

ECON 166

Recap and the Way Forward

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Agenda

- Hedonic Equation
 - Concepts
 - Methods
 - Theory
- Multijurisdictional Equilibrium Model
 - Concepts
 - Methods
 - Theory
- Zoning
 - Concepts
 - Methods
 - Theory
- Statistics, FRED 2, and FRED GRAPH
- Housing Policy – MORE COMING!

Hedonic Equation

- Concepts
- Methods
- Theory

Choosing Housing Characteristics

- ⑩ Characteristics Space vs. Commodity Space
 - ⑩ Preferences over characteristics vs. preferences over commodities
 - ⑩ Different bundles of characteristics can be on the same indifference curve
-

Hedonic Regression

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

Transforming Variables

Suppose the functional form of a relationship between x and y is assumed to be:

$$y = Ax^a$$

which is a non-linear equation.

However, by taking the natural logarithm of both sides of the equation gives

$$\ln(y) = \ln(A) + a \ln(x)$$

This expression that is linear in the logarithms of the transformed variables

Transforming Variables

Why transform variables?

If we use the functional form $y = Ax^{\alpha}$ the parameter α 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*

α is the percent change in y for a 1% change in x

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

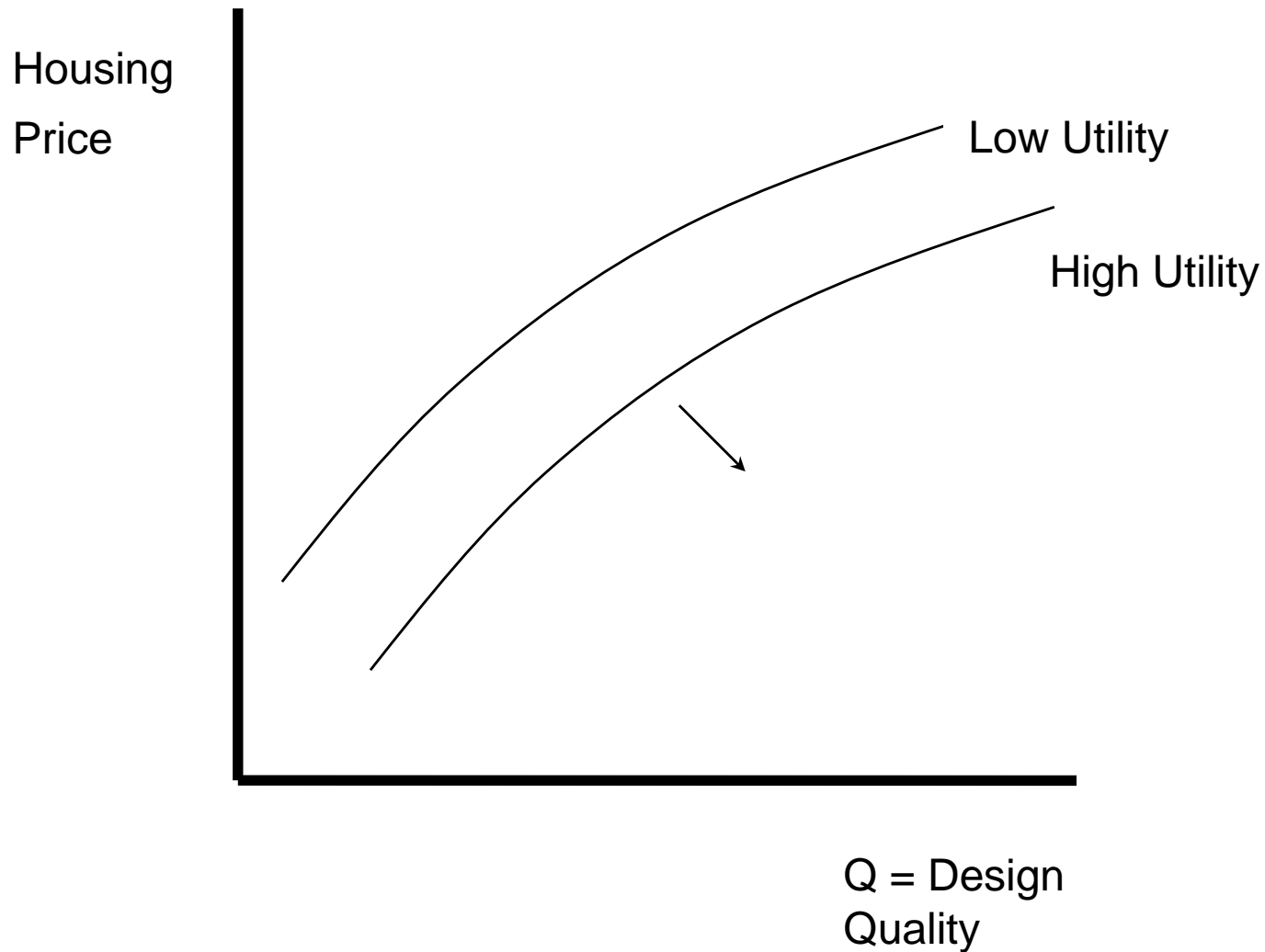
- elasticity of house price with respect to floorarea

