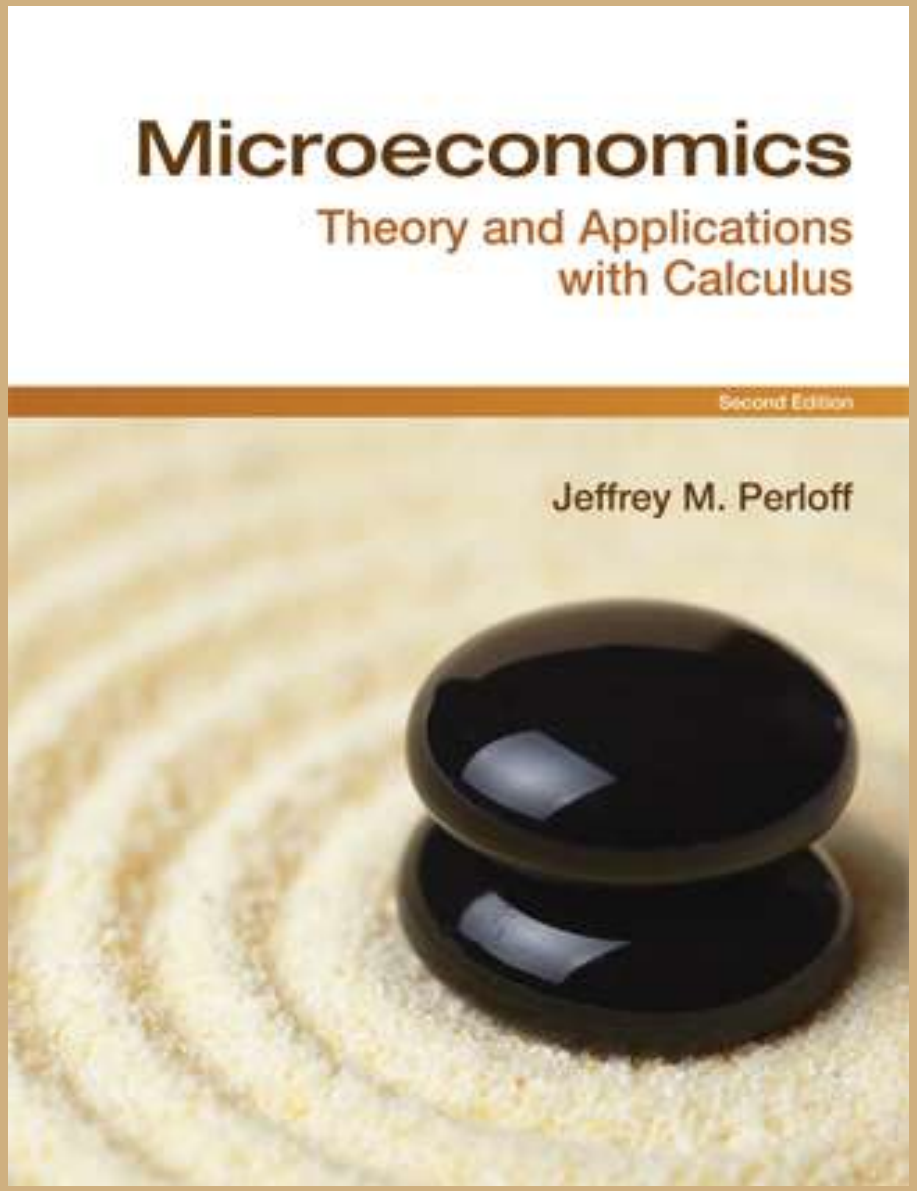
Chapter 12

Pricing and Advertising

Everything is worth what its purchaser will pay for it.

