

Chapter 4

Consumer and Firm Behavior: The Work-Leisure Decision and Profit Maximization

Plan

- Understanding basic microeconomic principles to build a simple macroeconomic model.
- One period model i.e., **STATIC** Decisions. NO SAVINGS.
- Many periods model i.e., **DYNAMIC** Decisions. PART III.

Consumer **Optimization** Problem

- One decision to make:
 - How many units to eat (consume)?
 - How much time for leisure?
- The consumer supply labor and demand goods.
- Work-Leisure decision is affected by:
 - Preferences
 - Constraints

Firm **Optimization** Problem

- How much labor to hire/fire ?
- The decision to maximize profit depends on:
 - available technology
 - market environment
- The firm demands labor and supply goods.

Macro Outcome

Given the optimizing behavior of:

The consumer

The firm

Analyze how these economic agents will respond to changes in the environment they live in.

For example: a change in taxes
a change in the wage rate

The Representative Consumer (all are identical)

- Preferences
- Budget constraint
- Optimize (find best rational choice, **rational**)
- How to respond to a change in:
 - Non-wage income
 - Market wage rate

Figure 4-1 Indifference Curves (Preferences)

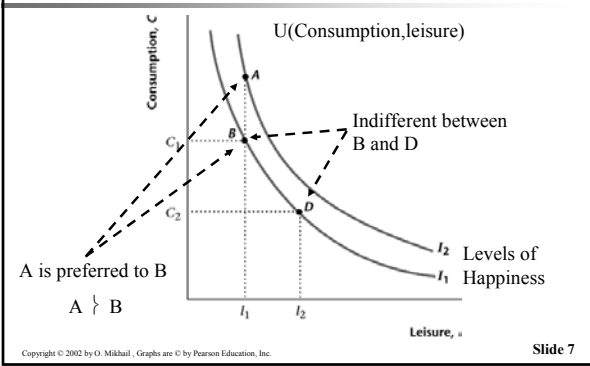
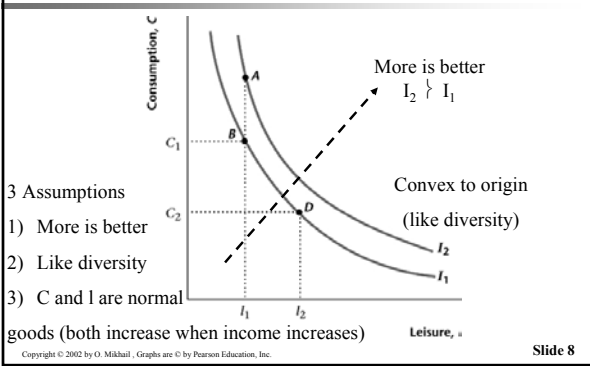


Figure 4-1 Indifference Curves (Preferences)



Moving along an Indifference Curve

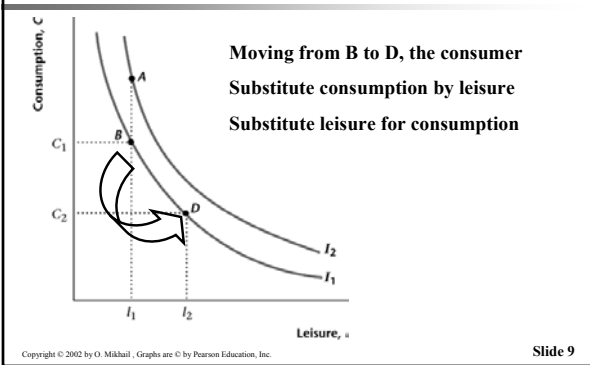
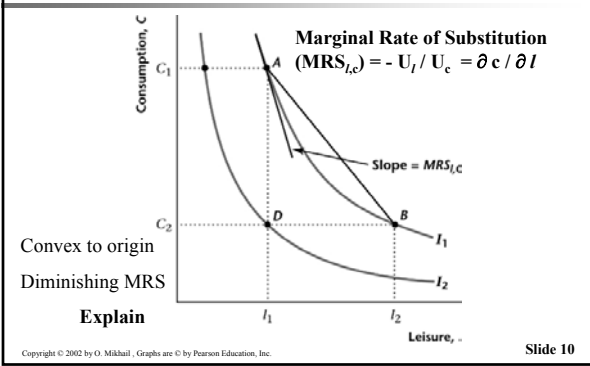