Chapter 10

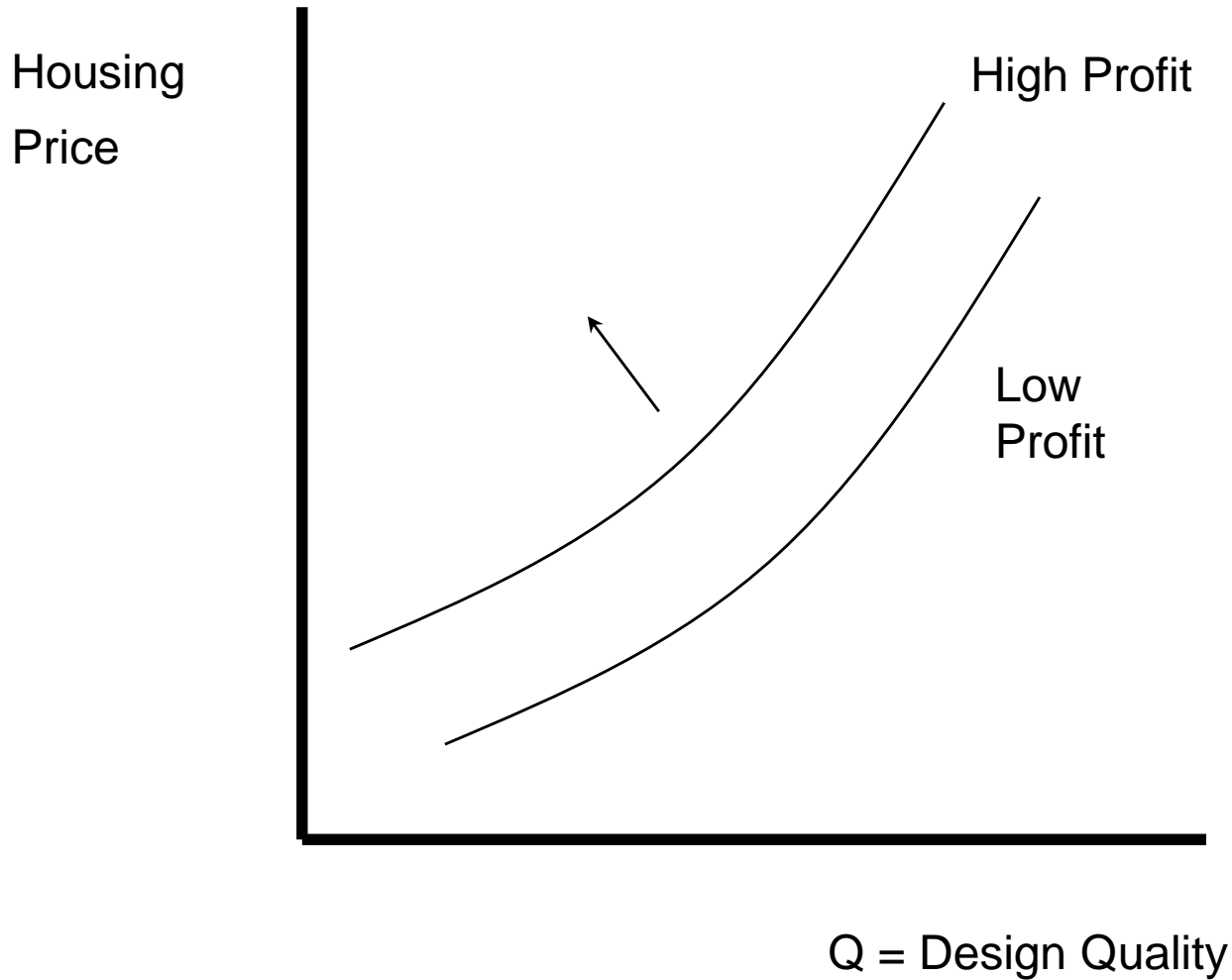
The Hedonic Housing Model

- 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:
 - $P_j = \partial P_H(h_1, h_2, \dots, h_n) / \partial h_j$
- 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

