UNIT 1  PERFECT COMPETITION:
FIRM AND INDUSTRY
EQUILIBRIUM

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1.0  OBJECTIVES

After reading this unit, you will be able to:

- identify the characteristics a perfectly competitive market and their implications;
- explain the concept of firm as a Price Taker in Perfectly Competitive Market (PCM);
- state the profit-maximisation condition for a perfectly competitive (PC) firm;
- explain the Equilibrium of a perfectly competitive market or a industry;
- talk about the shut Down Point and Break-Even Output for a PC Firm;
- derive a perfectly competitive firm’s short-run supply curve from the firm’s profit-maximisation problem;

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Market Structure

- construct the short-run market supply curve from the short-run supply curves of individual firms;
- perform comparative statics analysis of the short-run equilibrium in a perfectly competitive market; and
- state the conditions for the long-run perfectly competitive equilibrium.

1.1 INTRODUCTION

Market structure refers to arrangements that bring buyers and sellers together. The market for a product may also refer to the whole region where buyers and sellers of that product are spread and there is such free competition that one price for the product prevails in the entire region. Whether a firm can be regarded as competitive depends on several factors such as the number of firms in the industry, degree of rivalry, degree of homogeneity of the product, economies of scale and easiness with which any firm can enter in the market and exit from it. On the basis of these characteristics, especially in terms of degree of competition, a market can be classified as a perfectly competitive market, monopoly, duopoly, oligopoly and monopolistic competition. In this unit, we aim to explore the features of a perfectly competitive market, equilibrium of industry and firms under such a market.

1.2 PERFECT COMPETITION: CHARACTERISTICS OF A PERFECTLY COMPETITIVE MARKET

A perfectly competitive market exhibits the following characteristics:

1) The industry is fragmented. It consists of large number of buyers and sellers. Each buyer’s purchases are so small that they have an imperceptible effect on market price. Each seller’s output is so small in comparison to the market demand that it does not affect the market price. In addition, each seller’s input purchases are so small that they have an negligible impact on input prices.

2) Firms produce homogeneous products. i.e., consumers perceive the products to be identical or homogeneous no matter who produces them. Product of Firm A will in no way be differentiated from those of Firm B. This results in price competition.

3) There is perfect knowledge/information amongst both firms and consumers: Firms will have total knowledge of any improvement in technology and manufacturing processes, while consumers will be fully aware of all firms’ prices.

4) The industry is characterised by equal access to resources. All firms – those currently in the industry, as well as prospective entrants – have access to the same technology and inputs. Firms can hire inputs, such as labour, capital, and materials, as they need them, and they can release them from their employment when they do not need them.

5) There are no barriers to entry: Nothing hinders firms from entering the market in order to compete with existing producers. Such barriers could be insurmountably high initial (start-up) costs, lack of access to key
technology or raw materials, and legal barriers such as not having necessary patent rights.

Sometimes, economists distinguish perfect competition from pure competition and impose the following two more conditions for a market to be perfectly competitive:

1) Perfect mobility of factors of production between the industries
2) No transport costs involved in a perfectly competitive market.

However, if one closely looks into the characteristics described earlier, one can easily find that the additional conditions mentioned above are implicit and therefore for the purpose of convenience and to avoid any confusion, pure and perfect completions are used as synonyms to each other.

These characteristics have three implications for how perfectly competitive markets work:

1) The first characteristic – *the market is fragmented* – implies that sellers and buyers act as price takers. That is, a firm takes the market price of the products given when making an output decision and a buyer takes the market price as given when making purchase decisions. This characteristic also implies that a firm takes input prices as fixed when making decisions about input quantities.

2) The second and third characteristics – *firms produce homogeneous products* and consumers have perfect information about prices – imply a law of one price: Transactions between buyers and sellers occur at a single market price. Because the products of all firms are perceived to be identical and the prices of all sellers are known, a consumer will purchase at the lowest price available in the market. No sales can be made at any higher price. The lowest price demanded by one firm will become the market price – every firm will have to sell at that price only.

