Lecture 6
Competition, Monopoly, Monopolistic Competition and Oligopoly
Overview

- Firm supply decisions in a perfectly competitive market
  - Short run supply
  - Long run supply
- Competitive equilibrium
- Monopoly
  - Supply decisions
  - Barriers to entry/sources of monopoly power
- Monopolistic Competition
Overview

- Oligopoly
  - Rivals reactions
  - Nash equilibrium
  - Prisoners’ Dilemma
- Measuring market structure
Market structure

Start by looking at extreme cases

- Competitive market
  - Many firms
  - Commodity market obvious example

- Monopoly markets
  - Single seller
  - Firm with patent, government protection or access to scarce resource
Intermediate Cases

- Monopolistic competition
  - Many firms
  - Firms sell differentiated products
  - Some market power

- Oligopolistic markets
  - Few sellers
  - Barriers to entry

- Take into account rivals' response to your actions
Competitive or Commodity Markets

➤ Characteristics of a Commodity Market

1. Price taking
2. Product homogeneity
3. Free entry and exit
4. Perfect Information
Commodity Markets

➢ Price Taking

– The individual firm sells a very small share of the total market output
  • Cannot influence market price
  • Firm’s demand curve is perfectly elastic

– The individual consumer buys too small a share of industry output to have any impact on market price.

– Examples: wheat farmer, me buying gas.
Commodity Markets

➢ Product Homogeneity

- The products of all firms are perfect substitutes
- Small differences in quality
- Examples
  - Agricultural products, oil, copper, iron, lumber, coal
Characteristics of Substitutes

- Two products tend to be close substitutes when
  - They have similar performance characteristics
  - They have similar occasion for use and
  - They are sold in the same geographic area
Commodity Markets

➢ Free Entry and Exit

– Buyers can easily switch from one supplier to another
– Suppliers can easily enter or exit a market
– All factors of production are perfectly mobile in the long-run
Commodity Markets

Perfect Information

- Every consumer knows about all goods being produced and their prices
- All producers have well defined production functions
- Can relax these assumptions
Commodity Markets

- Do we believe these assumptions hold all the time?
  - Seem to hold in commodity markets
  - Other markets have characteristics similar to commodity markets

- Even if all the conditions do not hold, competition can still be fierce if at least two hold
  - Predictions of basic model will still hold
Perfectly Competitive Markets

- Need to be aware of the assumptions so that we know whether the assumptions are violated in such a way that the model is no longer valid
- We will talk about other market structures where some of these assumptions don’t hold
Profit Maximizing Choice of Output

Determining the profit maximizing level of output

- Profit ($\pi$) = Total Revenue - Total Cost
- Total Revenue ($R$) = $Pq$
- Total Cost ($C$) = $Cq$
- Therefore:

$$\pi(q) = R(q) - C(q)$$
Profit Maximizing Choice of Output

Cost, Revenue, Profit ($s per year)

Total Revenue

Slope of $R(q) = MR$

Output (units per year)
Profit Maximizing Choice of Output

**Cost, Revenue, Profit ($s per year)**

**Output (units per year)**

The graph illustrates the relationship between total cost and output. The total cost function $C(q)$ is plotted with the slope of $C(q)$ equal to the marginal cost $MC$. The point of interest is where the total cost curve intersects with the marginal cost line, indicating the profit-maximizing output level.
Profit Maximizing Choice of Output

Distance between the two curves is $\pi$. 

Output (units per year)
Profits are maximized when \( MC = MR \).

- This is the point where the two curves are farthest apart.
- This is true regardless of the type of market in which the firm operates.
Marginal Revenue, Marginal Cost, and Profit Maximization

\[ \pi = R - C \]

\[ MR = \frac{\Delta R}{\Delta q} \]

\[ MC = \frac{\Delta C}{\Delta q} \]
Marginal Revenue, Marginal Cost, and Profit Maximization

Profits are maximized when:

\[
\frac{\Delta \pi}{\Delta q} = \frac{\Delta R}{\Delta q} - \frac{\Delta C}{\Delta q} = 0 \quad \text{or} \quad MR - MC = 0
\]

so that

\[MR(q) = MC(q)\]
Consider the case for a firm operating in a commodity market.