Publilius Syrus
(first century BC)



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Chapter 12 Outline

12.1 Why and How Firms Price Discriminate
12.2 Perfect Price Discrimination
12.3 Quantity Discrimination
12.4 Multimarket Price Discrimination
12.5 Two-Part Tariffs
12.6 Tie-In Sales
12.7 Advertising

12.1 Why and How Firms Price Discriminate

- Why does Disneyworld charge local residents $369 for an annual pass and out-of-towners $489?
- Why are airline fares less if you book in advance?
- Why are computers and software bundled and sold at a single price?

- Firms sometimes use ***nonuniform pricing***, where prices vary across customers, to earn a higher profit.

12.1 Why and How Firms Price Discriminate

- A firm engages in ***price discrimination*** by charging consumers different prices for the same good based on
  - individual characteristics
  - belonging to an indentifiable sub-group of consumers
  - the quantity purchased
- Two reasons why a firm earns a higher profit from price discrimination than uniform pricing:
  1. Price-discriminating firms charge higher prices to customers who are willing to pay more than the uniform price.
  2. Price-discriminating firms sell to some people who are not willing to pay as much as the uniform price.

12.1 Why and How Firms Price Discriminate

- Necessary conditions for *successful* price discrimination:
  1. A firm must have market power (otherwise it can't charge a price above the competitive price).
     - Examples: monopoly, oligopoly, monopolistically competitive, cartel
  2. A firm must be able to identify which consumers are willing to pay relatively more and there must be variation in consumers' ***reservation price***, the maximum amount someone is willing to pay.
  3. A firm must be able to prevent or limit resale from customers who are charged a relatively low price to those who are charged a relatively high price.

12.1 Why and How Firms Price Discriminate

- 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.
  - Examples: haircuts, plumbing services, admission that requires showing an ID
- Not all differential pricing is price discrimination.
- It is not price discrimination if the different prices simply reflect differences in costs.
  - Example: selling magazines at a newsstand for a higher price than via direct mailing

12.1 Types of Price Discrimination

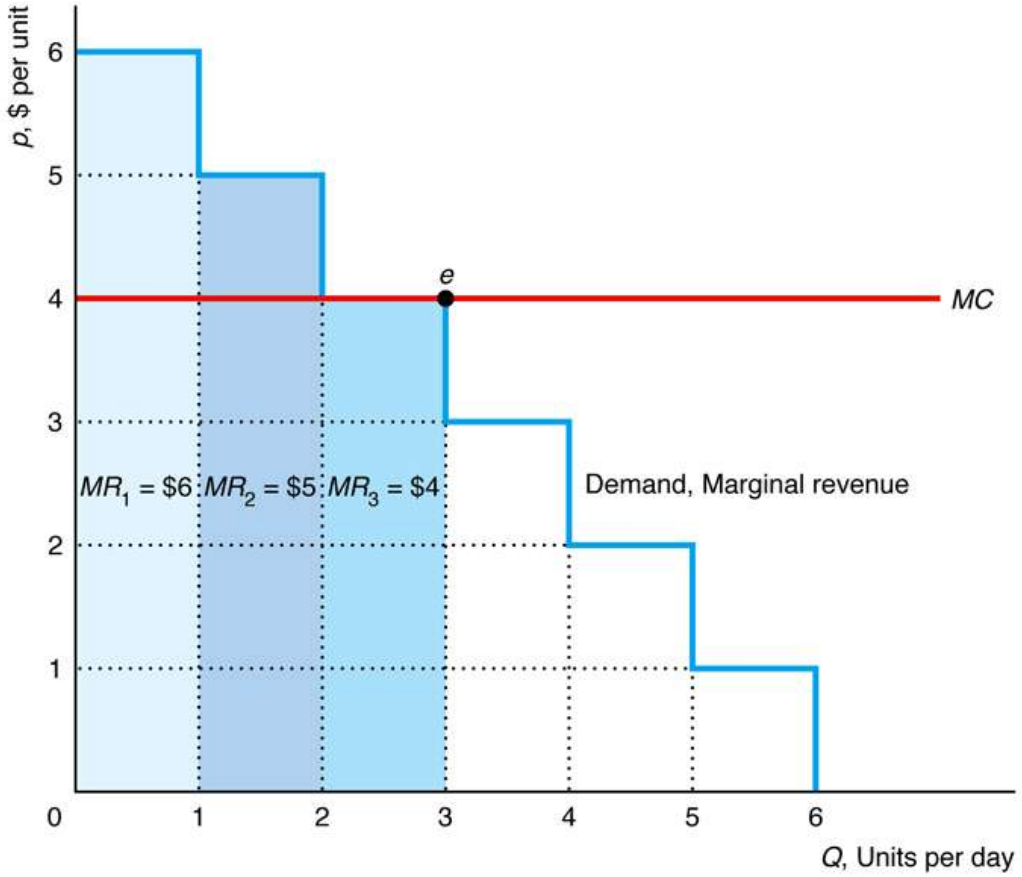
1. **First-degree**
   - Also known as ***perfect price discrimination***
   - Each unit sold for each customer's reservation price
2. **Second-degree**
   - Also known as ***quantity discrimination***
   - Firm charges a different price for large quantities than for small quantities
3. **Third-degree**
   - Also known as ***multimarket price discrimination***
   - Firm charges different groups of customers different prices, but charges any one customer the same price for all units sold

