Chapter 4
Read this chapter together with unit four in the study guide

Consumer Choice
Topics

1. Preferences.

2. Utility.


5. Behavioral Economics.
Premises of Consumer Behavior

- Individual preferences determine the amount of pleasure people derive from the goods and services they consume.
- Consumers face constraints or limits on their choices.
- Consumers maximize their well-being or pleasure from consumption, subject to the constraints they face.
Your first test ……

Date: 3/3/14

Time: AT 17:15-18.30

Venue: SECTION A
Properties of Consumer Preferences

• **Completeness** - when facing a choice between any two bundles of goods, a consumer can rank them so that one and only one of the following relationships is true: The consumer prefers the first bundle to the second, prefers the second to the first, or is indifferent between them.
Properties of Consumer Preferences (cont.)

- **Transitivity** - a consumer’s preferences over bundles is consistent in the sense that, if the consumer *weakly prefers* Bundle $z$ to Bundle $y$ (likes $z$ at least as much as $y$) and weakly prefers Bundle $y$ to Bundle $x$, the consumer also weakly prefers Bundle $z$ to Bundle $x$. 
Properties of Consumer Preferences (cont.)

- **More Is Better** - all else being the same, more of a commodity is better than less of it (always wanting more is known as *nonsatiation*).
  - **Good** - a commodity for which more is preferred to less, at least at some levels of consumption.
  - **Bad** - something for which less is preferred to more, such as pollution.
Preference Maps

- **Indifference curve** - the set of all bundles of goods that a consumer views as being equally desirable.
  - **Indifference map** - a complete set of indifference curves that summarize a consumer’s tastes or preferences.
Figure 4.1 Bundles of Pizzas and Burritos Lisa Might Consume

Which of these two bundles would be preferred by Lisa?

Lisa prefers any bundle in area A over e

Lisa prefers bundle f over bundle e, since f has more of both goods: Pizza and Burritos

If Lisa is indifferent between bundles e, a, and c ….

we can draw an indifferent curve over those three points
we can draw an indifferent curve over those three points
1. Bundles on indifference curves farther from the origin are preferred to those on indifference curves closer to the origin.

2. There is an indifference curve through every possible bundle.

3. Indifference curves cannot cross.

4. Indifference curves slope downward.
Impossible Indifference Curves

- Lisa is indifferent between $e$ and $a$, and also between $e$ and $b$…
  - so by transitivity she should also be indifferent between $a$ and $b$…
  - but this is impossible, since $b$ must be preferred to $a$ given it has more of both goods.
Impossible Indifference Curves (cont.)

- Lisa is indifferent between \( b \) and \( a \) since both points are in the same indifference curve...
  - But this contradicts the “more is better” assumption. Can you tell why?
  - Yes, \( b \) has more of both and hence it should be preferred over \( a \).
Figure 4.2 Impossible Indifference Curves
Solved Problem 4.1

• Can indifference curves be thick?
• Answer:
  - Draw an indifference curve that is at least two bundles thick, and show that a preference property is violated
Solved Problem 4.1

- Consumer is indifferent between $b$ and $a$ since both points are in the same indifference curve...
  - But this contradicts the “more is better” assumption since $b$ has more of both and hence it should be preferred over $a$. 

![Diagram showing indifference curve with points a and b]
Willingness to Substitute Between Goods

• Marginal rate of substitution (MRS) - the maximum amount of one good a consumer will sacrifice to obtain one more unit of another good.

\[ MRS = \frac{\Delta B}{\Delta Z} \]

♦ The slope of the indifference curve!
Figure 4.3(a) MRS Along an Indifference Curve

- The MRS from bundle \( a \) to bundle \( b \) is -3.
  - This is the same as the slope of the indifference curve between those two points.

From bundle \( a \) to bundle \( b \), Lisa is willing to give up 3 Burritos in exchange for 1 more Pizza...

From bundle \( b \) to bundle \( c \), Lisa is willing to give up 2 Burritos in exchange for 1 more Pizza...

