Unit 4 Theory of Price and Output Determination

Concept of Firm and Industry:

FIRM: Firm is taken as a single unit of an industry producing goods and services with maximizing profit. Example: Apple Company, Louis Vuitton, ADIDAS etc.
Industry: It is the group of firms which produces homogeneous products.
For example: Mobile industry, Fashion industry, Sports industry.

Concept of Equilibrium:

It is the state of balance between two or more interacting forces i.e demand and supply. In this situation, all opposite forces come into a point and take rest. Market equilibrium is the situation of balance between two opposite market forces namely demand and supply of a commodity.
According to Hanson," A firm will be in equilibrium when it has no advantages to increase or decrease the output".
There are two methods or approaches for determining the equilibrium of a firm which are as follows:

- **Total Revenue and Total Cost Approach (TR-TC approach).**
- **Marginal Revenue and Marginal Cost Approach (MR-MC approach).**

Total Revenue and Total Cost Approach (TR-TC Approach)

- **Under Perfect Competition market.**

- **Under Monopoly market.**

Total Revenue and Total Cost Approach (TR-TC Approach).

Under Perfect Competition Market:

Definition:

Features or characteristics:

TR-TC Approach:

According to this approach, a firm is said to be in equilibrium when it maximize its profit. The profit is the difference between Total revenue and Total cost. The firm maximizes the profit when the difference between TR and TC is maximum i.e TR should be maximum and TC should be minimum.

So, Profit (∏) = TR – TC.

Equilibrium of firms under Perfect competition market:

Perfect competition market is the market structure in which there is a very large number of buyers and large number of sellers selling homogeneous products. Price is fixed by industry and firms are just price taker. The firms can sell as much as it wants only at the price fixed by the industry. Therefore, the total revenue curve is positively upward slopping line due to constant price which increased at the same rate. It is assumed that the Total Cost (TC) is inversely S-shaped due to operation of law of variable proportion. A firm attains equilibrium at that output at which the difference between TR and TC is Maximum. It is graphically shown below:

…….Figure …….

In above figure, X-axis represents output whereas Y- axis shows total revenue and total cost. TR represents Total Revenue Curve and TC represents Total Cost Curve and represents Total Profit Curve. The difference between TR and TC is measured by the vertical distance between TR and TC. Up to, output OQ1 and beyond output OQ3, TC curve is above TR curve i.e TC>TR. Therefore, in this situation, the firm is having loss. Point A and Point B is called Break-even-point as TR=TC which means neither gain nor loss.

According to this method, a firm is said to be equilibrium when the gap between TR and TC is maximum. To find this gap, we draw a straight line TT1 which is tangent with TC curve at point N and is parallel to TR curve .The maximum gap between TR and TC is shown by MN. This is the maximum profit and hence equilibrium point. Between Output the output OQ1 and OQ3, TR is greater than TC i.e TR>TC. So, between these output levels, there is profit. At output level OQ2 the vertical distance MN is maximum, i.e the profit is maximum and at point E the profit curve is at peak or apex point. Hence, the firm remains at equilibrium at the output level of OQ2.

Total Revenue and Total Cost Approach (TR-TC Approach).

Under Monopoly Market:

Definition & Features:

Equilibrium of Firm under Monopoly under TR-TC approach:

Under monopoly market structure, a firm determines the price of its product itself. Therefore, the firm is price maker. The monopoly firm or monopolist reduce price of its product in order to increase the sales. Therefore, TR curve is upward sloping but at the decreasing rate and TC curve is inversely S-shaped. The profit is maximized where there is maximum vertical distance between TR and TC curves. Therefore, the equilibrium is determined by comparing the TR and TC at each level of output.

The profit maximizing condition is illustrated in the given below:

Diagram……

In above diagram, X-axis represents output and Y-axis measures cost and revenue. Total Revenue (TR) is bell shaped due to varying price of the product. It is initially raised, reached maximum point and declined. Total Cost (TC) curve is inverse S-shaped due to law of variable proportion in production process.

The TR and TC intersect at each other at 2 points i.e "A and B". At point "A'" OQ1 and at point "B" OQ3 levels of output are produced. These 2 points are known as Break-even-point where there is neither profit nor loss because TR equals to TC. The firm bears loss at these 2 levels of output as TC> TR. The firm enjoys profit in the range between Q1 and Q3 as TR>TC in this range. But the maximum profit is obtained when monopolistic produces OQ2 level of output. In this level of output, the gap between TR and TC is Maximum. This gap is obtained by drawing lines TT1 and TT2 which is tangent to TR and TC at point M and N respectively and parallel to each other. The firm receives maximum profit

at Q3 level of output i.e. OQ2 as shown by profit curve "∏". The profit curve is also becomes maximum at Q2 level.

Firm Equilibrium under MR-MC Approach:

Firm equilibrium under Monopoly market under MR-MC approach in short run:

Introduction:

The firm will adjust the output and the price in such a way that marginal revenue and marginal cost are equal, whereby the firm can obtain maximum profit. In short-run equilibrium, whether the firm can make abnormal profit, normal profit or loss depending on the level of AC and AR.