12.2 Perfect Price Discrimination

- Under perfect price discrimination, the firm charges each consumer a price that is exactly equal to the maximum he/she is willing to pay.
  - Examples: college financial aid, auto dealerships, clairvoyants
- Thus, 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.

12.2 Perfect Price Discrimination

- All consumer surplus is transformed into firm profit.



12.2 Perfect Price Discrimination

- If $D(Q)$ is the inverse demand function for total output, Q, and $p = D(Q)$ is the reservation price charged of each customer, the discriminating monopoly's revenue is:

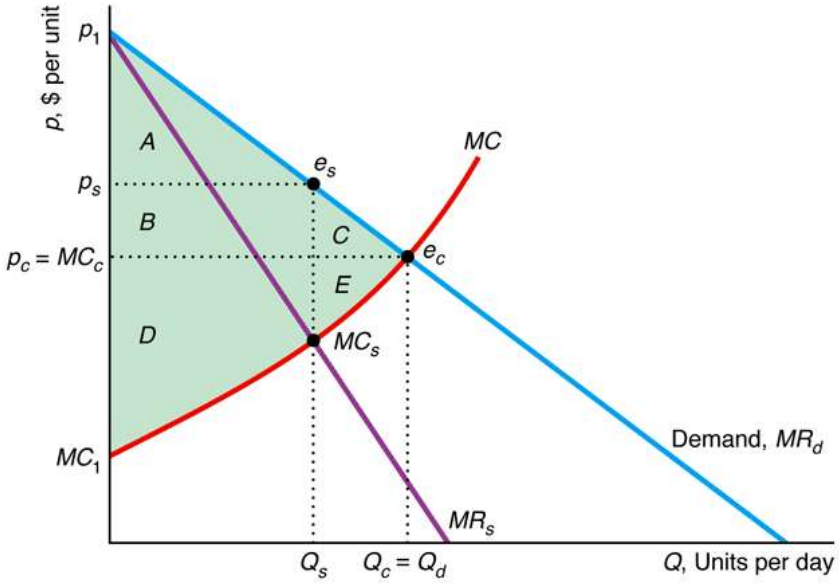
$$R = \int_0^Q D(z)\,dz$$

  - This is equal to the area under the demand curve up to Q.

- Maximizing profit by choosing output: $\max_Q \pi = \int_0^Q D(z)\,dz - C(Q)$
  - FOC: $\frac{d\pi}{dQ} = D(Q) - \frac{dC(Q)}{dQ} = 0$
- Result: produce where $D(Q)$ equals MC.

12.2 Perfect Price Discrimination

- Producing where Demand = MC, all consumer surplus (*A*+*B*+*C*) is transformed into firm profit.