3) The fourth and fifth characteristics imply that the *industry is characterised by free entry*. That is, if it is profitable for new firms to enter the industry, they will eventually do so. Free entry does not mean that a new firm incurs no cost when it enters the industry, but rather that it has access to the same technology and inputs that existing firms have.

In the real world it is hard to find examples of industries which fit all the criteria of ‘perfect knowledge’ and ‘perfect information’. However, some industries are close to perfectly competitive markets:

- **Foreign exchange markets.** As currency is all homogeneous and traders will have access to many different buyers and sellers and buyers also have choice from which trader to buy the currency. A good information about relative prices is available to the buyers and thus easy to compare prices while buying currency.

- **Agricultural markets.** Normally, there are several farmers selling identical products in the market which has many buyers. At the market, it is easy to compare prices. Therefore, agricultural markets often get close to perfect competition.
Internet based markets: The internet has made many markets closer to perfect competition because the internet has made it very easy to compare prices, quickly and efficiently (perfect information). Owing to the relatively low cost of doing business through internet, it has become easier to enter in the market. For example, selling a good on internet through a service like Amazon or e-kart etc. is close to perfect competition. Equal access to the market and availability of full information about the prices of the products, enable the price of goods to fall in line with the market price making the firms to earn only normal profit in the long run.

Check Your Progress 1

1) Describe briefly the characteristics of a perfectly competitive market and their implications?

2) Can you imagine in real world the markets akin to a perfectly competitive market, if yes list them with their similarities?

1.3 THE FIRM AS A PRICE TAKER IN PERFECTLY COMPETITIVE MARKET (PCM)

The aggregate demand and supply of industry determine the equilibrium price of the homogeneous product. The firm cannot influence this on its own, and thus simply accepts that it is facing a fixed price. The demand curve for the price taker firm is infinitely elastic, since the market can absorb any amount produced by any one supplier (Fig. 1.1).

A competitive market firm is a price-taker, so demand will be perfectly elastic. The demand curve is also the MR and AR curve.

\[ P = D = AR = MR \]

Fig. 1.1 : Demand and Revenue for a Perfectly Competitive Market (PCM)
In case for the perfectly competitive market firm, the price will be the same. The horizontal demand curve, is also the average revenue (AR) and marginal revenue curve (MR), i.e. \( P = AR = MR \). This can be verified as follows:

Total Revenue (TR) = Price × Quantity

\[
TR = P \times Q
\]

\[
AR = \frac{TR}{Q} = \frac{P \times Q}{Q} = P \quad \text{which is ‘given’}
\]

\[
MR = \frac{\Delta TR}{\Delta Q} = \frac{\Delta (P \times Q)}{\Delta Q} = \frac{P \cdot \Delta Q}{\Delta Q} = P
\]

(Price is given for a PCM firm)

**Supply curve for the firm.** To know about the supply curve of the firm, it would be necessary to look into the profit\(^1\) maximising behaviour of the price taker firm.

Assuming that the firm produces and sells a quantity \( Q \), its economic profit is \( \pi = TR(Q) - TC(Q) \), where \( TR(Q) \) is the total revenue derived from selling the quantity \( Q \) and \( TC(Q) \) is the total economic cost of producing the quantity \( Q \). As the firm is a price taker, it perceives that its volume decision has a negligible impact on market price and its goal is to choose a \( Q \) to maximise its total profit. To illustrate the firm’s problem, suppose that a rose grower anticipates that the market price for fresh-cut roses will be \( P = ₹1.00 \) per rose. Table 1.1 shows total revenue, total cost, and profits for various output levels and Fig. 1.2(a) graphs these numbers.