Figure 4-2 Properties of Indifference Curves



Budget Constraint

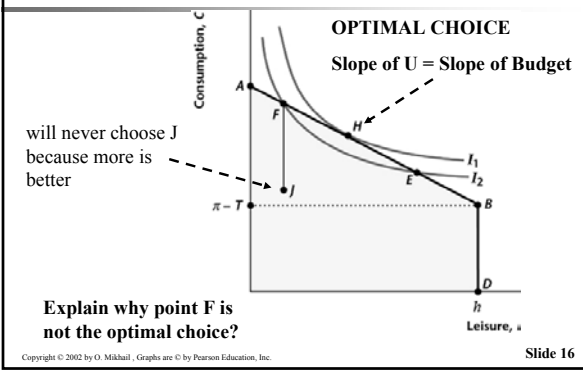
- No money Economy (Barter Economy).
- Two goods: consumption and labor time.
- Any trade must involve the exchange of goods for labor time.
- Time constraint: $l + N^s = h \rightarrow N^s = h - l$
Leisure time l + Work time N^s = Total time available
- Budget constraint: $C = w N^s + \pi - T$
real consumption = real disposable income

Breakdown of the Budget Constraint

Budget constraint $C = w N^s + \pi - T$

- w : real wage
- $w N^s$: real wage income in units of goods
- π : (real profits) real dividends from firms.
The consumer owns the firm
- T : real lump-sum taxes (does not depend on the actions of the agent being taxed).

Figure 4-5 Consumer Optimization



The Optimal Choice and the Slopes

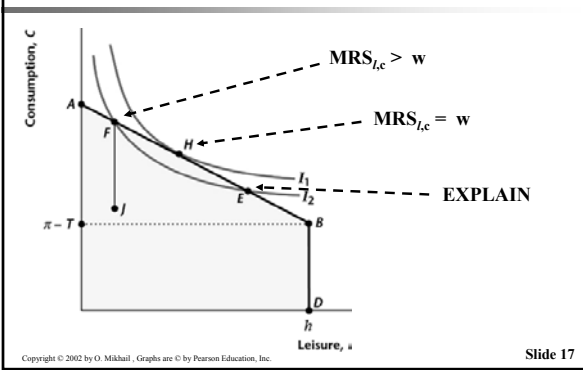
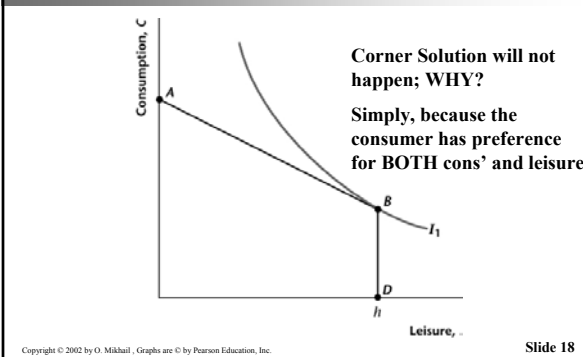


Figure 4-6 The Representative Consumer Chooses not to Work



The Game

Starting from an (equilibrium) optimal choice
 how does the consumer respond to changes in:

- Real Dividend Income minus Taxes
 - Example: tax cut
- Real Wage

Figure 4-7 An Increase in the Consumer's Dividend Income

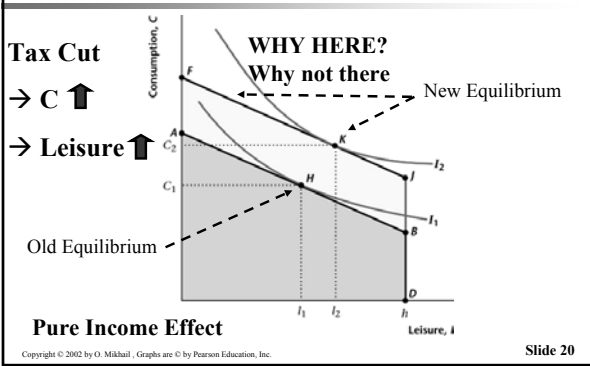
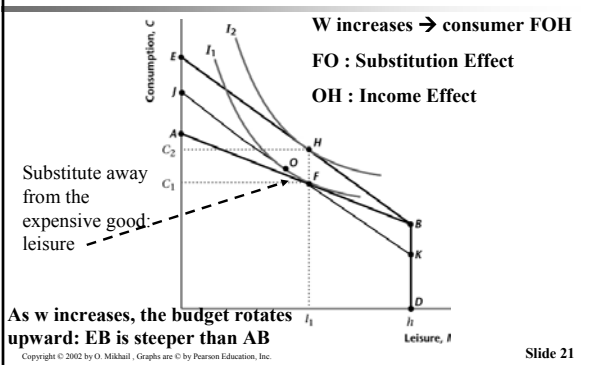


