Chapter 11
Pricing Strategies for Firms with Market Power
Overview

I. Basic Pricing Strategies
   – Monopoly & Monopolistic Competition
   – Cournot Oligopoly

II. Extracting Consumer Surplus
   – Price Discrimination
     ■ Two-Part Pricing
   – Block Pricing
     ■ Commodity Bundling

III. Pricing for Special Cost and Demand Structures
   – Peak-Load Pricing
   – Cross Subsidies
     ■ Transfer Pricing

IV. Pricing in Markets with Intense Price Competition
   – Price Matching
     ■ Randomized Pricing
   – Brand Loyalty
Standard Pricing and Profits for Firms with Market Power

Price

Quantity

Profits from standard pricing = $8

P = 10 - 2Q

MR = 10 - 4Q

MC

10

8

6

4

2

1

2

3

4

5

1

2

3

4

5
An Algebraic Example

- $P = 10 - 2Q$
- $C(Q) = 2Q$
- If the firm must charge a single price to all consumers, the profit-maximizing price is obtained by setting $MR = MC$. 
- \[ 10 - 4Q = 2, \text{ so } Q^* = 2. \]
- \[ P^* = 10 - 2(2) = 6. \]
- Profits = \((6)(2) - 2(2) = $8\).
A Simple Markup Rule

- Suppose the elasticity of demand for the firm’s product is $E_F$.
- Since $\text{MR} = \frac{P[1 + E_F]}{E_F}$.
- Setting $\text{MR} = \text{MC}$ and simplifying yields this simple pricing formula:
  $$P = \frac{E_F}{(1 + E_F)} \times \text{MC}.$$ 
- The optimal price is a simple markup over relevant costs!
  - More elastic the demand, lower markup.
  - Less elastic the demand, higher markup.
An Example

- Elasticity of demand for Kodak film is -2.
- \[ P = \frac{E_F}{1 + E_F} \times MC \]
- \[ P = \frac{-2}{1 - 2} \times MC \]
- \[ P = 2 \times MC \]
- Price is twice marginal cost.
- Fifty percent of Kodak’s price is margin above manufacturing costs.
Markup Rule for Cournot Oligopoly

- Homogeneous product Cournot oligopoly.
- \( N \) = total number of firms in the industry.
- Market elasticity of demand \( E_M \).
- Elasticity of individual firm’s demand is given by \( E_F = N \times E_M \).
- Since \( P = \left[ E_F / (1 + E_F) \right] \times MC \),
- Then, \( P = \left[ NE_M / (1 + NE_M) \right] \times MC \).
- The greater the number of firms, the lower the profit-maximizing markup factor.
An Example

- Homogeneous product Cournot industry, 3 firms.
- MC = $10.
- Elasticity of market demand = - ½.
- Determine the profit-maximizing price?
- \( E_F = N E_M = 3 \times (-1/2) = -1.5. \)
- \( P = \left[ E_F/(1+ E_F) \right] \times MC. \)
- \( P = [-1.5/(1- 1.5] \times $10. \)
- \( P = 3 \times $10 = $30. \)
Extracting Consumer Surplus: Moving From Single Price Markets

- Most models examined to this point involve a “single” equilibrium price.
- In reality, there are many different prices being charged in the market.
- Price discrimination is the practice of charging different prices to consumers for the same good to achieve higher prices.
- The three basic forms of price discrimination are:
  - First-degree (or perfect) price discrimination.
  - Second-degree price discrimination.
  - Third-degree price discrimination.
First-Degree or Perfect Price Discrimination

- Practice of charging each consumer the maximum amount he or she will pay for each incremental unit.
- Permits a firm to extract all surplus from consumers.
Perfect Price Discrimination

Profits*: 
\[ \frac{1}{2}(4-0)(10 - 2) = $16 \]

Total Cost* = $8

* Assuming no fixed costs
Caveats:

- In practice, transactions costs and information constraints make this difficult to implement perfectly (but car dealers and some professionals come close).
- Price discrimination won’t work if consumers can resell the good.
Second-Degree Price Discrimination

- The practice of posting a discrete schedule of declining prices for different quantities.
- Eliminates the information constraint present in first-degree price discrimination.
- Example: Electric utilities
Third-Degree Price Discrimination

- The practice of charging different groups of consumers different prices for the same product.
- Group must have observable characteristics for third-degree price discrimination to work.
- Examples include student discounts, senior citizen’s discounts, regional & international pricing.
Implementing Third-Degree Price Discrimination