**Table 1.1: Total Revenue, Cost and Profit for a Price Taking Rose**

<table>
<thead>
<tr>
<th>Producer Firm</th>
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(Units in Thousands and value in ₹)

<table>
<thead>
<tr>
<th>( Q )</th>
<th>( TR(Q) )</th>
<th>( TC(Q) )</th>
<th>Profit</th>
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<tr>
<td>0</td>
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<tr>
<td>60</td>
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<td>95</td>
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<td>210</td>
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<td>360</td>
<td>300</td>
<td>60</td>
</tr>
<tr>
<td>420</td>
<td>420</td>
<td>460</td>
<td>40</td>
</tr>
</tbody>
</table>

Fig. 1.2(a) shows that profit is maximised at \( Q = 300 \) (i.e., 300,000 roses per month). It also shows that the graph of total revenue is a straight line with a slope of 1. Thus, as we increase \( Q \), the firm’s total revenue goes up at a constant rate equal to the market price, ₹1.00 which is also equal to MR.

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\(^1\) A distinction is to be made between economic profit and accounting profit, i.e.

- Economic profit = sales revenue - economic costs
- Accounting profit = sales revenue - accounting costs

That is, economic profit is the difference between a firm’s sales revenue and the totality of its economic costs, including all relevant opportunity costs, for example, reward or return of the labour put in by the owner of the firm which is treated equivalent to the return expected in his next best alternative use. Therefore, whenever we discuss profit maximisation, we are talking about economic profit maximisation.
Marginal cost (MC), the rate at which cost changes with respect to a change in output, following usual return to scales, is exhibited as U-shaped curve.

Fig. 1.2 shows that for quantities between $Q = 60$ and the profit-maximising quantity $Q = 300$, producing more roses increases profit. Increasing the quantity in this range increases total revenue faster than total cost, i.e. $MR > MC$ or in our case $P > MC$.

When $P > MC$, each time the rose producer increases its output by one rose, its profit goes up by $P - MC$, the difference between the marginal revenue and the marginal cost of that extra rose.

Further, for quantities greater than $Q = 300$, producing fewer roses increases profit. Decreasing quantity in this range decreases total cost faster than it decreases total revenue – that is, marginal revenue is less than marginal cost, or $P < MC$. When $P < MC$, each time the producer reduces its output by one rose, its profit goes up by $MC - P$, the difference between the marginal cost and the marginal revenue of that extra rose.

The producer can increase its profit when either $P > MC$ or $P < MC$, quantities at which these inequalities hold cannot maximise its profit. It must be the case, then, that at the profit-maximising output, $P = MC$, i.e. a price-taking firm maximises its profit when it produces a quantity $Q^*$ at which the marginal cost equals the market price.

![Graph showing total profit and marginal cost](image)

**Fig. 1.2**

Fig. 1.2 (b) however shows that there are two points ($Q = 60$, and $Q = 300$) at which $MR = MC$. The difference between $Q = 60$ and $Q = 300$ is that at $Q = 300$, the marginal cost curve is rising, while at $Q = 60$ the marginal cost curve is falling. The point at which $Q = 60$ represents the point at which profit is
minimised rather than maximised. This shows that there are two profit-maximisation conditions for a price-taking firm:

a) \( P = MC \).

b) \( MC \) must be increasing.

If either of these conditions does not hold, the firm cannot maximise its profit. It would be able to increase profit by either increasing or decreasing its output. Thus the rising part of the \( MC \) curve reflects the firm’s supply curve, and horizontal summation of the entire firms’ supply curve will be the market’s supply curve which is upward sloping. This concept would be further elaborated in the later part of this Unit. Any change in market demand will also shift the demand curve for the firm which would change the \( MC = MR \) point along the MC curve. Fig. 1.3 shows that when market demand increases from \( D_0 \) to \( D_1 \) and decreases to \( D_2 \), the demand curve (which is also the MR and AR curve) for the firm shifts upwards or downwards, along the upward-sloping MC curve. Any change in MR will change the profit maximising intersection of \( MC = MR \), would accordingly change the supply of the firms, whose horizontal summation would indicate the market supply curve.

