Case. How to sell this book?

• Suppose it’s the only IO book on the market
  • Profits we can make depend on
    • Information we have on consumers
    • Instruments we can use to design tariffs
  • If limited information and instruments
    • Only available strategy: uniform price
  • If more information → price discrimination
    • Ideally, know exactly what each consumer is willing to pay
    • If not, identify characteristics related to willingness to pay and segment market into several groups (e.g., US market vs. European market)
    → Personalized and group pricing (Chapter 8)
Case. How to sell this book? (cont’d)

• If more information → price discrimination (cont’d)
  • If no identifiable characteristics, design different versions and induce consumers to self-select (e.g., hard-back vs. paperback)
    → Menu pricing (Chapter 9)

• If more instruments → several possibilities
  • Sell different versions (menu pricing)
  • Sell at different prices over time (e.g., discount future prices, condition prices on purchase history)
    → Intertemporal pricing (Chapter 10)
  • Set a special price for a bundle of product (e.g., book + instructor manual + CD-rom with slides and exercises)
    → Bundling and tying (Chapter 11)

• More information & more instruments → higher profits
Case. How to sell this book? (cont’d)

• What if other IO books on the market?
  • More information or more instruments *don’t necessarily translate into more profits*.
  • Why?
    • Competitors can use the same strategies.
    • Competition can be exacerbated for some groups of consumers.

• We study
  • Effects of imperfect competition
  • Impacts on welfare
Chapter 8 - Objectives

Chapter 8. Learning objectives

• Be able to distinguish between the 3 types of price discrimination.
• See how personalized and group pricing allow a monopolist to extract more consumer surplus and, thereby, to increase profits.
• Understand how to set different prices for different groups.
• Understand that in oligopoly settings, the positive surplus extraction effect of price discrimination may be outweighed by a negative competition enhancing effect.
Definition

• 2 varieties of a good are sold (by the same seller) to 2 buyers at different net prices
  • Net price = price (paid by the buyer) – cost associated with product differentiation

• Feasibility?
  • Market power
  • No arbitrage
    • Consumers find it impossible or too costly
    • ‘Physical arbitrage’ → transfer of the good itself between consumers
    • ‘Personal arbitrage’ → transfer of demand between different packages aimed at different consumers (see Chapter 9)
Typology

Information that seller has about consumers’ willingness to pay

Perfect

Personalized pricing (1st degree)
Individualized price for each unit purchased by each buyer $\rightarrow$ full surplus extraction

Group pricing (3rd degree)
Segmentation based on indicators related to consumers’ preferences $\rightarrow$ different prices per group

Menu pricing (2nd degree)
No observable indicators $\rightarrow$ use of self-selecting devices (target a specific package for each class of buyers)

Limited

Uniform price
Case. **Airline fares**

- **Favorable context**
  - Great heterogeneity across consumers
  - Limited arbitrage opportunities
  - Negligible marginal cost (up to capacity)

- **Discount fares based on restrictions**
  - Restrictions fostering self-selection
    - Purchase in advance, Saturday-night stay over, surcharge for one-way tickets, ...
  - Restrictions based on observable characteristics
    - Family, age, students

- **Strategy of low cost carriers**
  - Eliminate above restrictions *(except intertemporal pricing)*
  - New form of geographical group pricing *(see Chapter 9)*
Group & personalized pricing in monopoly

- Monopolist \(\uparrow\) profits when it obtains more refined information about consumers’ reservation prices

- Model
  - Unit mass of consumers with unit demand
  - Valuation \(\theta\) uniformly distributed over \([0,1]\)
  - Buy if \(\theta \geq p\) → demand: \(q = 1 - p\)
  - Zero marginal cost; profits: \(p (1 - p)\)
  - If uniform price: \(p^u = 1/2, \pi^u = 1/4, CS^u = 1/8, DL^u = 1/8\)
  - Not satisfactory:

Would buy at a larger price than \(p^u\)

Would buy at a price above MC
Group & personalized pricing in monopoly (cont’d)

- Refined information
  - Partition \([0,1]\) into \(N\) subintervals of equal length
  - Monopolist knows from which group each consumer comes & can charge a different price for each group
  - Take \(N = 2\)
    
