



# Outline

- 1 Price Discrimination
- 2 Perfect Price Discrimination
- 3 Group Price Discrimination
- 4 Non-linear Price Discrimination
- 5 Two-Part Pricing
- 6 Bundling
- 7 Peak-Load Pricing
- 8 Pricing in Practice





# Price Discrimination

- Price discrimination occurs when a firm charges different prices for a good or service.
- Idea: Exploit the fact that, for almost any good or service, some consumers are willing to pay more for a good/service than others.
- Price discrimination increases profit above level achieved with uniform pricing via two channels:
  - 1 Higher prices for some.
    - Price discrimination can extract additional CS from consumers who place a high value on a good/service.
  - 2 New customers.
    - Firms can also sell to new customers who would not be willing to pay profit-maximizing uniform price.

# Get yer tickets!

## (a) No Extra Customers from Price Discrimination

Pricing	Profit from 10 College Students	Profit from 20 Senior Citizens	Total Profit
Uniform, \$10	\$100	\$200	\$300
Uniform, \$20	\$200	\$0	\$200
Price discrimination*	\$200	\$200	\$400

## (b) Extra Customers from Price Discrimination

Pricing	Profit from 10 College Students	Profit from 5 Senior Citizens	Total Profit
Uniform, \$10	\$100	\$50	\$150
Uniform, \$20	\$200	\$0	\$200
Price discrimination*	\$200	\$50	\$250

\*The theater price discriminates by charging college students \$20 and senior citizens \$10.

Notes: College students go to the theater if they are charged no more than \$20. Senior citizens are willing to pay up to \$10. The theater's marginal cost for an extra customer is zero.

# Necessary Conditions for Price Discrimination

- To price discriminate, the firm must:
  - ① Have market power.
    - Monopolist, oligopolist, or monopolistically competitive firm may be able to price discriminate.
    - Perfectly competitive firm cannot.
  - ② Identify groups with different price sensitivities.
    - Firm must identify demand differences across consumers.
  - ③ Prevent resale.
    - This is usually the biggest obstacle to price discrimination.
    - Why?

# Necessary Conditions for Price Discrimination

- Resale is easier in some industries than others.
- Managers can take actions to make resale more difficult.
  - Raise transaction costs.
    - E.g. require photo id for use of low priced tickets.
  - Require contracts forbidding resale.
    - E.g. Student discounts on computers/software.
  - Void warranties if purchase from unauthorized retailer.
    - E.g. Nikon and international resale; Costco and watches.



# Not all Price Differences are Price Discrimination

- While it can be profit maximizing for a firm with market power to price discriminate, not all price difference are due to price discrimination.
- Some price differences are due to differences in costs.
  - E.g. Newsstand vs. subscription price for magazines.

# Types Price Discrimination

- Three main types of price discrimination:
  - Type 1: Perfect Price Discrimination (1st degree price discrimination)
    - The firm sells each unit at the maximum amount any customer is willing to pay.
    - Price differs across consumers, and may even differ for a given consumer.
  - Type 2: Group Price Discrimination (3rd degree price discrimination)
    - The firm charges each group of customers a different price, but it does not charge different prices within the group.
  - Type 3: Non-linear Price Discrimination (2nd degree price discrimination)
    - The firm charges a different price for large purchases than for small quantities so that the price paid varies according to the quantity purchased.

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## Perfect Price Discrimination

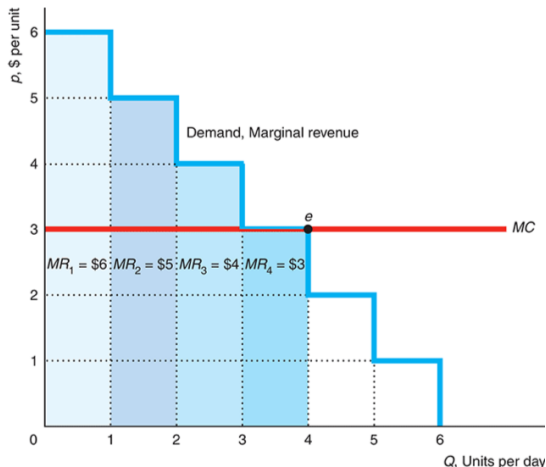
- A firm with market power that can prevent resale and has full information about its customers' willingness to pay price discriminates by selling each unit at the *reservation price*.