![Market DD and SS](image1)

**Fig. 1.3: The PCM Firms’ Supply Curve**

### 1.4 THE PRICE-TAKING FIRM’S COST STRUCTURE

To understand the response of a price-taking firm in the short-run and also in the long run, we need to explore the cost structure of a typical such firm in the industry. The firm’s short-run total cost of producing a quantity of output \( Q \) is:

\[
STC(Q) = SFC + NSFC + TVC(Q)
\]

This equation identifies three categories of costs for this firm.

- **TVC (Q)** represents total variable costs. These are output-sensitive costs — that is, they go up or down as the firm increases or decreases its output. Total variable costs include materials costs and the costs of certain kinds of labour (e.g., factory labour). Total variable costs are zero if the firm produces zero output and thus are examples of non-sunk costs. If a rose producer, in our example, decides to shut down its rose growing
operations, it would avoid the need to spend money on fertilizer and pesticide.

- SFC represents the firm’s sunk fixed costs. A sunk fixed cost is a fixed cost that a firm cannot avoid if it temporarily suspends operations and produces zero output. For this reason, sunk fixed costs are often also called unavoidable costs. For example, suppose that a rose grower has signed a long-term lease (e.g., for five years) to rent land on which to grow roses and that the lease prevents it from subletting the land to anyone else. The lease cost is fixed because it does not vary with the quantity of roses that the firm produces. It is output insensitive. It is also sunk because the firm cannot avoid the rental payments, even by producing zero output.

- NSFC represents the firm’s non-sunk fixed costs. A non-sunk fixed cost is a fixed cost that must be incurred if the firm is to produce any output, but it does not have to be incurred if the firm produces no output. Non-sunk fixed costs, as well as variable costs, are also often called avoidable costs. For a rose grower, an example of a non-sunk fixed cost would be the cost of heating the greenhouses. Because greenhouses must be maintained at a constant temperature whether the firm grows 10 or 10,000 roses within the greenhouses, so the cost of heating the greenhouses is fixed (i.e., it is insensitive to the number of rose stems produced). But the heating costs are non-sunk because they can be avoided if the grower chooses to produce no roses in the greenhouses.

The firm’s total fixed (or output-insensitive) cost, TFC, is thus given by TFC = NSFC + SFC. If NSFC = 0, there are no fixed costs that are non-sunk. In that case, TFC = SFC.

Check Your Progress 2

1) Why a firm is always a price taker in a perfectly competitive market? Give adequate justification for your answer.

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2) Briefly explain the cost structure of a PC firm and its relevance in determining the price and output of such a firm?

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1.5 THE PERFECTLY COMPETITIVE MARKET: FIRM IN THE SHORT RUN AND LONG RUN

1.5.1 Short Run Price and Output

The perfectly competitive market firm (‘PCM firm’ henceforth) is basically left with two decisions in the short run to maximise the profit; whether to produce and how much to produce. It is pertinent to note that profit maximisation
output choice also implies cost-minimising input choices, or in short, profit maximisation implies cost minimisation. Assuming that the firm has decided to produce, regarding the second decision, in line with our assumption of profit maximisation, the PC firm will set output at the point where MC equals MR. Being a price-taker, the price is set by market forces (supply and demand) and the firm will have three possible outcomes in the short run, as shown in Fig. 1.4 below:

Given that \( \pi = TR(Q) - TC(Q) \), which in the unit-cost picture corresponds to \( AR - AC \), Fig. 1.4 shows three possibilities:

- **Normal profit**: When the market price equals the AC of the PC firm, the firm will be at break-even, i.e. it will enjoy normal profits. This is shown in the first diagram of Fig 1.4 as the MR = MC point coincides with average costs. As AR = AC there is a normal profit.

- **Abnormal/supernormal profit**: The middle diagram illustrates a situation where the market price (and thus the MR, AR curve) is above the average cost. The firm sets output at \( Q_{\text{e-max}} \) and earns an abnormal profit.

