OBJECTIVES

Objectives

- Explain how managers use price discrimination to increase profits
  - Identify submarkets with different price elasticities of demand
  - Segment the market and charge different prices to consumers in each submarket
MOTIVATION FOR PRICE DISCRIMINATION

- Figure 8.1: Single-Price Monopolist Profit-Maximizing Outcome
  - Single-price monopoly equilibrium fails to capture all consumer surplus and also results in a dead-weight loss.
  - Price discrimination provides a strategic mechanism for capturing some, or all, of this lost surplus.
FIGURE 08-01

Single-Price Monopolist Profit-Maximizing Outcome
Price discrimination: When the same product is sold at more than one price
  ▶ Differences in price among similar products are not necessarily evidence of price discrimination;
  ▶ Costs could also be different.
First-Degree Price Discrimination

- All customers are charged a price equal to their reservation price.
- The firm captures 100 percent of the consumer surplus.
- Equilibrium output and marginal cost are the same as under perfect competition.
- There is no dead-weight loss.
- Requires that firms have a relatively small number of buyers and that they are able to estimate buyers’ reservations prices
  - May be operationalized by means of a two-part tariff (see below)
  - Haggling
  - Car dealers with person-specific discounts plus extras (How high is your max budget?)
First degree price discrimination

**Figure 12.2 First-Degree Price Discrimination**
Second-Degree Price Discrimination

- Most commonly used by utilities (gas, electricity, water, etc.).
- Different prices are charged for different quantities of a good.
  - Two possibilities:
    a) different consumers pay different price if they buy different quantity
    b) each consumer pays different price for consecutive purchases
- What condition must be fulfilled to make this price discrimination possible?
Second-Degree Price Discrimination

Dollars per unit of output

Demand

P_0

P_1

P_2

Output

FIGURE 08-02
$3^{rd}$ DEGREE PRICE DISCRIMINATION

- **Conditions**
  - Demand must be heterogeneous; that is, different demand segments must have different price elasticities of demand.
  - Managers must be able to identify and segregate the different segments.
  - Markets must be successfully sealed so that customers in one segment cannot transfer the goods to another segment.
    - “segment and seal” - condition or
    - “no-arbitrage-condition”
Example: Students
- Limited income makes students more responsive to price differences.
- Students’ demand is thus likely to be more elastic than that of other segments.
- Students can be readily identified by their student IDs, aiding in segmentation.

Other groups
- Senior citizens for travel
- Airlines for business and tourists
- Seasonal prices
- Drugs, books in different countries
Optimal strategy

- Allocate total output so that marginal revenue in all segments is equal to the firm’s marginal cost.
- Optimal price ratios

\[
\frac{P_1}{P_2} = \left[ \frac{1 - \left( \frac{1}{|\eta_2|} \right)}{1 - \left( \frac{1}{|\eta_1|} \right)} \right]
\]

- Segments with relatively elastic demand are charged a lower price, and vice versa.
Examples

- Why do women pay more?
  - Dry cleaners: shirts vs. blouses (high price differences)
  - Hair salons: difference could double
  - Some countries forbid price discrimination on gender; EU regulation discussed

- Yield management and airline pricing
  - Yield management models are complex pricing mechanisms
  - Dynamic in the sense that prices respond to customer behavior
  - At any one time, several classes of seats priced differently
  - Demand forecasting based on third-price discrimination
  - Main driver in airline revenues
Examples

- Disney I - a day in Disneyland Anaheim, near LA
  - Family A from Point Place, Wisconsin pays $312
  - Family B from Los Angeles, California pays $292
  - Why? On which characteristics has been price discriminated?

- Disney II - prices at amusement parks
  - Gate prices are the highest ones
  - Differences: at gate, online or on special days
  - Five parks card: substantial discount
  - Tickets for grandparents who do not enjoy the roller coaster that much anymore (age-based prices?)

