Goal of Ch 3 and 4: To construct a model of demand based on individual decision making (i.e., consumer choice). We will find this model has broad applicability.

To construct such a model we require a tool for comparing different assortments of goods. This is the role of preferences.

Bundle: Some combination of all goods available
Consumer Preferences

Preference Ordering: A scheme whereby the consumer ranks all possible consumption bundles in order of preference

Requirements:
1) preference statements must be consistent
2) and must always be able to be made

Say we have two bundles A and B, we can say:

1) A is preferred to B \( A \succ B \)
2) A is at least as good as B \( A \succeq B \)
3) A is worse than B \( A \prec B \)
4) A is no better than B \( A \preceq B \)
5) A is equally preferred to B \( A \sim B \)
Preference Ordering Assumptions

1) Completeness
- all possible bundles can be compared and ranked
- bundles may be discrete or continuous

2) Non-satiation or Monotonicity
- more of a good is better, *ceteris paribus*.

3) Transitivity (consistency)
- if $A > B$ and $B > C$, then $A > C$

4) Convexity
- a mixture of goods is more preferable to extremes
- people like variety, dislike having none of a good
Graphical Representation of Preferences
Indifference Curve

A set of bundles among which the consumer is indifferent. Bundles that lie above are preferred to it, bundles that lie below are not.
Indifference Map

The completeness assumption implies that there is an indifference curve through *every* possible bundle.

Each indifference curve can be assigned an index value to denote the order of preference. This value is only a ranking (ordinal), and is not a quantitative comparison (cardinal).
Implication of Earlier Assumptions

1) There is an indifference curve through every possible bundle (Completeness)

2) Indifference curves have negative slope (Non-satiation)

3) Indifference curves cannot cross (Transitivity, Non-satiation)
Implication of Earlier Assumptions

4) Indifference curves become less steep as we move down and to the right. In terms of calculus, the slope (first derivative) of the indifference curve is decreasing (Convexity)

5) Indifference Curves aren’t “thick” (Non-satiation)
Marginal Rate of Substitution

At any point on an indifference curve, the rate at which the consumer is willing to exchange the good measured along the vertical axis for the good on the horizontal axis

\[ \text{MRS} = \| \text{slope of indifference curve} \| = \| \frac{\Delta F}{\Delta S} \| \]
Diminishing MRS

The more of one good a consumer has, the more they are willing to give it up for a unit of the other good

Implication of convexity assumption
Different Preferences

Reflected in shape of indifference curves, therefore the MRS will be different.
The Utility Function

A mathematical function which represents the consumers preference ordering. The utility function assigns a number to every bundle in the preference order according to two rules:

1) If the consumer is indifferent between two bundle the function, assign the same number
2) If the consumer prefers the bundle to another the function, assign a higher number

Note: There may be more than one function which can represent a consumer’s preferences

Example with 1 Good: \( U(x) = x \)
Example with 2 Goods: \( U(x,y) = x + y \)
Marginal Utility

The change in total utility from a small change in amount of a good

\[ MU(x) = \frac{dU(x)}{dx} \]

Example:

If \( U(x) = 2x \), \( MU(x) = 2 \)

If \( U(x, y) = x^{\frac{1}{2}} y^{\frac{1}{2}} \), \( MU_x(x, y) = \frac{1}{2} \frac{y^{\frac{1}{2}}}{x^{\frac{1}{2}}} \), \( MU_y(x, y) = \frac{1}{2} \frac{x^{\frac{1}{2}}}{y^{\frac{1}{2}}} \)

Monotonicity implies \( MU(x) > 0 \)
Marginal Rate of Substitution - Again

The tradeoff moving along an indifference curve resulting from preferences. This tradeoff is given by the slope of the indifference curve, i.e.: holding utility constant.

This means: \( MU_x \Delta x = - MU_y \Delta y \)

\( \frac{MU_x}{MU_y} = - \frac{\Delta y}{\Delta x} = MRS \)

Using calculus, take total derivative of \( U(x,y) \)
Drawing Indifference Curves

Basically, put numbers into the utility function.

Example: $U(x, y) = x^2 y$
Cobb - Douglas Utility Function

A very common utility function used because of its mathematical simplicity.

\[ U = A x^a y^b \]
Perfect Substitutes

Preferences such that the consumer is willing to substitute between two goods (exchange at a constant rate along the indifference curve)

\[ U(x, y) = ax + by \]
Perfect Complements

Preferences such that the consumer can not substitute between two goods. Goods are used in fixed proportions.

\[ U(x, y) = \min\{L, R\} \]
Quasi-Linear

Preferences such that the consumer can not substitute between two goods. Goods are used in fixed proportions.

\[ U(x, y) = v(x) + by \text{ where } v(x) \text{ is increasing and } b > 0 \]

Indifference curves are parallel as they move vertically.