**Unit 4: Imperfect Competition**

4-4. Oligopolies

**Characteristics of Oligopolies:**
- A Few Large Producers (Less than 10)
- Identical or Differentiated Products
- High Barriers to Entry
- Control Over Price (Price Maker)
- Mutual Interdependence
- Firms use Strategic Pricing

Examples: OPEC, Cereal Companies, Car Producers

**Oligopoly**

**How do Oligopolies Occur?**
Oligopolies occur when only a few large firms start to control an industry.
High barriers to entry keep others from entering.

Types of Barriers to Entry
1. Economies of Scale
   - Ex: The car industry is difficult to enter because only large firms can make cars at the lowest cost
2. High Start-up Costs
3. Ownership of Raw Materials

**Why do Oligopolies exist?**
- Mergers
- Economies of scale
- Reputation
- Strategic barriers
- Government barriers

**Measures of Industry Concentration**

- Concentration ratio of an industry is used as an indicator of the relative size of firms in relation to the industry as a whole.
- When four firms control 40% or more of the market, the industry is considered oligopolistic

Shortcomings—
- Localized Markets
- Inter-industry competition
- World Trade
Herfindahl-Hirschman Index (HHI) is a measure of the size of firms in relationship to the industry and an indicator of the amount of competition among them.

The index is defined as the sum of the squares of the market shares of each individual firm. 

\[ \text{HHI} = \sum_{i=1}^{n} \left( \%S_i \right)^2 \]

As such, it can range from 0 to 10,000, moving from a very large amount of very small firms to a single monopolistic producer.

Six largest firms produce 90 percent of the output:

Case 1: All six firms produce 15 percent

Case 2: One firm produces 80 percent while the five others produce 2 percent each.

\[ \text{Case 1: Herfindahl index of 1360 (15^2 x 6)} \]
\[ \text{Case 2: Herfindahl index of 6420 (80^2 + (2^2 x 5)} \]

What is a Balanced Oligopoly?

- An oligopoly in which the sales of the leading firms are distributed fairly evenly among them

In which type is market power most concentrated?

- Unbalanced Oligopoly

What is a Horizontal Merger?

- A merger between firms producing the same good in the same industry

What is a Vertical Merger?

- A merger between firms that have a supplier-purchaser relationship
What is a Conglomerate Merger?
• A merger between firms in unrelated industries

Firms in Oligopoly are said to be Mutually Interdependent
• Firms realize the large impact that other firms behavior has on their profits
• Leads to many models of oligopoly, depending on how the firms deal with the mutual interdependence issue

One way to deal with the Mutual Interdependence problem is…..
LET’S CHEAT!!!!
THE COLLUSION SOLUTION!!!

What is Collusion?
• The practice of firms to negotiate price and market decisions that limit competition

One model of collusion that can be used is the cartel model
• Internationally, some cartels like OPEC exist
• Domestically, these would be illegal
• If the cartel can collude perfectly, would tend to charge the monopoly price

What is a Cartel?
• A group of firms that collude to limit competition in a market by negotiating and accepting agreed-upon price and market shares
Ingredients for a successful cartel

- Control a large share of the market
- Inelastic and stable demand for the product
- Similar costs among cartel members
- Fairly homogenous product
- Few number of firms
- Ways of preventing cheating on the agreement

Game Theory
The study of how people behave in strategic situations

An understanding of game theory helps firms in an oligopoly maximize profit.

Game theory helps predict human behavior
THE ICE CREAM MAN SIMULATION
1. You are a ice cream salesmen at the beach
2. You have identical prices as another salesmen.
3. Beachgoers will purchase from the closest salesmen
4. People are evenly distributed along the beach.
5. Each morning the two firms pick locations on the beach

Where is the best location?

Why learn about game theory?
- Oligopolies are interdependent since they compete with only a few other firms.
- Their pricing and output decisions must be strategic as to avoid economic losses.
- Game theory helps us analyze their strategies.

SIMULATION!

Where should you put your firm?

