Hedonic Models and the Analysis of Nuclear Facilities’ Impacts on Property Values

A Survey of the Economic Literature
Overview of Methodology and Literature Review

- What is the methodology?
- What are some landmark studies and what do they tell us?
- What are the strengths/limitations of these studies?
- What data would be needed to do such a study for PORTS?
- What would the literature suggest we might find?
The Basic Methodology

- A statistical approach to uncovering the average “value” consumers place on attributes such as crime, proximity to public amenities, traffic congestion, clean air, and so on
Figure A1: Indifference curves in $z$-$\theta$ space

\[ \theta(I,z,u_0) \]

\[ \theta(I,z,u_1) \]

\[ \theta(I,z,u_2) \]

$u_2 > u_1 > u_0$

Same $z_j$, spend less on house $\rightarrow$ more to Spend on x.
Figure A2: Consumer’s choice

Point A: highest utility such that consumer’s willingness to pay is equal to price $P(z)$. 

$P(z)$

$\theta(I,z,u_0)$

$\theta(I,z,u_1)$

$z^*_j$

$z_j$
Figure A3: Different consumers

\[ P(z) \]

\[ \theta_1(y,z,u_0) \]

\[ \theta_1(y,z,u_1) \]

\[ \theta_2(y,z,u_0) \]

\[ \theta_2(y,z,u_1) \]
Figure A4: Offer functions

$\pi_2 > \pi_1 > \pi_0$

$\phi(r, z, \pi_2)$

$\phi(r, z, \pi_1)$

$\phi(r, z, \pi_0)$
Point A: highest profit such that producer’s offer price $\phi$ is equal to price $P(z)$.
Figure A6: Different producers

\[ \phi_1(r, z, \pi_1) \]

\[ \phi_1(r, z, \pi_0) \]

\[ \phi_2(r, z, \pi_1) \]

\[ \phi_2(r, z, \pi_0) \]

\[ P(z) \]
Figure A7: Market equilibrium
Figure A8: Hedonics – supply and demand for attribute $z_j$

\[ P'(z_i) \]
\[ P'(z_j) \]
\[ P'(z_k) \]

$\$/unit

$D_i$, $S_i$, $D_j$, $S_j$, $D_k$, $S_k$
Selected Existing Studies & Findings

• The Origins
  • Griliches (1971)
  • Harrison and Rubinfeld (1978)

• Recent Work
  • Bezdek and Wendling (2006)
  • Braden et al. (2011)
  • Davis (2011)
  • Greenstone and Gallagher (2008)
Data and Modeling Needs

• Requires one or more of the following data
  • Census data
  • Property assessed values
  • Property sales records
  • Reliable indicators of neighborhood conditions vis-à-vis environmental quality, public amenities and services, public safety, and so on
• Varying degrees of modeling complexity possible
  • Spatial and temporal correlations
  • Multicollinearity
  • Endogeneity
Conclusions from the Literature

• Public perception suggests large losses to property values due to proximity of hazardous sites, including nuclear sites. However, empirical results suggest small effects and sometimes positive effects.
• Nuclear sites often increase property values in rural communities, because of the economic growth and tax revenues they generate for the region.
• Even when nuclear sites do not contribute substantially to the local economy, the impact of proximity on house values estimated to be either nil or relatively small.