From bundle \( c \) to bundle \( d \), Lisa is willing to give up 1 Burrito in exchange for 1 more Pizza...

\[ Z, \text{ Pizzas per semester} \]

\[ B, \text{ Burritos per semester} \]
Figure 4.3(b) Marginal Rate of Substitution

- From bundle \( a \) to bundle \( b \), Lisa is willing to give up 2 Pizzas for 1 Burrito.

- Nevertheless, from \( b \) to \( c \) she is willing to give up 3 Pizzas for 1 burrito.

- This is very unlikely
  - Could you think why?
Diminishing Marginal Rate of Substitution

• The marginal rate of substitution approaches zero as we move down and to the right along an indifference curve.

• **Discussion:** could you imagine a good that does not exhibit this property?
Curvature of Indifference Curves

• Casual observation suggests that most people’s indifference curves are convex.

• Special Cases:
  - **Perfect substitutes** - goods that a consumer is completely indifferent as to which to consume.
  - **Perfect complements** - goods that a consumer is interested in consuming only in fixed proportions.
Figure 4.4(a) Perfect Substitutes

- Bill views Coke and Pepsi as perfect substitutes: can you tell how his indifference curves would look like?
  - Straight, parallel lines with an MRS (slope) of $-1$.
  - Bill is willing to exchange one can of Coke for one can of Pepsi.
Perfect Complements

- If she has only one piece of pie, she gets as much pleasure from it and one scoop of ice cream, \(a\),
- as from it and two scoops, \(d\),
- or as from it and three scoops, \(e\).
Figure 4.4(c) Imperfect Substitutes

- The standard-shaped, convex indifference curve in panel lies between these two extreme examples.
  - Convex indifference curves show that a consumer views two goods as imperfect substitutes.
Application: Indifference Curves Between Food and Clothing
1. Don is altruistic. Show the possible shape of his indifference curves between charity and all other goods.

2. Miguel considers tickets to the Houston Grand Opera and to Houston Astros baseball games to be perfect substitutes. Show his preference map.

3. If Joe views two candy bars and one piece of cake as perfect substitutes, what is his marginal rate of substitution between candy bars and cake?
Utility

- **Utility** - a set of numerical values that reflect the relative rankings of various bundles of goods.

- **Utility function** - the relationship between utility values and every possible bundle of goods:

\[ U(Z, B) \]
Utility Function: Example

\[ U(Z, B) = \sqrt{BZ} \]
Ordinal Preferences

• If we only know a consumer’s relative ranking of bundles, the measure of pleasure is *ordinal*.
  - Tells us the relative ranking of two things but not how much more one rank is than another (letter grades).

• A *cardinal* measure is one by which absolute comparisons between ranks may be made (money).
Utility and Indifference Curves

• An indifference curve consists of all those bundles that correspond to a particular level of utility.

• If Lisa’s utility function is $U(Z, B)$, then an indifference curve is given by

$$\bar{U} = U(Z, B)$$
Figure 4.5(a) The Relationship Between the Utility Function and Indifference Curves
Figure 4.5(b) The Relationship Between the Utility Function and Indifference Curves (cont.)
Marginal Utility

- **Marginal utility** - the extra utility that a consumer gets from consuming the last unit of a good.
  - the slope of the utility function as we hold the quantity of the other good constant.

- Marginal utility of good Z is:

\[ MU_Z = \frac{\Delta U}{\Delta Z} \]
As Lisa consumes more pizza, holding her consumption of burritos constant at 10, her total utility, $U$, increases…

- and her marginal utility of pizza, $MU_Z$, decreases (though it remains positive).

Marginal utility is the slope of the utility function as we hold the quantity of the other good constant.
Utility and Marginal Rates of Substitution

- The $MRS$ is the negative of the ratio of the marginal utility of another pizza to the marginal utility of another burrito.
- Formally,

$$MRS = \frac{\Delta B}{\Delta Z} = -\frac{MU_Z}{MU_B}$$
Budget Constraint

- **Budget line** *(or budget constraint)* - the bundles of goods that can be bought if the entire budget is spent on those goods at given prices.
- **Opportunity set** - all the bundles a consumer can buy, including all the bundles inside the budget constraint and on the budget constraint.
Budget Constraint (cont.)