- **Loss**: Finally, when the price is below any point on the AC-curve, the firm will operate at a loss, as profit maximising output (\( Q_{\text{e-max}} \) – which is the same as the loss minimising level of output; \( Q_{\text{loss-min}} \) in the diagram) results in an AR below AC.

A firm in a perfectly competitive environment can only enjoy abnormal profits in the short run. The same holds for losses, which makes intuitive sense as no firm will be willing/able to uphold long term losses. The market mechanism together with the assumptions will act to create long run equilibrium where the PC firm will earn normal profits only.

### 1.5.2 Short Run Abnormal Profit – Market Entry

The firm depicted in the Fig. 1.5 on the left has an AC curve where the \( AC_{\text{min}} \) point is below the market price, \( P_0 \). The firm sets output at the profit maximisation point of \( MC = MR \) and thus has an average revenue which is above average cost. This is the abnormal profit per unit, shown by the double-edged arrow, and these times the quantity shows the total abnormal profit for the PC firm.
Market Structure

![Market Structure Diagram](image)

**Fig. 1.5: Short run profit in a perfectly competitive market**

What then happens, keeping in mind the assumptions of free market entry and perfect knowledge/information, is that new firms will be attracted and of course enter the market. This increases supply from $S_0$ to $S_1$ causing the price to fall from $P_0$ to $P_1$. Falling market price will lower AR for the single PC firm, creating a long run equilibrium where once again $AR = AC$. The firm’s short run profit is thus eroded in the long run by market entry.

### 1.5.3 Short Run Loss

Assume that firms which have been attracted to the market in the situation of abnormal profit, increased market output to the extent where the increase in supply lowered the market price to a level where individual firms made losses. This is the situation shown in Fig. 1.6 for a loss-making firm. At a market price of $P_0$, the firm’s AR is below AC. The firm will still produce at $MC = MR$ (‘loss-minimising’ point in this case) and will run at a loss, shown by the double-sided arrow. Total loss is the rectangle. As firms begin to exit the market over time — switching to more attractive producer substitutes — the market supply curve will shift to the left.

![Short Run Loss Diagram in a PCM Firm](image)

**Fig. 1.6: Short Run Loss in a PCM Firm**

In the LR, some firms will exit the market and market supply will decrease — shown by the shift from $S_0$ to $S_1$ in the market diagram on the right. As the market price rises, the firm’s AR rises and when $AR = AC$ once again, there is LR equilibrium and every firm makes normal profits. What the firms can do in the short run? As a PC firm is a price taker, not much can be done to influence the AR side of the coin, so firms are focused on lowering costs. A firm running at a loss will have to find ways to become more efficient (i.e. lower MC) and/or decrease costs in general. One of the most common methods
used to decrease costs is to decrease the amount of labour used in production and to try to use remaining labour more efficiently.

1.5.4 Long Run Price and Output of a PC Firm

A long-run PC firm’s equilibrium occurs at a price at which supply equals demand and firms have no incentive to enter or exit the industry. More specifically, a long-run PC equilibrium firm is characterised by a market price \( P^* \), a number of identical firms’ \( n^* \), and a quantity of output \( Q^* \) per firm that satisfies three conditions:

a) Each firm maximises its long-run profit with respect to output and plant size. Given the price \( P^* \), each active firm chooses a level of output that maximises its profit and selects a plant size that minimises the cost of producing that output. This condition implies that a firm’s long-run marginal cost equals the market price, or \( P^* = MC(Q^*) \).

b) Each firm’s economic profit is zero. Given the price \( P^* \), a prospective entrant cannot earn positive economic profit by entering this industry. Moreover, an active firm cannot earn negative economic profit by participating in this industry. This condition implies that a firm’s long-run average cost equals the market price, or \( P^* = AC(Q^*) \).

c) Market demand equals market supply. At the price \( P^* \), market demand equals market supply, given the number of firms \( n^* \) and individual firm supply decisions \( Q^* \). This implies that \( D(P^*) = n^*Q^* \), or equivalently, \( n^* = D(P^*)/Q^* \).