		Monopoly	
	Competition	Single Price	Perfect Price Discrimination
Consumer Surplus, *CS*	*A* + *B* + *C*	*A*	0
Producer Surplus, *PS*	*D* + *E*	*B* + *D*	*A* + *B* + *C* + *D* + *E*
Welfare, *W* = *CS* + *PS*	*A* + *B* + *C* + *D* + *E*	*A* + *B* + *D*	*A* + *B* + *C* + *D* + *E*
Deadweight Loss, *DWL*	0	*C* + *E*	0

12.2 Perfect Price Discrimination

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

- Although this outcome is efficient…
  - it maximizes total welfare
  - no deadweight loss is generated

- … it is harmful to consumers because all welfare is producer surplus!

12.3 Quantity Discrimination

- Price varies only with the quantity purchased, not across different consumers buying the same quantity.

- Not all quantity discounts are price discrimination; some reflect reductions in firm costs associated with large-quantity sales.

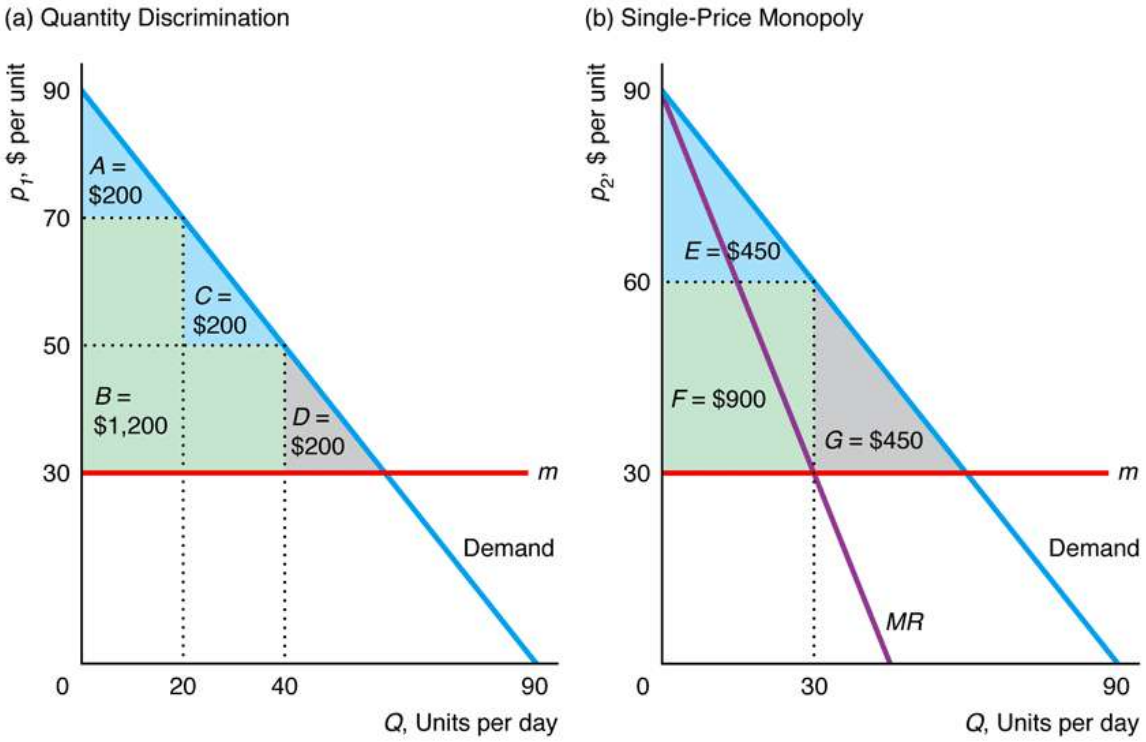
- Additionally, quantity discrimination may involve charging consumers ***more*** per unit rather than less.
  - Example: increasing-block pricing associated with electricity; per KWH charge increases the more you use.