• If Lisa spends all her budget, \( Y \), on pizza and burritos, then

\[
p_{B}B + p_{Z}Z = Y
\]

- where \( p_{B}B \) is the amount she spends on burritos and \( p_{Z}Z \) is the amount she spends on pizzas.

• This equation is her budget constraint.
  - It shows that her expenditures on burritos and pizza use up her entire budget.
Budget Constraint (cont.)

- How many burritos can Lisa buy?
  - To answer solve budget constraint for $B$ (quantity of burritos):

\[
P_B B + P_Z Z = Y
\]

\[
P_B B = Y - P_Z Z
\]

\[
B = \frac{Y - P_Z Z}{P_B}
\]
Budget Constraint (cont.)

• From previous slide we have:

\[ B = \frac{Y - P_ZZ}{P_B} \]

• If \( p_Z = $1 \), \( p_B = $2 \), and \( Y = $50 \), then:

\[ B = \frac{$50 - ($1 \times Z)}{$2} = 25 - 0.5Z \]
Table 4.1 Allocations of a $50 Budget Between Burritos and Pizza

<table>
<thead>
<tr>
<th>Bundle</th>
<th>Burritos</th>
<th>Pizza</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a$</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>$b$</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>$c$</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>$d$</td>
<td>0</td>
<td>50</td>
</tr>
</tbody>
</table>
From previous slide we have that if:

- \( p_Z = \$1 \), \( p_B = \$2 \), and \( Y = \$50 \),

then the budget constraint, \( L^1 \), is:

\[
B = \frac{\$50 - (\$1 \times Z)}{\$2} = 25 - 0.5Z
\]

Amount of Burritos consumed if all income is allocated for Burritos.

Amount of Pizza consumed if all income is allocated for Pizza.
The Slope of the Budget Constraint

• We have seen that the budget constraint for Lisa is given by the following equation:

\[ B = \frac{Y}{P_B} - \frac{P_Z}{P_B} Z \]

\[ \text{Slope} = \frac{\Delta B}{\Delta Z} = \text{MRT} \]

• The slope of the budget line is also called the marginal rate of transformation (MRT)
  • rate at which Lisa can trade burritos for pizza in the marketplace
Figure 4.8(a) Changes in the Budget Constraint: Price of Pizza Doubles

If the price of pizza doubles, (increases from $1 to $2) the slope of the budget line increases.

\[ B = \frac{Y}{P_B} - \frac{P_Z}{P_B} Z \]

Slope: 
- When \( P_Z = $1 \), the slope is \(-1/2 = -0.5\)
- When \( P_Z = $2 \), the slope becomes \(-2/2 = -1\)

This area represents the bundles she can no longer afford.
Figure 4.8(b) Changes in the Budget Constraint: Income Doubles

If Lisa’s income increases by $50 the budget line shifts to the right (with the same slope!)

This area represents the new consumption bundles she can now afford!!!
Solved Problem 4.3

• A government rations water, setting a quota on how much a consumer can purchase. If a consumer can afford to buy 12 thousand gallons a month but the government restricts purchases to no more than 10 thousand gallons a month, how does the consumer’s opportunity set change?
Solved Problem 4.3

![Graph showing budget line and quota.](image)

- The graph illustrates the budget line for a household with water consumption ranging from 10 to 12 thousand gallons per month.
- The quota constraint is indicated by a vertical line at the 10,000-gallon mark.
- The feasible set of goods is represented by the area below the budget line, labeled as region A.
- The shaded area between the budget line and the quota line is marked as region B.
Constrained Consumer Choice

- Given information on Lisa’s preferences and her budget, we can determine her optimal bundle.
- Her optimal bundle is the bundle out of all the bundles that she can afford that gives her the most pleasure.
Figure 4.9 Consumer Maximization, Interior Solution

- Would Lisa be able to consume any bundle along I3 (i.e. bundle f)?
  - No! Lisa does not have enough income to afford any bundle along I3.

