Hedonic Pricing Method

[1]

Methods, Section 3
Hedonic Pricing Method
Overview

The hedonic pricing method is used to estimate economic values for ecosystem or environmental services that directly affect market prices. It is most commonly applied to variations in housing prices that reflect the value of local environmental attributes.

It can be used to estimate economic benefits or costs associated with:

- environmental quality, including air pollution, water pollution, or noise
- environmental amenities, such as aesthetic views or proximity to recreational sites

The basic premise of the hedonic pricing method is that the price of a marketed good is related to its characteristics, or the services it provides. For example, the price of a car reflects the characteristics of that car—transportation, comfort, style, luxury, fuel economy, etc. Therefore, we can value the individual characteristics of a car or other good by looking at how the price people are willing to pay for it changes when the characteristics change. The hedonic pricing method is most often used to value environmental amenities that affect the price of residential properties.
This section continues with an example application of the hedonic pricing method, followed by a more complete technical description of the method and its advantages and limitations.

Hypothetical Situation:
Agency staff want to measure the benefits of an open space preservation program in a region where open land is rapidly being developed.

Why Use the Hedonic Pricing Method?
The hedonic pricing method was selected in this case because:

1. Housing prices in the area appear to be related to proximity to open space.
2. Data on real estate transactions and open space parcels are readily available, thus making this the least expensive and least complicated approach.

Alternative Approaches:
If the open space of concern is used mainly for recreation, the travel cost method might be used. Alternatively, survey-based methods, like contingent valuation or contingent choice, might be used. However, these methods would generally be more difficult and expensive to apply.

Application of the Hedonic Pricing Method:

Step 1:
The first step is to collect data on residential property sales in the region for a specific time period (usually one year). The required data include:

- selling prices and locations of residential properties
- property characteristics that affect selling prices, such as lot size, number and size of rooms, and number of bathrooms
- neighborhood characteristics that affect selling prices, such as property taxes, crime rates, and quality of schools
- accessibility characteristics that affect prices, such as distances to work and shopping centers, and availability of public transportation
- environmental characteristics that affect prices

In this case, the environmental characteristic of concern is the proximity to open space. The researcher might collect data on the amount and type of open space within a given radius of each property, and might also note whether a property is directly adjacent to open space. Often, this type of data may be obtained from computer-based GIS[2] (geographical information systems) maps. Data on housing prices and characteristics are available from municipal offices, multiple listing services, and other sources.
Step 2:

Once the data are collected and compiled, the next step is to statistically estimate a function that relates property values to the property characteristics, including the distance to open space. The resulting function measures the portion of the property price that is attributable to each characteristic. Thus, the researcher can estimate the value of preserving open space by looking at how the value of the average home changes when the amount of open space nearby changes.

How Do We Use the Results?

The results can be used to evaluate agency investments in open space preservation. For example, specific parcels may be under consideration for protection. The hedonic value function can be used to determine the benefits of preserving each parcel, which can then be compared to the cost.

Case Study Example of the Hedonic Pricing Method—Values of Environmental Amenities in Southold, Long Island [ref.][3]

The Situation

The town of Southold, Long Island, New York has coastlines on both the Peconic Bay and Long Island Sound. Compared to the rest of Long Island, it is a relatively rural area, with a large amount of farmland. However, population and housing density are rapidly increasing in the town, resulting in development pressures on farmland and other types of open space.

The Challenge

The Peconic Estuary Program is considering various management actions for the Estuary and surrounding land areas. In order to assess some of the values that may result from these management actions, a hedonic valuation study[4] was conducted, using 1996 housing transactions.

The Analysis

The study found that the following variables that are relevant for local environmental management were had significant effects on property values in Southold:

- Open Space: Properties adjacent to open space had, on average, 12.8% higher per-acre value than similar properties located elsewhere.
- Farmland: Properties located adjacent to farmland had, on average, 13.3% lower per-acre value. Property values increased very slightly with greater distance from farmland.

- Major Roads: Properties located within 20 meters of a major road had, on average, 16.2% lower per-acre value.
- Zoning: Properties located within an area with two- or three-acre zoning had, on average, 16.7% higher per-acre value.
- Wetlands: For every percentage point increase in the percent of a parcel classified as a wetland, the average per-acre value increased by .3%.

