

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.

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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

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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.

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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

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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

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Figure 4-1 Indifference Curves (Preferences)

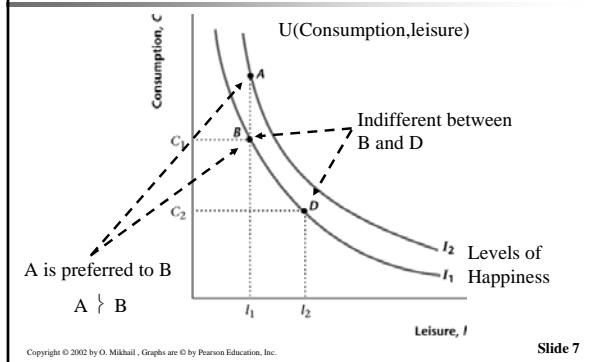
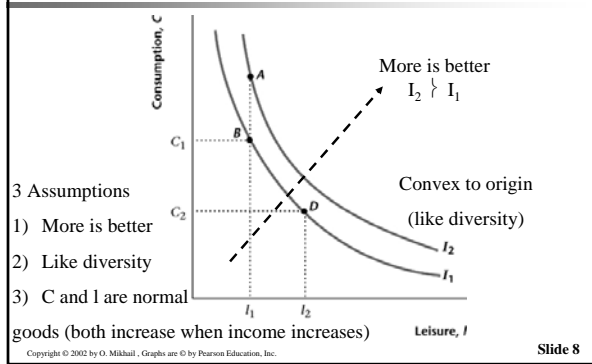


Figure 4-1 Indifference Curves (Preferences)



Moving along an Indifference Curve

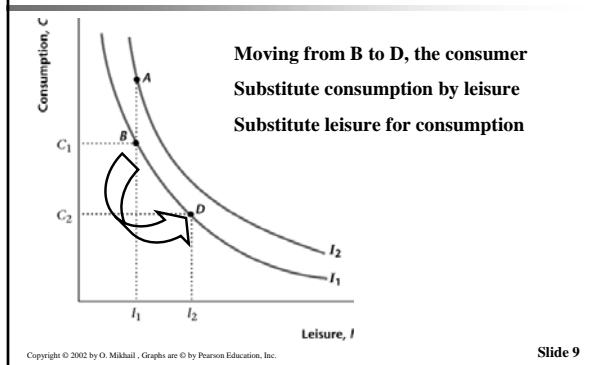
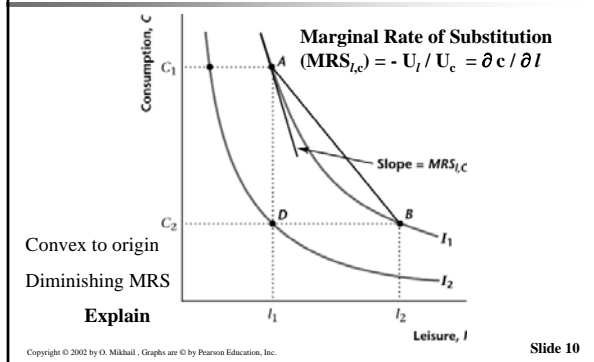


Figure 4-2 Properties of Indifference Curves



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

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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).

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Real Expenditure and Real Disposable Income

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

Substitute $N^s = h - l$ into the budget

$$C = w (h - l) + \pi - T$$

Then multiply w by the parenthesis

$$C = wh - wl + \pi - T$$

Rearrange to get

$$C + wl = wh + \pi - T$$

w is the price of leisure in terms of the cons' good.

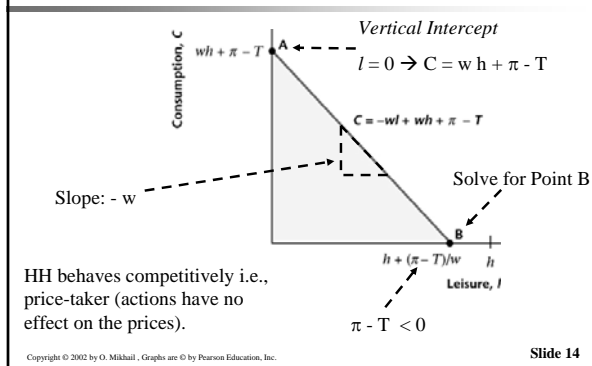
$C + wl$: the implicit real expenditure on c and l

