CHAPTER 8

Utility and Demand
Learning Objectives

◆ Explain the limits to consumption and describe preferences using the concept of utility

◆ Explain the marginal utility theory of consumer choice

◆ Use marginal utility theory to predict the effects of changes in prices and incomes and to explain the paradox of value

◆ Describe some new ways of explaining consumer choices
The choices you make as a buyer of goods and services is influenced by many factors, which economists summarize as

- Consumption possibilities
- Preferences

Consumption Possibilities

Consumption possibilities are all the things that you can afford to buy.
Consumption Choices

We’ll study the consumption possibilities of Lisa, who buys only two goods: movies and pop.

A Consumer’s Budget Line

Consumption possibilities are limited by income, the price of a movie, and the price of pop.

When Lisa spends all of her income, she reaches the limits of her consumption possibilities.

Lisa’s budget line shows the limits of her consumption possibilities.
Lisa has $40 to spend, the price of a movie is $8 and the price of pop is $4 a case.

The table lists seven possible ways in which she can spend her $40.

The graphs plots these combinations of movies and pop.

<table>
<thead>
<tr>
<th>Possibility</th>
<th>Movies Quantity</th>
<th>Movies Expenditure (dollars)</th>
<th>Pop Cases</th>
<th>Pop Expenditure (dollars)</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>B</td>
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<td>32</td>
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</table>
Consumption Possibilities

Lisa can afford any of the combinations at the points $A$ to $F$.

Some goods are indivisible and must be bought in whole units at the points marked.

Other goods are divisible goods and can be bought in any quantity.

The line through points $A$ to $F$ is Lisa’s budget line.
Consumption Choice

Preferences

The choice that Lisa makes depends on her preferences—her likes and dislikes.

Her benefit or satisfaction from consuming a good or service is called utility.

Total Utility

Total utility is the total benefit a person gets from the consumption of goods. Generally, more consumption gives more total utility.
Table 8.1 shows Lisa’s total utility schedule.

Total utility from a good increases as the quantity of the good increases.

For example, as Lisa sees more movies in a month, her total utility from movies increases.
Marginal Utility

**Marginal utility** from a good is the *change* in total utility that results from a unit-increase in the quantity of the good consumed.

As the quantity consumed of a good increases, the marginal utility from it decreases.

We call this decrease in marginal utility as the quantity of the good consumed increases the principle of **diminishing marginal utility**.
Maximizing Utility

Table 8.1 shows Lisa’s marginal utility schedules.

Marginal utility from a good decreases as the quantity of the good increases.

For example, as the number of movies seen in a month increases, marginal utility from movies decreases.

<table>
<thead>
<tr>
<th>Quantity (per month)</th>
<th>Total utility</th>
<th>Marginal utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>.50</td>
</tr>
<tr>
<td>1</td>
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<td>.40</td>
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</table>

<table>
<thead>
<tr>
<th>Cases (per month)</th>
<th>Total utility</th>
<th>Marginal utility</th>
</tr>
</thead>
<tbody>
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<tr>
<td>10</td>
<td>260</td>
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</tbody>
</table>
Maximizing Utility

Figure 8.2(a) shows Lisa’s total utility and marginal utility from pop.

Total utility from pop increases as more pop is consumed.

The bars along the total utility curve show the extra total utility (marginal utility) from each additional case of pop.
Maximizing Utility

Figure 8.2(b) illustrates diminishing marginal utility.

As Lisa increases the quantity of pop she drinks, her marginal utility from pop diminishes.
Utility-Maximizing Choice

The key assumption is that the household chooses the consumption possibility that maximizes total utility.

A Spreadsheet Solution

The direct way to find the utility-maximizing choice is to make a table in a spreadsheet and do the calculations.

- Find the just-affordable combinations
- Find the total utility for each just-affordable combination
- The utility-maximizing combination is the consumer’s choice
Find Just-Affordable Combinations

Lisa has $40 a month to spend on movies and pop. The price of a movie is $8 and the price of pop is $4 a case.

Each row of Table 8.2 shows a combination of movies and pop that exhausts Lisa’s $40.
Utility-Maximizing Choice

Find the Total Utility for Each Just-Affordable Combination

When Lisa sees 1 movie and drinks 8 cases of pop a month, ...

she gets 50 units of utility from the 1 movie and 248 units of utility from the 8 cases of pop.

Her total utility is 298 units.

<table>
<thead>
<tr>
<th>Movies $8</th>
<th>Total utility from movies and pop</th>
<th>Pop $4</th>
<th>Total utility</th>
<th>Cases (per month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity (per month)</td>
<td>Total utility</td>
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<td>0</td>
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</table>
Utility-Maximizing Choice

Consumer Equilibrium

Lisa chooses the combination that gives her the highest total utility.

Lisa maximizes her total utility when she sees 2 movies and drinks 6 cases of pop a month.

Lisa gets 90 units of utility from the 2 movies and 225 units of utility from the 6 cases of pop.

<table>
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<tr>
<th>Movies $8</th>
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</table>
Consumer equilibrium is the situation in which Lisa has allocated all of her available income in the way that maximizes her total utility, given the prices of movies and pop.

Lisa’s consumer equilibrium is 2 movies and 6 cases of pop a month.

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<tr>
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Utility-Maximizing Choice

A more natural way of finding the consumer equilibrium is to use the idea of choices made at the margin.

Choosing at the Margin

Having made a choice, would spending a dollar more or a dollar less on a good bring more total utility?

Marginal utility is the increase in total utility that results from consuming \textit{one more unit} of the good.

The \textbf{marginal utility per dollar} is the marginal utility from a good that results from spending \textit{one more dollar} on it.
Utility-Maximizing Choice

The **marginal utility per dollar** equals the marginal utility from a good divided by its price.

