



# MANAGERIAL ECONOMICS

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Lecture No - 31 : Oligopoly

## Recap from last Session

- **Determination of price and output in the short/long run**
- **Non Price Competition**

## **Session Outline**

Features of Oligopoly

Non-collusive models of oligopoly

## **Non price competition – product innovation and advertisement**

Two common form of non-price competition is

- 1.Product innovation and
- 2.Advertisement

Both go on simultaneously.

Cost incurred on these-selling cost

## **Non price competition – product innovation and advertisement**

Increase in selling cost – ASC initially decreases but ultimately increases – ASC is u shaped like AC curve

Non price competition through selling cost leads all the firms to an almost similar equilibrium.

Firm's group equilibrium

## Critical appraisal of Chamberlin's theory

1. Assumption of independent pricing and output decision – firms are bound to get affected by decisions of rivals since their products are close substitutes.
2. Firms do not learn from past experience – difficult to accept
3. Product group is ambiguous – each firm is an industry by virtue of its specialized and unique product.

## Critical appraisal of Chamberlin's theory

4. Heroic assumption of identical cost and revenue curves are questionable.
5. Assumptions of free entry is considered incompatible with product differentiation.
6. It is difficult to find any example in the real world to which his model of monopolistic competition is relevant

## Oligopoly

Oligopoly is the most realistic types of market and yet is the most complicated to be defined as theory.

It comes from greek word “oligo” means few and ‘polo’ means sell – it means market with a few seller.



## Oligopoly

Oligopoly is a market where a few dominant sellers sell differentiated or homogeneous products under continuous consciousness of rival's action.

Interdependence of various firm

## Characteristics of an Oligopoly Market

- Only a few firms supply the entire market with a product that may be standardized or differentiated.
- At least some firm have large market shares and thus can influence the price of the product.
- The Firm is oligopolistic are aware of their interdependence and always consider their rival's reaction when setting prices, output goals, advertising budgets and other business policies.

## Characteristics of an Oligopoly Market

- The oligopoly market is concerned with group behavior.
- Collusive oligopoly
- Non-collusive oligopoly

## Characteristics of an Oligopoly Market

- **Entry Barrier**
  - Huge investment requirement
  - Strong consumer loyalty for existing brands
  - Economies of scale
- **Interdependent decision making**

## Characteristics of an Oligopoly Market

- **Non Price Competition**
  - Oligopoly firms avoid price war because it will not benefit firms only benefit consumers.
  - They resort to other strategies like highly aggressive advertisement, product bundling, influencing value perception of consumers, branding and offering better service packages.

## Characteristics of an Oligopoly Market

- **Non Price Competition**
  - The extreme case of non price competition is the formation of cartels.
  - Firms also tacitly agree to sell their products in separate market and at the same price.

## Characteristics of an Oligopoly Market

- **Indeterminateness of the demand curve**
- Demand is affected by own price, advertisement and quality
- Price of Rival's product, their quality, packaging and promotion
- Oligopoly firm face two demand curves, highly elastic, less elastic – different types of reaction by rivals firm in response to change in price

## Characteristics of an Oligopoly Market

- **Duopoly**
- Special case of oligopoly – only two players in the market
- During price war less efficient firm had to exit or the price reached after the price war is so low that new firms do not find market attractive or small firm may not be able to survive due to high cost.



## Characteristics of an Oligopoly Market

- **Duopoly**
- The other possibility of duopoly that there are many small players, but two large players are competing and created duopoly like situation.
- Example – premier, Hindustan motors,
- Tata and Reliance – CDMA
- Pepsi and Coca cola

## Equilibrium Price and output

- Due to interdependence, there is an uncertainty about the reaction pattern of rivals.
- A wide variety of reaction pattern become possible and accordingly a large variety of models of price output determination may be constructed.
- The actual solution is therefore indeterminate unless there is specification of particular reaction pattern of the rivals.

## Non-Collusive Oligopoly

- Common characteristics of non-collusive oligopoly is that they assume certain pattern of reaction of competitors, in each period and despite the fact that the expected reaction does not in fact materialize , the firm continue to assume that the initial assumption holds.
- In other words, Firms are assumed never learn from past experience which makes their behavior at least naïve.

## Non-Collusive Oligopoly

Cournot's model

Stacklberg's Model

Kinked Demand curve

## Cournot's model

Illustrated the market situation under oligopoly with an example of two firms engaged in production and sale of mineral water. Each firm owns a spring mineral water which is available free from nature.

