

## Hedonic Equation

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## Hedonic Regression

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### Basic Concepts

the term "hedonic" – pleasure (+) and pain (-)  
consumers demand *characteristics*  
consumption of an item is consumption of a *bundle of characteristics*  
there is an *explicit* market in the item, but no *explicit* (only implicit) markets in characteristics  
Examples: pocket calculators, houses

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## Hedonic Regression Example

### hedonic\_example.xls

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- ⑩ Source of data:  
<http://www.sfgate.com/homes/>
  - ⑩ Variables included in the analysis
    - ⑩ House price (asking price) ← Dependent (LHS) variable
    - ⑩ Number of bedrooms
    - ⑩ Number\* of bathrooms
    - ⑩ Square feet of floor area
    - ⑩ Year built
- ← Independent (RHS) variables

\* "half" or "partial" bath entered as one-half

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## Transforming Variables

Why transform variables?

If we use the functional form  $y = Ax^\alpha$  the parameter  $\alpha$  represents an *elasticity* – the elasticity of  $y$  with respect to  $x$ .

*Elasticity* is a measure of how sensitive one variable is to changes in another variable – expressed in terms of percentages

$\alpha$  is the percent change in  $y$  for a 1% change in  $x$

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## Elasticity

What's so good about elasticity?

It is *scale-free*: it does not depend on the units in which  $x$  and  $y$  are measured.

Some common elasticities

- own-price elasticity of demand
- cross price elasticity of demand
- income elasticity of demand

Some uncommon elasticities

- elasticity of house price with respect to floorarea

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## Hedonic Regression Transformed

| SUMMARY OUTPUT        |              |                |          |          |                |             |              |             |  |
|-----------------------|--------------|----------------|----------|----------|----------------|-------------|--------------|-------------|--|
| Regression Statistics |              |                |          |          |                |             |              |             |  |
| Multiple R            | 0.810861338  |                |          |          |                |             |              |             |  |
| R Square              | 0.657497082  |                |          |          |                |             |              |             |  |
| Adjusted R Square     | 0.611839028  |                |          |          |                |             |              |             |  |
| Standard Error        | 0.203254043  |                |          |          |                |             |              |             |  |
| Observations          | 35           |                |          |          |                |             |              |             |  |
| ANOVA                 |              |                |          |          |                |             |              |             |  |
|                       | df           | SS             | MS       | F        | Significance F |             |              |             |  |
| Regression            | 4            | 2.379190384    | 0.594798 | 14.39762 | 1.13734E-06    |             |              |             |  |
| Residual              | 30           | 1.291961794    | 0.043112 |          |                |             |              |             |  |
| Total                 | 34           | 3.671152178    |          |          |                |             |              |             |  |
|                       | Coefficients | Standard Error | t Stat   | P-value  | Lower 95%      | Upper 95%   | Lower 95.0%  | Upper 95.0% |  |
| Intercept             | 5.348889002  | 4.287494425    | 1.249603 | 0.058661 | -0.32654781    | 17.02342691 | -0.32654781  | 17.02342691 |  |
| BR                    | -0.174128232 | 0.087882291    | -2.36015 | 0.015555 | -0.312762364   | -0.0354941  | -0.312762364 | -0.0354941  |  |
| Baths                 | -0.107604554 | 0.096282022    | -1.11812 | 0.272291 | -0.304288075   | 0.088979568 | -0.304288075 | 0.088979568 |  |
| ln(sqft)              | 1.064661683  | 0.201701043    | 5.27678  | 6.32E-07 | 0.853414964    | 1.077919963 | 0.853414964  | 1.077919963 |  |
| YearBlt               | -0.001788343 | 0.002234304    | -0.79258 | 0.440034 | -0.006311195   | 0.00281451  | -0.006311195 | 0.00281451  |  |

Sometimes debatable about which variables *should* be transformed.

Teaser question: should you make a logarithmic transformation of a dummy variable?