12.3 Quantity Discrimination

- Consider a firm that uses declining-block prices to maximize profit.
  - \$70 is charged for $1 \leq Q \leq 20$
  - \$50 is charged for $Q > 20$
  - Thus, a consumer who buys **30 units** pays \$70 • 20 = \$1400 for the first block and \$50 • 10 = \$500 for the second block, for a total of \$1900.

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

12.3 Quantity Discrimination



	Quantity Discrimination	Single Price
Consumer Surplus, CS	$A + C = \$400$	$E = \$450$
Producer Surplus or Profit, $PS = \pi$	$B = \$1{,}200$	$F = \$900$
Welfare, $W = CS + PS$	$A + B + C = \$1{,}600$	$E + F = \$1{,}350$
Deadweight Loss, DWL	$D = \$200$	$G = \$450$

12.4 Multimarket 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.
  - Example: senior or student discounts
- The firm chooses quantities sold to each group, Q_1 and Q_2, such that $\max_{Q_1,Q_2} \pi = R_1(Q_1) + R_2(Q_2) - C(Q_1 + Q_2)$
  - FOCs:

$$\frac{\partial \pi}{\partial Q_1} = \frac{dR_1(Q_1)}{dQ_1} - \frac{dC(Q)}{dQ}\frac{\partial Q}{\partial Q_1} = 0 \qquad \frac{\partial \pi}{\partial Q_2} = \frac{dR_2(Q_2)}{dQ_2} - \frac{dC(Q)}{dQ}\frac{\partial Q}{\partial Q_2} = 0$$

  - Marginal revenue from each group should be the same and equal to marginal cost:

$$MR^1 = MC = MR^2$$

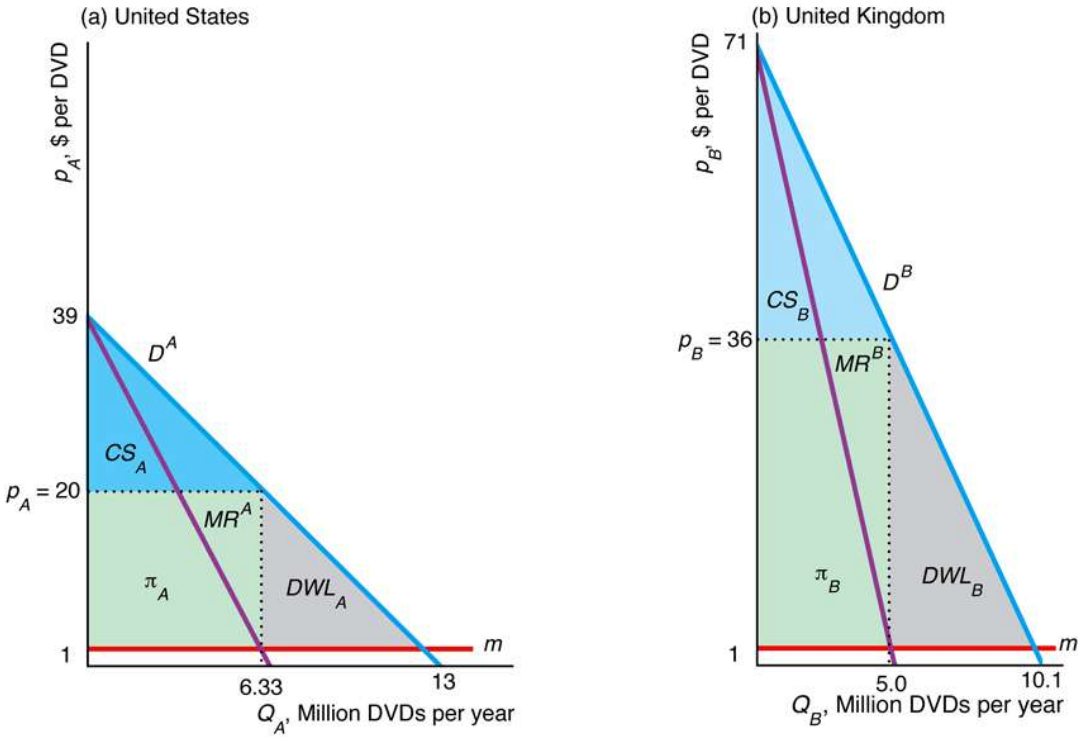
12.4 Multimarket Price Discrimination

- The first-order conditions imply that marginal revenue from each group should be the same and equal to marginal cost: $MR^1 = MC = MR^2$
- Because marginal revenue is a function of elasticity, we can write:
  - $$MR^A = p_A\left(1+\frac{1}{\varepsilon_A}\right) = m = p_B\left(1+\frac{1}{\varepsilon_B}\right) = MR^B$$

    $$\frac{p_B}{p_A} = \frac{1+1/\varepsilon_A}{1+1/\varepsilon_B}$$
- Thus, the higher price will be charged in the less elastic market segment.

12.4 Multimarket Price Discrimination

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



12.4 Multimarket Price Discrimination

- Welfare under multimarket price discrimination is lower than it is under either competition or perfect price discrimination.
  - Under competition, more output is produced and CS is greater

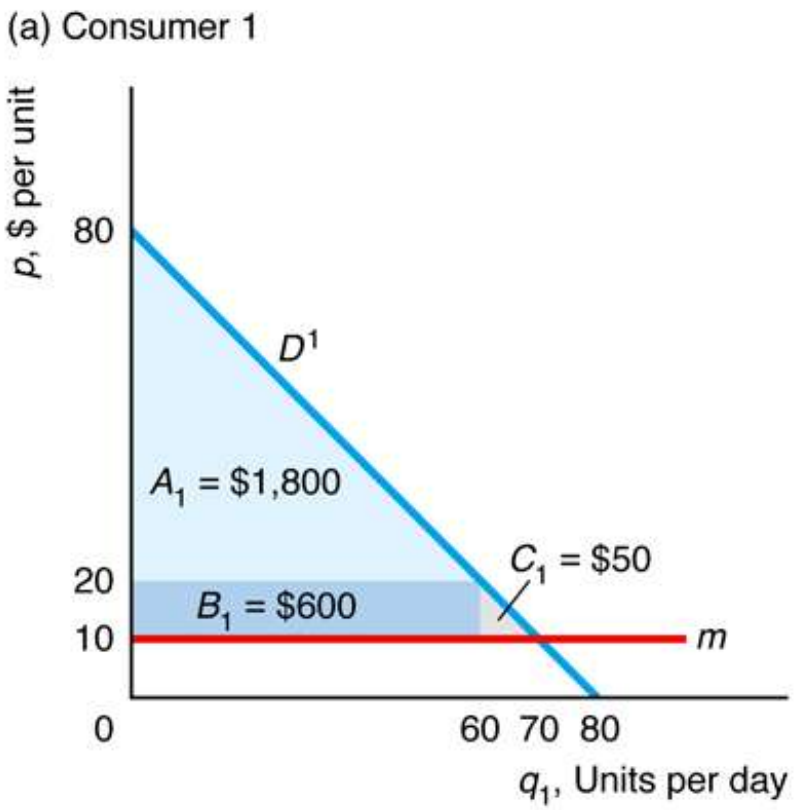
- The welfare effects relative to uniform price monopoly are indeterminate.
  - Both types of monopolies set price above marginal cost, so output is lower than in competition.
  - Welfare is likely to be lower with discrimination because of consumption inefficiency and time wasted shopping.

12.5 Two-Part Tariffs

- Another form of second-degree price discrimination, a ***two-part tariff*** 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).
  - Think of the first tariff as an "access fee" and the second as a "usage fee"
  - Examples:
    - A country club charges a membership fee and greens fees to play a round of golf
    - The state fair charges an entrance fee and a per ticket fee for rides
    - Cell phone service providers charge a monthly service fee and a fee per text message

12.5 Two-Part Tariffs

- If all consumers are identical, the firm can capture all CS by setting charging a lump-sum "access fee" equal to CS (A_1+B_1+C_1) and a "usage fee" equal to marginal cost (m).