    \([0,1/2] \rightarrow q_1 = 1/2 - p_1\)
    
    \([1/2,1] \rightarrow q_2 = \max\{1/2, 1 - p_2\}\)

\[
\pi(2) = \frac{1}{4} + \frac{1}{16} > \pi^u
\]

\[
CS(2) = \frac{1}{8} + \frac{1}{32} > CS^u
\]

\[
DL(2) = \frac{1}{32} < DL^u
\]
Group & personalized pricing in monopoly (cont’d)

- Refined information (cont’d)
  - $N$ subintervals

\[
\pi(N) = \frac{1}{2} - \frac{2N-1}{4N^2}
\]
\[
CS(N) = \frac{4N-3}{8N^2}
\]
\[
DL(N) = \frac{1}{8N^2}
\]

- Lesson: If information about consumers’ reservation prices ↑, monopolist ↑ profits. Under personalized prices, monopolist captures entire surplus and deadweight loss vanishes.
Group pricing and localized competition

• Extension of Hotelling model
  • 2 firms (MC = 0) located at extreme points of [0,1]
  • Mass 1 of consumers uniformly distributed on [0,1]
  • Utility of consumer $x$ (assuming linear transport costs):
    \[
    r - \tau x - p_1 \text{ if she buys 1 unit of good 1,}
    \]
    \[
    r - \tau(1-x) - p_2 \text{ if she buys 1 unit of good 2.}
    \]

• Information (exogenously and freely accessible to both firms) partitions $[0,1]$ into $N$ subintervals of equal length
  • Let $N = 2^k$, with $k = 0, 1, 2, ...$
  • $k$ measures the quality of information
Group pricing and localized competition (cont’d)

• 3-stage game
  1. Firms decide to acquire information of quality $k$ or not
  2a. Firms choose their regular price
  2b. Firm(s) with information target(s) specific discount to consumer segments

• Pricing decisions (stages 2a and 2b) → 4 subgames
  • Neither firms acquires information
    • Same as linear Hotelling model (see Chapter 5)
    \[ \pi_{NI,NI} = \tau / 2 \]
  • Both firms acquire information
  • Firm $i$ acquires information; firm $j$ doesn’t
Group pricing and localized competition (cont’d)

• Both firms acquire information

  • In each segment, firms are in asymmetric positions: firm 1 has an advantage in segments in \([0, 1/2]\), and firm 2 in segments in \([1/2, 1]\).

  • In segments close to the extremes, the closest firm gets the whole segment.

  • Head-to-head competition only exists for the two middle segments, where poaching occurs.
Group pricing and localized competition (cont’d)

• Both firms acquire information (cont’d)
  • Example with $k = 3$ (8 segments)

• We can compute $\pi^{I,I}(k)$

• Properties
  • **U-shaped** → interplay between 2 effects of improved information: higher competition (dominates for low $k$) and surplus extraction (dominates for large $k$)

$\pi^{I,I}(k) < \pi^{NI,NI}(k) = \tau / 2$ for all $k$
Group pricing and localized competition (cont’d)

- Only one firm acquires information

- Equilibrium: asymmetric version of previous subgame
  - Suppose firm 1 has information
  - 3 groups of segments, from left to right
    - 1\textsuperscript{st} group: firm 1 acts as a constrained monopolist
    - 2\textsuperscript{nd} group: both firms have positive demand
    - 3\textsuperscript{rd} group: firm 2 acts as a constrained monopolist
  - Differences with case where they both have information
    - 1\textsuperscript{st} group is larger
    - Only firm 1 poaches consumers in 2\textsuperscript{nd} group
  - Illustration with $k = 3$ (8 segments)
Group pricing and localized competition (cont’d)

• Only one firm acquires information (cont’d)
  • We can compute $\pi^{I,NI}(k)$ and $\pi^{NI,I}(k)$
  • Profits of informed firm are U-shaped
    • Same 2 effects as before
    • But, eventually, $\pi^{I,NI}(k) > \pi^{NI,NI}(k)$

• Profits of uninformed firm ↓ with quality of information

• Information acquisition decision (stage 1)

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Group pricing and localized competition (cont’d)

• Information acquisition decision (cont’d)