### Definition (Reservation Price)

The maximum amount any consumer would pay for a good.

- Given the demand curve indicates willingness to pay, the reservation price is given by the height of the demand curve at each output level.
- Hence, a perfectly price-discriminating firm's marginal revenue is the same as its price.
  - This means the firm's marginal revenue curve is the same as its demand curve.

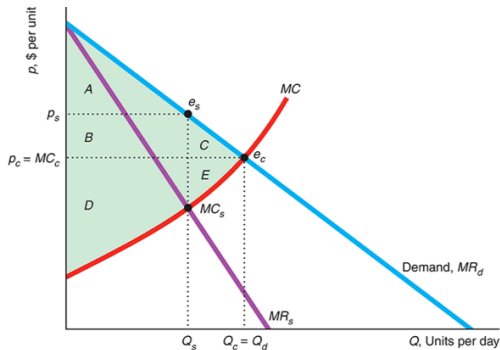
# Perfect Price Discrimination



# Perfect Price Discrimination

- Perfect price discrimination is efficient because it maximizes the sum of consumer surplus and producer surplus.
- But all of the surplus goes to the firm; consumer surplus is zero.
- Consumer surplus is greatest with competition, lower with a single-price monopoly, and eliminated by perfect price discrimination.

# Perfect Price Discrimination



	Monopoly		
	Competition	Single Price	Perfect Price Discrimination
Consumer Surplus, CS	$A + B + C$	$A$	$0$
Producer Surplus, PS	$D + E$	$B + D$	$A + B + C + D + E$
Total Surplus, $TS = CS + PS$	$A + B + C + D + E$	$A + B + D$	$A + B + C + D + E$
Deadweight Loss	$0$	$C + E$	$0$

# Perfect Price Discrimination in Practice

- Perfect price discrimination is rarely fully achieved in practice.
- Firms can still increase profits with imperfect individual price discrimination.
  - Idea: charge individual-specific prices to different consumers, which may or may not be the consumers' reservation prices.
- Historically, it was difficult to gather information on consumer reservation prices due to high transaction costs, but this is changing.
  - Change largely due to computer technology.
  - Hotels, car/truck rental companies, cruise lines, airlines, and other firms are increasingly using individual price discrimination.



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# Group Price Discrimination

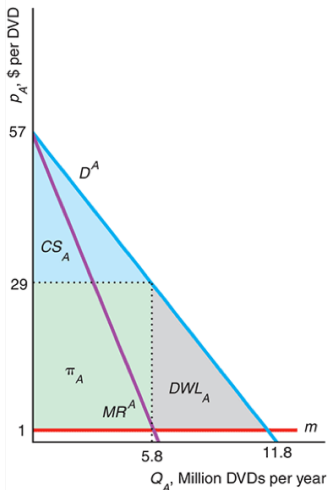
- Group price discrimination occurs when potential customers are divided into two or more groups with different prices for each group (and a single price within a group).
- Two conditions for group price discrimination.
  - 1 Consumer groups must differ via an observable characteristic (age, location, etc).
  - 2 The firm must have market power, be able to identify groups with different reservation prices, and prevent resale.

