CHAPTER 3

Consumer Behavior

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CHAPTER 3 OUTLINE

3.1 Consumer Preferences
3.2 Budget Constraints
3.3 Consumer Choice
3.4 Revealed Preference
3.5 Marginal Utility and Consumer Choice
3.6 Cost-of-Living Indexes

Consumer Behavior

The theory of consumer behavior describes how consumers allocate incomes among different goods and services to maximize their well-being.

Consumer behavior is best understood in three distinct steps:
1. Consumer preferences
2. Budget constraints
3. Consumer choices
### Consumer Preferences

**Market Baskets**

- Market basket (or bundle) List with specific quantities of one or more goods.

**Table 3.1 Alternative Market Baskets**

<table>
<thead>
<tr>
<th>Market Basket</th>
<th>Units of Food</th>
<th>Units of Clothing</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>B</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>D</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>E</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>G</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>H</td>
<td>10</td>
<td>40</td>
</tr>
</tbody>
</table>

To explain the theory of consumer behavior, we will ask whether consumers prefer one market basket to another.

### Some Basic Assumptions about Preferences

1. **Completeness:** Preferences are assumed to be complete. In other words, consumers can compare and rank all possible baskets. Thus, for any two market baskets A and B, a consumer will prefer A to B, will prefer B to A, or will be indifferent between the two. By indifferent we mean that a person will be equally satisfied with either basket.

   Note that these preferences ignore costs. A consumer might prefer steak to hamburger but buy hamburger because it is cheaper.

2. **Transitivity:** Preferences are transitive. Transitivity means that if a consumer prefers basket A to basket B and basket B to C, then the consumer also prefers A to C. Transitivity is normally regarded as necessary for consumer consistency.

3. **More is better than less:** Goods are assumed to be desirable—i.e., to be good. Consequently, consumers always prefer more of any good to less. In addition, consumers are never satisfied or satiated; more is always better, even if just a little better. This assumption is made for pedagogic reasons; namely, it simplifies the graphical analysis. Of course, some goods, such as air pollution, may be undesirable, and consumers will always prefer less. We ignore these “bads” in the context of our immediate discussion.
3.1 CONSUMER PREFERENCES

Indifference Curves

Because more of each good is preferred to less, we can compare market baskets in the shaded areas. Basket A is clearly preferred to basket G, while E is clearly preferred to A. However, A cannot be compared with B, D, or H without additional information.

CONSUMER PREFERENCES

Indifference Curves

- Indifference curve: Curve representing all combinations of market baskets that provide a consumer with the same level of satisfaction.

An Indifference Curve

The indifference curve $U_1$ that passes through market basket A shows all baskets that give the consumer the same level of satisfaction as does market basket A; these include baskets B and D.

Our consumer prefers basket E, which lies above $U_1$, to A, but prefers A to H or G, which lie below $U_1$.

Any market basket on indifference curve $U_3$, such as basket A, is preferred to any basket on curve $U_2$ (e.g., basket B), which in turn is preferred to any basket on $U_1$, such as D.

Indifference Maps

- Indifference map: Graph containing a set of indifference curves showing the market baskets among which a consumer is indifferent.
If indifference curves $U_1$ and $U_2$ intersect, one of the assumptions of consumer theory is violated. According to this diagram, the consumer should be indifferent among market baskets $A$, $B$, and $D$. Yet $B$ should be preferred to $D$ because $B$ has more of both goods.

Indifference Curves Cannot Intersect

The marginal rate of substitution (MRS) measures the maximum amount of a good that a consumer is willing to give up in order to obtain one additional unit of another good. The magnitude of the slope of an indifference curve measures the consumer’s marginal rate of substitution (MRS) between two goods. In this figure, the MRS between clothing ($C$) and food ($F$) falls from 6 (between $A$ and $B$) to 4 (between $B$ and $D$) to 2 (between $D$ and $E$) to 1 (between $E$ and $G$). Convexity: The decline in the MRS reflects a diminishing marginal rate of substitution. When the MRS diminishes along an indifference curve, the curve is convex.

Perfect Substitutes and Perfect Complements

- **perfect substitutes**: Two goods for which the marginal rate of substitution of one for the other is a constant.
- **perfect complements**: Two goods for which the MRS is zero or infinite; the indifference curves are shaped as right angles.
- **bads**: Good for which less is preferred rather than more.
### Perfect Substitutes and Perfect Complements

**In (a), Bob views orange juice and apple juice as perfect substitutes:**
He is always indifferent between a glass of one and a glass of the other.

**In (b), Jane views left shoes and right shoes as perfect complements:**
An additional left shoe gives her no extra satisfaction unless she also obtains the matching right shoe.

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### A utility function can be represented by a set of indifference curves, each with a numerical indicator.

- Utility score: Numerical score representing the satisfaction that a consumer gets from a given market basket.
- Utility function: Formula that assigns a level of utility to individual market baskets.