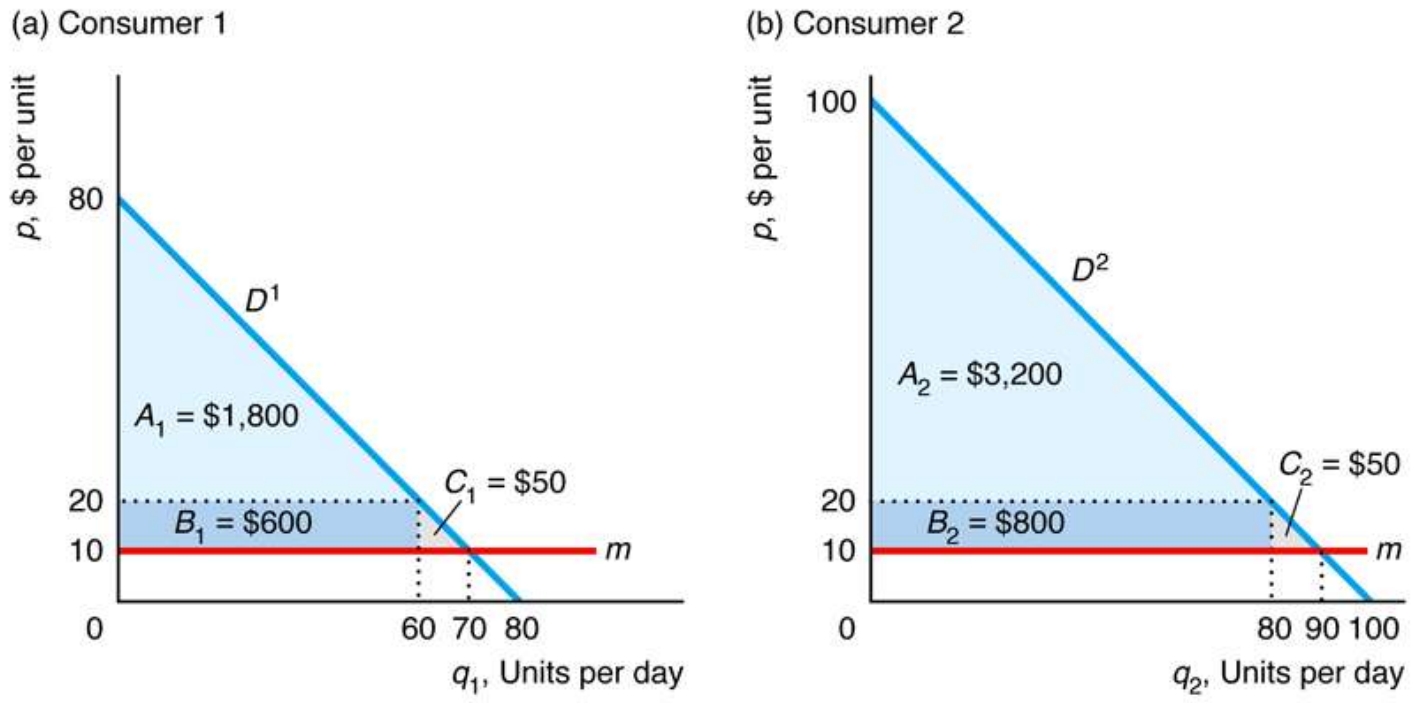


12.5 Two-Part Tariffs

- Now assume that the monopoly has two customers.
- If the firm can treat customers differently, it can still capture all consumer surplus as in the previous graph.
- If the firm has to charge all customers the same price, it maximizes profit by:
  - Setting the lump-sum "access fee" equal to the potential CS of the consumer with the smaller demand and a price that is above marginal cost.

12.5 Two-Part Tariffs

- With different customers, firm charges lump-sum fee of A_1 and per unit fee of $20.