## 2 Group Example

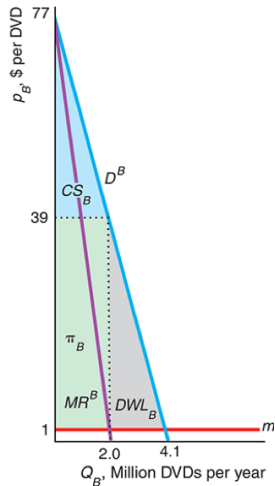
- Warner Brothers, a legal monopoly by copyright, produces and sells *Harry Potter and the Deathly Hallows, Part 2* on DVD in various countries.
- Warner Bros. engaged in group price discrimination by charging different prices in different countries.
  - Resale not possible because DVDs have incompatible formats.
- In this case, Warner Bros has a common marginal cost, and maximizes profit by acting like a traditional monopoly in each market.
  - Differences in prices across countries reflects differences in demand.

## 2 Group Example

(a) United States



(b) United Kingdom



## 2 Group Example

- With two groups ( $A$  and  $B$ ), and a common marginal cost, a firm engaged in group price discrimination produces where:

$$MR^A = MC = MR^B$$

- Recall that for a profit maximizing monopolist:  $MR = p[1 + 1/\varepsilon]$ . Thus:

$$MR^A = p_A[1 + 1/\varepsilon_A] = MC = p_B[1 + 1/\varepsilon_B] = MR^B$$

Which implies:

$$\frac{p_B}{p_A} = \frac{[1 + 1/\varepsilon_A]}{[1 + 1/\varepsilon_B]}$$

That is, the ratio of prices depends on the elasticity of demand in the two markets.

# Necessary Conditions for Group Price Discrimination

- Key issue for group price discrimination: dividing customers into groups.
- How might a firm do this?

# Necessary Conditions for Group Price Discrimination

- Two possible approaches:
  - 1 Divide based on observable characteristics.
    - Idea: Some characteristics are associated with high/low reservation prices or demand elasticities.
  - 2 Divide based on actions.
    - Idea: Allow people to self select on the basis of the value of time.

# Group Price Discrimination and Consumer Surplus

- $CS$  is greater and more output is produced with perfect competition than with group price discrimination.
  - Group price discrimination transfers some of the competitive  $CS$  to the firm as additional profit, and causes deadweight loss due to reduced output.
- It is not clear if  $TS$  is higher if a monopoly uses group price discrimination or a single price.
  - The closer the firm comes to perfect price discrimination using group discrimination, the more output it produces, increasing  $TS$ .



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# Non-linear Price Discrimination

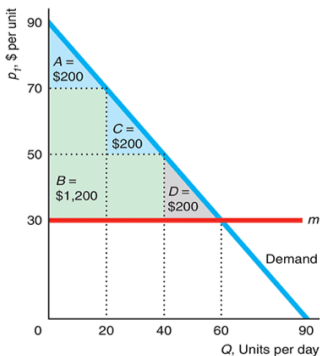
- Many firms are unable to determine the reservation prices of consumers even though they have market power and the ability to prevent resale.
- However, they can exploit the fact that a typical demand curve is downward sloping.
- In this case, the firm can price discriminate by letting the price each consumer pays vary with the number of units they buy (*non-linear price discrimination*).

# Non-linear Price Discrimination

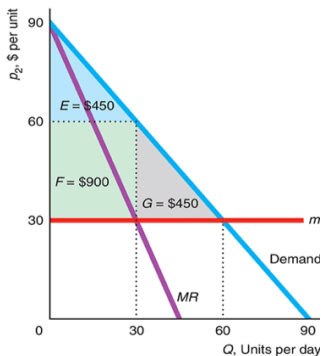
- Example of non-linear price discrimination: Block pricing.
  - With block pricing, the firm charges one price per unit for the first block purchased, and a different price per unit for subsequent blocks.
    - This strategy is often used by utilities.
- The more block prices a firm can set, the closer the firm gets to perfect price discrimination.