- The firm is a price taker.
- Revenue is given by: \( R(q) = P \cdot q \).
- \( MR = P \) and \( R(q) \) is a horizontal line.

Call market output \((Q)\), and firm output \((q)\). market demand \((D)\) and firm demand \((d)\).
Demand and Marginal Revenue Faced by a Competitive Firm

Price $ per bushel

Output (bushels)

Price $ per bushel

Output (millions of bushels)

Firm

Industry
The Competitive Firm’s Demand

- Profit Maximization occurs where: $MC(q) = MR = P$.

- Let’s combine production and cost analysis to see again why this is the profit maximizing (or cost minimizing) point for the firm to produce.
A Competitive Firm Making a Positive Profit

At $q^*$: $MR = MC$ and $P > ATC$

\[
\pi = (P - AC) \times q^*
\]

or $ABCD$
A Competitive Firm Making a Positive Profit

- The way I have drawn these curves is $P > AVC$ and $P > ATC$.
- Firm is making a profit.
- However, in the short-run firm will produce as long as $P > AVC$, even if $P < AFC$.
- Why?
- Let’s see why.
A Competitive Firm Incurring Losses

At $q^*$: $MR = MC$ and $P < ATC$
Losses = $(P - AC) \times q^*$ or ABCD

If firm produced 0 then losses = CBFE or amount of fixed costs
A Firm’s Short-Run Supply Curve

- **S = MC above AVC**

### Graph
- **Price ($ per unit)**
- **MC**
- **ATC**
- **AVC**
- **P = AVC**
- **Shut-down**
- **P = AVC**
- **P1**
- **P2**
- **q1**
- **q2**

Output
Choosing Output in the Long Run

- In the long run, a firm can alter all its inputs, including the amount of machinery and the size of the plant.
- Firms can also enter and exit the industry at no cost.
Choosing Output in the Long Run

- Firms continue to use the same rule when choosing output; \( P = MC \).
- However, now the relevant marginal cost is long-run marginal cost.
- Firms produce output as long as \( P \geq LRAC \).
Choosing Output in the Long Run

- Recall that we have assumed that firms can enter the industry at no cost and begin producing output.
- What will firms do if they see an industry where firms are earning a positive profit?
  - Note, this is above the opportunity cost for all of the resources being employed.
- Firms will enter the industry until long-run profits are zero.
Choosing Output in the Long Run

Price ($ per unit of output)

Question: Where are long-run profits zero?

$40
$30

$q_1$, $q_2$, $q_3$

$LAC$, $LMC$, $SMC$, $SAC$

$P = MR$
Long-Run Competitive Equilibrium

• Profit attracts firms
• Supply increases until profit = 0

Firm

$ per unit of output

$40

$30

LMC

LAC

Output

$q_2$

Industry

$P_1$

$P_2$

$S_1$

$S_2$

$D$

Output

$Q_1$

$Q_2$

$P_1$

$P_2$

$q_2$

$q_2$

$q_2$
Choosing Output in the Long Run

Long-Run Competitive Equilibrium

1) $MC = MR$

2) $P = LAC$
   - No incentive to leave or enter
   - Profit = 0

3) Equilibrium Market Price—quantity demanded equals quantity supplied.
Monopoly

- The monopolist is the supply-side of the market and has complete control over the amount offered for sale.

- Profits will be maximized at the level of output where marginal revenue equals marginal cost.
Monopoly

Monopolist’s Output Decision

1) Profits maximized at the output level where $MR = MC$

2) Cost functions are the same

$$\pi(Q) = R(Q) - C(Q)$$

$$\frac{\Delta \pi}{\Delta Q} = \frac{\Delta R}{\Delta Q} - \frac{\Delta C}{\Delta Q} = 0 = MC - MR$$

or $MC = MR$
Maximizing Profit When Marginal Revenue Equals Marginal Cost

The Monopolist’s Output Decision

- Moving to output levels below $MR = MC$ the increase in revenue is greater than the increase in cost ($MR > MC$).
- Moving to output levels above $MR = MC$ the increase in cost is greater than the increase in revenue ($MR < MC$).
Maximizing Profit When Marginal Revenue Equals Marginal Cost

\[ D = AR \]

\[ P = MC \]