Figure 4-8 Increase in the real Wage Rate
 Income and Substitution Effects



Effect of Real Wage on Labor Supply

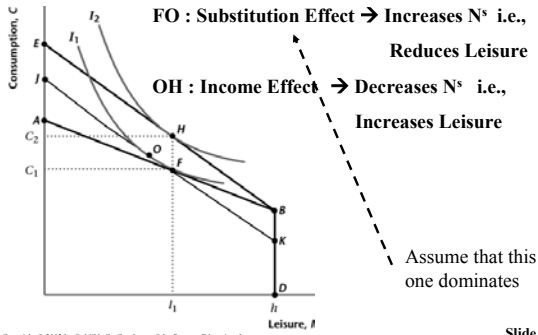


Figure 4-9 Labor Supply Curve

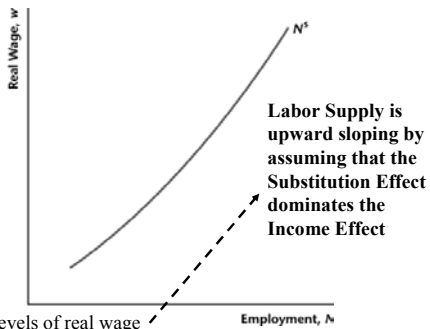


Figure 4-10 Effect of an Increase in Dividend Income or a Decrease in Taxes



THEORY CONFRONTS DATA

Empirical Evidence

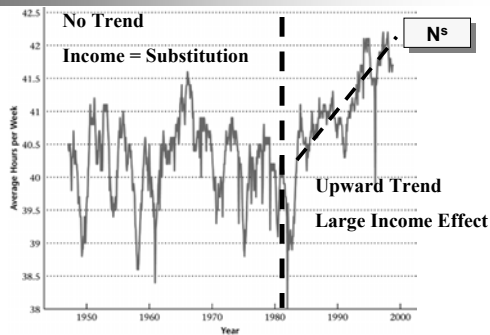
Figure 4-12 Real Wage in Manufacturing, 1947-1998



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Figure 4-13 Average Hours per Week in Manufacturing, 1947-1998



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The Representative Firm

The Representative Firm

- Choices:
 - Supply consumption goods
 - Demand labor

- Choices determined by:
 - Available technology → **Production Function**
 - Profit maximization

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The Production Function

$$Y = z F(K, N^d)$$

K: Capital input

N: Labor input

z: Total Factor Productivity:
Degree of sophistication of the
production process

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Figure 4-14 Production Function, Fixing the Quantity of Capital and Varying the Quantity of Labor

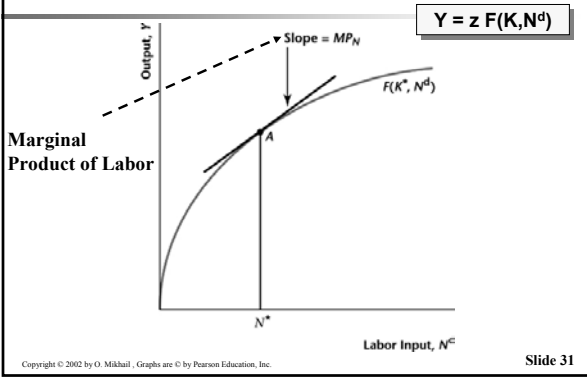
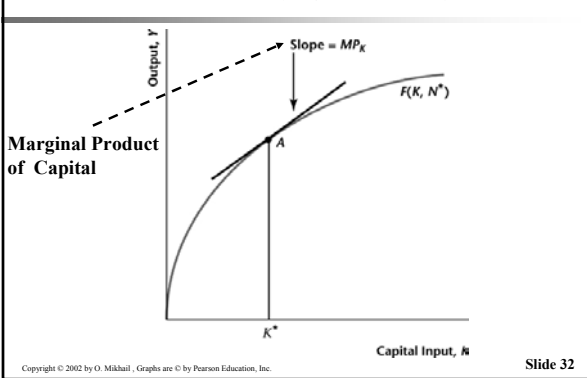


Figure 4-15 Production Function, Fixing the Quantity of Labor and Varying the Quantity of Capital



Properties of the Production Function

- Constant Returns to Scale
- Marginal product is positive
- Diminishing marginal product (concavity of the production function)
- Marginal product shifts whenever the quantity of the other factor input change

Implications of the Returns to Scale

- Constant Returns to Scale: (CRS)
a small firm is just as efficient as a large firm.
- Increasing Returns to Scale: (IRS)
large firms are more efficient than small firms.
- Decreasing Returns to Scale: (DRS)
small firms are more efficient than large firms.

Implication of CRS

The economy will behave in exactly the same way if there were many small firms producing consumption goods as it would if there were a few large firms, provided that all firms are price-takers.