Calling the marginal utility from movies $MU_M$ and the price of a movie $P_M$, then the marginal utility per dollar from movies is $MU_M/P_M$.

Calling the marginal utility of pop $MU_P$ and the price of pop $P_P$, then the marginal utility per dollar from pop is $MU_P/P_P$.

By comparing $MU_M/P_M$ and $MU_P/P_P$, we can determine whether Lisa has allocated her budget in the way that maximizes her total utility.
Utility-Maximizing Choice

Utility-Maximizing Rule

A consumer’s total utility is maximized by following the rule:

- Spend all available income
- Equalize the marginal utility per dollar for all goods
Utility-Maximizing Choice

Lisa’s Marginal Calculation

Figure 8.3 shows why the utility-maximizing rule works.

Each row of the table (on the next slide) shows a just-affordable combination.

Start by choosing a row—a point on the budget line.
Utility-Maximizing Choice

In row $B$, 

\[ \frac{MU_P}{P_P} < \frac{MU_M}{P_M}. \]

Lisa spends too much on pop and too little on movies.

If Lisa spends less on pop and more on movies, …

$MU_P$ increases and $MU_M$ decreases.
Utility-Maximizing Choice

In row $D$, \( \frac{MU_P}{P_P} > \frac{MU_M}{P_M} \).

Lisa spends too much on movies and too little on pop.

If Lisa spends less on movies and more on pop, …

\( MU_M \) increases and \( MU_P \) decreases.
Utility-Maximizing Choice

In row c, $\frac{MU_P}{P_P} = \frac{MU_M}{P_M}$.

Lisa maximizes her total utility.
Predictions of Marginal Utility Theory

A Fall in the Price of a Movie

When the price of a good falls the quantity demanded of that good increases—the demand curve slopes downward.

For example, if the price of a movie falls, we know that $MU_M/P_M$ rises, so before the consumer changes the quantities bought, $MU_M/P_M > MU_P/P_P$.

To restore consumer equilibrium (maximum total utility), the consumer increases the movies seen to drive down the $MU_M$ and restore $MU_M/P_M = MU_P/P_P$. 
Predictions of Marginal Utility Theory

A change in the price of one good changes the demand for another good.

You’ve seen that if the price of a movie falls, $MU_M/P_M$ rises, so before the consumer changes the quantities consumed, $MU_M/P_M > MU_P/P_P$.

To restore consumer equilibrium (maximum total utility), the consumer decreases the quantity of pop consumed to drive up the $MU_P$ and restore $MU_M/P_M = MU_P/P_P$. 
Predictions of Marginal Utility Theory

Table 8.3 shows Lisa’s just-affordable combinations when the price of a movie is $4.

Before Lisa changes what she buys

\[ MU_M / P_M > MU_P / P_P. \]

To maximize total utility, Lisa sees more movies and drinks less pop.
Predictions

Figure 8.4 illustrates these predictions.

A fall in the price of a movie increases the quantity of movies demanded—a movement along the demand curve for movies, ...

and decreases the demand for pop—a shift of the demand curve for pop.
Predictions of Marginal Utility Theory

A Rise in the Price of pop

Now suppose the price of pop rises.

We know that $\frac{MU_P}{P_P}$ falls, so before the consumer changes the quantities bought, $\frac{MU_P}{P_P} < \frac{MU_M}{P_M}$.

To restore consumer equilibrium (maximum total utility), the consumer decreases the quantity of pop consumed to drive up the $MU_P$ and increases the quantity of movies seen to drive down $MU_M$.

These changes restore $\frac{MU_M}{P_M} = \frac{MU_P}{P_P}$. 
Table 8.4 shows Lisa’s just-affordable combinations when the price of pop is $8 and the price of a movie is $4.

Before Lisa changes what she buys

\[ \frac{MU_M}{P_M} < \frac{MU_P}{P_P}. \]

To maximize her total utility, Lisa drinks less pop.
Predictions of Marginal Utility Theory

Figure 8.5 illustrates these predictions.

A rise in the price of pop decreases the quantity of pop demanded—a movement along the demand curve for pop.
Predictions of Marginal Utility Theory

A Rise in Income

When income increases, the demand for a normal good increases.

Given the prices of movies and pop, when Lisa’s income increases from $40 to $56 a month, she buys more movies and more pop.

Movies and pop are normal goods.

Table 8.5 shows these predictions.
Predictions of Marginal Utility Theory

Table 8.5 shows Lisa’s just-affordable combinations when she has $56 to spend.

With $40 to spend, Lisa sees 6 movies and drinks 4 cases of pop a month.

With $56 to spend, Lisa spends the extra $16, so she buys more of both goods.

She sees 8 movies and drinks 6 cases of pop a month.
Predictions of Marginal Utility Theory

Figure 8.6 illustrates these predictions.

(a) Demand for movies

(b) Demand for pop
The Paradox of Value

The paradox of value “Why is water, which is essential to life, far cheaper than diamonds, which are not essential?” is resolved by distinguishing between total utility and marginal utility.

We use so much water that the marginal utility from water consumed is small, but the total utility is large.

We buy few diamonds, so the marginal utility from diamonds is large, but the total utility is small.
Paradox Resolved

The paradox is resolved by distinguishing between total utility and marginal utility.

For water, the price is low, total utility is large, and marginal utility is small.

For diamonds, the price is high, total utility is small, and marginal utility is high.

But marginal utility per dollar is the same for water and diamonds.
Predictions …

Value and Consumer Surplus

The supply of water is perfectly elastic, so the quantity of water consumed is large and the consumer surplus from water is large.

In contrast, the supply of diamonds in perfectly inelastic, so the price is high and the consumer surplus from diamonds is small.