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## Hedonic Regression

**END THIS SLIDESHOW**

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### Chapter 10

#### The Hedonic Housing Model

- Implicit price of multi-faceted good
  - Housing, wages, cars
  - Price is a function of multiple characteristics:
    - $P_H(h_1, h_2, \dots, h_n)$
  - Marginal Price is simply the partial derivative:
    - $P_i = \partial P_H(h_1, h_2, \dots, h_n) / \partial h_i$
- Consumers get utility from numeraire good and various housing characteristics
  - Utility function:  $U(G, H(h_1, h_2, \dots, h_n))$
  - Budget constraint:  $W = G + P_H(h_1, h_2, \dots, h_n)$
- Producers vary mix of housing characteristics

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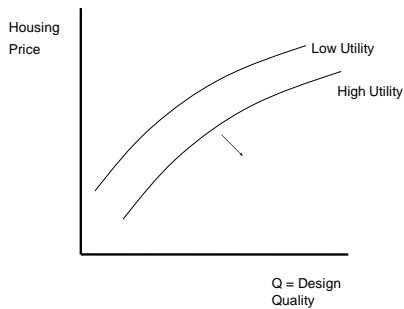
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### Household Bid Curves




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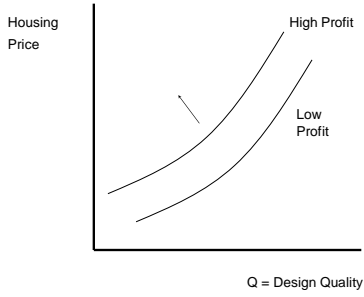
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### Producer Offer Curves




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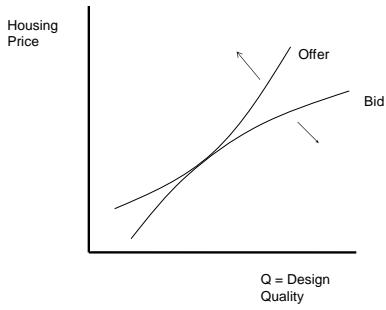
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### Hedonic Equilibrium




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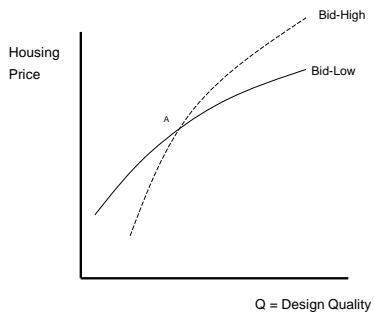
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### Heterogeneous Consumers: High versus Low Demand




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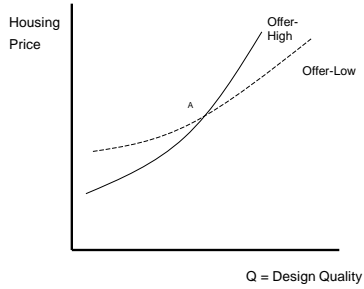
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### Heterogeneous Producers: High versus Low Cost




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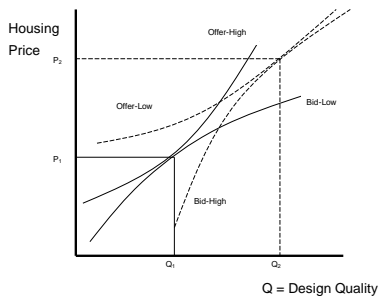
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### Hedonic Equilibrium




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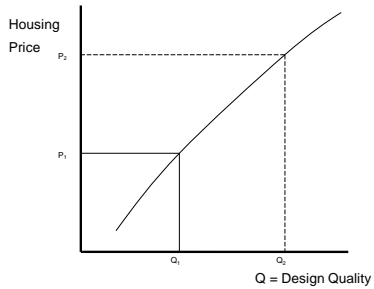
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### Hedonic Price Function – Set of Tangencies for Multiple Consumers & Producers




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## Implications of the Model

- $P = P_H(h_1, h_2, \dots, h_n)$  "Hedonic Price Function"
- $P_j = \partial P_H(h_1, h_2, \dots, h_n) / \partial h_j$  Marginal price of good of good j
- Marginal Price = Marginal willingness to pay by consumer
- Marginal Price = Marginal cost to producer
- Matching of high-demand consumers to low-cost firms

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