Lost profit

\[ Q_1, Q_2, Q^* \]

\[ P_1, P_2, P^* \]
Monopoly

The Monopolist’s Output Decision

An Example

\[ Cost = C(Q) = 50 + Q^2 \]
\[ MC = \frac{\Delta C}{\Delta Q} = 2Q \]
Monopoly

The Monopolist’s Output Decision

An Example

\[
Demand = P(Q) = 40 - Q
\]

\[
R(Q) = P(Q)Q = 40Q - Q^2
\]

\[
MR = \frac{\Delta R}{\Delta Q} = 40 - 2Q
\]
Monopoly

The Monopolist’s Output Decision

An Example

\[ MR = MC \text{ or } 40 - 2Q = 2Q \]

\[ Q = 10 \]

When \( Q = 10 \), \( P = 30 \)
Monopoly

The Monopolist’s Output Decision

An Example

- By setting marginal revenue equal to marginal cost, it can be verified that profit is maximized at $P = $30 and $Q = 10$.  

Example of Profit Maximization

- **Observations**
  - Profit = (P - AC) \times Q = ($30 - $15)(10) = $150
Sources of Market Power

- A firm’s monopoly power is determined by the firm’s elasticity of demand.
  - More sensitive demand is to changes in price the closer we are to the competitive outcome ($P=MC$).
Monopoly

A Rule of Thumb for Pricing

- We want to translate the condition that marginal revenue should equal marginal cost into a rule of thumb that can be more easily applied in practice.
A Rule of Thumb for Pricing

- Can show that optimal price is:

\[ P = \frac{MC}{1 + \left(\frac{1}{E_D^*}\right)} \]

- Where \( E_D^* \) is the elasticity of demand at the optimal level of output.
  - When demand is perfectly elastic \( P = MC \).
Sources of Monopoly Power

- The firm’s elasticity of demand is determined by:
  1) Elasticity of market demand
  2) Number of firms
  3) The interaction among firms

- Anything that limits the number of substitutes for a firm’s product will enhance its market power.
Sources of Monopoly Power

- Some of the things that limit substitutes are:
  1. Control over a unique input or special knowledge—Specific Assets
  2. The government
    - Governments frequently limits entry into markets through the use of licenses and other devices.
Sources of Monopoly Power

3. Patents
   - Other firms are prevented from competing with the firm holding the patent for a given number of years.

4. Scale Economics

5. Learning Curves

6. Brand Advantages
The Social Costs of Monopoly Power

- Monopoly power results in higher prices and lower quantities.
- However, does monopoly power make consumers and producers in the aggregate better or worse off?
Deadweight Loss from Monopoly Power

Because of the higher price, consumers lose $A+B$ and producer gains $A-C$. 

The graph illustrates the concept of deadweight loss in a monopoly setting. The diagonal line represents the marginal cost (MC), and the downward-sloping curve is the marginal revenue (MR). The market price ($P_m$) is higher than the competitive price ($P_c$), resulting in a loss of consumer surplus ($A$) and producer surplus ($A-C$). The areas $B$ and $C$ represent deadweight loss.
The Social Costs of Monopoly Power

Rent Seeking

- Firms may spend to gain monopoly power
  - Lobbying
  - Advertising
  - Building excess capacity
Monopolistic Competition

Market structure that combines monopoly and competition—Monopolistic Competition.
- Where there are many buyers buying slightly different products.
- Where there are just a few sellers.

Examples of these types of markets are
- Automobiles
- Soft drinks
- Hotels/restaurants
Our models for these markets will combine some aspects of the competitive model and some aspects of the monopoly model.
Monopolistic Competition

➢ Characteristics

1) Many firms

2) Free entry and exit
   • 1) and 2) ensure competition in the long run

3) Differentiated product
   • Means firms have some monopoly power.
Monopolistic Competition

- The amount of monopoly power depends on the degree of differentiation.