The crux of this model is a situation in which firms ignore interdependence and take decisions as if they are operating independently in the market

## Cournot's Model of Duopoly

### Assumptions:

- Two interdependent sellers selling homogeneous goods.
- Large number of buyers in the market
- Identical cost curves, each duopolist has a zero cost of production.
- Each duopolist makes an output plan during a period which cannot be revised in that period.

## Cournot's Model of Duopoly

### Assumptions:

- Neither of the duopolist sets the price but each accepts the price of his product at which total planned output can be sold.
- Though each duopolist is aware of the mutual interdependence between their output plans, each is quite ignorant of the direction and magnitude of the revision in his rival's plan that would be induced by any given change in his own.

## Cournot's Model of Duopoly

Let  $Q_1, Q_2$  be the output level of two sellers whose cost of production is zero.

$$\text{Total output} = Q = Q_1 + Q_2$$

$$P = a + bQ, \quad a > 0, \quad b < 0$$

$$\Pi_1 = PQ_1 = (a + bQ) Q_1 = [a + b(Q_1 + Q_2)] Q_1 \quad (\text{Since Cost of production is zero})$$

$$\Pi_1 = aQ_1 + bQ_1^2 + bQ_1Q_2$$



## Cournot's Model of Duopoly

There will be different combinations of  $Q_1$  and  $Q_2$  from which a fixed level of profit of the first seller can be obtained.

The locus of all such combinations is called an isoprofit curve, or profit indifference curve of the first seller.

For each level of  $\Pi$ , there will be one such profit indifference curve of one seller.

## Cournot's Model of Duopoly

- To maximize  $\Pi_1$ ,  $\partial \Pi_1 / \partial Q_1 = 0$ ,  
 $a + 2bQ_1 + bQ_2 = 0$  , or,  $bQ_2 = -2bQ_1 - a$ , or,  
 $q_2 = -2Q_1 - a/b$  -Reaction curve function of first seller

It gives combination of  $Q_1$  and  $Q_2$  for which the profit of first seller will be maximum.

## Cournot's Model of Duopoly

$\Pi_2 = P Q_2 = (a + bQ) Q_2 = [ a+ b (Q_1+Q_2)] Q_2$  ( Since Cost of production is zero)

$$\Pi_2 = aQ_2 + b Q_1Q_2 + bQ_2^2$$

There will be different combinations of  $Q_1$  and  $Q_2$  from which a fixed level of profit of the second seller can be obtained.

The locus of all such combinations is called an isoprofit curve, or profit indifference curve of the second seller.

## Cournot's Model of Duopoly

To maximize  $\Pi_2$ ,  $\partial \Pi_2 / \partial Q_2 = 0$ ,

$a + bQ_1 + 2bQ_2 = 0$ , or,  $2bQ_2 = -bQ_1 - a$ , or,

$Q_2 = -(1/2)Q_1 - (a/2b)$  - Reaction curve function of second seller

It gives combination of  $Q_1$  and  $Q_2$  for which the profit of second seller will be maximum.

## Cournot's Model of Duopoly

### Output

$$a + 2bQ_1 + bQ_2 = 0$$

$$a + bQ_1 + 2bQ_2 = 0$$

Adding both

$$2a + 3bQ_1 + 3bQ_2 = 0, \text{ or, } 2a + 3b(Q_1 + Q_2) = 0$$

$$\text{Or, } 2a + 3bQ = 0, \text{ or, } 3bQ = -2a,$$

$$Q = -2a/3b - \text{Duopoly Output}$$

## Cournot's Model of Duopoly

### Output

In case of perfect competitive market with demand curve  $P = a + bQ$

( assuming zero cost), equilibrium will be achieved at

Price = MC

Price = 0,

$P = a + bQ = 0$

$Q = -a/b$  – Perfect Competitive output

## Cournot's Model of Duopoly

If there is monopoly market with zero costs and the same demand function, equilibrium will be achieved where

$MR = 0$ ,  $a + 2bQ = 0$ , or,  $2bq = -a$

$Q = -(a/2b)$  – Monopoly output

So with zero cost and straight line demand function, the monopoly output is half of the competitive output and duopoly output is two-third of competitive output.

## Cournot's Model of Duopoly

As per Cournot's solution, equilibrium is stable and each firm will be maximizing profit by selling equal amounts of output at the same price.

Equilibrium is reached when both the firms earn maximum profit and have no tendency to change their output.



## **Session References**

**Micro Economics :ICFAI University Press**

**Managerial economics – Geetika, Ghosh and Choudhury**