Chapter 12

Price Discrimination

Price Discrimination

- Price discrimination: selling the exact same product for different prices

- It's everywhere:

    - Disneyland charges locals $369 for an annual pass and $489 for out of towners

    - Airline fares

    - Computer with software bundles

    - Hotel rates

Conditions for Price Discrimination

- A firm engages in price discrimination by charging consumers different prices for the same good based on:

    - Individual characteristics

    - Belonging to an identifiable sub-group of consumers

    - The quantity purchased

Conditions for Price Discrimination

- Two reasons why firms earn a higher profit by price discriminating rather than charging a uniform price:

    1. Price discriminating firms charge higher prices to those who are willing to pay more than the uniform price

    2. Price discriminating firms also sell to some people who are not willing to pay the uniform price by identifying those consumers and charging less

Who Can Price Discriminate

- To successfully price discriminate, firms must meet 4 conditions:

  1. The firm must have at least some market power

  2. Consumers of different types must differ in their price elasticities of demand, the firm must be able to identify how they differ, and be able to identify what type of consumer everyone is

  3. Firms must be able to prevent resale between the different types

  4. The price discrimination must be legal!

Conditions for Price Discrimination

- A firm's inability to prevent resale is often the biggest obstacle to successful price discrimination

- Resale is difficult or impossible for services and when transaction costs are high

    - Haircuts, plumbing services, admissions that require ID

- Not all differential pricing is price discrimination

- It is not price discrimination if the different prices simply reflect differences in cost

    - Example: selling magazines at a newsstand vs. online subs

Not All Price Differences are Price Discrimination

- Suppose the OKC Thunder charge $25 per ticket for the upper level but charge $100 to sit in the lowest level — price discrimination?

- Suppose a bar of soap costs $1 but right next to it is a 6-pack of the same soap for $5 — price discrimination?

- Suppose an airline charges $100 for an OKC to Dallas flight in August and $200 for the same flight on December 24 — price discrimination?

- Sometimes the answer is nuanced and we need to consider carefully what the product is

Perfect Price Discrimination

- Also known as 1st Degree Price discrimination

- Under perfect price discrimination, the firm charges each consumer a price that is exactly equal to the maximum she is willing to pay

    - Each consumer gets zero consumer surplus

    - Firm profit is increased by the amount of consumer surplus that would exist in a competitive market — all CS is transferred to the firm

Perfect Price Discrimination

- The perfect price discrimination result of producing where demand equals MC means that the competitive quantity of output gets produced

- This outcome is efficient:

  - It maximizes total welfare

  - No deadweight loss is generated

- But the outcome is harmful to consumers because all surplus is producer surplus

2nd Degree Price Discrimination

- Also called nonlinear price discrimination

- Quantity discounts: the simply practice of making your purchase price sensitive to how many units of the good you've already purchased

    - Ordering thank you notes online

- Basic idea: each individual has different demand elasticities in regards to each subsequent unit purchased — reflects diminishing marginal returns

- Still, not differentiation between customers — everyone faces the same schedule of prices

- Note: not all quantity discounts are purely price discrimination, sometimes it just reflects cost differences

2nd Degree Price Discrimination

- Consider a firm that uses declining-block prices to maximize profit

  - $70 charged for $1 \leq Q \leq 20$

  - $50 charged for $Q > 20$

  - A consumer who buys 30 units pays $\$70 \times 20 = \$1400$ for the first block and $\$50 \times 10 = \$500$ for the second black for a total of $1900

- By contrast, under a non-discriminating monopoly, this consumer would be charged a uniform price of $60 and pay a total of $1800 for 30 units

Two-Part Pricing

- Another form of nonlinear pricing — **two part tariffs** — is when the firm charges a consumer a lump-sum fee for the right to purchase (**first tariff**) and a per unit fee for each unit actually purchased (**second tariff**)

  - First tariff is an access fee and the second a usage fee

  - Examples:

    - A country club charges a membership fee and green fees to play a round of golf

    - The state fair charges an entrance fee and a per ticket fee for rides

Tie-in Sales

- Another type of nonuniform pricing is a **tie-in sale**, in which customers can buy one product only if they agree to purchase another product as well

  - **Requirement tie-in sale**: customers who buy one product from a firm are require to make all purchases of related products from that firm