This figure shows three indifference curves with utility levels of 20, 50, and 100, respectively, associated with the utility function FC.
3.1 CONSUMER PREFERENCES

Ordinal versus Cardinal Utility
- ordinal utility function: Utility function that generates a ranking of market baskets in order of most to least preferred.
- cardinal utility function: Utility function describing by how much one market basket is preferred to another.

Example 3.2: Can Money Buy Happiness?
A cross-country comparison shows that individuals living in countries with higher GDP per capita are on average happier than those living in countries with lower per-capita GDP.

Ordinal versus Cardinal Utility
- ordinal utility function: Utility function that generates a ranking of market baskets in order of most to least preferred.
- cardinal utility function: Utility function describing by how much one market basket is preferred to another.

Table 3.2: Market Baskets and the Budget Line
<table>
<thead>
<tr>
<th>Market Basket</th>
<th>Food (F)</th>
<th>Clothing (C)</th>
<th>Total Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>40</td>
<td>$80</td>
</tr>
<tr>
<td>B</td>
<td>20</td>
<td>30</td>
<td>$80</td>
</tr>
<tr>
<td>C</td>
<td>40</td>
<td>20</td>
<td>$80</td>
</tr>
<tr>
<td>D</td>
<td>60</td>
<td>10</td>
<td>$80</td>
</tr>
<tr>
<td>E</td>
<td>80</td>
<td>0</td>
<td>$80</td>
</tr>
</tbody>
</table>

The budget line describes the combinations of goods that can be purchased given the consumer's income and the prices of the goods. Line AG (which passes through points B, D, and E) shows the budget associated with an income of $80, a price of food of $1 per unit, and a price of clothing of $2 per unit. The slope of the budget line (measured between points B and D) is $-1/2$. The slope of the budget line (measured between points B and D) is $-1/2$. The slope of the budget line (measured between points B and D) is $-1/2$.

\[ C = \left( \frac{1}{P_c} \right) \left( \frac{P_f}{P_c} \right) F \]
3.2 BUDGET CONSTRAINTS

The Effects of Changes in Income and Prices

Income Changes: A change in income (with prices unchanged) causes the budget line to shift parallel to the original line. If the income of $80 is increased to $160, the budget line shifts outward. If the income falls to $40, the line shifts inward.

Price Changes: A change in the price of one good (with income unchanged) causes the budget line to rotate about one intercept. When the price of food falls from $1.00 to $0.50, the budget line rotates outward. However, when the price increases from $1.00 to $2.00, the line rotates inward.

3.3 CONSUMER CHOICE

The maximizing market basket must satisfy two conditions:
1. It must be located on the budget line.
2. It must give the consumer the most preferred combination of goods and services.
CONSUMER CHOICE

3.3

Satisfaction is maximized (given the budget constraint) at the point where

\[ \text{MRS} = \frac{P_x}{P_y} \]  \hspace{1cm} (3.3)

- **marginal benefit**: Benefit from the consumption of one additional unit of a good.
- **marginal cost**: Cost of one additional unit of a good.

The condition given in equation (3.3) illustrates the kind of optimization conditions that arise in economics. In this instance, satisfaction is maximized when the marginal benefit—the benefit associated with the consumption of one additional unit of food—is equal to the marginal cost—the cost of the additional unit of food. The marginal benefit is measured by the MRS.

Example 3.3

**Designing New Automobiles (II)**

The consumers in (a) are willing to trade off a considerable amount of interior space for some additional acceleration. Given a budget constraint, they will choose a car that emphasizes acceleration. The opposite is true for consumers in (b).

Corner Solutions

- **corner solution**: Situation in which the marginal rate of substitution of one good for another in a chosen market basket is not equal to the slope of the budget line.
### 3.3 CONSUMER CHOICE

**EXAMPLE 3.4**

*A College Trust Fund*

When given a college trust fund that must be spent on education, the student moves from A to B, a corner solution. If, however, the trust fund could be spent on other consumption as well as education, the student would be better off at C.

### 3.4 REVEALED PREFERENCE

If an individual facing budget line $l_1$ chose market basket A rather than market basket B, A is revealed to be preferred to B. Likewise, the individual facing budget line $l_2$ chooses market basket B, which is then revealed to be preferred to market basket D. Whereas A is preferred to all market baskets in the green-shaded area, all baskets in the pink-shaded area are preferred to A.

Revealed Preference: Two Budget Lines

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Figure 3.17 If a consumer chooses one market basket over another, and if the chosen market basket is more expensive than the alternative, then the consumer must prefer the chosen market basket.

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Figure 3.18 Revealed Preference: Four Budget Lines

Facing budget line $l_3$, the individual chooses E which is revealed to be preferred to A (because A could have been chosen).

Likewise, facing budget line $l_4$, the individual chooses G which is also revealed to be preferred to A.

Whereas A is preferred to all market baskets in the green-shaded area, all baskets in the pink-shaded area are preferred to A.
3.4 REVEALED PREFERENCE

**EXAMPLE 3.5** Revealed Preference for Recreation

When facing budget line $l_1$, an individual chooses to use a health club for 10 hours per week at point $A$. When the fees are altered, she faces budget line $l_2$. She is then made better off because market basket $A$ can still be purchased, as can market basket $B$, which lies on a higher indifference curve.

