CHAPTER 11
Perfect Competition & Monopoly
Upon completion of this chapter, you will be able to:

- Explain how firms in perfect competition determine output and why firms are “price takers”
- Explain how monopolists determine price and output and why they are price makers
- Use simple calculus to calculate the profit maximisation output for perfect competitive firms and monopolists
- Compare perfect competition with monopoly from the point of social efficiency
- Explain the managerial implications of perfect competition and monopoly.
**Price-Output Decisions of Firms**

**Basic Business Decisions:**

- What **Output** level to produce to max Profits?
- What **Price** to charge?
- At these levels of P & Q, what is profit level?
- ➡️ The answer depends on the structure (organization) of the market
- ➡️ If firm incurs losses:
  - should it continue operating in the **short-run** (and in the long run, hoping that things may change)
  - or should firm close down and exit the market?
- ➡️ What if firm’s objective is to maximise revenue?
  - What values for P & Q?
Market Structure Spectrum

More Competitive

Perfect Competition

Monopolistic Competition

Oligopoly

Monopoly

Less Competitive
## Comparative Characteristics of Markets

<table>
<thead>
<tr>
<th></th>
<th>Perfect Competition</th>
<th>Monopolistic Competition</th>
<th>Oligopoly</th>
<th>Monopoly</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number &amp; Nature of Sellers</strong></td>
<td>Many (small sellers)</td>
<td>Many (small to medium)</td>
<td>Few (large)</td>
<td>One</td>
</tr>
<tr>
<td></td>
<td>Independent</td>
<td></td>
<td>Inter-dependent</td>
<td></td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td>No control</td>
<td>Some control</td>
<td>Considerable control</td>
<td>Absolute control</td>
</tr>
<tr>
<td><strong>Nature of Product</strong></td>
<td>Homogeneous (no differentiation)</td>
<td>Some differentiation</td>
<td>Sometimes but not always</td>
<td>No substitutes</td>
</tr>
<tr>
<td><strong>Barriers to entry</strong></td>
<td>None</td>
<td>Low</td>
<td>Considerable</td>
<td>Entry is blocked</td>
</tr>
<tr>
<td><strong>Profit Potential</strong></td>
<td>Normal Profits in LR</td>
<td>Some profits in SR &amp; LR</td>
<td>Considerable Profits in SR &amp; LR</td>
<td>Large Profits in SR &amp; LR</td>
</tr>
<tr>
<td><strong>Product Promotion &amp; Advertising</strong></td>
<td>None or minimal</td>
<td>Considerable</td>
<td>Heavy</td>
<td>Some but not directed at rivals, but to increase sales</td>
</tr>
</tbody>
</table>
**Characteristics of Perfect Competition**

- many sellers
  - so no individual believes that their own action can affect market price
- firms take price as given
  - so face a horizontal demand curve
- the product is *homogeneous* (identical, similar)
- perfect customer information/knowledge
  - about price, product features & quality, location of sellers, etc
- free entry and exit of firms
- Perfect mobility of resources
- ➔ Examples:  - Stock Market  
  - Wheat market
Based on these characteristics of PC:

- Firms are price takers
- Each firm produces a very small % of entire market
- Non-price competition activities are not necessary or possible
- Each firm’s demand curve is horizontal (perfectly elastic)

This means that $P = AR = MR$
**Demand Curve in PC**

- **Horizontal demand curve:** \( P = AR = MR \)
- buyers will buy ALL that firm can sell at the going market price.
- firm’s MR is same for each additional unit of product
- \( \Rightarrow \) equal to the price of the product.

Let’s prove this: Recall that \( TR = P \cdot Q \)

- \( AR = \frac{TR}{Q} \Rightarrow AR = \frac{(P \cdot Q)}{Q} \Rightarrow \textbf{Thus } P=AR \)
- \( MR = \frac{dTR}{dQ} = \frac{d(P \cdot Q)}{dQ} \).
- Since firms are price-takers, \( P \) does not change,
- \( \Rightarrow P \left( \frac{dQ}{dQ} \right) = P \Rightarrow \textbf{Thus } P=MR \)
Prices are determined in the market

Consider the following demand and supply functions:

\[ Q_d = 300 - 15P \]
\[ Q_s = 100 + 5P \]

At equilibrium, \( Q_d = Q_s \)

\[ 300 - 15P = 100 + 5P \]
\[ 20P = 200 \]
\[ P_e = 10 \]
\[ Q_e = 150 \]
The firm accepts $P_e = 10$ as given, and decides what output to produce where $MR = MC$ to maximize profits.
Total Revenue, Total Cost & Profit

- Total revenue: \( TR = P \times Q \)
- Average revenue: \( AR = \frac{TR}{Q} \)
- Marginal revenue: \( MR = \frac{\Delta TR}{\Delta Q} \).