$wh + \pi - T$: the implicit real disposable income

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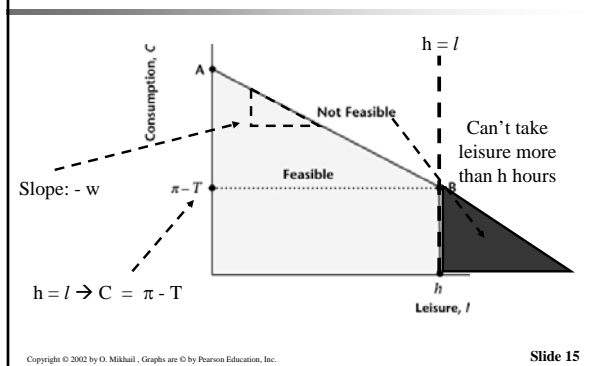
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Figure 4-3 Representative Consumer's Budget Constraint ($T > \pi$)



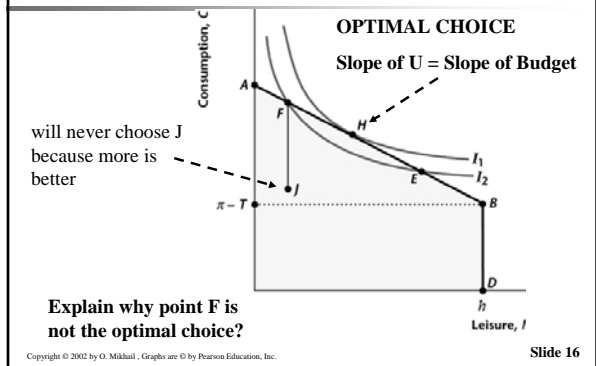
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Figure 4-4 Representative Consumer's Budget Constraint ($T < \pi$)



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Figure 4-5 Consumer Optimization



The Optimal Choice and the Slopes

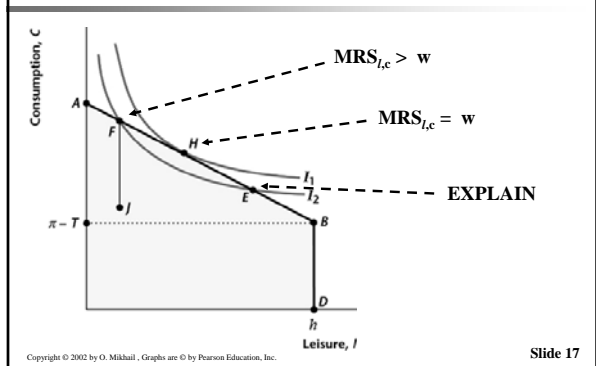
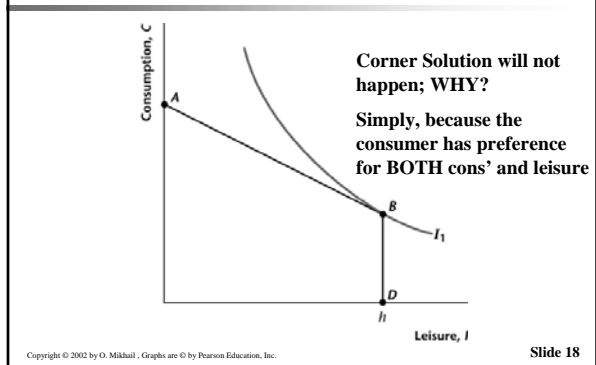


Figure 4-6 The Representative Consumer Chooses not to Work



Comparative Statics (The Game)

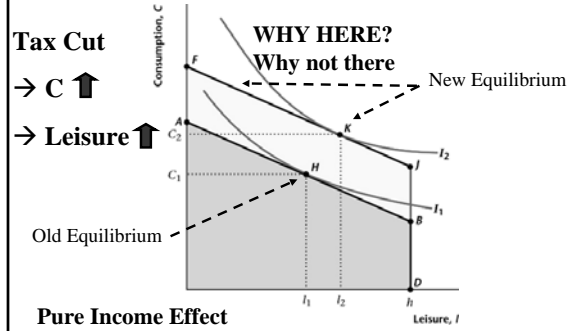
Starting from an (equilibrium) optimal choice
how does the consumer respond to changes in:

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

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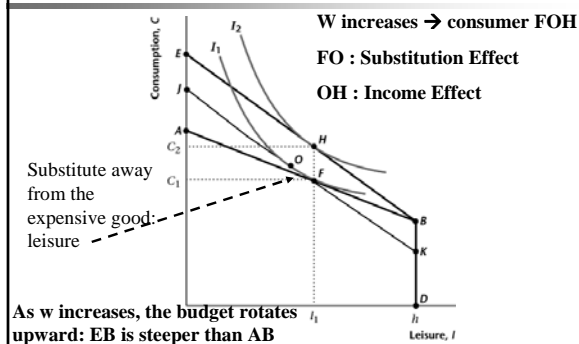
Figure 4-7 An Increase in the Consumer's Dividend Income