# Non-linear Price Discrimination

(a) Quantity Discrimination



(b) Single-Price Monopoly



	Block Pricing	Single Price
Consumer Surplus, $CS$	$A + C = \$400$	$E = \$450$
Producer Surplus or Profit, $PS = \pi$	$B = \$1,200$	$F = \$900$
Total Surplus, $TS = CS + PS$	$A + B + C = \$1,600$	$E + F = \$1,350$
Deadweight Loss, $DWL$	$D = \$200$	$G = \$450$

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# Two-Part Pricing

- With two-part pricing, the firm charges each consumer a lump-sum access fee for the right to buy as many units of the good as the consumer wants at a per-unit price.
- With two-part pricing, a consumer's overall expenditure for an amount  $q$  consists of an access fee,  $A$ , and a per-unit price  $p$ . So total expenditure is:

$$E = A + pq$$

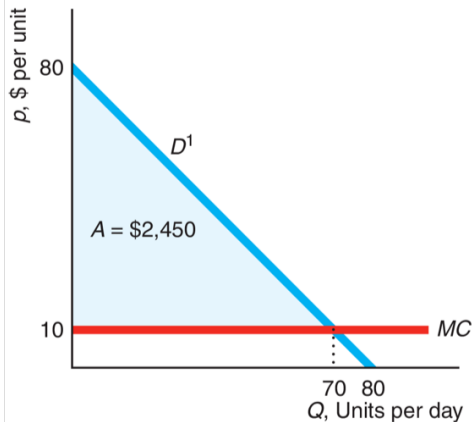
- To engage in two-part pricing, a firm must have market power, know how individual demand curves vary across its customers, and be able to prevent resale.

# Two-Part Pricing: Identical Consumers

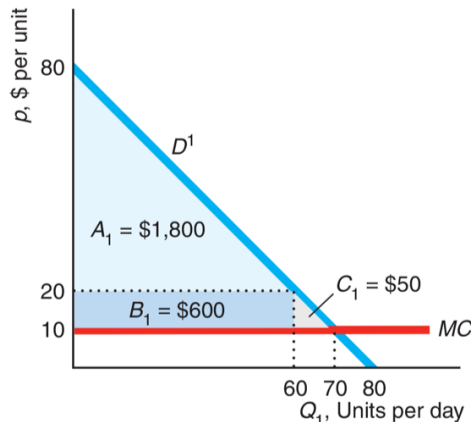
- With identical consumers, a firm can set a two-part price that is efficient ( $p = MC$ ), and results in all surplus going to the firm ( $CS = 0$ ).
- In this case, if the firm were to charge  $p > MC$ , it would sell fewer units and make a smaller profit.

# Two-Part Pricing: Identical Consumers

(a) Price Equals Marginal Cost



(b) Price Is Above Marginal Cost



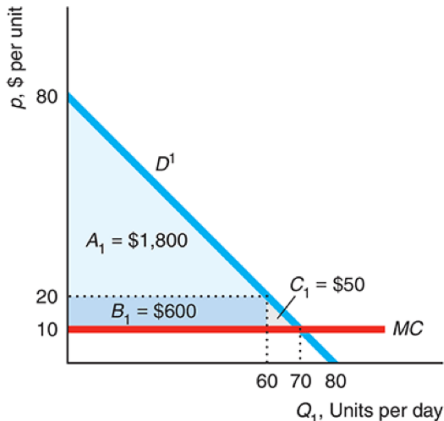


# Two-Part Pricing: Heterogeneous Consumers

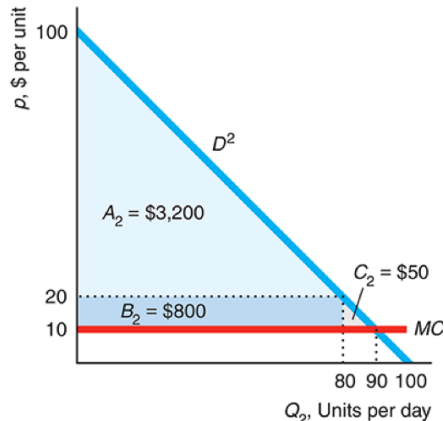
- Two-part pricing is more complex if different consumers have different demand curves.
- Different demand curves implies consumers have different  $CS$ .
- Two-part pricing would require that the monopolist charge different access fees, and this may not be possible.