3.5 MARGINAL UTILITY AND CONSUMER CHOICE

- **marginal utility (MU)** Additional satisfaction obtained from consuming one additional unit of a good.
- **diminishing marginal utility** Principle that as more of a good is consumed, the consumption of additional amounts will yield smaller additions to utility.

\[
0 = MU_A' / P_A - MU_B' / P_B
\]

\[
MRS = MU_A' / MU_B' = P_B / P_A
\]

* **equal marginal principle** Principle that utility is maximized when the consumer has equalized the marginal utility per dollar of expenditure across all goods.

3.5 MARGINAL UTILITY AND CONSUMER CHOICE

**EXAMPLE 3.6** Marginal Utility and Happiness

A comparison of mean levels of satisfaction with life across income classes in the United States shows that happiness increases with income, but at a diminishing rate.
Inefficiency of Gasoline Rationing

When a good is rationed, less is available than consumers would like to buy. Consumers may be worse off. Without gasoline rationing, up to 20,000 gallons of gasoline are available for consumption (at point B). The consumer chooses point C on indifference curve U₂, consuming 5000 gallons of gasoline. However, with a limit of 2000 gallons of gasoline under rationing (at point E), the consumer moves to D on the lower indifference curve U₁.

Comparing Gasoline Rationing to the Free Market

If the price of gasoline in a competitive market is $2.00 per gallon and the maximum consumption of gasoline is 10,000 gallons per year, the woman is better off under rationing (which holds the price at $1.00 per gallon), since she chooses the market basket at point F, which lies below indifference curve U₁ (the level of utility achieved under rationing). However, she would prefer a free market if the competitive price were $1.50 per gallon, since she would select market basket G, which lies above indifference curve U₁.

Cost-of-Living Indexes

- Cost-of-living index: Ratio of the present cost of a typical bundle of consumer goods and services compared with the cost during a base period.
  
Ideal Cost-of-Living Index

- Ideal cost-of-living index: Cost of attaining a given level of utility at current prices relative to the cost of attaining the same utility at base-year prices.
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3.6 COST-OF-LIVING INDEXES

Ideal Cost-of-Living Index

<table>
<thead>
<tr>
<th>Table 3.3 Ideal Cost-of-Living Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price of books</strong></td>
</tr>
<tr>
<td>2005 (Sarah)</td>
</tr>
<tr>
<td>2005 (Rachel)</td>
</tr>
<tr>
<td><strong>Number of books</strong></td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td><strong>Price of food</strong></td>
</tr>
<tr>
<td>$2.00/lb.</td>
</tr>
<tr>
<td>$2.20/lb.</td>
</tr>
<tr>
<td><strong>Pounds of food</strong></td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>300</td>
</tr>
<tr>
<td><strong>Expenditure</strong></td>
</tr>
<tr>
<td>$500</td>
</tr>
<tr>
<td>$1260</td>
</tr>
</tbody>
</table>

The initial budget constraint facing Sarah in 1995 is given by line $l_1$, her utility-maximizing combination of food and books is at point $A$ on indifference curve $U_1$. Rachel requires a budget sufficient to purchase the food-book consumption bundle given by point $B$ on line $l_2$ (and tangent to indifference curve $U_1$).

Ideal Cost-of-Living Index

Laspeyres Index
- Laspeyres price index: Amount of money at current year prices that an individual requires to purchase a bundle of goods and services chosen in a base year divided by the cost of purchasing the same bundle at base-year prices.

Laspeyres Index overcompensates Rachel for the higher cost of living, and the Laspeyres cost-of-living index is, therefore, greater than the ideal cost-of-living index.

Paasche Index
- Paasche index: Amount of money at current-year prices that an individual requires to purchase a current bundle of goods and services divided by the cost of purchasing the same bundle in a base year.

Paasche index will understate the ideal cost of living, because it assumes that the individual will buy the current-year bundle in the base period.

Comparing Ideal Cost-of-Living and Laspeyres Indexes

Comparing the Laspeyres and Paasche Indexes

Laspeyres index will overstate the ideal cost of living, and the Paasche index will understate it because it assumes that the individual will buy the current-year bundle in the base period.
COST-OF-LIVING INDEXES

- fixed-weight index  Cost-of-living index in which the quantities of goods and services remain unchanged.

Price Indexes in the United States: Chain Weighting

- chain-weighted price index  Cost-of-living index that accounts for changes in quantities of goods and services.

EXAMPLE 3.6  The Bias in the CPI

A commission chaired by Stanford University professor Michael Boskin concluded that the CPI overstated inflation by approximately 1.1 percentage points—a significant amount given the relatively low rate of inflation in the United States in recent years.

Approximately 0.4 percentage points of the 1.1-percentage-point bias was due to the failure of the Laspeyres price index to account for changes in the current year mix of consumption of the products in the base-year bundle.