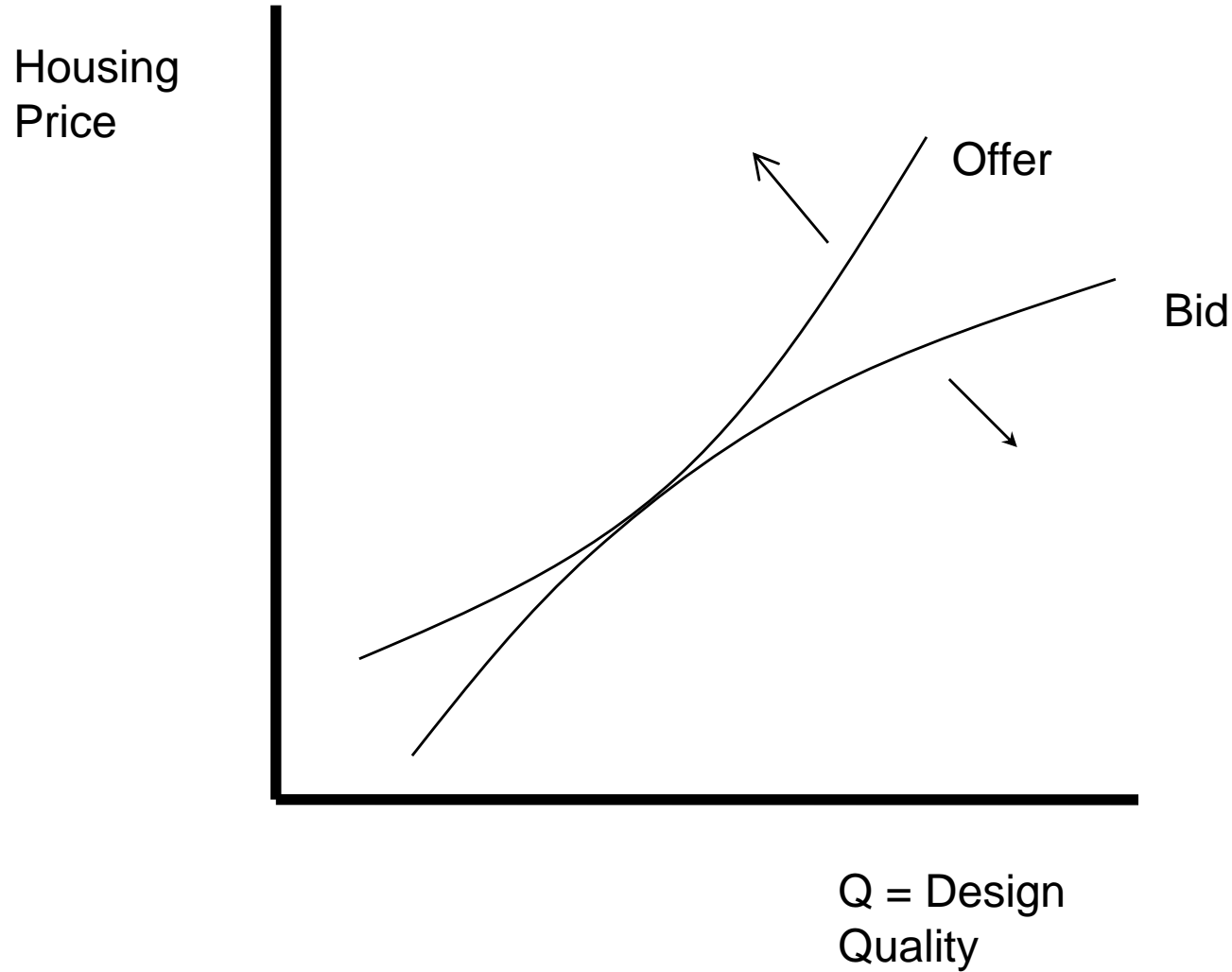
Household Bid Curves



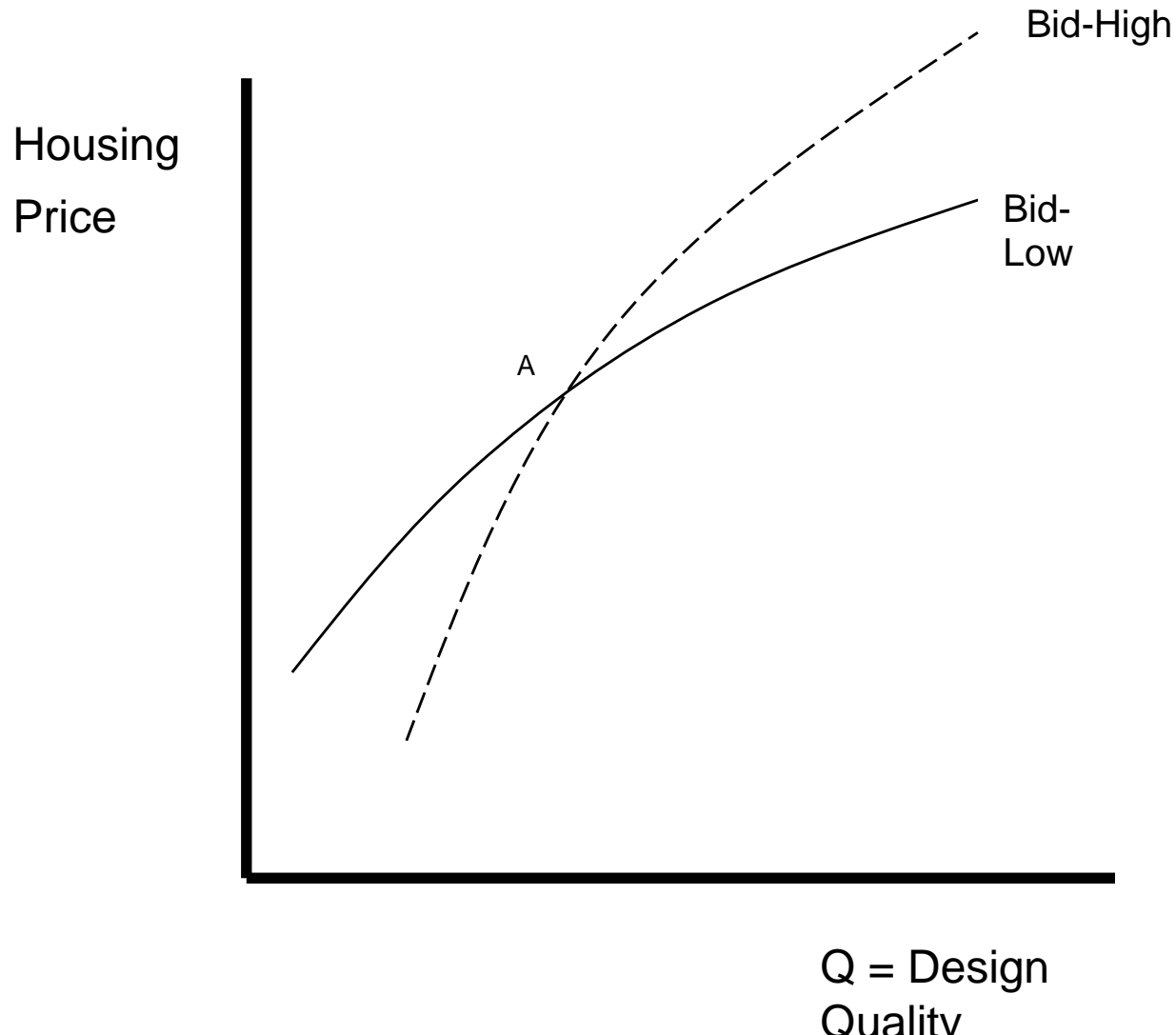