Firm A decides where to goes first.
- What is the best strategy for choosing a location each day?
- Can you predict the end result each day?
- How is this observed in the “real-world”?

The Prisoner’s Dilemma
Charged with a crime, each prisoner has one of two choices: Deny or Confess

<table>
<thead>
<tr>
<th>Prisoner 1</th>
<th>Prisoner 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deny</td>
<td>Confess</td>
</tr>
<tr>
<td>Both Deny = 5 Years in jail each</td>
<td>Confess = Free</td>
</tr>
<tr>
<td>Deny = 20 Years</td>
<td>Both Confess= 10 Years in jail each</td>
</tr>
</tbody>
</table>
Game Theory Matrix
You and your partner are competing firms. You have one of two choices: Price High or Price Low. Without talking, write down your choice.

<table>
<thead>
<tr>
<th>Firm 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>High</td>
<td>Both High = $20 Each</td>
<td>Low = $30</td>
<td>High = 0</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>High = 0</td>
<td>Low = $30</td>
<td>Both Low = $10 each</td>
<td></td>
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</tbody>
</table>

Game Theory Matrix
Notice that you have an incentive to collude but also an incentive to cheat on your agreement.

<table>
<thead>
<tr>
<th>Firm 2</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>High</td>
<td>Both High = $20 Each</td>
<td>Low = $30</td>
<td>High = 0</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>High = 0</td>
<td>Low = $30</td>
<td>Both Low = $10 each</td>
<td></td>
</tr>
</tbody>
</table>

Dominant Strategy
The Dominant Strategy is the best move to make regardless of what your opponent does. What is each firm’s dominant strategy?

<table>
<thead>
<tr>
<th>Firm 2</th>
<th></th>
<th>No Dominant Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>$100, $50</td>
<td>$50, $90</td>
</tr>
<tr>
<td>Low</td>
<td>$80, $40</td>
<td>$20, $10</td>
</tr>
</tbody>
</table>

Video: Split or Steal
What is each player’s dominate strategy?

<table>
<thead>
<tr>
<th>Firm 2</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Split</td>
<td></td>
<td>Steal</td>
<td></td>
</tr>
<tr>
<td>Firm 1</td>
<td>Half, Half</td>
<td>None, All</td>
<td></td>
</tr>
<tr>
<td>Steal</td>
<td>All, None</td>
<td>None, None</td>
<td></td>
</tr>
</tbody>
</table>

What did we learn?
1. Oligopolies must use strategic pricing (they have to worry about the other guy)
2. Oligopolies have a tendency to collude to gain profit. (Collusion is the act of cooperating with rivals in order to “rig” a situation)
3. Collusion results in the incentive to cheat.
4. Firms make informed decisions based on their dominant strategies

2007 FRQ #3
Payoff matrix for two competing bus companies

<table>
<thead>
<tr>
<th>Rankin Wheels</th>
<th>Roadway</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>$1,000, $650</td>
<td>$950, $850</td>
</tr>
<tr>
<td>Late</td>
<td>$750, $650</td>
<td>$700, $800</td>
</tr>
</tbody>
</table>

(a) In which market structure do these firms operate? Explain.
(b) If Roadway chooses an early departure, which departure time is better for Rankin Wheels?
(c) Identify the dominant strategy for Roadway.
(d) Is choosing an early departure a dominant strategy for Rankin Wheels? Explain.
(e) If both firms know all of the information in the payoff matrix but do not cooperate, what will be Rankin Wheels’ daily profit?
Because firms are interdependent  
There are 3 types of Oligopolies  
1. Price Leadership (no graph)  
2. Colluding Oligopoly  
3. Non Colluding Oligopoly

Example: Small Town Gas Stations  
To maximize profit what will they do?  
OPEC does this with OIL

#1. Price Leadership

Price Leadership
• Collusion is ILLEGAL.  
• Firms CANNOT set prices.  
• Price leadership is a strategy used by firms to coordinate prices without outright collusion

