14.01 Principles of Microeconomics, Fall 2007
Chia-Hui Chen
September 21, 2007

Lecture 8

Irish Potato Famine, Network Externalities and Uncertainty

Outline

1. Chap 4: *Irish Potato Famine*
2. Chap 4: *Network Externalities*
3. Chap 5: *Uncertainty*

1 Irish Potato Famine

Typical Giffen good. In Year 1845-1849, people consumed more potatoes when the price increased. (Figure 1)

2 Network Externalities

Network externality. One person's demand depends on the demands of other people.

- [Bandwagon effect (Figure 2)] Positive network externality. When more people buy, you will buy more.

  Example. iPod: buy to be in style.
  - Market demand more elastic than real demand curve.
  - Seller sets lower price.

  Example. Operating system: more software available.

  Example. Internet telephone.
- [Snob effect (Figure 3)] Negative network externality. When others buy, you will not buy.
  - Market demand more inelastic than real demand curve.
  - Seller sets Higher price.

  Example. Designer clothes: want to be special.

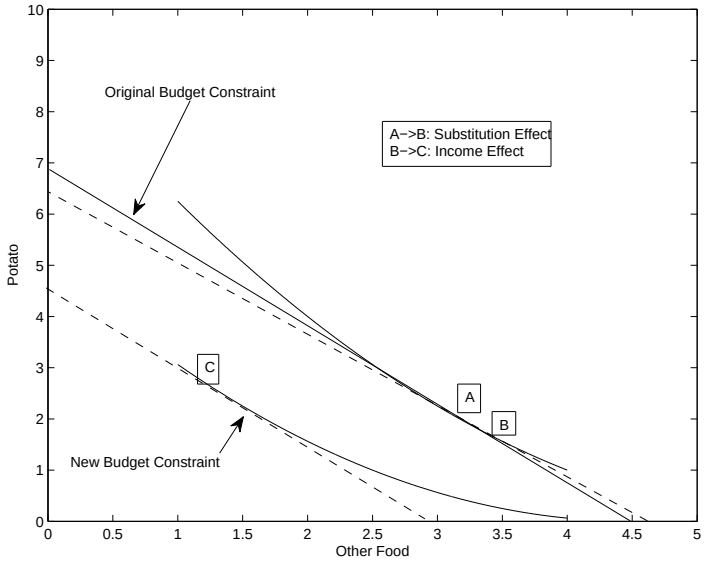

Figure 1: Irish Potato Famine: Price Higher, Consume More

3 Uncertainty

An Outline in Uncertainty

- Preference, Decision
- Expected Value / Variability, Risk Standard Deviation
- Expected Utility

To measure risk we must know:

- All of the possible outcomes.
- The probability that each outcome will occur, the sum of the probabilities that each outcome will occur = 1.

Example. Probability of Weather

- Sunny 70%.
- Rainy 5%.
- Cloudy 25%.

The sum of all the probabilities is 100%.

Objective probability. Based on observed frequency of past events.