The Results

Based on the results of this study, managers could, for example, calculate the value of preserving a parcel of open space, by calculating the effects on property values adjacent to the parcel. For a hypothetical simple case, the value of preserving a 10 acre parcel of open space, surrounded by 15 "average" properties, was calculated as $410,907.

Summary of the Hedonic Pricing Method:

The hedonic pricing method is used to estimate the value of environmental amenities that affect prices of marketed goods. Most applications use residential housing prices to estimate the value of environmental amenities. The method is based on the assumption that people value the characteristics of a good, or the services it provides, rather than the good itself. Thus, prices will reflect the value of a set of characteristics, including environmental characteristics, that people consider important when purchasing the good.

The hedonic pricing method may be used to estimate economic benefits or costs associated with:

- environmental quality, including air pollution, water pollution, or noise
- environmental amenities, such as aesthetic views or proximity to recreational sites

The hedonic pricing method is relatively straightforward and uncontroversial to apply, because it is based on actual market prices and fairly easily measured data. If data are readily available, it can be relatively inexpensive to apply. If data must be gathered and compiled, the cost of an application can increase substantially.

Applying the Hedonic Pricing Method Using Housing Prices:

In general, the price of a house is related to the characteristics of the house and property itself, the characteristics of the neighborhood and community, and environmental characteristics. Thus, if non-environmental factors are controlled for, then any remaining differences in price can be attributed to differences in environmental quality.

For example, if all characteristics of houses and neighborhoods throughout an area were the same, except for the level of air pollution, then houses with better air quality would cost more. This higher price reflects the value of cleaner air to people who purchase houses in the area.

To apply the hedonic pricing method, the following information must be collected:

- A measure or index of the environmental amenity of interest.
- Cross-section and/or time-series data on property values and property and household characteristics for a well-defined market area that includes homes with different levels of environmental quality, or different distances to an environmental amenity, such as open space or the coastline.

The data are analyzed using regression analysis[5] , which relates the price of the property to its characteristics and the environmental characteristic(s) of interest. Thus, the effects of different characteristics on price can be estimated. The regression results indicate how much property values will change for a small change in each characteristic, holding all other characteristics constant.

The analysis may be complicated by a number of factors. For example, the relationship between price and characteristics of the property may not be linear – prices may increase at an increasing or decreasing rate when characteristics change. In addition, many of the variables are likely to be correlated, so that their values change in similar ways. This can lead to understating the significance of some variables in the analysis. Thus, different functional forms and model specifications for the analysis must be considered.

Advantages of the Hedonic Pricing Method:

- The method's main strength is that it can be used to estimate values based on actual choices.
- Property markets are relatively efficient in responding to information, so can be good indications of value.
- Property records are typically very reliable.
- Data on property sales and characteristics are readily available through many sources, and can be related to other secondary data sources to obtain descriptive variables for the analysis.
- The method is versatile, and can be adapted to consider several possible interactions between market goods and environmental quality.

Issues and Limitations:

- The scope of environmental benefits that can be measured is limited to things that are related to housing prices.
- The method will only capture people's willingness to pay for perceived differences in environmental attributes, and their direct consequences. Thus, if people aren't aware of the linkages between the environmental attribute and benefits to them or their property, the value will not be reflected in home prices.
- The method assumes that people have the opportunity to select the combination of features they prefer, given their income. However, the housing market may be affected by outside influences, like taxes, interest rates, or other factors.
- The method is relatively complex to implement and interpret, requiring a high degree of statistical expertise.
- The results depend heavily on model specification.
- Large amounts of data must be gathered and manipulated.
- The time and expense to carry out an application depends on the availability and accessibility of data.

Back to top

Continue to:

Method 4 - Travel Cost Method[6]

Back to:

Method 2 - Productivity Method[7]

Links

1. http://www.ecosystemvaluation.org/index.html
2. javascript:uniDef();
3. javascript:secDef();
4. javascript:secDef();
5. javascript:triDef();
6. http://www.ecosystemvaluation.org/travel_costs.htm

7. http://www.ecosystemvaluation.org/productivity.htm