- Suppose the total demand for a product is comprised of two groups with different elasticities, $E_1 < E_2$.
- Notice that group 1 is more price sensitive than group 2.
- Profit-maximizing prices?
- $P_1 = \left[ \frac{E_1}{1 + E_1} \right] \times MC$
- $P_2 = \left[ \frac{E_2}{1 + E_2} \right] \times MC$
An Example

- Suppose the elasticity of demand for Kodak film in the US is $E_U = -1.5$, and the elasticity of demand in Japan is $E_J = -2.5$.
- Marginal cost of manufacturing film is $3.
- $P_U = \left[\frac{E_U}{1 + E_U}\right] \times MC = \left[-1.5/(1 - 1.5)\right] \times 3 = 9$
- $P_J = \left[\frac{E_J}{1 + E_J}\right] \times MC = \left[-2.5/(1 - 2.5)\right] \times 3 = 5$
- Kodak’s optimal third-degree pricing strategy is to charge a higher price in the US, where demand is less elastic.
Two-Part Pricing

- When it isn’t feasible to charge different prices for different units sold, but demand information is known, two-part pricing may permit you to extract all surplus from consumers.

- Two-part pricing consists of a fixed fee and a per unit charge.
  - Example: Athletic club memberships.
How Two-Part Pricing Works

1. Set price at marginal cost.
2. Compute consumer surplus.
3. Charge a fixed-fee equal to consumer surplus.

\[\text{Fixed Fee} = \text{Profits}^* = \$16\]

* Assuming no fixed costs
Block Pricing

- The practice of packaging multiple units of an identical product together and selling them as one package.

- Examples
  - Paper.
  - Six-packs of soda.
  - Different sized of cans of green beans.
An Algebraic Example

- Typical consumer’s demand is $P = 10 - 2Q$
- $C(Q) = 2Q$
- Optimal number of units in a package?
- Optimal package price?
Optimal Quantity To Package: 4 Units

MC = AC
Optimal Price for the Package: $24

Consumer’s valuation of 4 units = \(0.5(8)(4) + (2)(4)\) = $24
Therefore, set \(P = $24\)! 

\[ MC = AC \]
Costs and Profits with Block Pricing

Profits* = [.5(8)(4) + (2)(4)] – (2)(4)
= $16

Costs = (2)(4) = $8

MC = AC

* Assuming no fixed costs
Commodity Bundling

- The practice of bundling two or more products together and charging one price for the bundle.

- Examples
  - Vacation packages.
  - Computers and software.
  - Film and developing.
An Example that Illustrates Kodak’s Moment

- Total market size for film and developing is 4 million consumers.
- Four types of consumers
  - 25% will use only Kodak film (F).
  - 25% will use only Kodak developing (D).
  - 25% will use only Kodak film and use only Kodak developing (FD).
  - 25% have no preference (N).
- Zero costs (for simplicity).
- Maximum price each type of consumer will pay is as follows:
Reservation Prices for Kodak Film and Developing by Type of Consumer

<table>
<thead>
<tr>
<th>Type</th>
<th>Film</th>
<th>Developing</th>
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<tbody>
<tr>
<td>F</td>
<td>$8</td>
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<td>FD</td>
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Optimal Film Price?

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Optimal Price is $8; only types F and FD buy resulting in profits of $8 x 2 million = $16 Million.

At a price of $4, only types F, FD, and D will buy (profits of $12 Million).

At a price of $3, all will types will buy (profits of $12 Million).
Optimal Price for Developing?

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At a price of $6, only “D” type buys (profits of $6 Million).
At a price of $4, only “D” and “FD” types buy (profits of $8 Million).
At a price of $2, all types buy (profits of $8 Million).
Optimal Price is $3, to earn profits of $3 x 3 million = $9 Million.
Total Profits by Pricing Each Item Separately?

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Total Profit = Film Profits + Development Profits
= $16 Million + $9 Million = $25 Million

Surprisingly, the firm can earn even greater profits by bundling!
Pricing a “Bundle” of Film and Developing
## Consumer Valuations of a Bundle

<table>
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What’s the Optimal Price for a Bundle?

