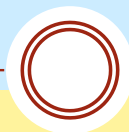


Models of Competition



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Comments on the materials in this slide set



- These materials are designed to provide you with a broad base of theoretical and conceptual constructs, and discussion of issues.
- I have included materials that serve as review of topics you should have done in the introductory economics (INQR/IHSS 1200).
- You must go over this slide set – BM1 – in its entirety on your own to review the basic materials.

Outline of these lecture slides



- Outline theories and concepts to lay foundation for analysis
- Examine
 - Nature of industries and markets
 - Characterization of demand and costs
 - Models of perfect competition and monopoly
 - The different dimensions in which firms compete
 - Firms' key decision variables
- Next set of slides – BM2 – we will discuss
 - Model of *Bertrand* differentiated product price-competition

Industries

Examples



- Industries produce specific types of products or services
 - Pharmaceuticals
 - Medical Devices
 - Airlines
 - Automobiles
 - Telecommunications
 - Physicians and hospitals
 - Insurance
 - Semiconductors
- Some decision variables are similar across industries (e.g., price and quantity) while others can vary considerably (e.g., variety, quality, or innovation – e.g., manifested in R&D and patents)

Industries

Structure



- Industries can have very different structures
- Commonly used measures of structure are
 - Number of firms
 - Size distribution of firms
 - Concentration ratio
 - ✦ E.g., four-firm concentration ratio; Hirschman-Herfindahl Index
- Some examples
 - Aircraft engine manufacturing: very small number of firms; very high concentration
 - Ready-to-eat breakfast cereals: few firms, higher concentration
 - Specific cancer therapies: few firms, highly concentrated
 - Maple syrup: large number of firms; lower concentration



Review of microeconomics

I will not discuss this slide set in detail as demand, elasticities, costs, profits, competition, and monopoly were part of IHSS/Econ 1200.

You must read through the materials in BM1 yourself.

The concepts here will be important for the next segment on oligopoly – slides BM2.

Defining a Market



- Before we discuss models of competition, it is important to think about what constitutes the *relevant market*
- Cancer therapies: Markets can be wide across countries, but products/treatment categories very narrow.
- Arterial stents: Markets are wide across many countries, but products/treatment categories very narrow.
- Automobiles: Ferrari and Hyundai do not compete. Highly differentiated products due to attributes.
- Electricity: An electricity generator in California does not compete providing service with one in Florida. Geographic segmentation due to transmission constraints.
- Plumbing service: Markets are local. Mobility of labor.
- We define a market by examining the *substitutability* of the products or services

Defining a Market

Cross-Price Elasticity: Concept



- Concept: **cross-price elasticity of demand (CPE)**
- Consider two products Y and X

$$\varepsilon_{Q(Y), P(X)}^D = \left\{ \frac{\text{Percentage change in quantity demanded of } Y}{\text{Percentage change in price of } X} \right\}$$

$$\varepsilon_{Q(Y), P(X)}^D \begin{cases} > 0 & \text{Substitutes in consumption : e.g., Coke and Pepsi} \\ = 0 & \text{Unrelated in consumption : e.g., pens and sugar} \\ < 0 & \text{Complements in consumption : e.g., cars and petrol} \end{cases}$$