![Fig. 1.7: Long-Run Equilibrium in a Perfectly Competitive Market](image)

Fig. 1.7 shows these conditions graphically. Because the equilibrium price simultaneously equals long-run marginal cost and long-run average cost, each firm produces at the bottom of its long-run average cost curve.

1.5.5 Conclusions

The PCM firm’s behaviour in determining its output in the short and long run leads to make the following conclusions:
Market Structure

a) The PC firm can make abnormal profits in the short run, but will make a normal profit in the long run as lack of entry barriers allows new firms to enter the market and increase supply and lower the market price.

b) The firm cannot run at a loss in the long run either since some firms will leave the market and supply will converge to a long run equilibrium which allows the (surviving) firms a normal profit once again.

c) The LR equilibrium level of output is thus: \( P = AC_{\text{min}} = MC = AR = MR \).

Check Your Progress 3

1) State whether following statements are true or false:

a) A competitive firm in the long run will produce output up to the point where price equals average variable cost.

b) A firm’s shutdown point comes where price is less than minimum average cost.

c) A firm’s supply curve depends only on its marginal cost. Any other cost concept is irrelevant for supply decisions.

d) The \( P = MC \) rule for competitive industries holds for upward-sloping, horizontal, and downward-sloping MC curves.

e) The competitive firm sets price equal to marginal cost.

2) Interpret this dialogue:

A: “How can competitive profits be zero in the long run? Who will work for nothing?”

B: “It is only excess profits that are wiped out by competition. Managers get paid for their work; owners get a normal return on capital in competitive long-run equilibrium – no more, no less.”

3) A firm is operating at a loss. Explain why the firm might stay rather than exit the market.

4) Why can a PC firm only make a normal profit in the long run according to our model?
1.6 Shut Down Point and Break-Even Output for PC Firm

When a firm is earning normal profit, output is at the point where AR = AC, this is the break-even point of output. The shut-down point, the point at which firm is likely to leave the market, is the output level where it is equally costly for the firm to continue producing as it is for the firm to leave the market. If the firm can cover all of the variable costs and at least some of the fixed costs (i.e. non-sunk fixed costs as defined above) then it has an incentive to remain on the market. If the price falls below the AVC then the firm will not cover even the variable costs – and leave the market. Hence, the point where the firm must decide whether to remain on the market or leave is when AR = AVC. This is the shut-down point.

It will be easier to understand these critical issues clearly in a figure using the actual numbers rather than points A, B, and C etc. Fig. 1.8 attempts to explain these points. Assume that the original demand on the market gives a market price of ₹10, which are the PCM firm’s MR and AR. This is the long run equilibrium and also the break-even point, as the firm covers all its costs – even opportunity costs – earning it a normal profit. Assume that for some reason (either increasing supply or decreasing demand) the market price starts to fall and subsequently the firm’s AR, MR, D-curve falls to a price level of ₹6. Being a profit maximiser, the firm sets output where MC = MR, which is now at 80 units rather than 100. At this output level the firm cannot cover all its costs; ATC at an output of 80 is ₹11. The firm loses ₹5 on each unit produced, giving an overall loss of ₹400 (₹5 × 80 units).

![Diagram](image)

**Fig. 1.8: Shut Down and Break-even Price for a PCM Firm**

- Why doesn’t the firm leave the market at a price level of ₹6? Consider the choices facing the firm:
  - a) Stay in the business and make a loss of ₹400
  - b) Leave the business and make a loss of ₹560, which is the total fixed cost (see TFC calculation in Fig. 8.7), i.e. TFC = (ATC – AVC) x Q. At an output of 70, we get (₹12 – ₹4) x 70 = ₹560.
This is not much of a choice, rather a lack of options. The firm will have a strong incentive to stay in the market during the short run, hoping perhaps that either market price will increase or that increased efficiency and/or cost-cutting can lower MC and AC to a normal profit level again.