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



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Effect of Real Wage on Labor Supply

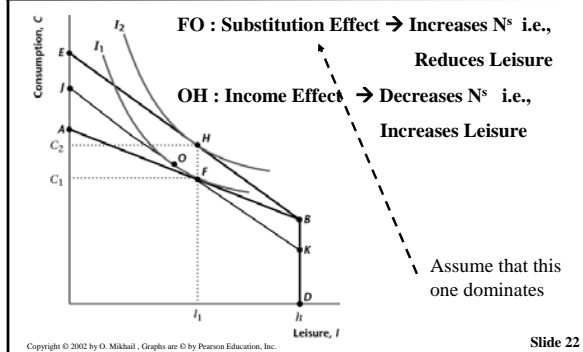


Figure 4-9 Labor Supply Curve

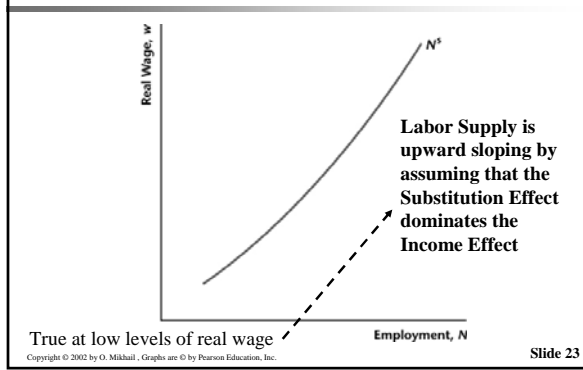
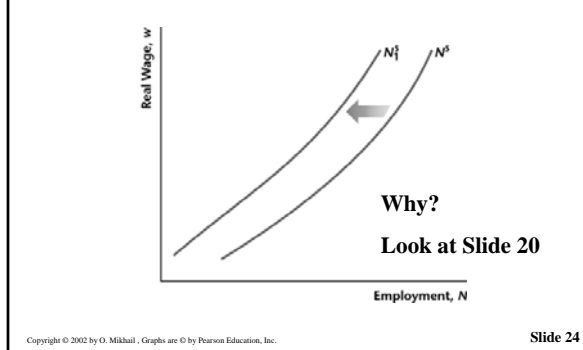


Figure 4-10 Effect of an Increase in Dividend Income or a Decrease in Taxes



THEORY CONFRONTS DATA

Empirical Evidence

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

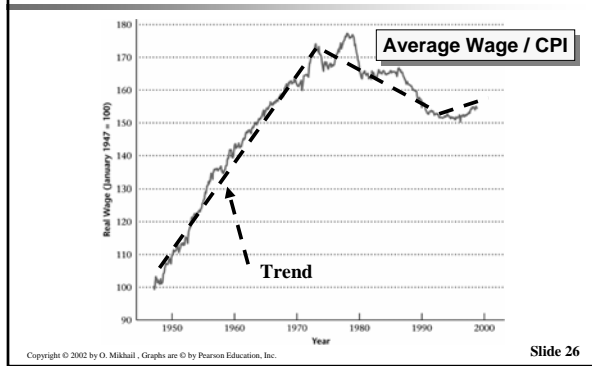
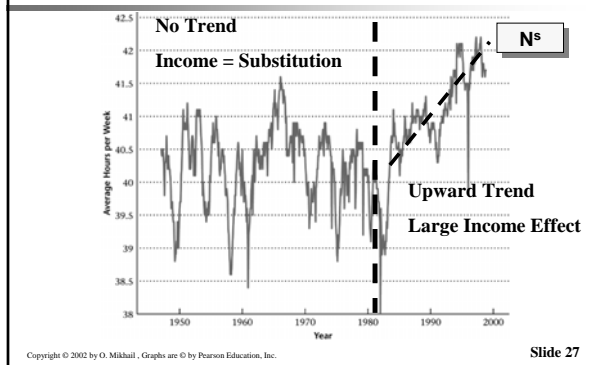