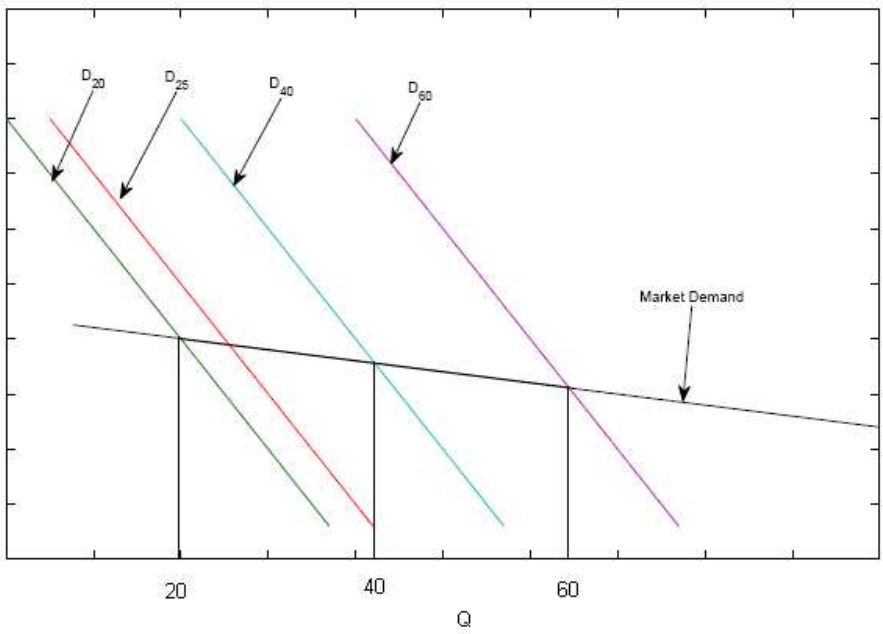

Figure 2: Bandwagon Effect: Positive Network Externalities

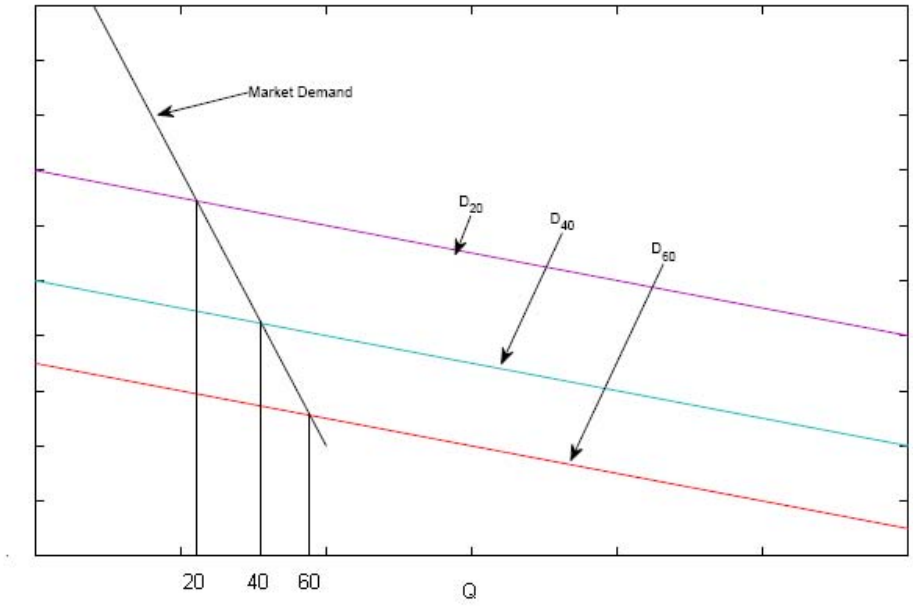

Figure 3: Snob Effect: Negative Network Externalities

Subjective probability. Based on perception, theory and understanding of outcomes.

Measures to characterize payoffs and degree of risk.

Example (Job).

	Outcome 1	Outcome 2
Job 1	\$2000 with probability 50%	\$1000 with probability 50%
Job 2	\$1510 with probability 99%	\$510 with probability 1%

Table 1: Compare Two Jobs, Each has Two Outcomes

Expected value.

$$E(x) = p_1x_1 + p_2x_2 + ... + p_nx_n,$$

where x is a random variable, which has realizations $x_1, x_2, ..., x_n$ with probability $p_1, p_2, ..., p_n$ respectively. Discuss the example. Expected values of salary from job 1 and 2 are:

$$E(job1) = 0.50 \times 2000 + 0.50 \times 1000 = 1500.$$

$$E(job2) = 0.99 \times 1510 + 0.01 \times 510 = 1500.$$

Since

$$E(job1) = E(job2),$$

we do not know which job is better.

Standard deviation.

$$\sigma(x) = \sqrt{p_1[x_1 - E(x)]^2 + p_2[x_2 - E(x)]^2 + ... + p_n[x_n - E(x)]^2}.$$

We can consider the risks of those jobs from standard deviation:

$$\sigma_1 = \sqrt{0.50 \times (2000 - 1500)^2 + 0.50 \times (1000 - 1500)^2} = 500,$$

$$\sigma_2 = \sqrt{0.99 \times (1510 - 1500)^2 + 0.01 \times (510 - 1500)^2} = 99.5.$$

Since

$$\sigma_1 > \sigma_2,$$

for less risk, we will choose job 2.

Expected utility.

$$E[u(x)] = p_1u(x_1) + p_2u(x_2) + ... + p_nu(x_n).$$