    - Example: photocopy machine buyers must buy services and supplies from the same company

  - **Bundling**: two goods are combined so that customers cannot buy either good separately

    - Example: refrigerators are sold with shelves

3rd Degree Price Discrimination

- Firms divide potential customers into two or more groups based on some easily observable characteristic and set a different price for each group

  - Senior and student discounts

- The firm choses quantities sold to each group Q_1 and Q_2:

$$\pi = R_1(Q_1) + R_2(Q_2) - C(Q_1 + Q_2)$$

- Then maximizes profit by setting derivative with respect to both Q_1 and Q_2 equal to zero: $\dfrac{\delta\pi}{\delta Q_1} = 0$ and $\dfrac{\delta\pi}{\delta Q_2} = 0$

- Marginal revenue from each group should be the same and equal to marginal cost: $MR_1 = MC = MR_2$

3rd Degree Price Discrimination Example

- $Q_1 = 100 - p_1$ and $Q_2 = 120 - 0.5p_2$

- $C(Q) = 2000 + 20(Q_1 + Q_2)$

- **Step 1**: find the inverse demand for Q_1 and Q_2

- **Step 2**: Find the revenue functions for Q_1 and Q_2 by multiplying the inverse demand functions by their respective Q

- **Step 3:** Find the MR functions for Q_1 and Q_2

- **Step 4**: Find the MC by taking the derivative of the cost function with respect to **TOTAL OUTPUT** $(Q_1 + Q_2)$

- **Step 5**: Set each MR function equal to MC and solve for $Q_1^*, Q_2^*, p_1^*,$ and p_2^*

3rd Degree Price Discrimination Example

- Step 1: inverse demand curves

    - $p_1 = 100 - Q_1$ and $p_2 = 240 - 2Q_2$

- Step 2: revenue functions

    - $R(Q_1) = 100Q_1 - Q_1^2$ and $R(Q_2) = 240Q_2 - 2Q_2^2$

- Step 3: marginal revenue

    - $MR_1 = 100 - 2Q_1$ and $MR_2 = 240 - 4Q_2$

- Step 4: marginal cost — **TREAT $(Q_1 + Q_2)$ IN THE COST FUNCTION AS ONE VARIABLE**

    - $MC = 20$

- Step 5: Set each MR = MC and solve for $Q_1^*, Q_2^*, p_1^*, p_2^*$

    - $100 - 2Q_1 = 20$ and $240 - 4Q_2 = 20$

    - $Q_1^* = 40, Q_2^* = 55, p_1^* = 60, p_2^* = 130$

3rd Degree Price Discrimination

- The derivatives on the previous slide imply that MR from each group should be the same and equal MC

- Because MR is a function of elasticity, we can write:

$$MR_1 = p_1(1 + \frac{1}{\epsilon_1}) = m = p_2(1 + \frac{1}{\epsilon_2}) = MR_2$$

$$\frac{p_1}{p_2} = \frac{1 + 1/\epsilon_1}{1 + 1/\epsilon_2}$$

- The higher price will be charged to the less elastic market segment

Some Points

- Note that because there's only one MC, the MR ends up the same across all sub-markets even though the price differs

- The optimal price for each group will depend on the group specific price elasticity — greater elasticity means lower prices for your group!

$$\frac{p_A}{p_B} = \frac{1 + \frac{1}{E_A}}{1 + \frac{1}{E_B}}$$

Real World Example

- Sometimes firms are able to implicitly price discriminate even though consumers face the same set of prices/opportunities

    - Coupons

    - Airline tickets — business travelers and recreational travel

    - Seasonal pricing for resort vacation packages

Advertising

- Monopoly firms don't just decide on price and quantity — also make important decisions about how much to advertise their products

- Advertising may positively influence consumers' preferences and thereby increase demand

- Although higher demand increases gross profit, if the cost of advertising is substantial then net profit may or may not increase