# Two-Part Pricing: Heterogenous Consumers

(a) Valerie



(b) Neal



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# Bundling

- Firms with market power often pursue a pricing strategy called bundling, where they sell multiple goods or services at a single price.
- Most goods are bundles of many separate parts, but firms may bundle even when there are no production advantages and transaction costs are small.
- Bundling allows firms to increase profit by charging different consumers different prices based on their willingness to pay.

# Bundling

- There are two main forms of bundling:
  - 1 Pure bundling: Only a package deal is offered.
  - 2 Mixed bundling: Goods are available as a package or separately.

## Bundling: Example

- Classic example of bundling: Corel WordPerfect Office
- Corel only sells components as part of a bundle (word processor, spreadsheet program, slideshow program, etc.).
- Whether or not this strategy is profitable depends on how reservation prices vary across consumers.
- For simplicity, assume the marginal cost of producing an extra copy of any program is essentially zero and fixed costs are negligible so that the firm's revenue equals its profit, and that the firm must charge all customers the same price – that is, the firm cannot price discriminate.

# Pure Bundling

- Pure bundling increases profits if consumers' reservation prices are negatively correlated.
  - This occurs when the customer who has the higher reservation price for one product has the lower reservation price for the other product.
- Pure bundling is more profitable because the firm captures more of the consumer's potential  $CS$  - their reservation price.

# Pure Bundling

	Word Processor	Spreadsheet	Bundle
Alisha	\$120	\$50	\$170
Bob	\$90	\$70	\$160
Profit-maximizing price	\$90	\$50	\$160
Units sold	2	2	2

Figure: Pure Bundling with Negatively Correlated Reservation Prices



# Pure Bundling

- Pure bundling decreases profits if reservation prices are positively correlated.
  - This occurs when the customer who has the highest reservation price for one product also has the highest reservation price for the other product.

# Pure Bundling

	Word Processor	Spreadsheet	Bundle
Carol	\$100	\$90	\$190
Dmitri	\$90	\$40	\$130
Profit-maximizing price	\$90	\$90	\$130
Units sold	2	1	2

Figure: Pure Bundling with Positively Correlated Reservation Prices

# Mixed Bundling

- With mixed bundling, consumers are allowed to buy the pure bundle, or to buy any of the bundle's components separately.
- As an example, let's revisit the software example.

# Mixed Bundling

	Word Processor	Spreadsheet	Bundle
Aaron	\$120	\$30	\$150
Brigitte	\$110	\$90	\$200
Charles	\$90	\$110	\$200
Dorothy	\$30	\$120	\$150

## Tie-in Sales

- Another form of bundling: Tie in sales
- Tie in sales require customers who buy one product from a firm to make all concurrent and subsequent purchases of a related product from that firm.
- Tie in requirement allows the firm to identify heavy users and charge them more per unit.
- Example: Printer manufacturers.
  - If the firm can require that consumers buy their ink cartridges from them, the firm will be able to capture most of the consumers' surplus. Heavy users pay more than light users due to the high cost of ink cartridges.
  - Manufacturers of printers (such as HP) use strategies (such as design of warranty) to encourage use of new brand-name cartridges and not to refill them.

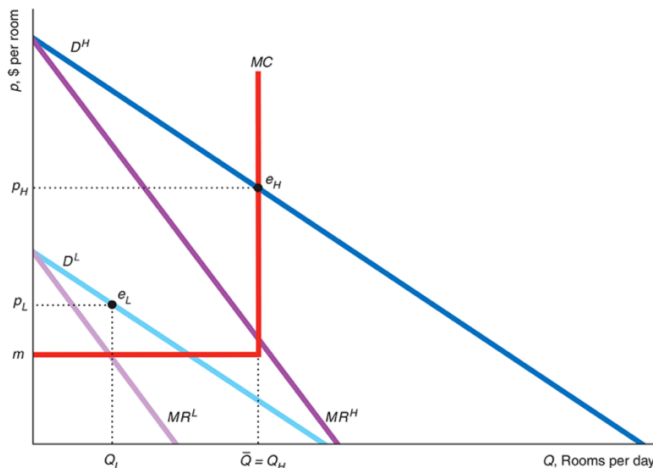
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# Peak-Load Pricing