General Process:  
1. “Dominant firm” initiates a price change  
2. Other firms follow the leader

(a) If Easy Ride chooses to maintain its current fare, which strategy is better for City Wheels? Explain.  
(b) Is there a dominant strategy for Easy Ride? Explain.  
(c) Assume that the companies must make their decisions simultaneously and do not cooperate. What will be the daily profit for each firm?  
(d) If these two firms could cooperate, which strategy would each firm choose?  
(e) Suppose that the local government decides to provide a subsidy of $40 per day to the bus companies. However, only a company that agrees to lower its fare is eligible to receive the subsidy. Draw a new payoff matrix that reflects the change in government policy.
Price Leadership

Breakdowns in Price Leadership

• Temporary Price Wars may occur if other firms don’t follow price increases of dominant firm.
• Each firm tries to undercut each other.
Example: Employee Pricing for Ford

#2. Colluding Oligopolies

Firms in a colluding oligopoly act as a monopoly and share the profit

Cartel = Colluding Oligopoly

A cartel is a group of producers that create an agreement to fix prices high.
1. Cartels set price and output at an agreed upon level
2. Firms require identical or highly similar demand and costs
3. Cartel must have a way to punish cheaters
4. Together they act as a monopoly

#3. Non-Colluding Oligopolies

Kinked Demand Curve Model

The kinked demand curve model shows how noncollusive firms are interdependent
If firms are NOT colluding they are likely to react to competitor’s pricing in two ways:
1. Match price-If one firm cuts it’s prices, then the other firms follow suit causing inelastic demand
2. Ignore change-If one firm raises prices, others maintain same price causing elastic demand
If this firm increases its price, other firms will ignore it and keep prices the same. As the only firm with high prices, Qd for this firm will decrease a lot.

If this firm decreases its price, other firms will match it and lower their prices. Since all firms have lower prices, Qd for this firm will increase only a little.

Where is Marginal Revenue? MR has a vertical gap at the kink. The result is that MC can move and Qe won’t change. Price is sticky.

Market Structures Venn Diagram

Name the market structure(s) that it is associated with each concept:
1. Price Maker (Demand > MR)
2. Collusion/Cartels
3. Identical Products
4. Price Taker (Demand = MR)
5. Excess Capacity
6. Low Barriers to Entry
7. Game Theory
8. Differentiated Products
9. Long-run Profits
10. Efficiency
11. Normal Profit
12. Dead Weight Loss
13. High Barriers to Entry
14. Firm = Industry
15. MR=MC Rule
4-4. Oligopolies

- No Similarities
- Perfect Competition
- Monopolistic Competition
- Oligopoly
- Monopoly

- Perfect Competition
  - Identical Products
  - No advantage
  - No barriers to entry
  - No Long-run Profit
  - Price = ATC
  - Both efficiencies
  - D = MR = AR = P
  - Price-Taker
  - 100s

- Monopolistic Competition
  - Monopoly
  - No Similarities
  - MR = MC
  - Shut-Down Point
  - Motivation for Profit
  - Cost Curves
  - Differentiated Products
  - Excess Capacity
  - More Elastic Demand than Monopoly
  - 100s
  - Low barriers to entry
  - No Long-run Profit
  - Price = ATC
  - Price Maker (D > MR)
  - Some Non-Price Competition
  - Inefficient
  - Collusion
  - Strategic Pricing (interdependence)
  - Game Theory
  - 10 or less
  - Unique Good
  - Price Discrimination
  - 1
  - High Barriers
  - Ability to Make LR Profit
  - Inefficient

- Oligopoly
  - Excess Advertising
  - Homogeneous Products
  - Excess Capacity
  - More Elastic Demand than Monopoly
  - 100s

- Monopoly
  - Price Maker (D > MR)
  - Home Non-Price Competition
  - Inefficient

Monopolistic Competition vs. Oligopoly

Jacob Clifford
San Pasqual High School, Escondido, CA
jclifford@euhsd.k12.ca.us