Deciding Whether to Advertise

- Advertise if cost is less than the additional gross profit, area B
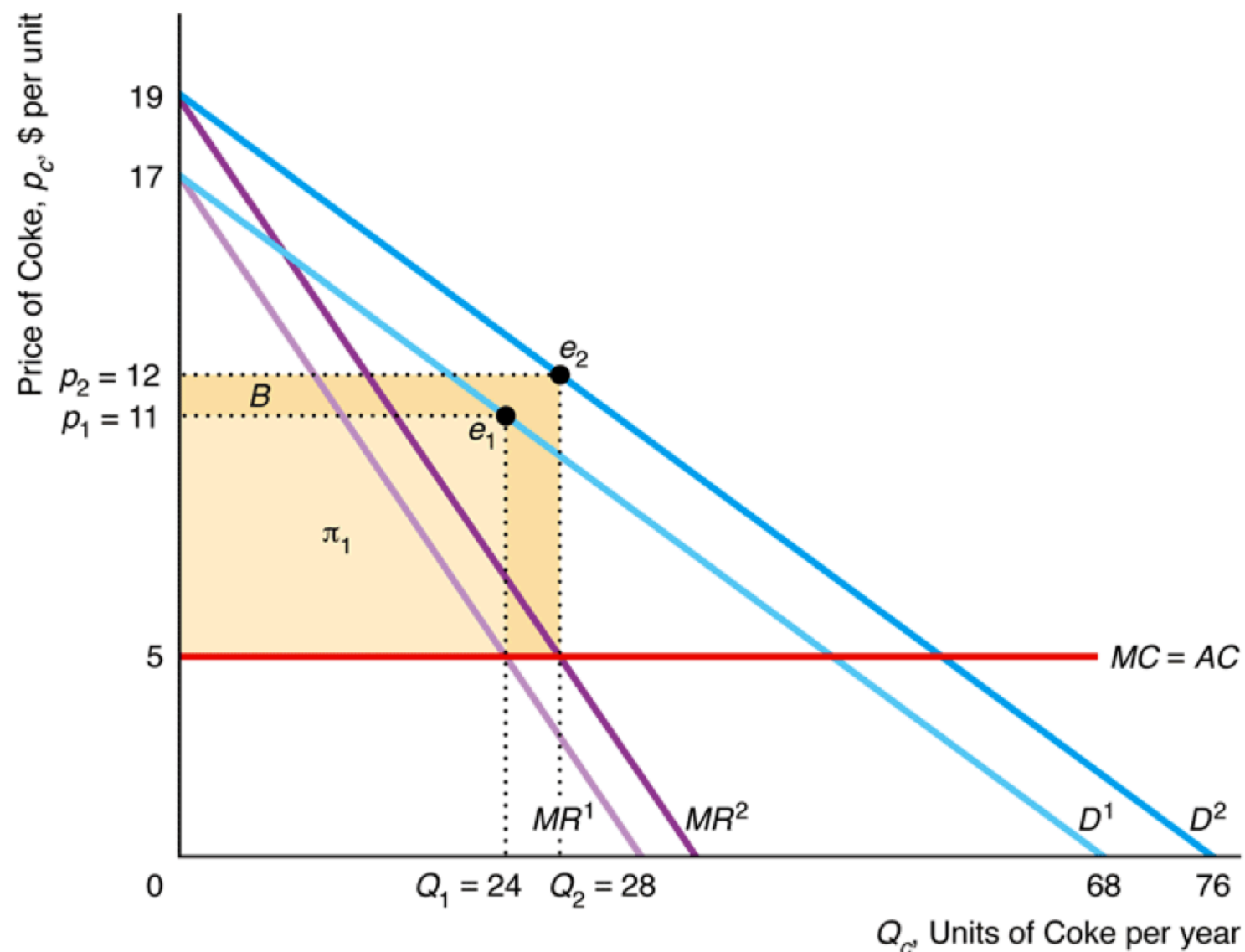
How Much to Advertise

- Given the maximization problem:

$$\pi = R(Q, A) - C(Q) - A$$

- The profit maximizing output and advertising levels are the $Q*$ and $A*$ that satisfy our profit maximization problem:

$$\frac{\delta\pi(Q,A)}{\delta Q} = \frac{\delta R(Q,A)}{\delta Q} - \frac{\delta C(Q)}{\delta Q} = 0 \text{ and } \frac{\delta\pi(Q,A)}{\delta A} = \frac{\delta R(Q,A)}{\delta A} - 1 = 0$$

- The monopoly advertises until the marginal benefit from the last unit of advertising equals $1, the marginal cost