Producer Offer Curves



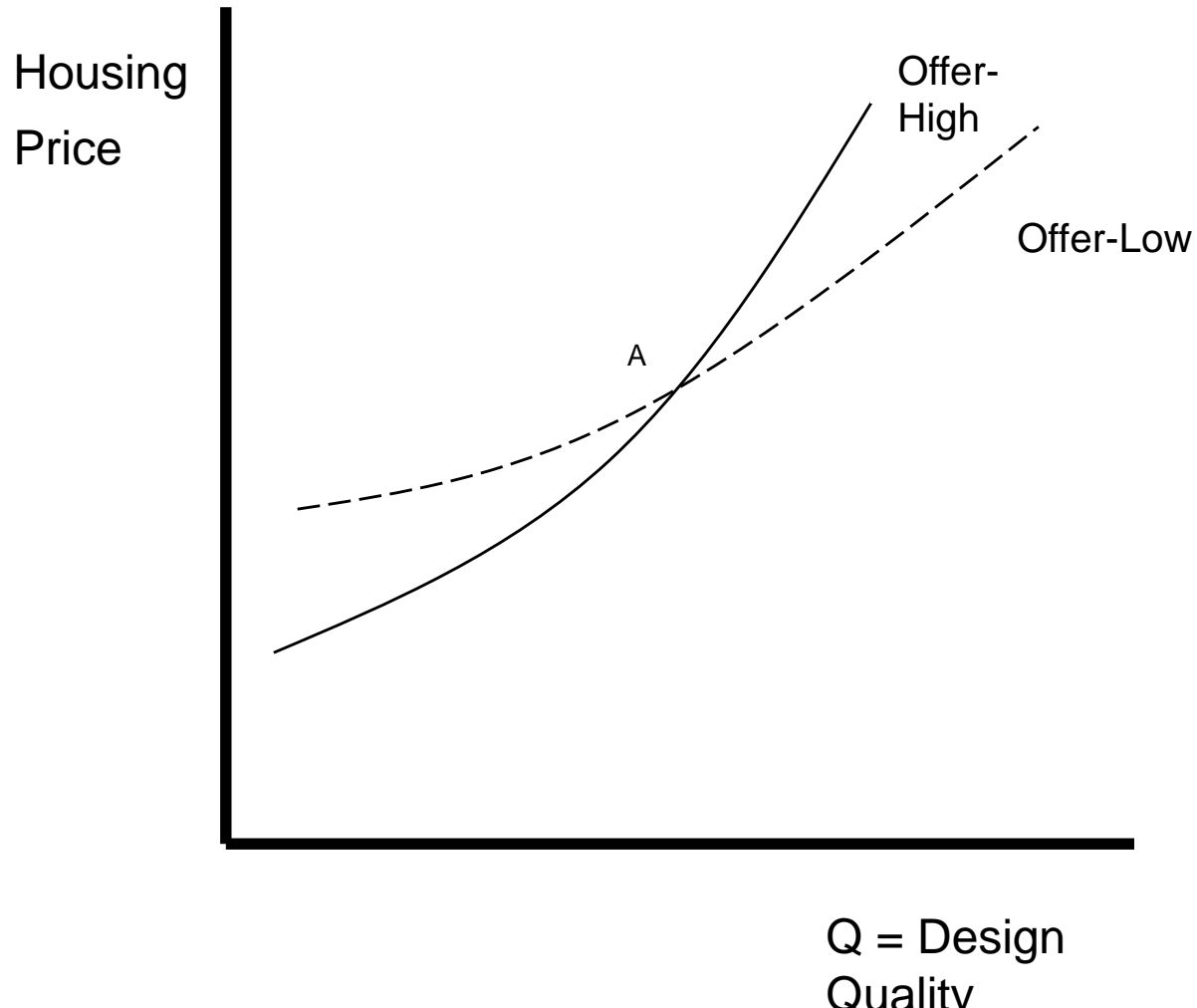
Hedonic Equilibrium