- $k < 3 \rightarrow NI$ is a dominant strategy
- $k \geq 3 \rightarrow I$ is a dominant strategy $\rightarrow$ prisoner’s dilemma
Group pricing and localized competition (cont’d)

• **Lesson**: In a competitive setting, customer-specific information impacts firms in 2 conflicting ways:
  • firms can extract more surplus from each consumer;
  • price competition is exacerbated.
When the quality of information is sufficiently large, the former effect dominates the latter. Then, firms use the information and price discriminate at equilibrium. However, they may well be better off if they could jointly agree not to use information.
Personalized pricing and location decisions

• Two-stage game
  • Firms choose their location on the Hotelling line.
  • Firms compete with personalized prices (i.e., there is Bertrand competition in each and every location)

• Equilibrium
  • Price schedules at stage 2:
    • Firm with the lowest cost prevails $\rightarrow$ price $=$ other firm’s MC
    • Otherwise, price $=$ firm’s own MC

\[ p_1^*(x) = p_2^*(x) = \max \left\{ \tau |x - l_1|, \tau |x - l_2| \right\} \]

• $\rightarrow \pi_1 = \text{(total transportation cost of firm 2 as a monopolist)} - \text{(total transportation cost of the two firms together)}
Personalized pricing and location decisions (cont’d)

• **Equilibrium** (cont’d)
  • Location at stage 1
    • To maximize profits, a firm must choose a location generating the largest decrease in total transportation costs.
    • → no deviation if both firms locate at the transportation cost minimizing points:

\[
\ell_1^* = \frac{1}{4}, \ell_2^* = \frac{3}{4}
\]

• **Lesson**: When both firms set personalized prices and locations are endogenous, firms choose the socially optimal locations.
Group pricing in monopoly: basic argument

- Extension of multi-product monopoly (see Chapter 2)
  - Monopolist can sell its product on \( k \) separate markets
  - \( Q_i(p_i) \): distinct demand curve for market \( i \)
  - \( C(q) \): monopolist’s total cost (\( q \): total quantity)
  - Monopolist chooses vector of prices to maximize

\[
\Pi(p_1, p_2, \ldots, p_k) = \sum_{i=1}^{k} p_i Q_i(p_i) - C\left(\sum_{i=1}^{k} Q_i(p_i)\right)
\]

- For any \( i \), markup is given by inverse elasticity rule:

\[
\frac{p_i - C'(q)}{p_i} = \frac{1}{\eta_i} \rightarrow \text{ if } \eta_i > \eta_j, \text{ then } p_i < p_j
\]

- **Lesson**: A monopolist optimally charges less in market segments with a higher elasticity of demand.
Case. International price discrimination in the textbook market (Cabolis et al., 2006)

- Differences in book prices, US vs. elsewhere
  - No difference for general audience books
  - Textbooks substantially more expensive in the US
- Why?
  - No cost factor (most textbooks are printed in the US)
  - → must be due to different demand elasticities
  - Demand less elastic in the U.S. because teachers require a single comprehensive textbook per course (not so much the tradition in European universities)
Oligopolistic international pricing

• Effects of competition?
  • Geographical price discrimination exists in oligopolistic industries (e.g., car industry; see Case 8.4)
  • But, strategic motives may lead firms to set a uniform price on all geographical segments.
  • Why?
    • Suppose firm active on several market segments.
    • Some segments are more competitive than others.
    • Commitment to set same price everywhere → price ↑ on competitive market segments → softened price competition → profits ↑ on these segments.
    • May outweigh benefit of adapting prices to local conditions.
    • (See specific model in book)
Case. Pricing by supermarkets in the UK

• Inquiry of UK Competition Commission
  • April 1999 to July 2000
• Among 15 leading supermarket groups
  • 8 priced uniformly
  • 7 adjusted prices to local conditions
    • For a limited number of products
    • Average level of difference between minimum and maximum prices for each product: 4.3 to 19.2%
Review questions

• In which industries do we observe group pricing? Provide two examples.
• Does an increase in competition lead to more or less (third-degree) price discrimination? Discuss.
• How does the ability to geographically price discriminate affect location decisions of firms?
• What is an empirical regularity concerning international price discrimination?