Defining a Market

Cross-Price Elasticity: Concept



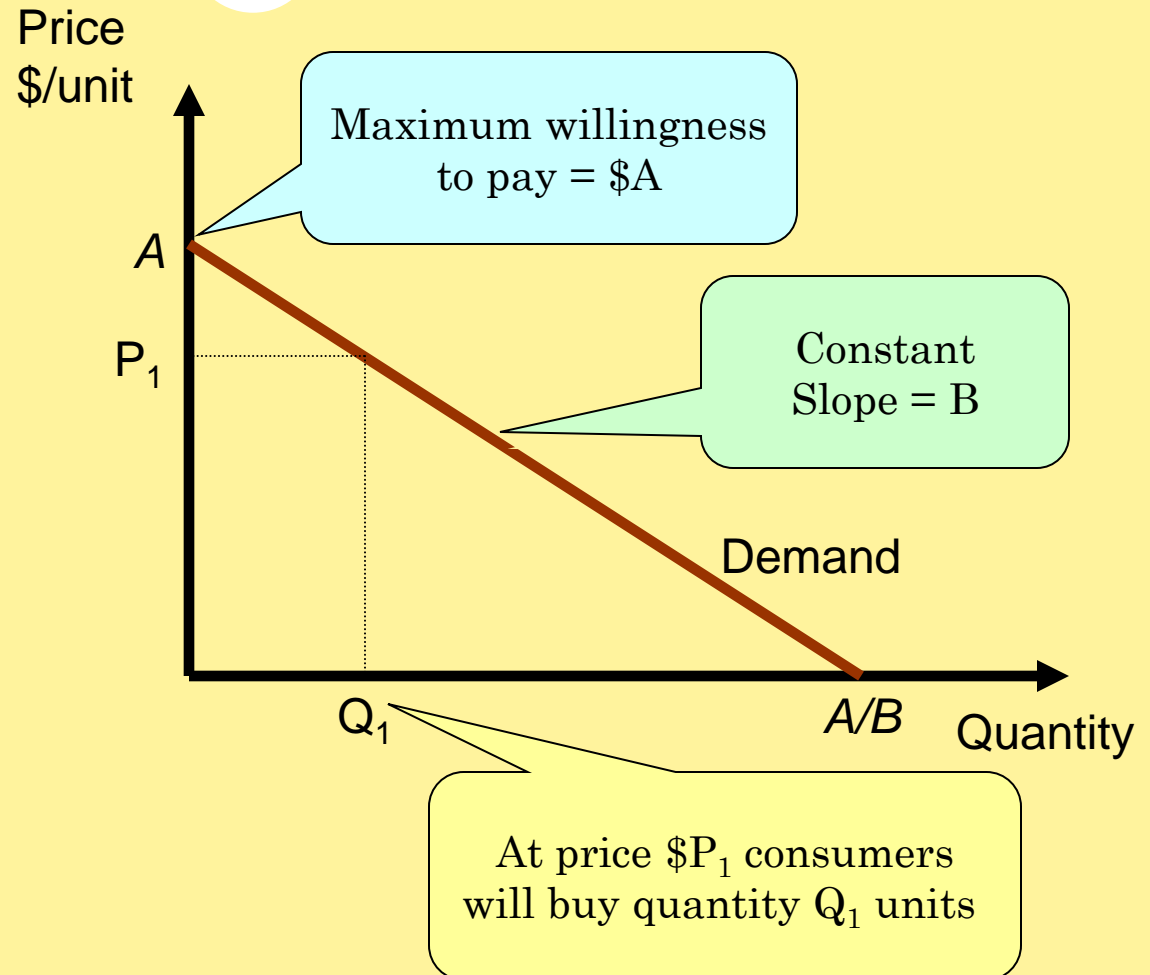
- For a product like the automobile, the extent of product differentiation is important
 - Ferrari and Hyundai: $CPE \approx 0$
 - Toyota Camry and Hyundai Sonata: $CPE > 0$
- For electricity service provision, distance is important
 - Increase in distance tends to render $CPE \approx 0$
- Defining the *relevant market* is important, otherwise we may not be able to properly assess the effects of a regulation on the market participants

Market Demand

Standard Linear

Linear Demand
 $P = A - B \cdot Q$

E.g.,
 $P = 10 - 2Q$



Market Demand

Own-Price Elasticity: Concept



- Concept: **own-price elasticity of demand**
- Consider demand for “vacation cruises”

$$\varepsilon_{Q(\text{cruise}), P(\text{cruise})}^D = \left\{ \frac{\text{Percentage change in quantity demanded of cruises}}{\text{Percentage change in price of cruise}} \right\} < 0$$

$$\left| \varepsilon_{Q(\text{cruise}), P(\text{cruise})}^D \right| \begin{cases} > 1 & \text{elastic demand} \\ < 1 & \text{inelastic demand} \end{cases}$$