Automobile
- Ferrari and monopoly power
  - Consumers can have a preference for Ferrari—performance, handling, style
  - The greater the preference (differentiation) in consumers’ minds the higher the price.
Monopolistic Competition

➢ The Makings of Monopolistic Competition
  – Two important characteristics
    • Differentiated but highly substitutable products
    • Free entry and exit
Monopolistic Competition

- How do firms differentiate their products?
  - Presumably through advertising.
  - This is actual the origin of this model, trying to explain advertising.
- Why do firms want to do this?
A Monopolistically Competitive Firm in the Short and Long Run
A Monopolistically Competitive Firm in the Short and Long Run

Observations (short-run)
- Downward sloping demand—differentiated product
- Demand is relatively elastic—good substitutes
- \( MR < P \)
- Profits are maximized when \( MR = MC \)
- This firm is making economic profits
Observations (long-run)

- Profits will attract new firms to the industry (no barriers to entry)
- The old firm’s demand will decrease to $D_{LR}$
- Firm’s output and price will fall
- Industry output will rise
- No economic profit ($P = AC$)
- $P > MC$ -- some monopoly power
Comparison of Monopolistically Competitive Equilibrium and Perfectly Competitive Equilibrium

**Perfect Competition**

- $P_c$ (Price)
- $Q_c$ (Quantity)
- $D = MR$

**Monopolistic Competition**

- $Q_{MC}$ (Monopolistic Equilibrium Quantity)
- Deadweight loss

Graphs illustrating the comparison between Perfect Competition and Monopolistic Competition, highlighting the concepts of Deadweight loss and equilibrium points.
Monopolistic Competition

Monopolistic Competition and Economic Efficiency

- The monopoly power (differentiation) yields a higher price than perfect competition. If price was lowered to the point where $MC = D$, total surplus would increase by the yellow triangle.
Monopolistic Competition

Monopolistic Competition and Economic Efficiency

- Although there are no economic profits in the long run, the firm is still not producing at minimum AC and excess capacity exists.
Monopolistic Competition Versus Perfect Competition

- Monopolistic competition is similar to perfect competition.
  - Each firm acts independently, without regard to the responses of its competitors.
  - Free entry guarantees that firms earn zero economic profits in the long-run.
Monopolistic Competition Versus Perfect Competition

- Monopolistic competition differs from perfect competition.
  - Monopolistic competitors are not price takers.
  - The firm's equilibrium price exceeds its marginal cost.
  - Firms have excess capacity in long-run equilibrium.
Nonprice Competition

Firms in monopolistic competition sometimes engage in nonprice competition.

- Provide better-quality products.
- Product characteristics are designed to match the preferences of specific groups of consumers.
- May involve location.
Profit-Maximizing Product Differentiation

People who like better gas mileage cars buy from you.

People who like faster cars buy from the other firm.

Type of Car

Slower/better gas mileage

Type of Car Sold by the Other Firm

Faster/Poor gas mileage

Type of Car that Your Firm Should Sell to Maximize Profit
Oligopoly

➢ Characteristics
  - Small number of firms
  - Product differentiation may or may not exist
  - Barriers to entry

➢ Oligopoly exists in markets where a few producers produce most of the output
## Ten Most Concentrated Industries

*Percentage of Value of Shipments Accounted for by the Largest Firms in High-Concentration Industries, 1992*

<table>
<thead>
<tr>
<th>SIC NO.</th>
<th>INDUSTRY DESIGNATION</th>
<th>FOUR LARGEST FIRMS</th>
<th>EIGHT LARGEST FIRMS</th>
<th>NUMBER OF FIRMS</th>
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<td>2823</td>
<td>Cellulosic man-made fiber</td>
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<td>Motor vehicles</td>
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<td>Small arms ammunition</td>
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<tr>
<td>3632</td>
<td>Household refrigerators and freezers</td>
<td>82</td>
<td>98</td>
<td>52</td>
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</tbody>
</table>
Oligopoly

What are some barriers to entry?

- Natural
  - Scale economies
  - Patents
  - Technology
  - Name recognition/branding
Oligopoly

What are some barriers to entry?

- Strategic action
  - Flooding the market
  - Controlling an essential input
Oligopoly

Management Challenges
- Strategic actions
- Rival behavior

Question
- What are the possible rival responses to a 10% price cut by Ford?
Oligopoly

- Equilibrium in an Oligopolistic Market
  - In perfect competition, monopoly, and monopolistic competition producers did not have to consider a rival’s response when choosing output and price.
  - In oligopoly producers must consider the response of competitors when choosing output and price.
Oligopoly

Equilibrium in an Oligopolistic Market

- Defining Equilibrium
  - Firms do the best they can and have no incentive to change their output or price
  - All firms assume competitors are taking rival decisions into account.
Oligopoly

➢ Nash Equilibrium
  – Each firm is doing the best it can given what its competitors are doing.
Oligopoly

➢ The Cournot Model

– Duopoly

• Two firms competing with each other. They choose output independently.

