flat indifference curve. They must be given a large increase in leisure to compensate for a small decrease in income.
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.
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 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.
• 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.
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.
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.
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.
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.
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.
Empirical Evidence

- The labor supply curve is slightly backward bending for men.
  - The income effect is slightly greater than the substitution effect.
- 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.
Elasticity of Labor Supply

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

\[
\text{Elasticity of Labor Supply} = \frac{\% \text{ Change in quantity of labor supplied}}{\% \text{ Change in the wage rate}}
\]
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.
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.
2. Applying and Extending the Model
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.
• If a person has a low wage rate (WN is flat), higher non-labor income (NH), or steep indifference curves (I₁), he is less likely to participate in the labor force (U₁).

• If a person has a high wage rate (HW'), low non-labor income (0), or flat indifference curves (I₂), she is more likely to participate (U₂).

• 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?
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?
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?
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.
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.

- **Break-Even Level of Income** ($Y_b$)
  - The level of earned income at which the individual/family receives no benefit.
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 \times $60 = $50$
Benefit Example

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

\[ Y_b = \frac{B}{t} \]

If \( B = 80 \), \( t = .5 \), then \( Y_b = 160 \)
• 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.
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.
- There has been a large reduction in caseloads since 1996.
Welfare Caseloads

![Graph showing the number of families receiving welfare caseloads from 1970 to 2006. The graph indicates a steady increase from 1970 to 1994, with a peak in 1994, followed by a sharp decline in 1997, and a gradual decrease thereafter.]
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.
- 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.
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
End
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