14.01 Principles of Microeconomics, Fall 2007
Chia-Hui Chen
September 12, 2007

Lecture 4

Price Elasticity of Supply; Consumer Preferences

Outline

1. Chap 2: *Elasticity - Price Elasticity of Supply*
2. Chap 3: *Consumer Behavior - Consumer Preferences*

1 Price Elasticity of Supply

Price elasticity of supply. The percentage change in quantity supplied resulting from one percentage change in price.

$$E_P^S = \frac{\frac{dQ_S}{Q_S}}{\frac{dP}{P}} = \frac{P}{Q_S}\frac{dQ_S}{dP}.$$

In the short run, if price increases, firms will want to produce more but cannot hire workers and buy machines immediately, thus the supply is less elastic. In contrast, supply is more elastic in the long run.

Example (Example in Elasticities of Demand). Assume the quantity demanded is

$$Q^D = 14 - 3P + I + 2P_S - P_C.$$

- P - Price
- I - Income
- P_S - Price of substitute
- P_C - Price of complement

Calculate E_P^D, E_I, E_{QP_S} and E_{QP_C} when $P = 1$, $I = 10$, $P_S = 2$ and $P_C = 1$.
Solution:
Given the values of variables, the quantity demanded is:

$$Q^D = 14 - 3 \times 1 + 10 + 2 \times 2 - 1 = 24.$$

The elasticities are

$$E_P^D = \frac{P}{Q_D}\frac{dQ_D}{dP} = \frac{1}{24} \times (-3) = -\frac{1}{8},$$

$$E_I = \frac{I}{Q}\frac{dQ}{dI} = \frac{10}{24} \times 1 = \frac{5}{12},$$

$$E_{QP_S} = \frac{P_S}{Q}\frac{dQ}{dP_S} = \frac{2}{24} \times 2 = \frac{1}{6},$$

$$E_{QP_C} = \frac{P_C}{Q}\frac{dQ}{dP_C} = \frac{1}{24} \times (-1) = -\frac{1}{24}.$$

2 Consumer Preferences

$$\text{Consumer behavior} \left\{ \begin{array}{c} \text{Consumer preferences} \\ \text{Budget constraints} \end{array} \right\} \Longrightarrow$$

- What amount and types of goods will be purchased.
- Origin of demand, how to decide demand.

Topics

1. Preference
2. Indifference Curve, Marginal Rate of Substitution (MRS)
3. Utility Functions

Preference

Notation

- A $\succ$ B: A is preferred to B.
- A$\sim$ B: A is indifferent to B.

Basic assumptions for preferences

- Completeness - can rank any basket of goods.
  (always possible to decide preference or indifference)
- Transtivity - A$\succ$B and B$\succ$C implies A$\succ$ C.
  This assumption seems obvious, but can have contradiction (see example below).

	Property I	Property II	Property III
Good A	3	1	2
Good B	2	3	1
Good C	1	2	3

Table 1: Example of contradiction of transitivity.

Example (A contradiction of transtivity). Chart below lists 3 goods and 3 properties, assume that people will prefer one to another if 2 properties are better. Table 1. Actually A $\succ$ B, B $\succ$ C and C $\succ$ A - this loop contradicts the assumption.

- Non-satiation - more is better. (Monotonicity) Assume we discuss goods, since in general, more is not always better.
- Convexity - given two indifferent bundles, always prefer the average to each of them. In Figure 1, the average point C is more preferred to A or B.

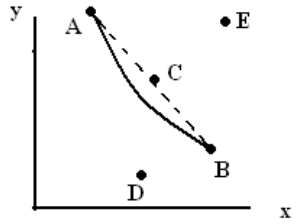

Figure 1: Convexity of indifference curve.

Indifference Curve, Marginal Rate of Substitution (MRS)

Properties of indifference curves

- Downward sloping: if not, non-satiation violated. Refer to Figure 1.

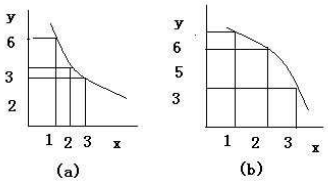

Figure 2: Compare the Shapes of Indifference Curve.

- Cannot cross: if not, non-satiation and transitivity cannot be satisfied simultaneously. In Figure 1, assume there is another indifference curve through A and D.

  $$A \sim B, A \sim D \Longrightarrow B \sim D.$$

  However,

  $$B \succ D$$

  in this figure. Contradiction exists.

- Shape: describes how willing one is to substitute one good for another. See Figure 2.

Marginal rate of substitution (MRS)

Marginal rate of substitution (MRS). How many units of Y one is willing to give up in order to get one more unit of X.

$$\frac{-\Delta y}{\Delta x} = \frac{-dy}{dx}$$

People prefer a balanced basket of goods.

- MRS decreasing.
- Preferred set is convex.
- The left one in Figure 2 makes more sense in the real world.

Perfect substitution. MRS is constant.

Perfect complements. Indifference curves are shaped as right angles.

Example (Perfect complements). Buying shoes. People need both the left one and the right one.

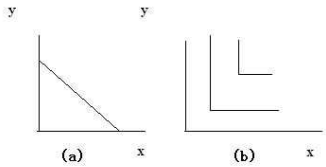

Figure 3: Perfect Substitution and Perfect Complements.

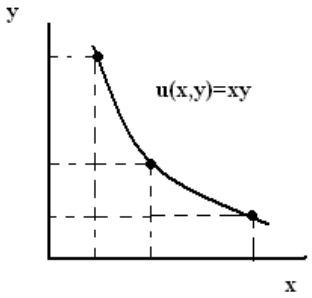

Figure 4: Indifference Curve with Utility Function $u(x, y) = xy$.

Utility Functions

Utility function. Assigns a level of utility to each basket of consumption.

Example (A sample utility function).

$$u(x, y) = xy.$$

For example, (5,5) is indifferent to (25,1) and (1,25).

Ordinal utility function. Ranks the preferences, but does not indicate how much one is preferred to another.

Cardinal utility function. Describes the extent to which one of the bundles is preferred to another. Only the ordinal utility function is required in this course.