Market Demand

Own-Price Elasticity: Concept



- Suppose (absolute value) of elasticity for electricity is **0.3**
 - It implies that a 10% rise in price of electricity will lead to a 3% decrease in the quantity demanded of electricity
 - Electricity is a necessity, hence it is not very price elastic
 - Electricity has no meaningful substitutes
- Suppose (absolute value) of elasticity for a BMW 7 series car is **9.4**
 - It implies that a 10% rise in the price of a BMW 7 series car will, *ceteris paribus*, lead to a 94% decrease in quantity demanded
 - BMW 7 series has several competitors, and some consumers will switch away to other brands
 - Consumers have the option of postponing purchases
 - BMW 7 series is a luxury item

Market Demand

Own-Price Elasticity: Concept



- Own-price elasticity is a very important concept
- Whether a product or service is relatively a necessity or luxury determines elasticity
- Whether a product or service has **substitutes in consumption** determines elasticity
 - E.g., BMW 5-series has substitutes (Audi, Lexus, Mercedes, etc) and consumers are likely to shop around more if BMW raises its price. This influences the price BMW can set
 - E.g., in the Hong Kong to Tokyo flight segment, 4 airlines (Japan Airlines, Cathay Pacific Airways, All Nippon Airways, and Delta) offer direct flights. This affects the ability of any one airline to charge high prices