- Total cost: \( TC = TFC + TVC \)
- Average total cost: \( ATC = \frac{TC}{Q} \)
- Average variable cost: \( AVC = \frac{TVC}{Q} \)
- Marginal cost: \( MC = \frac{\Delta TC}{\Delta Q} \).

\( \Pi = TR - TC \)

\( \text{Max } \Pi = \text{Max}(TR - TC) \)
Total Revenue-Total Cost approach:

- Compare the total revenue and total cost schedules and find the level of output that either maximizes the firm’s profits or minimizes its loss.
- Profit = TR – TC = (P - AC) · Q*

Marginal Revenue – Marginal Cost Approach

- To maximize profit, the firm produces where the additional revenue (MR) received from the last unit is equal to the additional cost (MC) of producing that unit.
- That is, where MR = MC.
- In perfect competition, the optimal output (Q*) is where P = MR = MC (since P = MR in perfectly competitive markets)
### PC: Hypothetical Data

<table>
<thead>
<tr>
<th>Q</th>
<th>TR = P * Q</th>
<th>TC = ATC * Q</th>
<th>Π = TR - TC</th>
<th>AR</th>
<th>ATC</th>
<th>MR = ΔTR/ΔQ</th>
<th>MC = ΔTC/ΔQ</th>
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<tr>
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<td>10</td>
<td>14.8</td>
<td>10</td>
<td>30</td>
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</tbody>
</table>
PC: Profit Maximisation with TR & TC

TR, TC (€)
MR = MC at Q = 5 and P = €10. At this Q, ATC₁ = €8. Thus the firm makes a per unit profit of €2, or total profits of €10.
If firm’s costs are represented by $ATC_2$, where $MR = MC$, $ATC_2 > P \rightarrow$ losses. The decision Rule is: If $P > AVC \rightarrow$ stay in operations. If $P < AVC \rightarrow$ close down.
Contribution Margin

- **Contribution Margin**
  - the amount by which price or average revenue (or total revenue) exceeds average variable cost (total variable cost).

- CM = AR(=P) - AVC or TR - TVC
  - If AR(=P) > AVC \(\Rightarrow\) CM is positive, and the firm should continue to produce in the short run.
  - This way, it covers part of its fixed costs.
  - If AR(=P) < AVC \(\Rightarrow\) CM is negative, so the firm should shut down.
Shut-down Point

**Shutdown Point:**
- This is the lowest price at which the firm would still produce.

At the shutdown point, the price is equal to the minimum point on the AVC.
- At the shutdown point, $P = AVC$ and this results in zero contribution margin.

If the price falls below the shutdown point, revenues fail to cover the fixed costs and the variable costs.
- In this case it would be better for the firm to shut down and accept the losses that are equal to its fixed costs.
Assume now that at the point where MR = MC, costs are represented by ATC₂ where ATC₂ > P and the firm is making losses. The decision Rule is: As long as P > AVC $\Rightarrow$ stay in operations. If P < AVC $\Rightarrow$ close down.
PC: SR Supply Curve

$P_0 = MR_0$

$P_1 = MR_1$

$P_2 = MR_2$

$P_3 = MR_3$

$MC = S_{SR}$

Shut-down point
PC: Industry Supply Curve

$MC_1 = S_{SR1} \quad MC_2 = S_{SR2}$

$P_0 \quad P_1 \quad P_2 \quad P_3$

$Q$
Quantity is set by the firm so that **short-run**:  
- Price = Marginal Cost = Average Total Cost

At the same quantity, **long-run**:  
- Price = Marginal Cost = Average Cost

**Economic Profit = 0**
In short run (with market price at $P_1$) firms in PC make profits. As a result, new firms will enter and industry, and the supply curve will shift to the right. This will lead to a new Equilibrium point and cause Price to fall. The new firm demand curve is tangent to the firm’s LRAC. Economic Profit = 0
Monopoly