12.6 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 required to make all purchases of another product from that firm.
    - Example: photocopying machine buyers must buy services and supplies from same company.
  - **Bundling**: two goods are combined so that customers cannot buy either good separately.
    - Example: Refrigerators are sold ***with*** shelves.

12.7 Advertising

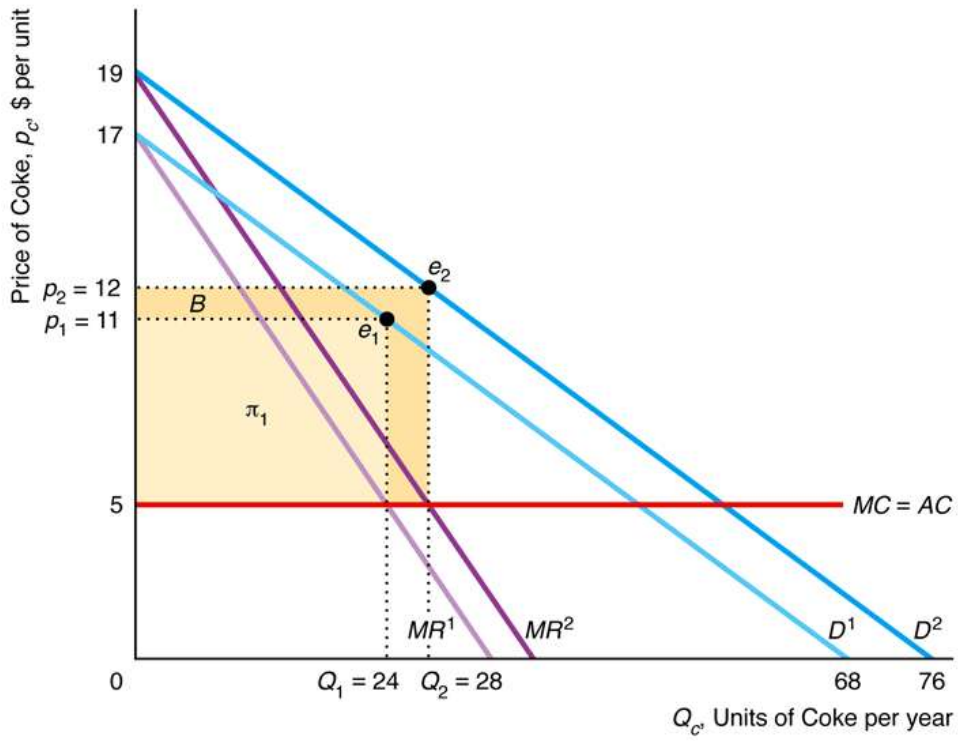
- Monopoly firms don't just decide on price and quantity, they also make important decisions about how much to advertise their products.

- Advertising may positively influence consumers' preferences and thereby increase demand for the product.

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

12.7 The Decision Whether to Advertise

- Advertise if cost is less than additional gross profit, area *B*.



12.7 How Much to Advertise

- If a monopoly raises advertising expenditures by $1, how much does its gross profit rise?
  - Additional advertising pays when gross profit rises by more than $1 following an additional dollar spent on advertising.
- Thus, the profit-maximizing amount of advertising equates the marginal benefit and marginal cost of advertising.
- Mathematically: $\max_{Q,\,A} \pi = R(Q,\,A) - C(Q) - A$
  - where R is revenue and is a function of output and advertising cost

12.7 How Much to Advertise

- Given the maximization problem:

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

- The profit-maximizing output and advertising levels are the Q^* and A^* that simultaneously satisfy the FOCs:

$$\frac{\partial \pi(Q,\,A)}{\partial Q} = \frac{\partial R(Q,\,A)}{\partial Q} - \frac{dC(Q)}{dQ} = 0 \qquad \frac{\partial \pi(Q,\,A)}{\partial A} = \frac{\partial R(Q,\,A)}{\partial A} - 1 = 0$$

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