## Chapter 12 Valuing Impacts from Observed Behavior: Direct Estimation of Demand Curves



## Constant Elasticity Demand Curve

Price


$$
q=\beta_{0} p^{\beta 1}
$$

Useful for sensitivity analysis


FIGURE 12-2 Constant Elasticity Demand Curve

## Extrapolating from Observations

## FIGURE 12-3 Imputing a Demand Curve from Two Points



## Chapter 13 Valuing Impacts from Observed Behavior: Indirect Market Methods

Observed Behavior $=$ Revealed Preference $\longleftrightarrow$ Stated Preference

1. Market Analogy Method (Trade-off Method)
2. Intermediate Good Method
3. Asset Valuation Method
4. Hedonic Pricing Method
5. Travel Cost Method
6. Defensive Expenditure Method

## Market Analogy Method

1. Using the market price of or expenditure on an Analogous Good. "Using the market price would be an appropriate estimate of the value of the publicly provided good if it equals the average amount that users of the publicly provided good would be willing to pay".
2. Using information about an Analogous Private-Sector Good to estimate the demand curve for a publicly provided good.
3. The Value of Time Saved (as one of Trade-Off Method to use Opportunity Cost: The value of what one gives up to get something) > Wage Rate, (but problems exist).
4. The Value of a Statistical Life (Forgone Earnings Method, Simple Consumer Purchase Studies, Simple Labor Market Studies)

## Analogous Good



## The Value of a Statistical Life - Simple Consumer Purchase Studies -



FIGURE 13-2 Decision Tree for Airbag Purchase

## The Value of a Statistical Life

- Forgone Earnings Method

The value of a life saved = Persons discount future earnings
Used by the courts. However, many problems exist.
e.g. It ignores individual's WTP to reduce the risk of their deaths

- Simple Labor Market Studies

Two indifferent supposition for job fatality risk
$(1 / 1,000) \mathrm{V}($ life $)=\$ 3,500$. Then, $\mathrm{V}($ life $)=\$ 3.5$ million
Greater chance Riskier job of fatal injury offers

* People overestimate the occurrence of low-probability bad event: e.g. swine influenza.


## Intermediate Good Method

To value "education and training programs" as human capital.
Annual Benefit = Income (with project) - Income (without project)

## Asset Valuation Method

Project affect the prices of assets (e.g. land, housing, stocks, etc). The impacts are said to be capitalized into the market value of the assets. Observed increase (or decrease) in asset values can be used to estimate the benefits (costs or disbenefits) of projects.

## Hedonic Pricing Method

## Problems with Simple Valuation Methods

1. Omitted Variable Problem
2. Self-Selection Bias
> Hedonic Pricing Method overcome these two problems.
Hedonic Pricing Method = Hedonic Regression Method Hedonic Price Function $\quad P=f(C B D$, SIZE, VIEW, NBHD)
(marginal) hedonic price, implicit price, rent differential of the attribute

$$
P=\beta_{0} C B D^{\beta 1} \text { SIZE }^{\beta 2} V I E W^{\beta 3} N B H D^{\beta 4} e^{\varepsilon}
$$

$\Rightarrow \ln (P)=\ln \beta_{0}+\beta_{1} \ln (C B D)+\beta_{2} \ln (S I Z E)+\beta_{3} \ln ($ VIEW $)+\beta_{4} \ln ($ NBHD $)+\varepsilon$



## Hedonic price of

 scenic views: Slope$$
r_{v}=\beta_{3} \frac{P}{V I E W}
$$

Decreases as the level of the scenic view increases

$$
r_{v}=W(V I E W, Y, Z)
$$

Y: household income
Z: household characteristics

## Value of Statistical Life

Nonlinear Regression Model

$$
\begin{aligned}
\ln (\text { wagerate })= & \beta_{0}+\beta_{1} \ln (\text { fatality risk }) \\
& +\beta_{2} \ln (\text { injury risk }) \\
& +\beta_{3} \ln (\text { job tenure }) \\
& +\beta_{4} \ln (\text { education }) \\
& +\beta_{5} \ln (\text { age })+\varepsilon
\end{aligned}
$$

## Travel Cost Method

## To value "Recreational Sites"

## Zone Travel Cost Methods

$$
\ln \left(\frac{V}{P O P}\right)=\beta_{0}+\beta_{1} \ln \bar{p}+\beta_{2} \ln \bar{p}_{s}+\beta_{3} \ln \bar{Y}+\beta_{4} \ln \bar{Z}+\varepsilon
$$

TABLE 13-1 Illustration of the Travel Cost Method

|  | Travel <br> Time | Travel <br> Distance | Average <br> Total <br> Cost per <br> (km) | Average <br> Number of <br> Visits per | Consumer <br> Surplus per | Consumer <br> Surplus per <br> Zone | Trips per <br> Zone |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Zone | (hours) | Person | (\$ thousands) | (thousands) |  |  |  |
| A | 0.5 | 2 | 20 | 15 | 525 | 5,250 | 150 |
| B | 1.0 | 30 | 30 | 13 | 390 | 3,900 | 130 |
| C | 2.0 | 90 | 65 | 6 | 75 | 1,500 | 120 |
| D | 3.0 | 140 | 80 | 3 | 15 | 150 | 30 |
| E | 3.5 | 150 | 90 | 1 | 0 | 0 | 10 |
| Total |  |  |  |  |  | 10,800 | 440 |

Different value of time for estimating average total cost:
A for $\$ 9.40 / \mathrm{hr}$, B for $\$ 5.50 / \mathrm{hr}$, C for $\$ 10.35 / \mathrm{hr}$, D and E for $\$ 8 / \mathrm{hr}$ (as wage rate)
Total cost is generally composed of driving, parking, walking and loading and unloading vehicles. Zone E needs customs and immigration crossing the border.

FIGURE 13-4 "Representative" Individual's Inverse Demand Curve for Visits to a Recreational Area


## Defensive Expenditures Method

The amount to spend to mitigate or eliminate the effect of a negative externality.


Before and after Ordinance

FIGURE 13-6 The Effect of an Ordinance Reducing Smog on Expenditures for Window Cleaning

## Presentation \& Report

1. Select one method of Valuing Market or Non-Market Goods from Chapter 9, 12,13 and 14.
2. Find one paper from "international" scientific journals from any research fields to use your selected method.
3. Explain the paper by powerpoint.

English presentation (7 mins) and discussion (3 to 5 mins ) for each.

## Report Submission

Deadline: 20 July
Summarize 3 to 4 pages report and submit me by email.
(hanaoka@ide.titech.ac.jp):

1) Reasons to select this paper.
2) Advantages and disadvantages of your selected method in the context of the selected topic. Discuss whether other methods are possible to apply for the selected topic.
3) Respond some questions if you need.
4) Impression (comments, requests, etc) of this course.