• Homogenous good

• The output of the other firm is assumed to be fixed

• Barriers to new entry
If Firm 1 thinks Firm 2 will produce 50 units, its demand curve is shifted to the left by this amount.

If Firm 1 thinks Firm 2 will produce 75 units, its demand curve is shifted to the left by this amount.

If Firm 1 thinks Firm 2 will produce nothing, its demand curve, $D_1(0)$, is the market demand curve.

What is the output of Firm 1 if Firm 2 produces 100 units?
The Reaction Curve

- A firm’s profit-maximizing output is a decreasing function of the expected output of Firm 2.
Firm 1’s reaction curve shows how much it will produce as a function of how much it thinks Firm 2 will produce. The x’s correspond to the previous example.

Firm 2’s reaction curve shows how much it will produce as a function of how much it thinks Firm 1 will produce.

In Cournot equilibrium, each firm correctly assumes how much its competitors will produce and thereby maximizes its own profits.
Oligopoly

The Linear Demand Curve

An Example of the Cournot Equilibrium

– Duopoly

• Market demand is $P = 30 - Q$ where $Q = Q_1 + Q_2$
• $MC_1 = MC_2 = 0$
Oligopoly

The Linear Demand Curve

An Example of the Cournot Equilibrium

– Firm 1’s Reaction Curve

Total Revenue, \( R_1 = P Q_1 = (30 - Q)Q_1 \)

\[ = 30Q_1 - (Q_1 + Q_2)Q_1 \]

\[ = 30Q_1 - Q_1^2 - Q_2Q_1 \]
Oligopoly

The Linear Demand Curve

An Example of the Cournot Equilibrium

\[ MR_1 = \frac{\Delta R_1}{\Delta Q_1} = 30 - 2Q_1 - Q_2 \]

\[ MR_1 = 0 = MC_1 \]

Firm 1's Reaction Curve

\[ Q_1 = 15 - \frac{1}{2}Q_2 \]

Firm 2's Reaction Curve

\[ Q_2 = 15 - \frac{1}{2}Q_1 \]
Oligopoly

The Linear Demand Curve

An Example of the Cournot Equilibrium

Cournot Equilibrium: \( Q_1 = Q_2 \)

\[
Q_1 = 15 - \frac{1}{2}(15 - \frac{1}{2}Q_1) = Q_1 = 10 = Q_2
\]

\[
Q = Q_1 + Q_2 = 20
\]

\[
P = 30 - Q = 10
\]
Duopoly Example

The demand curve is \( P = 30 - Q \) and both firms have 0 marginal cost.
Profit Maximization with Collusion

\[ R = PQ = (30 - Q)Q = 30Q - Q^2 \]
\[ MR = \frac{\Delta R}{\Delta Q} = 30 - 2Q \]
\[ MR = 0 \text{ when } Q = 15 \text{ and } MR = MC \]
Oligopoly

Profit Maximization with Collusion

Contract Curve

- $Q_1 + Q_2 = 15$
  - Shows all pairs of output $Q_1$ and $Q_2$ that maximizes total profits
- $Q_1 = Q_2 = 7.5$
  - Less output and higher profits than the Cournot equilibrium
Duopoly Example

For the firm, collusion is the best outcome followed by the Cournot Equilibrium and then the competitive equilibrium.
Cournot Model

- Equilibrium lies between competitive equilibrium and monopoly equilibrium.
- In general in the Cournot model where $n$ is the number of firms in the industry.
- When $n=1$ we have the monopoly outcome, when $n$ gets big we have the competitive outcome.

\[ Q = \frac{n}{(n+1)} \cdot \frac{a}{b} \]
First Mover Advantage-- The Stackelberg Model

Assumptions

- One firm can set output first
- MC = 0
- Market demand is $P = 30 - Q$ where $Q =$ total output
- Firm 1 sets output first and Firm 2 then makes an output decision
First Mover Advantage-- The Stackelberg Model