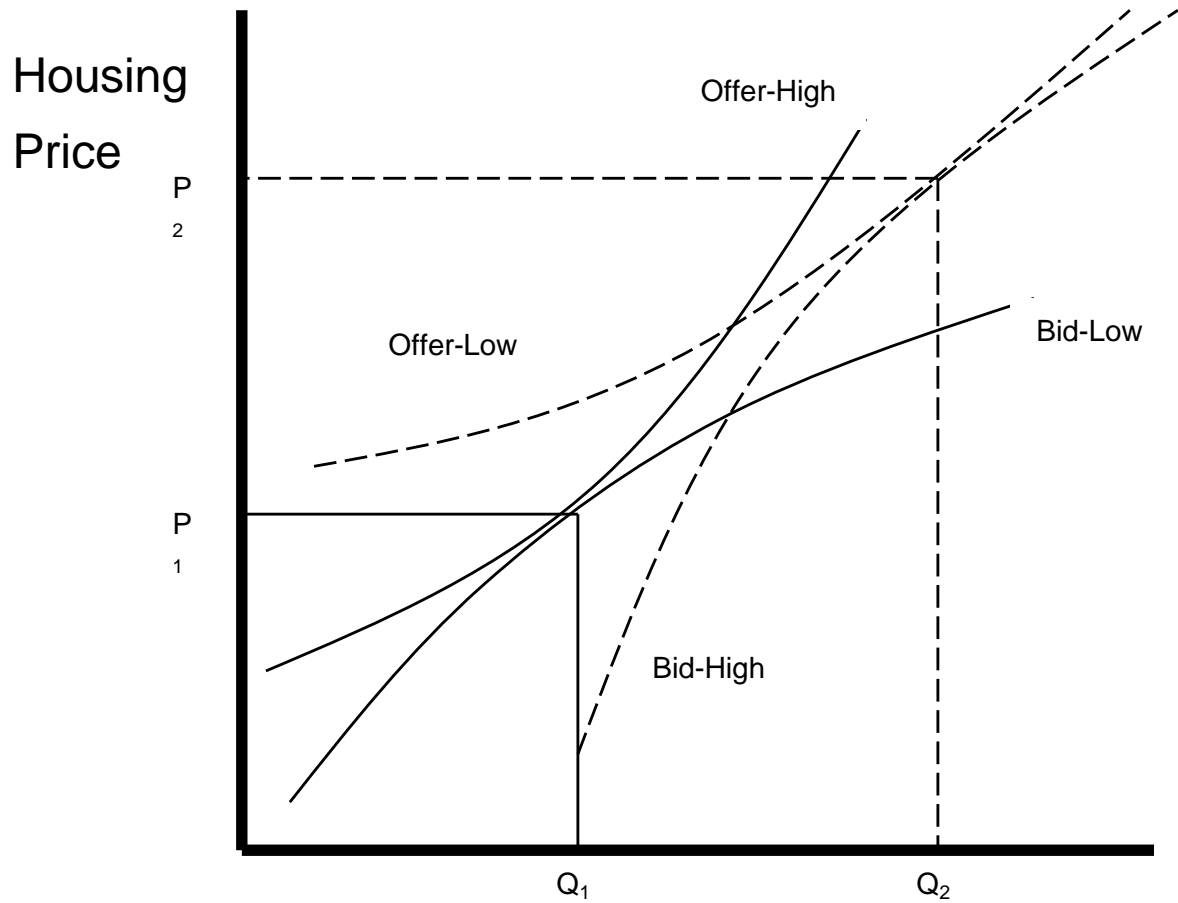
Heterogeneous Consumers: High versus Low Demand