Under monopoly market the firm is said to be in equilibrium when it fulfills the following two conditions:

- **Necessary / First order condition:**

  Marginal revenue should be equal to marginal cost.

  i.e. MR =MC

- **Sufficient / Second order condition:**

  MC curve must cut MR curve from below.

  i.e. slope of MC curve> slope of MR curve.

  ……Diagram……

  In above figure, the X-axis measures output and Y-axis measures cost, revenue and price. MC represents Marginal cost which is roughly U shape. The both AR and MR are average revenue and marginal revenue which is sloping downward from left to right and AR> MR. This is due to flexibility in price in case of monopoly market.

Here, at point A and E, MC intersects or cut fulfilling first order condition i.e. MR=MC. But at point A the second order condition isn't satisfied i.e. MC should

cut MR form below which is possible only at point E. So, at point E both the required conditions are fulfilled.

Hence, the equilibrium point is at E and equilibrium output is OQ2 and firm will maximize the profit by producing OQ2 level of output.

Firm equilibrium under Perfect Competition Market under MR-MC approach in short run:

Introduction:

It can sell as much as it wants only at the price determined by the market or industry. It means the price remains the same or stable. Therefore, AR and MR are the same and horizontal straight lines. The Marginal Cost (MC) curve is roughly U-shaped. The determination of equilibrium of the firm under PCM using MR-MC approach is graphically shown:

Under perfect competition market the firm is said to be in equilibrium when it fulfills the following two conditions:

- **Necessary / First order condition:**

  Marginal revenue should be equal to marginal cost.

  i.e. MR =MC

- **Sufficient / Second order condition:**

  MC curve must cut MR curve from below.

  i.e. slope of MC curve> slope of MR curve.

Figure:

In above figure the output is shown by X-axis whereas cost and revenue are shown by Y-axis. The marginal revenue curve = Average revenue =price which is parallel to X-axis overlapping to each other which is due to constant price in

perfectively competitive market. The Marginal Cost (MC) curve is U-shaped intersect the MR curve at 2 different points i.e. A and E where the first order condition is applied which means MR=MC. But at point E both first and second conditions are applied cutting MR by MC from below and MR=MC.

So, the equilibrium point is point E and equilibrium output is OQ2. The Firm will maximize its profit by producing OQ2 level of output.

#Price and Output determination under both markets in short and long run equilibrium:

- **Price and output determination under perfect completion market in short run equilibrium:**

Short-run Equilibrium:

Short-run refers to the time period where time is very short that a firm is unable to change its fixed factors of productions such as: plant, equipment, machinery. Therefore, a firm cannot change its production process. In short-run, some factors are variable and some are fixed. Under the PCM, the firms are simply the price-takers. They accept the price determined by the industry.

Based on the position of Average cost curve, the firm may face following three different situations in the short-run:

- **Equilibrium with abnormal profit. (If AR>AC)**
- **Equilibrium with normal profit. (If AR=AC)**
- **Equilibrium incurring loss. (If AR<AC).**

Conditions for Equilibrium:

- **Market supply should be equal to market demand.**
- **MC= MR.**
- **MC should intersect MR from below.**

Diagram (4) one industry and others firms

Equilibrium of Industry (1):

Figure I represents the equilibrium of an industry. In the diagram, X-axis represents the output and Y-axis represents the price. The downward slopping curve DD is the demand curve and upward slopping curve SS is supply curve. These 2 curves intersect each other at point E, which is called equilibrium point. Hence, the equilibrium price and quantity determined by the industry are OP and OQ respectively. So, the industry is price maker and all firms have to maintain the price set by the industry.

Equilibrium of the Firms:

Under PCM, in the short-run, there are 3 possibilities which are as follows:

- **Abnormal Profit(Supernormal profit/ Excess profit):**

  Figure II shows the abnormal profit gained by the firm. The firm earns abnormal profit when it's AR > AC. In the figure, E is the equilibrium

point because at this point MR= MC and MC curve intersects MR from below. Hence, the equilibrium price is OP and equilibrium output is OQ. The firm is earning abnormal profit equal to shaded rectangular part PEAC because AR is greater than AR and the average cost of production is OC.

In above figure: Total Revenue (TR) =OQEP, Total Cost (TC) = OQAC.

So, Profit (∏) = TR-TC

OPEQ-OQAC= AEPC.

- **Normal Profit or gain:**

In above figure, III show the normal gain or profit. The firm is in equilibrium at point E where MC intersects MR from below. The equilibrium output is determined by the firm OQ and price is OP. At this output, the firm is earning just the normal profit because AR and AC are equal. Normal profit is the profit which is just sufficient to run the business.

- **Loss:**

Figure IV represents loss of the firm which is shown by shaded rectangular figure EACP. The firm is in equilibrium at point E where both conditions are satisfied. The equilibrium output is OQ determined by the firm. At this output, AC > AR or price incurring or bearing loss.

Total Revenue (TR) = P*Q= OQEP Total Cost (TC) = AC* Q =OQAC

Loss = TR-TC= OQEP-OQAC= -AEPC (loss).