- Skiing
  - Daily vs. weekly tickets
What is the PIZZAMANN doing?

- Once you buy a Pizza, you get a red tomatoe,
  - which gives you a discount for your next purchase
  - Other examples?
- Why don’t they cut prices for everybody?
Coupons as an example for price discrimination

- Esp. in U.S. firms distribute coupons (by mail or in newspapers) which give a rebate for the product
- In Austria: Treuemarken

- Why is it better to give out coupons as compared to a general price cut??
  - Coupon users are more price-sensitive
    - They have a higher price elasticity
  - Only a small proportion of coupon receivers actually use them to claim the rebate
  - Coupons and rebates lead people to self-select their market segment.
  - Coupon reminds the customer each time that she is getting a lower price
Set an optimal coupon value

- Pricing strategy
  - $P(1 - 1/|\eta_R|) = (P - X)(1 - 1/|\eta_S|) = MC$
  - $P =$ market price
  - $X =$ discount from coupon or rebate
    - $\eta_R =$ price elasticity of demand by those who don’t use coupons or rebates
    - $\eta_S =$ price elasticity of demand by those who do use coupons or rebates
Example: Set a coupon value

- $MC = 2$
  - $\eta_R = -2$
  - $MR = MC \Rightarrow P = 4$
  - $\eta_S = -5$
    - $MR = (4 - X)[1 - 1/| - 5|] = 2 = MC$
    - $\Rightarrow X = 1.5$
PEAK LOAD PRICING

- Issues in pricing strategy
  - The demand for some goods is time sensitive or seasonal (peak or trough)
  - Plant capacity is constant.
PEAK LOAD PRICING

Examples

- Electricity generation
- Roads, Highways (toll)
- Resort and hotel rooms
- Intertemporal pricing of intellectual property—early release charges peak pricing and later release charges trough pricing—books released first as hard-bound with higher price followed by paperback at a lower price—leaders and followers in markets

- Plant capacity does not change (e.g. hotel beds), but it might be more expensive in peak season (you have to pay overtime, etc.)
Strategic response

- During peak time periods, when demand is high, managers should charge a higher price ($P_P$).
- During trough time periods, when demand is low, managers should charge a lower price ($P_T$).
- Marginal cost often follows a cyclical pattern in which MC is high during peak periods and low during trough time periods.
- Firms should equate marginal cost and marginal revenue separately in the two time periods to determine the appropriate prices.
Price discrimination vs. Peak-load pricing

- **Price discrimination:**
  - Everything produced at the same time
  - Marginal cost = \( f(Q_1 + Q_2) \)
  - Pricing solution:
    * \( MR_1(Q_1) = MR_2(Q_2) = MC(Q_1 + Q_2) \)

- **Peak-load pricing:**
  - Marginal costs: demanders use same capacity but at different times
  - Pricing: \( MR_1(Q_1) = MC_1(Q_1) \) and \( MR_2(Q_2) = MC_2(Q_2) \)
Why do your laundry at 3 a.m.?

- In Florida, Pennsylvania, Washington and Wisconsin:
  - electric utilities are allowed to practice time-of-day pricing to residential customers who opt to be charged in this way

- Austria: “Nachtstrom”

- Public utilities save quite a lot of money
  - In the case of peak demand, do not have to buy on the (more expensive) spot market or bring its least efficient (most expensive) capacity on line
TWO-PART TARIFFS

Two-part tariff

- When managers set prices so that consumers pay an entry fee and then a use fee for each unit of the product they consume
- Extract consumer surplus
  ★ Idea simple: use fee should be very low to maximize participation (demand) in the market
  ★ Entry fee to extract consumer surplus
TWO-PART TARIFFS

Examples

- Clubs (golf, health, etc.) that charge a membership fee and a per use fee
- Wireless phone plans that charge a fixed fee and then additional fees per minute
- Personal seat licenses (PSL) for sports stadiums - a fixed cost that gives the purchaser the right to buy tickets to games.
TWO-PART TARIFFS