Figure 4-13 Average Hours per Week in Manufacturing, 1947-1998



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

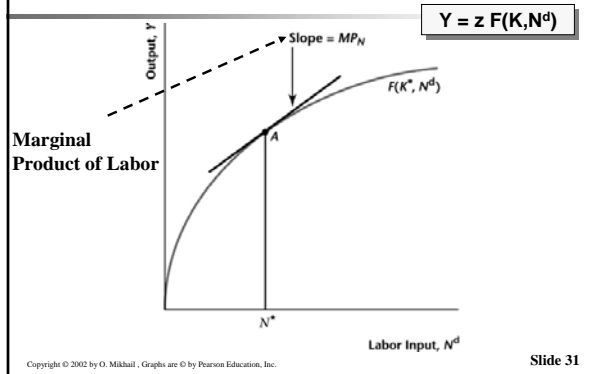
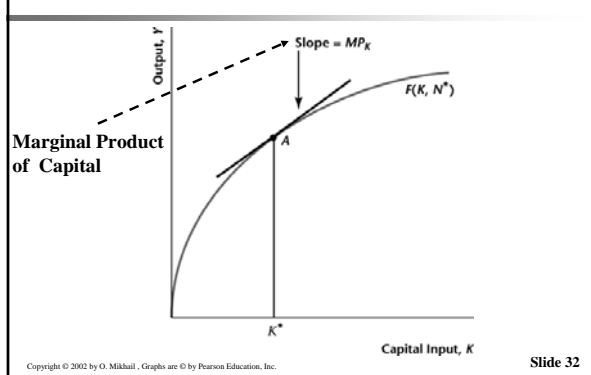


Figure 4-15 Production Function, Fixing the Quantity of Labor and Varying the Quantity of Capital



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.

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Implication of CRS

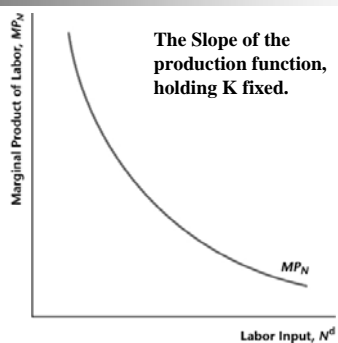
The economy will behave in exactly the same way if there were many small firms producing consumption goods as it would if there were a few large firms, provided that all firms are price-takers.

CRS allows us to select a representative firm.

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



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

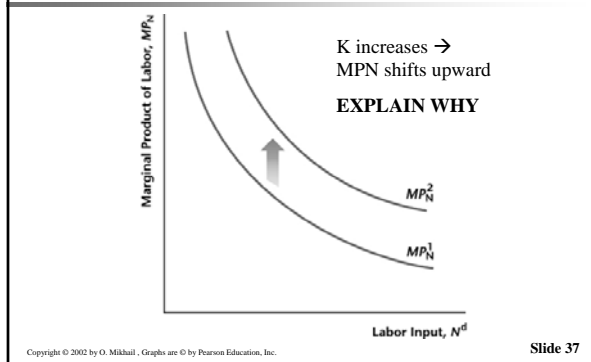


Figure 4-18 Total Factor Productivity Increases

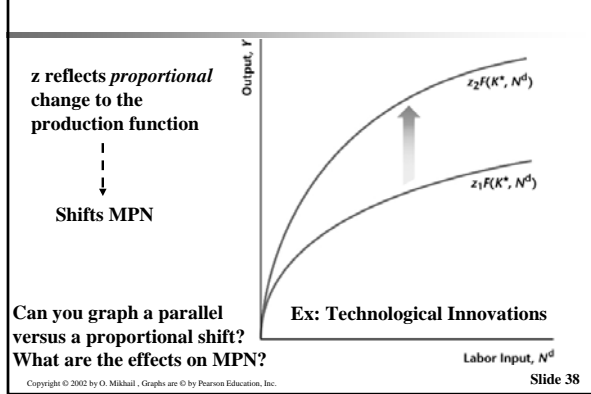
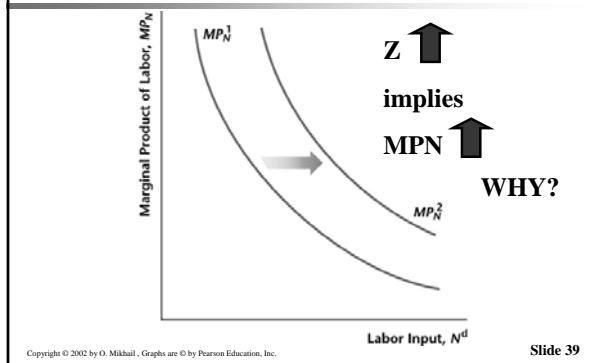


Figure 4-19 Effect of an Increase in Total Factor Productivity on the Marginal Product of Labor



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

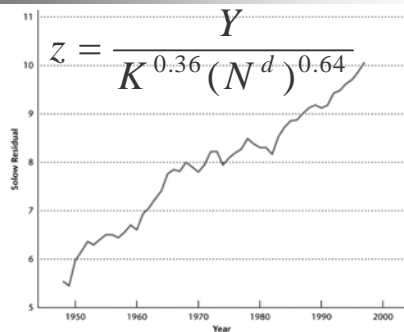
$$Y = z F(K, N^d) = z K^\alpha N^{1-\alpha}$$

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