The negative sign shows loss equal to area AEPC.

- **Price and output determination under perfect completion market in Long run equilibrium:**

Long Run:

It is a period in which a firm can change both fixed and variable factors of production. In long-run, the firm can make a choice for entry and exit from the industry depending on the profit situation.

In this period, all factors of productions become variable but the furtand exit of the firm is ruled outher entry . Due to this, each firm under PCM enjoys normal profit only in long-run.

Equilibrium condition:

- **Market demand must be equal to market supply (D=S).(Industry)**
- **Long run marginal cost (LMC) = Long run marginal revenue (MR).**
- **LMC should cut MR from below (i.e slope of LMC> slope of MR).**

Diagram

In above figure, figure I represents industry and II represents Firm, where E_0 is the equilibrium point where demand equals to supply and determines the equilibrium price OP in industry. The firm follows the price OP determined by the industry. By following this price OP, the firm is in equilibrium at the point E_1 where LMC=MR and LMC curve cuts MR curve from below. At the point E_1, LAC is tangent to AR curve. This shows that the firm is operating under normal profit.

- **Price and output determination under Monopoly Market in Short- run equilibrium:**

Short-Run:

It refers to the time period, where monopolist can't change the fixed factors of production such as: plant and equipment, machinery etc. due to some is fixed and some is variable. Monopolist can increase its output by changing variable factors only. However, a monopolist is free in making decision due to lack of competition.

In short-run equilibrium, whether a firm/industry makes abnormal profit, normal profit or loss depending upon the level of AC and A. Profit of the firm is also influenced by the external factors specially in the situation of economic depression a monopolist may bear loss as well. The three different cases are:

- **Equilibrium of a firm with abnormal profit. (If AR>AC).**
- **Equilibrium of a firm with normal profit. (If AR=AC).**
- **Equilibrium of a firm with loss. (If AR<AC).**

Conditions of Equilibrium:

- **Marginal Revenue (MR) = Marginal Cost (MC).**
- **MC should cut MR from below.**

The equilibrium position of a monopoly firm has been graphically represented below:

Diagram from Book.

In above figures X-axis represents the output and Y-axis represents cost, revenue and price. The downward slopping curve AR and MR represents Average revenue and Marginal revenue respectively. The U-shaped curve AC and MC represents Average cost and Marginal cost respectively. The point E is known as Equilibrium of a firm as it fulfills the condition of equilibrium.

The three possibilities in the short-run under monopoly are as follows:

- **Abnormal profit (Super normal profit / excess profit):**

  In Figure number (A), the equilibrium point is "E" equilibrium price is OP and equilibrium quantity is OQ. The average cost of production is OC. At this price, output and average cost production, the monopoly firm or monopolist is earning the abnormal profit equal to shaded rectangular area ABPC. The firm is earning abnormal profit because AR is higher than AC.

  Total Revenue (TR) = (P*Q) = OQBP and Total Cost (TC) = OQAC (AC*Q)

  Total Profit (∏) = TR-TC = OQBP-OQAC= ABPC.

- **Normal Profit :**

  The figure (B) demonstrates normal profit as equilibrium point is "E". The equilibrium output is OQ and equilibrium price is OP as AR= AC. So, the firm or industry is just earning normal profit.

- **Loss:**

  The figure (C) shows loss of a firm. The point "E" is equilibrium point where MR=MC. The equilibrium output is OQ and equilibrium price is OP. The average cost of production is OC. Since AR is lower than AC, the firm is bearing loss which is represented by the shaded rectangular area CBAP.

Total Revenue (TR) =OQAP and Total Cost (TC) = OQBC.

Loss = TC-TR = OQBC-OQAP= ABCP.

- **Price and output determination under Monopoly Market in Long- run equilibrium:**

Long –run equilibrium:

In long-run, the firm has enough time to adjust its sizes of plant and capacity. All the factors of productions are variable. On the other hand, there is no any fear of entering new competitors in the market. It can operate its business freely in normal situation. Therefore, it enjoys supernormal profit or abnormal profit in the long-run.

Conditions for equilibrium:

- **First order condition (Necessary): Marginal Cost should be equal to Marginal Revenue. (MC=MR).**
- **Second order condition (Sufficient): MC should cut MR curve from below. (Slope of MC curve > slope of MR).**

The long run equilibrium under monopoly is illustrated in the following figure:

Diagram from the book

- **In above figure, X-axis represents output and Y-axis represents cost, revenue and profit. The point "E" is equilibrium point as it fulfills both necessary and sufficient conditions. LAC and LMC are the long run average and marginal cost curves respectively. The firm has obtained the supernormal profit or abnormal profit shown by shaded part ABPC. OP is the equilibrium price with OQ quantity of output is produced. As AR>AC, the monopolist is operating under abnormal profit.**

  Total revenue (TR) = P*Q= OP*OQ=OQBP and Total Cost (TC) = AC*Q= OC*OQ= OQAC.

  Total Profit (∏) = TR-TC= OQBP- OQAC= ABPC.

Similarity and difference between Perfect Competition market and Monopoly market.

The End