CRS allows us to select a representative firm.

Figure 4-16 Marginal Product of Labor Schedule for the Representative Firm

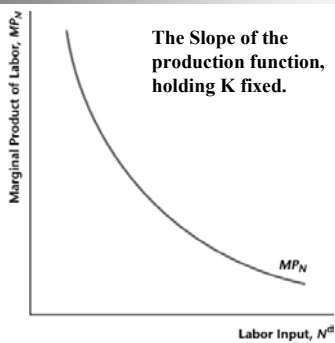


Figure 4-17 Adding Capital Increases the Marginal Product of Labor

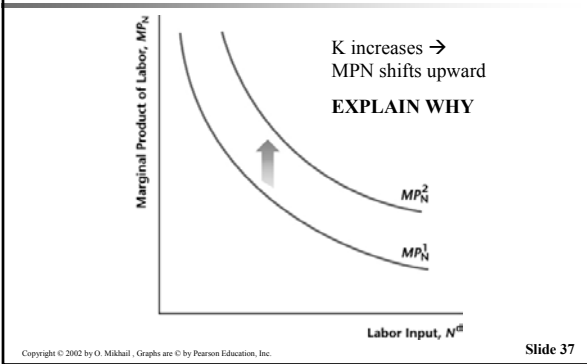


Figure 4-18 Total Factor Productivity Increases

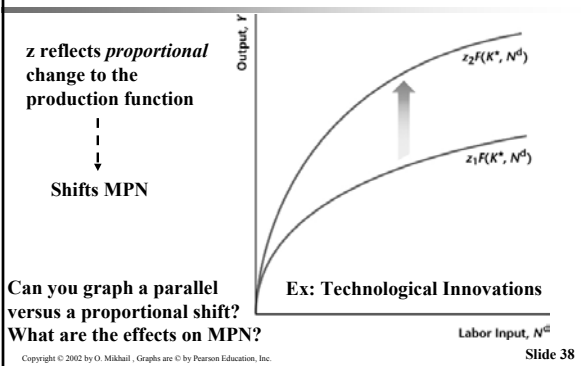
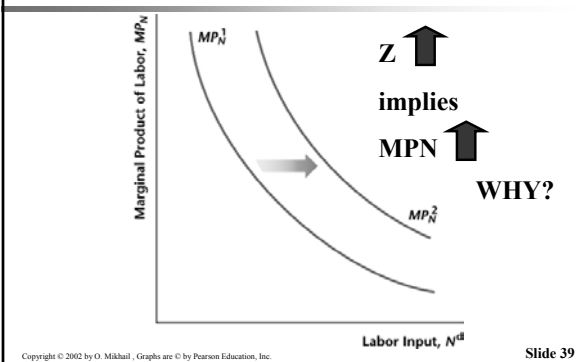


Figure 4-19 Effect of an Increase in Total Factor Productivity on the Marginal Product of Labor



Reasons for Changes to Total Factor Productivity

- Technological Innovations
- Weather
- Government Regulations (e.g., installation of pollution abatement equipment)
- Relative Energy Prices

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Measuring Total Factor Productivity

$$Y = z F(K, N^d) = z K^\alpha N^{1-\alpha}$$

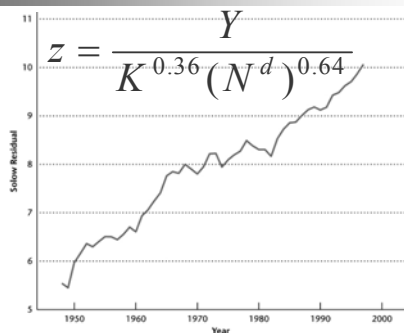
z is computed as a residual

The Solow residual (after Robert Solow 1957)

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Figure 4-20 The Solow Residual for the United States



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Profit Maximization

Figure 4-21 Revenue, Variable Costs, and Profit Maximization

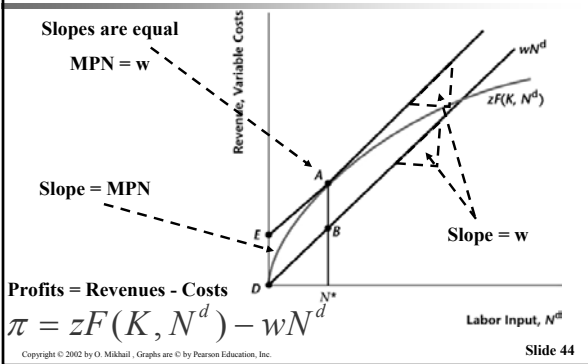


Figure 4-22 The Marginal Product of Labor Curve Is the Labor Demand Curve of the Profit-Maximizing Firm