Strategy when all demanders are the same

▶ Model

★ Assume that all consumers have the same preferences, defined by the demand curve \( P = a - bQ \).
★ Assume that the firm’s marginal cost is constant.
★ Entry fee is equal to consumer surplus.
★ Use fee is equal to marginal cost.
★ Total revenue is the same as under first-degree price discrimination.
Optimal Two-Part Tariff When All Demanders Are the Same

Price per unit of output

Demand

Consumer surplus = $A^*$

$P^*$

$MC = AVC$

$Q^*$

Quantitative
Example: Mobile Phone Calling Plans

- Telephone service is a classical example of a two-part tariff
  - A subscriber pays the phone company a monthly fee for the privilege of receiving a dial tone
  - Then the subscriber pays a price per call

- Sophisticated pricing strategies
  - As managers do not know consumers’ demand exactly, a menu of pricing plans is offered
  - Most plans are two part tariffs, but also elements of bundling and price discrimination can be found
TWO-PART TARIFFS

- A Two-Part Tariff with a Rising Marginal Cost
  - Strategy is the same as when marginal cost is constant.
  - Variable cost profit is positive when marginal cost has a positive slope.
  - Figure 8.6: Optimal Two-Part Tariff When Marginal Cost Is Rising
Optimal Two-Part Tariff When Marginal Cost Is Rising

Price per unit of output

Demand

Marginal cost

A*

P*

\( X^* \)

\( Y^* \)

Q*

Quantity

FIGURE 08-06
Example: Telephone pricing

- Telephone company is monopolist
- Demand: \( P = 100 - 0.5Q \)
- Marginal cost: \( MC = 10 \) (cents/minute)

- Optimal price for monopolist? Profit?
- Make also a graph

- Optimal price for a two-part tariff: charge a fee (Grundgebühr) and a price per minute
- Profit?
Solution: Telephone Pricing

- \( P = 100 - 0.5Q \)
- MC should equal MR:
  \( TR = 100Q - 0.5Q^2 \)
  \( MR = 100 - Q \)

- \( MR = MC \Rightarrow \)
  \( 100 - Q = 10 \Rightarrow Q = 90 \)
  \( P = 100 - 0.5Q \Rightarrow P = 55 \)

- \( \Pi = 90 \times (55 - 10) = 4050 \)

**TWO PART TARIFF:**
- \( Q = 180 \)
  - *Price/Minute* = 10
  - *Fee* = \( 90 \times 180/2 = 8100 \)
  - *Profit* = 8100
A Two-Part Tariff with Different Demand Curves

Assumptions:
- Market consists of strong demanders and weak demanders
- Equal number of each
Optimal Two-Part Tariff with Two Demand Types

FIGURE 08-07
Pricing strategies

- When strong demand is much stronger than weak demand:
  - Set use fee equal to marginal cost and entry fee equal to the strong demanders’ consumer surplus.
  - Weak demanders will be excluded from the market.

- When strong demand is not much stronger than weak demand:
  - Set use fee equal to marginal cost and entry fee equal to the weak demanders’ consumer surplus.
  - Both buy.
Pricing strategies (Continued)

- When strong demand is not much stronger than weak demand:
  - Set use fee above marginal cost at a price that maximizes variable cost profit and entry fee equal to the weak demanders’ consumer surplus.
  - Weak demanders will not be excluded from the market.

- Optimal strategy when strong demand is not much stronger than weak demand is found by comparing total average cost profit from the two strategies.
TWO-PART TARIFFS

- Strong and weak demand
  - Set high entry fee for strong demanders and low entry fee for weak demanders
  - User fee at marginal costs
- Problem: strong demanders will “hide” themselves by pretending they are weak.
  - Solution is to give some additional bonus or prestige to strong demanders
  - Gold and Silver Credit Card, ...