Heterogeneous Producers: High versus Low Cost

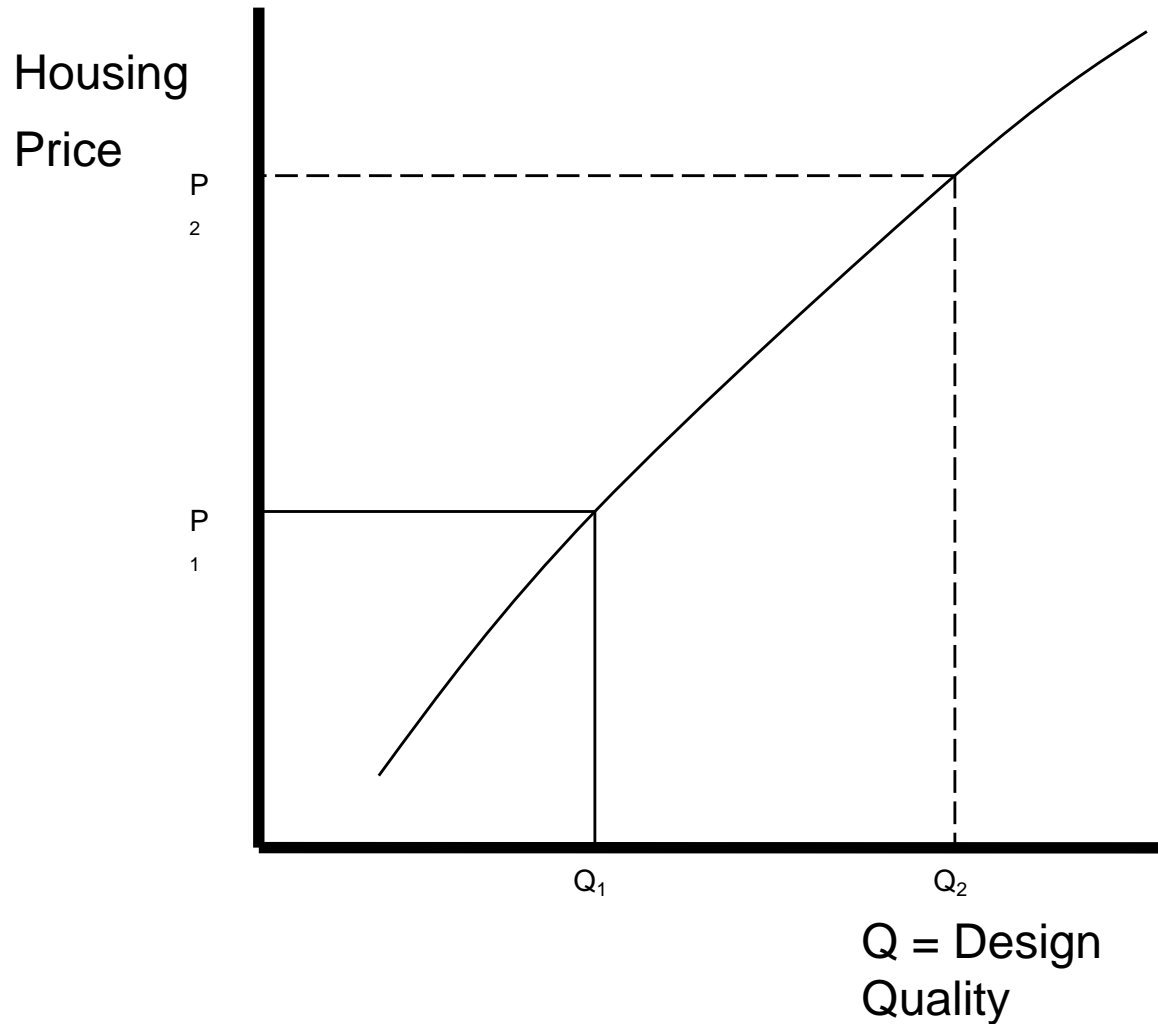


Hedonic Equilibrium



Q = Design
Quality

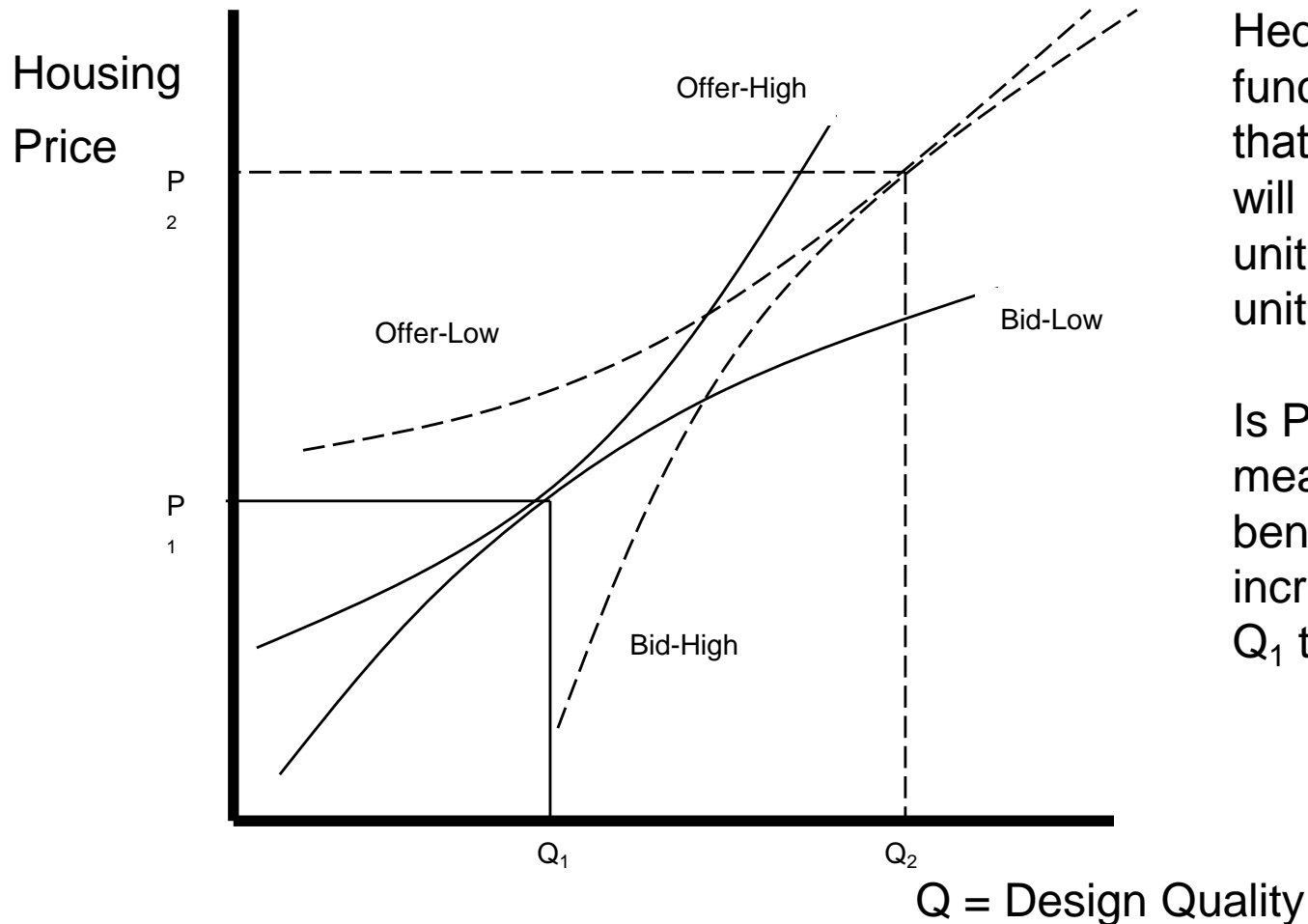
Hedonic Price Function – Set of Tangencies for Multiple Consumers & Producers



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

Marginal Willingness to Pay for an Increase from Q_1 to Q_2



Hedonic price function implies that “consumers” will pay P_1 for Q_1 units and P_2 for Q_2 units.

Is $P_2 - P_1$ a measure of the benefit of increasing Q from Q_1 to Q_2 ? NO!

Multijurisdictional Equilibrium Model

- Concepts
- Methods
- Theory

Choice of Jurisdiction (Tiebout-like model)

- ⑩ Assume there are M types of households (indexed $m=1,2,\dots,M$); households of the same type are identical
 - ⑩ They have identical preferences
 - ⑩ They have identical income
 - ⑩ Assume that there are J jurisdictions (indexed $j=1,2,\dots,J$)
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Choice of Jurisdiction

- ⑩ Each jurisdiction has:
 - ⑩ Amenities indicated by a_j specific to the jurisdiction
 - ⑩ Tax-expenditure package (t_j, y_j) specific to the jurisdiction

 - ⑩ Are amenities exogenous or endogenous?

 - ⑩ Is the tax-expenditure package exogenous or endogenous?
-

Multi-jurisdictional Equilibrium with Amenities and Tax-Expenditure Package

⑩ Equilibrium requires:

- ⑩ Equilibrium prices for all commodities traded on markets
 - ⑩ Labor market
 - ⑩ Housing (land) market in each jurisdiction
- ⑩ Balanced budget: $c_j(y_j) = t_j B_j$
- ⑩ Locational equilibrium of households
 - ⑩ For each type of household m which resides in jurisdiction j [†]

$$U_{mj}(*x_{mj}, *h_{mj}, y_j) \geq U_{mk}(*x_{mk}, *h_{mk}, y_k)$$

NOTE: If type m resides in both j and k , then the inequality is replaced by an equation

[†] The asterisks (*) in the expression below indicate optimal (realized) consumption.