- **Firm 1**
  - Must consider the reaction of Firm 2

- **Firm 2**
  - Takes Firm 1’s output as fixed and therefore determines output with the Cournot reaction curve: \[ Q_2 = 15 - \frac{1}{2}Q_1 \]
Firm 1

– Choose $Q_1$ so that:

\[
MR = MC, \quad MC = 0 \text{ therefore } MR = 0
\]
\[
R_1 = PQ_1 = 30Q_1 - Q_1^2 - Q_2Q_1
\]
First Mover Advantage--The Stackelberg Model

Substituting Firm 2’s Reaction Curve for $Q_2$:

$$R_1 = 30Q_1 - Q_1^2 - Q_1(15 - 1/2Q_1)$$
$$= 15Q_1 - 1/2 Q_1^2$$

$$MR_1 = \Delta R_1 / \Delta Q_1 = 15 - Q_1$$
$$MR = 0 : Q_1 = 15 \text{ and } Q_2 = 7.5$$
First Mover Advantage--The Stackelberg Model

➢ Conclusion
  – Firm 1’s output is twice as large as firm 2’s
  – Firm 1’s profit is twice as large as firm 2’s

➢ Questions
  – Why is it more profitable to be the first mover?
  – Which model (Cournot or Stackelberg) is more appropriate?
The Stackelberg Model

Consider the case where demand is given by:

\[ P = a - bQ \]

where \( MC_1 = MC_2 = 0 \).

You can show that:

\[ Q_1 = \frac{a}{2b} \quad Q_2 = \frac{a}{4b} \]

\[ Q = \frac{3a}{4b} \quad P = \frac{a}{4} \]

(You should work this out yourself)

Total output is higher than in the Cournot model and price is lower.
Price Competition

- Competition in an oligopolistic industry may occur with price instead of output.

- The Bertrand Model is used to illustrate price competition in an oligopolistic industry with homogenous goods.
Price Competition

Bertrand Model

Assumptions
- Homogenous good
- Market demand is $P = 30 - Q$ where $Q = Q_1 + Q_2$
- $MC = $3 for both firms and $MC_1 = MC_2 = $3
Price Competition

**Bertrand Model**

➢ Assumptions

- The Cournot equilibrium:

  \[ P = $12 \quad Q_1 = Q_2 = 9 \]

  \[ \pi \text{ for both firms} = $81 \]

- Now, assume the firms compete with price, not quantity.
Price Competition

Bertrand Model

➤ How will consumers respond to a price differential? (Hint: Consider homogeneity)

– The Nash equilibrium:
  • \( P = MC; P_1 = P_2 = 3 \)
  • \( Q = 27; Q_1 & Q_2 = 13.5 \)
  • \( \pi = 0 \)
Price Competition

**Bertrand Model**

- Why not charge a higher price to raise profits?

- How does the Bertrand outcome compare to the Cournot outcome?

- The Bertrand model demonstrates the importance of the strategic variable (price versus output).
# Outcome for different Oligopoly models

<table>
<thead>
<tr>
<th>Model</th>
<th>$Q_1$</th>
<th>$Q_2$</th>
<th>$Q$</th>
<th>$P$</th>
<th>$\Pi_1$</th>
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Where demand is given by: $P = a - bQ$, where $Q = Q_1 + Q_2$ and where $MC_1 = MC_2 = 0$. 

100
Competition Versus Collusion: The Prisoners’ Dilemma

- Each firm's profits are highest when they collude.
- Why wouldn’t each firm set the collusion price independently and earn the higher profits that occur with explicit collusion?
Assume:

\[ FC = \$20 \text{ and } VC = \$0 \]

Firm 1's demand: \[ Q = 12 - 2P_1 + P_2 \]

Firm 2's demand: \[ Q = 12 - 2P_2 + P_1 \]

Nash Equilibrium: \[ P = \$4 \quad \pi = \$12 \]

Collusion: \[ P = \$6 \quad \pi = \$16 \]
Possible Pricing Outcomes:

- If both charge $6, $\pi = $16

- If $P_1 = $6 and $P_2 = $4
  
  then $\pi_2 = P_2Q_2 - 20$
  
  $$\pi_2 = (4)[12 - (2)(4) + 6] - 20 = $20$$

  $\pi_1 = P_1Q_1 - 20$
  
  $$\pi_1 = (6)[12 - (2)(6) + 4] - 20 = $4$$
Payoff Matrix for Pricing Game

<table>
<thead>
<tr>
<th>Firm 1</th>
<th>Charge $4</th>
<th>Charge $6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charge $4</td>
<td>$12, $12</td>
<td>$20, $4</td>
</tr>
<tr>
<td>Charge $6</td>
<td>$4, $20</td>
<td>$16, $16</td>
</tr>
</tbody>
</table>
These two firms are playing a noncooperative game.