- Would Lisa be able to consume any bundle along I1?
  - Yes; she could afford bundles d, c, and a.
  - Nevertheless, there are other affordable bundles that should be preferred and affordable.
    - For instance bundle e.

- Bundle e is called a consumer’s optimum.
  - If Lisa is consuming this bundle, she has no incentive to change her behavior by substituting one good for another.
The budget constraint and the indifference curve have the same slope at the point $e$ where they touch.

Therefore, at point $e$:

$$MRS = -\frac{MU_z}{MU_B} = -\frac{P_z}{P_B} = MRT$$

**Figure 4.9 Consumer Maximization, Interior Solution (cont.)**

- **B**, Burritos per semester
- **Z**, Pizzas per semester
- **MRS** = Slope of $I^2$ = Slope of BL
Figure 4.10 Consumer Maximization, Corner Solution

![Graph showing budget line and indifference curves for burritos (B) and pizzas (Z). The point e represents the corner solution where the budget line intersects with indifference curve I^3.](image-url)
Solved Problem 4.4

- Nigel, a Brit, and Bob, a Yank, have the same tastes, and both are indifferent between a sports utility vehicle (SUV) and a luxury sedan. Each has a budget that will allow him to buy and operate one vehicle for a decade. For Nigel, the price of owning and operating an SUV is greater than that for the car. For Bob, an SUV is a relative bargain because he benefits from lower gas prices and can qualify for an SUV tax break. Use an indifference curve–budget line analysis to explain why Nigel buys and operates a car while Bob chooses an SUV.
Solved Problem 4.4

\[ e_N, \text{ Nigel’s optimal bundle} \]

\[ L^N, \text{ Nigel’s budget line} \]

\[ e_B, \text{ Bob’s optimal bundle} \]

\[ L^B, \text{ Bob’s budget line} \]
Figure 4.11 Optimal Bundles on Convex Sections of Indifference Curves

(a) Strictly Concave Indifference Curves

(b) Concave and Convex Indifference Curves
Food Stamps

• Renamed to Supplemental Nutrition Assistance Program (SNAP) in 2008.
• Nearly 11% of U.S. households worry about having enough money to buy food and 4.1% report that they suffer from inadequate food (U.S. Department of Agriculture, 2008).
• Households that meet income, asset, and employment eligibility requirements receive coupons that can be used to purchase food from retail stores.
Food Stamps (cont.)

• SNAP is one of the nation’s largest social welfare programs with expenditures of $73 billion for nearly 40 million people in 2010.

• Would a switch to a comparable cash subsidy increase the well-being of food stamp recipients?
  ◆ Would the recipients spend less on food and more on other goods?
Figure 4.12 Food Stamps Versus Cash

The figure illustrates the budget lines for food per month and all other goods per month. The blue line represents the original budget line, and the dashed red line shows the budget line with food stamps. The shaded areas A, B, I₁, I₂, and I₃ represent different indifference curves. The point e represents the original budget line, and the point f represents the budget line with food stamps. The area above the dashed line represents additional food per month, while the area below the original budget line represents additional goods per month.
Behavioral Economics

• By adding insights from psychology and empirical research on human cognition and emotional biases to the rational economic model, economists try to better predict economic decision making.
Test of Transitivity

• Adults tend to make transitive choices.
• Children are less likely to make transitive choices.
Endowment Effect

• People place a higher value on a good if they own it than they do if they are considering buying it.

• Consumer choice theory assumes a consumer’s endowment does not affect the indifference curve map.

• Research has shown that experience significantly reduces the endowment effect.
Salience

• People are more likely to consider information if it is presented in a way that grabs their attention or if it takes relatively little thought or calculation to understand.
Salience (cont.)

• When a stores posted prices exclude the sales tax, consumer are much less likely to react to a change in the price.

• Tax is not salient and some consumers ignore taxes.

• **Bounded rationality** - people have a limited capacity to anticipate, solve complex problems, or enumerate all options.