If, however, the market price falls even further, to ₹4, then the options become:

a) Stay in the business and make a loss of ₹560
b) Leave the business and make a loss of ₹560

The firm’s TR (₹4 × 70 = ₹280) will be identical to the TVC, which means that there is no contribution towards covering the fixed costs. The firm is making a loss of ₹560 by staying in the business and would make the same loss by leaving it. The point where P (AR) = AVC is therefore the shut-down point for the firm. The firm will not produce at a lower price level – just consider the options at a price of ₹2. The firm’s TR would be ₹120 (₹2 × 60) and TC would be ₹720 (₹12 × 60) leading to a loss of ₹600. The reason is that at a price (e.g. AR) of ₹2 the firm would not even be covering all its variable costs so total costs would be greater than total fixed costs alone. At any price below AVC the firm will leave the market.

*Therefore the important consideration for a PC firm will be: as long as the firm has an AR above AVC, the firm covers variable costs and at least some of the fixed costs (i.e. non-sunk fixed costs) – therefore there is an incentive to stay in the business in the short run. The shut-down point is when P (AR) = AVC*

### 1.7 SUPPLY CURVE FOR A PC FIRM AND FOR PC MARKET

The important decision points for a PC firm to stay in the business or leave the market, as derived above, requires revisiting the concept of supply curve of both a PC firm as well as of a perfectly competitive market. The significant modifications to be noted for the supply curve of a PC firm in short and long run are given below:

a) The PC firm’s supply curve in the short run is thus the portion of the MC curve which is above the AVC curve.

b) The long run supply would be the portion of the MC curve above ATC as no firm could withstand indefinite losses and would ultimately have to leave the market if it did not cover all costs.

Building on the proposition that firms will supply at any possible level above the average variable cost curve in the short run, the market supply can be derived from this. Fig. 1.9 assumes a market of three firms (it could however be any number), having different marginal and average costs. As the portion of the MC-curve above AVC is relevant, summing the individual firms’ output at various prices yields the short run industry/market supply curve; 5,000 units per month at a price of ₹5 up to 25,000 units per month at a price of ₹12.
Fig. 1.9: Supply Curve for PCM Firms and Markets (\( \sum MC_{PCM\,firm} = Market\, Supply \))

The concept of increasing marginal costs coupled to the profit maximisation condition of \( MC = MR \) renders each individual firm’s supply curve, and their horizontal aggregation is the market supply curve.

### 1.7.1 Constant-Cost, Increasing-Cost, and Decreasing-Cost Industries

As the market supply curve is derived from PC firms supply curves, it implies that when firms’ marginal costs are affected by technology, production improvements, lower costs of labour and raw material etc., the total market supply will also change accordingly.

Theoretically, we may have three situations:

**First**, when changes in industry output have no effect on input prices, we have a constant-cost industry. In such a case, after all adjustment to a change in demand have taken place, the market price must have returned to the lowest point on the LRAC curve, which is exactly where it was before. So in this case, the LR supply curve must be horizontal (instead of upward-sloping as in the picture above). We call this a **constant-cost industry**. This is most likely to be the case when the industry in question uses only a small portion of inputs, available in the market and usable by all the industries.

**Second**, if the industry in question has a large impact on the markets for its inputs, then the LR supply curve may slope upward or downward. If the effect of entry into the industry is to bid up the price of inputs, so that a firm’s cost curves rise as a result of the entry of new firms, then the market price after adjustment will be higher than it was before. In this case, the LR supply curve must be upward-sloping as in the picture above; this is called an **increasing-cost industry**, which results from external diseconomies.

**Third**, on the other hand, if entry into the industry creates a greater demand for inputs that allows those inputs to be produced through mass production techniques (i.e., at lower average cost), then the industry can benefit from lower costs of production. In this case, the LR supply curve is downward-sloping. This is called a **decreasing-cost industry**, which results from external economies.
Check Your Progress 4

1) Explain why the sum of individual firms’ MC curves is the market supply curve.