- Each firm independently does the best it can taking its competitor into account.

Question

- Why will both firms both choose $4 when $6 will yield higher profits?
Cartels

- Characteristics

  1) Explicit agreements to set output and price

  2) May not include all firms
Cartels

➤ Characteristics

3) Most often international

- Examples of successful cartels
  - OPEC
  - International Bauxite Association
  - Mercurio Europeo

- Examples of unsuccessful cartels
  - Copper
  - Tin
  - Coffee
  - Tea
  - Cocoa
Cartels

- Conditions that make forming a cartel easier.
  - Potential for monopoly power—inelastic demand.
  - A concentrated industry.
  - Firms compete primarily on price.
Cartels

What makes it easier to prevent cheating?

- Few firms in the industry
- Stable demand
- Public prices
- Repeated interactions
Cartels

Why cartels fail

- Firm’s have strong incentive to cheat
- Difficult to all agree on the appropriate policy
- Profits of the cartel encourage entry
- Often illegal
Market Structure

Markets are often described by the degree of concentration

- Common measure is N-firm concentration ratio = combined market share of the largest N firms (such as 4 or 20)
- Another is Herfindahl index, the sum of squared market shares

\[ H_i = \sum_i (S_i)^2 \]

Where \( S_i \) is firm \( i \)'s share of output
Measuring Market Structure

- Monopoly is one extreme with the highest concentration - one seller
- Perfect competition is the other extreme with many, many sellers
# Four Classes of Market Structure

<table>
<thead>
<tr>
<th>Nature of Competition</th>
<th>Range of Herfindahls</th>
<th>Price Competition Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfect competition</td>
<td>&lt; 0.2 usually</td>
<td>VERY intense</td>
</tr>
<tr>
<td>Monopolistic competition</td>
<td>&lt; 0.2 usually</td>
<td>Depends on product differentiation</td>
</tr>
<tr>
<td>Oligopoly</td>
<td>0.2 to 0.6</td>
<td>Depends on interfirm rivalry</td>
</tr>
<tr>
<td>Monopoly</td>
<td>0.6 to 1</td>
<td>Usually light, except when threat of entry</td>
</tr>
</tbody>
</table>
Competition Level Varies within Market Structure

- A monopoly market may produce the same outcomes as a competitive market
- A market with as few as two firms can lead to fierce competition
- With monopolistic competition, level of product differentiation determines the intensity of price competition
- Do not rely solely on Herfindahl index!!!
Summary

- We assume that all firms try and maximize profits.

- A competitive firm makes its output choice under the assumption that the demand for its own output is horizontal.
Summary

➢ In the short run, a competitive firm maximizes its profit by choosing an output at which price is equal to (short-run) marginal cost.

➢ In the long-run, profit-maximizing competitive firms choose the output at which price is equal to long-run marginal cost.
Market power is the ability of sellers or buyers to affect the price of a good.

Monopoly power is determined in part by the number of firms competing in the market.

Market power can impose costs on society.

In a monopolistically competitive market, firms compete by selling differentiated products, which are highly substitutable.
Firms with market power are in an enviable position because they have the potential to earn large profits, but realizing that potential may depend critically on the firm’s pricing strategy.

A pricing strategy aims to enlarge the customer base and capture as much consumer surplus as possible.
Summary

- In an oligopolistic market, only a few firms account for most or all of production.

- In the Cournot model of oligopoly, firms make their output decisions at the same time, each taking the other’s output as fixed.

- In the Stackelberg model, one firm sets its output first.
The Nash equilibrium concept can also be applied to markets in which firms produce substitute goods and compete by setting price.

In a cartel, producers explicitly collude in setting prices and output levels.

Firms would earn higher profits by collusively agreeing to raise prices, but the antitrust laws usually prohibit this.