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Optimal Bundle Price = $10 (for profits of $30 million)
Peak-Load Pricing

- When demand during peak times is higher than the capacity of the firm, the firm should engage in *peak-load pricing*.
- Charge a higher price ($P_H$) during peak times ($D_H$).
- Charge a lower price ($P_L$) during off-peak times ($D_L$).
Cross-Subsidies

- Prices charged for one product are subsidized by the sale of another product.
- May be profitable when there are significant demand complementarities effects.
- Examples
  - Browser and server software.
  - Drinks and meals at restaurants.
Double Marginalization

- Consider a large firm with two divisions:
  - the *upstream division* is the sole provider of a key input.
  - the *downstream division* uses the input produced by the upstream division to produce the final output.

- Incentives to maximize divisional profits leads the upstream manager to produce where $MR_U = MC_U$.
  - Implication: $P_U > MC_U$.

- Similarly, when the downstream division has market power and has an incentive to maximize divisional profits, the manager will produce where $MR_D = MC_D$.
  - Implication: $P_D > MC_D$.

- Thus, both divisions mark price up over marginal cost resulting in in a phenomenon called *double marginalization*.
  - Result: less than optimal overall profits for the firm.
Transfer Pricing

- To overcome double marginalization, the internal price at which an upstream division sells inputs to a downstream division should be set in order to maximize the overall firm profits.

- To achieve this goal, the upstream division produces such that its marginal cost, $MC_u$, equals the net marginal revenue to the downstream division ($NMR_d$):

\[ NMR_d = MR_d - MC_d = MC_u \]
Upstream Division’s Problem

- Demand for the final product $P = 10 - 2Q$.
- $C(Q) = 2Q$.
- Suppose the upstream manager sets $MR = MC$ to maximize profits.
- $10 - 4Q = 2$, so $Q^* = 2$.
- $P^* = 10 - 2(2) = $6, so upstream manager charges the downstream division $6 per unit.
Downstream Division’s Problem

- Demand for the final product $P = 10 - 2Q$.
- Downstream division’s marginal cost is the $6 charged by the upstream division.
- Downstream division sets $MR = MC$ to maximize profits.
- $10 - 4Q = 6$, so $Q^* = 1$.
- $P^* = 10 - 2(1) = $8, so downstream division charges $8 per unit.
Analysis

- This pricing strategy by the upstream division results in less than optimal profits!
- The upstream division needs the price to be $6 and the quantity sold to be 2 units in order to maximize profits. Unfortunately,
- The downstream division sets price at $8, which is too high; only 1 unit is sold at that price.
  - Downstream division profits are $8 \times 1 - 6(1) = $2.
- The upstream division’s profits are $6 \times 1 - 2(1) = $4 instead of the monopoly profits of $6 \times 2 - 2(2) = $8.
- Overall firm profit is $4 + $2 = $6.
Upstream Division’s “Monopoly Profits”

\[ P = 10 - 2Q \]

\[ MC = AC \]

\[ MR = 10 - 4Q \]

Profit = $8
Upstream Firm’s Profits when Downstream Marks Price Up to $8

\[ P = 10 - 2Q \]

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>10</td>
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<tr>
<td>8</td>
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\[ MR = 10 - 4Q \]

\[ MC = AC \]

Profit = $4
Solutions for the Overall Firm?

- Provide upstream manager with an incentive to set the optimal transfer price of $2 (upstream division’s marginal cost).
- Overall profit with optimal transfer price:

\[ \pi = 6 \times 2 - 2 \times 2 = 8 \]
Pricing in Markets with Intense Price Competition

- **Price Matching**
  - Advertising a price and a promise to match any lower price offered by a competitor.
  - No firm has an incentive to lower their prices.
  - Each firm charges the monopoly price and shares the market.

- **Induce brand loyalty**
  - Some consumers will remain “loyal” to a firm; even in the face of price cuts.
  - Advertising campaigns and “frequent-user” style programs can help firms induce loyal among consumers.

- **Randomized Pricing**
  - A strategy of constantly changing prices.
  - Decreases consumers’ incentive to shop around as they cannot learn from experience which firm charges the lowest price.
  - Reduces the ability of rival firms to undercut a firm’s prices.
Conclusion

- First degree price discrimination, block pricing, and two part pricing permit a firm to extract all consumer surplus.
- Commodity bundling, second-degree and third degree price discrimination permit a firm to extract some (but not all) consumer surplus.
- Simple markup rules are the easiest to implement, but leave consumers with the most surplus and may result in double-marginalization.
- Different strategies require different information.