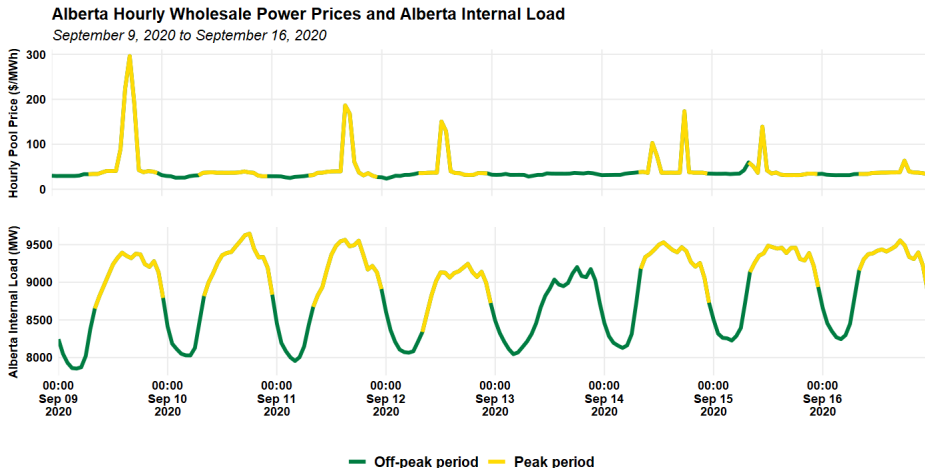
- Peak-load Pricing: Charge higher prices during periods of peak demand than in other periods.
- Commonly used by firms that face capacity constraints (e.g. hotels, airlines, utilities).
  - During peak demand period, the firm sets a high price to limit demand to available capacity.
  - During low demand period, profit maximizing price leaves excess capacity.

# Peak-Load Pricing





# Competitive Markets May Exhibit Higher Peak Pricing



Source: AESO data, graph by Andrew Leach. Peak periods are between 7am and 11pm other than on statutory holidays or Sundays.

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# Pricing in Practice: Whistler-Blackcomb

- Price discrimination, two-part pricing, bundling, and peak-load pricing are not mutually exclusive.
- Firms often use all four pricing tools simultaneously.
- E.g. Whistler-Blackcomb Ski Resort.

# Pricing in Practice: Whistler-Blackcomb

- Whistler satisfies three conditions needed to apply tools:
  - ① Has considerable *market power* as a top ski destination.
  - ② Obtains extensive *information* about customers by tracking skiing habits.
  - ③ Prevents *resale* of discount tickets (season pass/multi-day ticket) by putting photo on pass.

# Pricing in Practice: Whistler-Blackcomb

- Whistler-Blackcomb:
  - engages in individual price discrimination based on an individual's skiing history.
    - By tracking skiing history and linking it to the customer's personal address, the company is able to send personalized promotions to customers.
  - engages in non-linear price discrimination by offering discounts for multi-day passes or groups.
  - engages in group price discrimination by setting different prices by age.
  - utilizes two-part pricing. Local residents can buy an access pass that allows them to pay lower daily prices in season.
  - utilizes bundling by combining lift tickets with rentals/lessons.
  - engages in peak load pricing by varying fees over week/season.

# Takeaways

- 1 Firms that have market power, information about consumer demand, and are able to prevent resale can engage in price discrimination.
- 2 Price discrimination allows the firm to capture some (or all) consumer surplus.
- 3 Two-part pricing, bundling, and peak-load pricing can also increase the profitability of a firm with market power.