Definition of Multijurisdictional Equilibrium

- No one wants to move given the current tax-expenditure packages in each jurisdiction
- The median voter among current residents is decisive about the tax-expenditure package in each jurisdiction
- The tax-expenditure package satisfies the balance budget condition in each jurisdiction
- All markets clear, i.e., quantities supplied equal quantities demanded for all marketed goods

Jurisdictional Balanced Budget Condition

$$c(y_j) \leq t_j p_j H_j$$

Jurisdictional Balanced Budget Condition – What if...?

$$c(y_j) = ky_j$$

$$c(y_j) = ky_j^\beta$$

Zoning

- Concepts
- Methods
- Theory

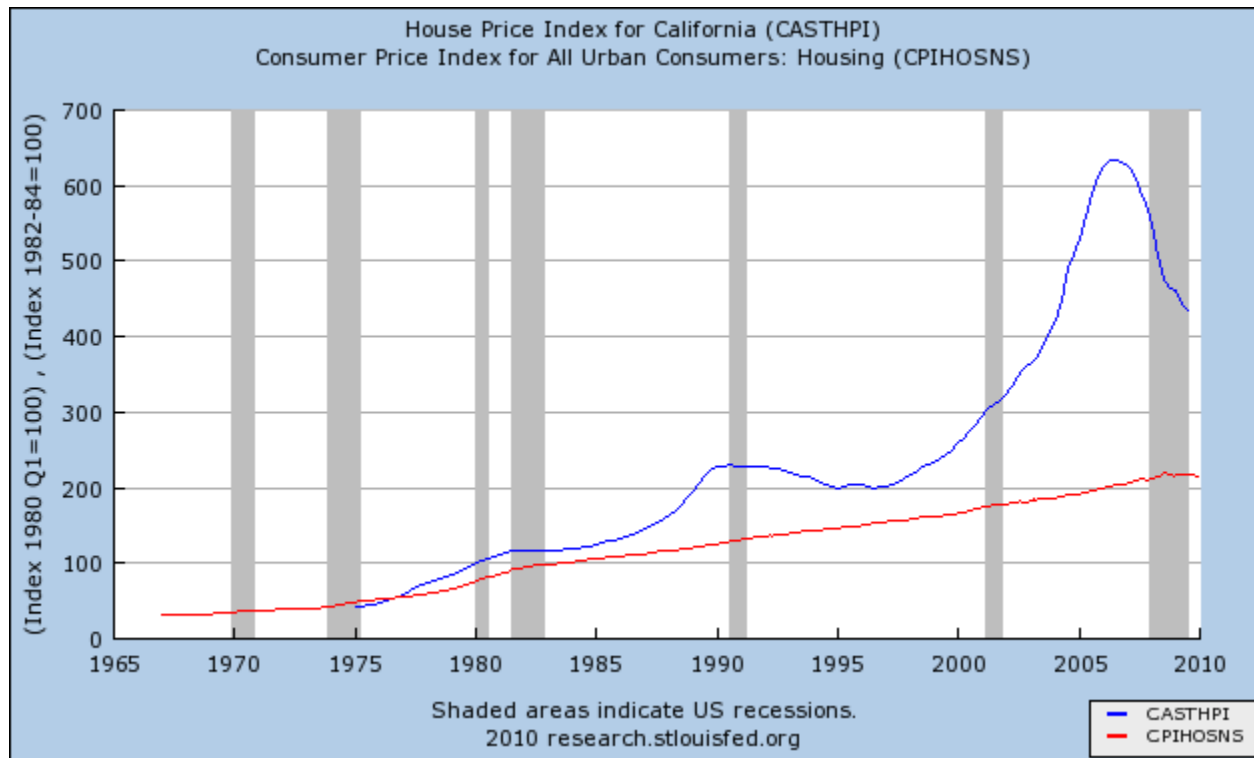
Effects of Zoning on Price

- Land Use Zoning – restricts amount of land that can be used for a specific purpose, e.g., residential
 - Will this always raise the price (compared to no governmental zoning)? Why or why not?
 - Will the increase in price reflect solely the restriction of supply? Why or why not?
 - How do you model land use zoning?
- Specific zoning regulations, e.g. maximum coverage or minimum lot size (within residential category)
 - Will this always raise the price (compared to no governmental zoning)? Why or why not?
 - Will the increase in price reflect solely the restriction of supply? Why or why not?
 - How do you model specific zoning regulations?

Statistics

- Mean vs. Median: Symmetric vs. Skewed Distributions
- FRED 2
- FRED GRAPH

California Housing Prices vs. Housing Component of National CPI



Graphics thanks to FRED-GRAPH

[http://research.stlouisfed.org/fred2/graph/?](http://research.stlouisfed.org/fred2/graph/)