Market Demand

Own-Price Elasticity: Estimates

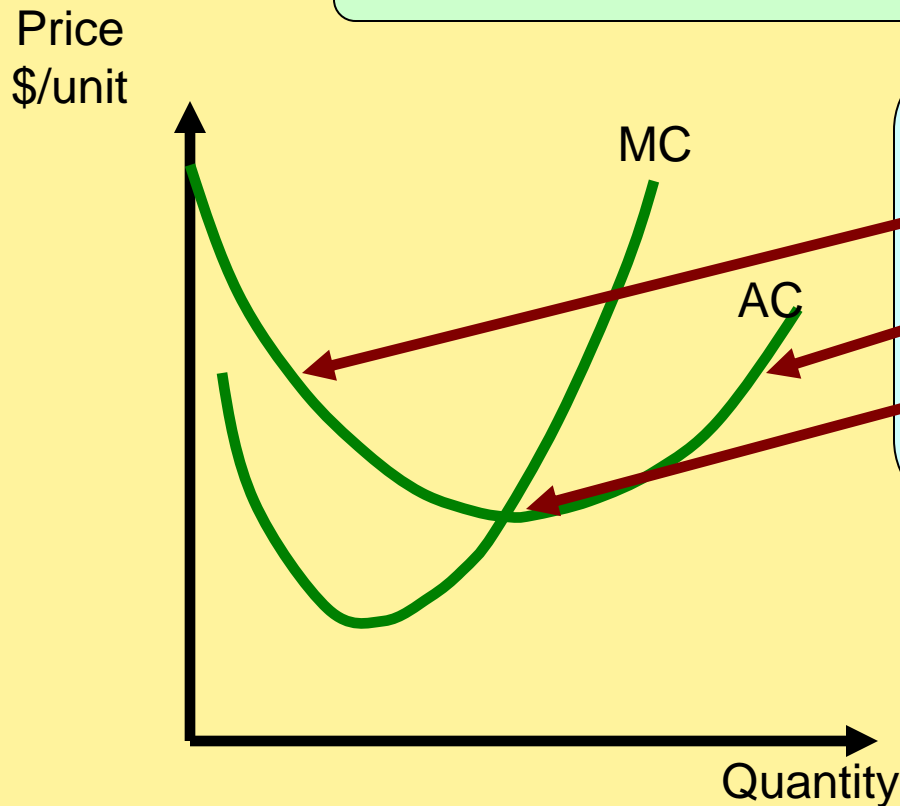


- Some illustrative estimates of own-price elasticities (absolute values) from U.S. market data
 - Beer: Miller Lite = 2.10; Budweiser = 3.80
 - Cars: Honda Accord = 51.6
 - Breakfast cereals: Kellogg's Corn Flakes = 3.4; Rice Krispies = 2.3
 - Soft drinks (2-liter bottle): Coke = 3.9; Mountain Dew = 3.7
 - Gasoline (petrol): 0.04
 - ✦ This estimate (based on short-run consumption data) indicates that a 10% increase in price of gasoline leads to a 4% decrease in quantity demanded. Inelastic, as expected, due to lack of viable alternatives.

Cost Functions

Standard U-Shaped

Typical average (AC) and marginal cost (MC) curves



Relationship between AC and MC

If $MC < AC$ then AC is falling

If $MC > AC$ then AC is rising

$MC = AC$ at the minimum of the AC curve

Cost Functions

Standard U-Shaped



- The precise shapes of the cost curves will arise from the nature of fixed-costs versus variable-costs
- If fixed-costs are very high, then the AC curve will show a larger declining segment
 - Larger scale economies
 - Pharmaceuticals: very high fixed-costs due to exorbitant costs of R&D, product development, testing, regulatory approvals; marginal cost per pill is very low
- If fixed-costs are low, then the AC curve will show a smaller declining segment
 - Smaller scale economies
 - A garden landscaping service company: relatively low fixed-costs; and higher variable costs

Models of Competition

Benchmark: Perfectly Competitive



- Some “illustrative” examples
 - Over 10,000 farms in the U.S. and Canada produce Maple syrup
 - Mediterranean coast has thousands of farmers growing olives
 - Dozens of firms worldwide make basic printer/copier paper and compete globally
 - Within a big city market, hundreds of individuals and small businesses provide repair and plumbing services
- In such markets, an individual seller typically has little or no influence on the market price, and has to take it as given
- If one seller attempts to raise its product or service price, consumers will switch away to buy from other sellers

Models of Competition

Benchmark: Perfectly Competitive



- Consider the **benchmark** classical model
- Many firms in the relevant market
- Many consumers
- Homogenous (or non-differentiated) product
- U-shaped average (AC) and marginal costs (MC)
- Little or no barriers to entry
- No sunk costs (non-recoverable cost component)
- Market demand is downward sloping
- Individual firm faces horizontal demand
 - Cannot change prices from what is given by the market
 - Individual firm's $MR=P$ (**explain**)

Models of Competition

Benchmark: Perfectly Competitive



- A firm in a competitive market exhibits **price-taking** behavior
- In this market, equilibrium results in $P=MC$
- Industry equilibrium occurs where the industry supply curve intersects the market demand curve
 - The industry supply curve is the horizontal summation of the individual firms' MC curves
- With zero/negligible entry barriers, entry and exit restore long-run competitive equilibrium of zero economic profits