2) What is the shutdown price when all fixed costs are sunk? What is the shutdown price when all fixed costs are non-sunk?

3) Would a perfectly competitive firm produce if price were less than the minimum level of average variable cost?

1.8 LET US SUM UP

We have studied in this unit how price-taking firms adjust their production decisions in the light of the market price and how the market price is determined. Since a PC firm is a price taker, in order to earn normal profit even in the long run, they need to adopt the strategies concentrating on enhancing their productivities so that they supply more output at given price with reduced average and marginal costs. The salient features of a perfectly competitive market are summarised below:

Supply Behaviour of the Competitive Firm

- A perfectly competitive firm sells a homogeneous product and is too small to affect the market price. To maximise profits, the competitive firm will choose that output level at which price equals the marginal cost of production, that is, \( P = MC \).

- Variable costs need to be taken into consideration in determining a firm’s short-run shutdown point. Below the shutdown point, the firm loses more than its fixed costs. It will therefore produce nothing when price falls below the shutdown price.

- In the long run, PC firm will stay in business only if price is at least as high as long-run average costs including some non-sunk fixed costs.

Supply Behaviour of Competitive Industries

- Each firm’s rising MC curve is its supply curve; the horizontal summation of all firms in the industry will provide the supply curve of the industry.
Because firms can adjust production over time, we distinguish two different time periods: (a) short-run equilibrium, when variable factors like labour can change but fixed factors like capital and the number of firms cannot, and (b) long-run equilibrium, when the numbers of firms and plants, and all other conditions, adjust completely to the new demand conditions.

In the long run, when firms are free to enter and leave the industry and no one firm has any particular advantage of skill or location, competition will eliminate any excess profits earned by existing firms in the industry. So, just as free exit implies that price cannot fall below the zero-profit point; free entry implies that price cannot exceed long-run average cost in long-run equilibrium.

When an industry can expand its production without pushing up the prices of its factors of production, the resulting long-run supply curve will be horizontal. When an industry uses factors specific and scarce factors, its long-run supply curve will slope upward, e.g. important special cases include relatively or completely inelastic supply which produces economic rent shared between the firm and that factor of production.

Disadvantages of Perfect Competition Generally Mentioned

- No scope for economies of Scale, this is because there are many small firms producing relatively small amounts.

- Industries with high fixed costs would be particularly unsuitable to perfect competition. This is one reason why existence of such a market is highly unlikely in the real world.

- Undifferentiated products lead to a monotonous situation for the consumers as little choice available to them. Differentiated products are very important in industries in FMCGs.

- Lack of supernormal profit may make investment in R&D unlikely. This would be important in an industry such as pharmaceuticals which require significant investment.

- With perfect knowledge there is no incentive to develop new technology because it would be shared with other companies.

Notwithstanding these facts, perfect competition is worth studying for two reasons. First, a number of important real-world markets consist of many small firms, each producing nearly identical products, each with approximately equal access to the resources needed to participate in the industry. The theory of perfect competition developed in this unit will help us to understand the determination of prices and the dynamics of entry and exit in these markets. Second, the theory of perfect competition forms an important foundation for understanding theory of price determination as many of the key concepts such as the vital roles of marginal revenue and marginal cost in output decisions will apply when we study other market structures such as monopoly, duopoly, monopolistic and oligopolistic competitive markets.
1.9 REFERENCES

5) Lipsey, RG (1979), An Introduction to Positive Economics, English Language Book Society, p. 201-259

1.10 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1
1) Read Section 1.2 and answer

Check Your Progress 2
1) Read Section 1.3 and answer
2) Read Section 1.4 and answer

Check Your Progress 3
1) a) False  b) False  c) False  d) False  e) False
3) Read Section 1.5, sub-sections 1.5.1 to 1.5.5 and answer
4) Read Section 1.5.4 and answer

Check Your Progress 4
1) Read Section 1.7 and answer
2) Read Section 1.6 and answer
3) No