1 Irish Potato Famine

14.01 Principles of Microeconomics, Fall 2007
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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.
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.
3 Uncertainty

Figure 2: Bandwagon Effect: Positive Network Externalities
Figure 3: Snob Effect: Negative Network Externalities
3 Uncertainty

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

**Measures to characterize payoffs and degree of risk.**

<table>
<thead>
<tr>
<th>Example (Job)</th>
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<tbody>
<tr>
<td>Outcome 1</td>
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<tr>
<td>Job 1</td>
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<tr>
<td>Job 2</td>
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Table 1: Compare Two Jobs, Each has Two Outcomes

**Expected value.**

\[ E(x) = p_1 x_1 + p_2 x_2 + ... + p_n x_n, \]

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:

- \( E(\text{job1}) = 0.50 \times 2000 + 0.50 \times 1000 = 1500. \)
- \( E(\text{job2}) = 0.99 \times 1510 + 0.01 \times 510 = 1500. \)

Since \( E(\text{job1}) = E(\text{job2}) \), 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.**

\[ E[u(x)] = p_1 u(x_1) + p_2 u(x_2) + ... + p_n u(x_n). \]