Models of Competition

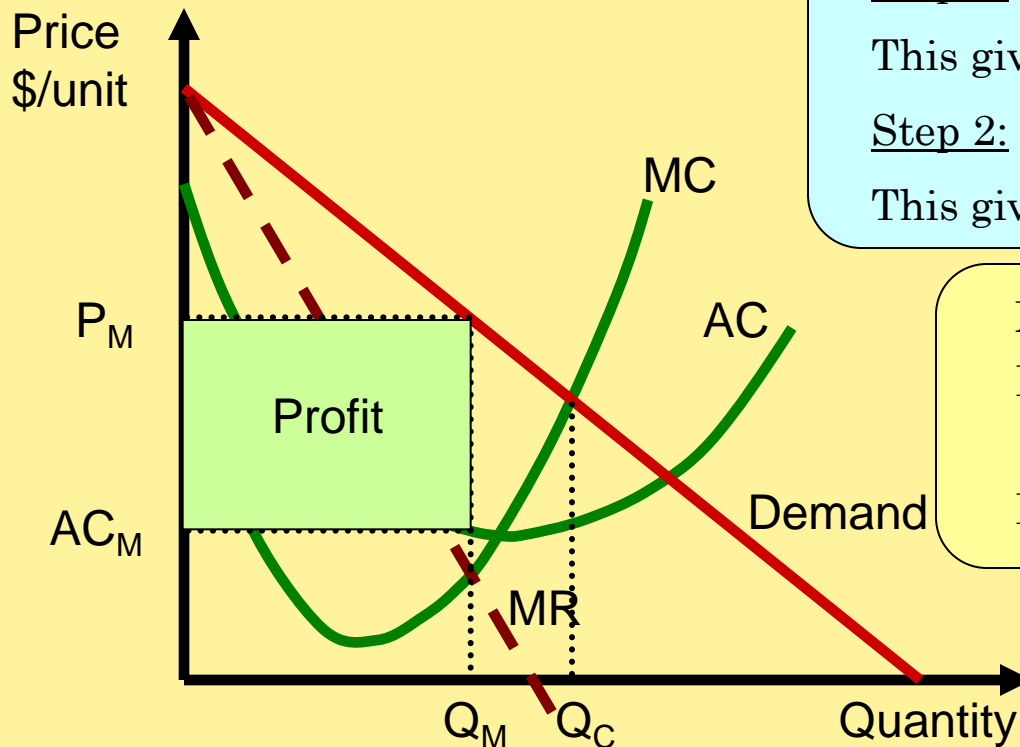
Monopoly



- Some “illustrative” examples
 - Only one airline that offers service on a particular route with no meaningful alternatives
 - ✦ E.g., Air France – Paris to Pointe A Pitre (Guadeloupe)
 - One dentist in a town with no alternatives within reasonable distance
 - One supplier of ready-made cement in the area
- Typically, a monopoly has two key features
 - No close substitutes
 - Barriers to entry (e.g.: patents; legal; scale economies; etc)
- Monopolies can be local, regional or national
- In such markets, the individual seller of the product or service will have the power to **set prices** of the product or service it sells

Monopoly and Profit Maximization

- Monopolist maximizes profit by equating marginal revenue with marginal cost



Step 1: Choose output where $MR = MC$

This gives output Q_M

Step 2: Identify market clearing price

This gives price P_M

MR less than price

Price greater than MC: loss of efficiency

Price greater than average cost

Positive economic profit

Long-run equilibrium: no entry

Competitive v. Monopoly Outcomes



- In competitive market (compared to monopoly)
 - Market price for the product or service is lower
 - Quantity transacted in the market is higher
 - Consumer surplus is higher
 - Producer surplus is lower
 - Total welfare is higher
 - Greater efficiency in the market
- While the idealized settings of the benchmark competitive market are hard to replicate, they serve as a very useful guidepost to what we may want to accomplish

Markets with Few Firms

Oligopoly



- The previous models were the extreme benchmarks – perfect competition and monopoly.
- Many markets are best treated as oligopolistic
 - Few firms – we will discuss duopoly (2 firms) markets
 - Likely barriers to entry
 - Likely sunk costs (non-recoverable entry costs)
 - Potentially differentiated products
- We will study one model of competition in oligopolistic markets
 - Bertrand price-competition with differentiated products
 - ✦ Slides BM2

Key Decision Variables



- Pharmaceuticals: firms have large **R&D** budgets and compete to obtain **patents**, success in commercialization and market power obtained via patents and advertising.
- Medical devices firms are similar to pharmaceuticals in some respects, but much different in others.
- Hospitals and medical clinics: compete in provision of service **variety** and **quality**

Numerical Problems



- I will provide sample questions a bit later so that you are proficient at solving numerical problems relating to competitive and monopoly markets