- Single seller that produces a product with no close substitutes
- Many buyers
- Absolute control on prices
- Large profit potential
- Entry is blocked; in other words, there are barriers to entry

Examples: CYTA (?), EAC, POST OFFICE
Barriers to Entry

- Economies of Scale (Natural Monopolies)
- Ownership/Control of Key Resources/Inputs or Sales Outlets
- Legal Protection (licensing agreements, patents, copyrights, franchise agreements)
- Large Capital Investment Requirements
- Brand Loyalty
Demand curve for the firm is the market demand curve

Number of buyers in the market (the population) is same as customer base of monopolist

To max Profits, firm produces a quantity \((Q^*)\) where \(MR=MC\)
**Demand & MR Curves**

**MR curve has twice the slope of the Demand curve.**

Demand function: \( P = a - bQ \)  \( \Rightarrow \)  **slope is \( -b \)**

Total Revenue (TR) function: \( P \times Q = (a - bQ)Q = aQ - bQ^2 \)

Marginal Revenue (MR): \( \frac{dTR}{dQ} = a - 2b \)  \( \Rightarrow \)  **slope is \( -2b \)**

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Graph:

- **Price**
  - 100

- **Quantity**
  - 5
  - 10

- **Equation**:
  - \( P = 100 - 10Q \)
  - \( MR = 100 - 20Q \)
Firm produces $\pi$-max. quantity $Q^*$ where $MR=MC$, subject to checking the following condition:

- if price is above ATC firm produces $Q^*$ at a profit.
- if price is between ATC and AVC firm produces $Q^*$ at a loss.
- if price is below AVC ($P < AVC$) which means that price does not cover average variable cost, (i.e., contribution margin is negative) then the firm should shut down ($Q^*=0$).
Profit Making Monopoly

![Graph showing profit making monopoly](image)
Loss Making Monopoly

The diagram illustrates the concept of a loss-making monopoly. At the output level labeled \( Q^* \), the marginal revenue (MR) equals the marginal cost (MC), indicating the point where the monopoly maximizes its profit given its loss-making conditions. The price \( P^* \) is set at 10 units, while the average total cost (ATC) is 11 units. The contribution margin is represented in the shaded area, showing the loss per unit sold. The average variable cost (AVC) is 8 units.
Demand, MR & Total Revenue

\[ TR = P \times Q. \text{ Maximum TR occurs at } Q_{TR^*}, \text{ where } MR = 0. \text{ MR lies below } P \text{ (AR).} \]

At output levels greater than \( Q_{TR^*} \), MR is negative.

Monopolist will always produce at elastic portion of D-curve.

\[ E_P > 1 \]
If a monopolist buys up all the firms in a competitive industry, then the industry’s D-curve becomes the monopolist’s D-curve, and the industry’s S-curve becomes the monopolist’s MC curve.

Optimum $Q^*$ (where $MR=MC$) for monopolist is now $Q_2$ (not $Q_1$ reached in the market under perfect competition).
Stage 1: Market under Perfect Competition

Equilibrium (D=S): Optimum market outcome under PC. 
=> Social MR=Social MC. 
=> Socially efficient outcome.

Consumer Surplus

Price

$P_c$

$Q_c$

$Q$

$S_{LR}$

$D$
Stage 2: Market taken over by Monopoly

\[ \pi_{\text{max.}}: \text{Optimum outcome in Monopoly where } MR = MC. \]

\[ \Rightarrow P^* \text{ and } Q_{M^*} \text{ are } \pi_{\text{max.}} \text{ values.} \]
Stage 2: Loss of Consumer Surplus

New Consumer Surplus

Loss of Consumer Surplus

Deadweight Loss

Stage 2: Loss of Consumer Surplus

Price

New Consumer Surplus

Loss of Consumer Surplus

Deadweight Loss

MC_{LR}

P^*

P_C

Q^*

Q_C

MR

D

Q
So we see that monopoly compared with perfect competition implies:
- higher price
- lower output

Under Monopoly there is loss of efficiency for the economy
- Efficiency means: Price = MC
- Smaller consumer surplus

Does the consumers always lose from monopoly?
- Among other things, this depends on whether the monopolist faces the same cost structure
- There may be the possibility of economies of scale.
- Technological innovations may benefit society
Managerial Implications

Perfect Competition
- Profit potential in Perfect Competition is very low
- Being cost efficient is key to survival
- Timing of entering the market is key for making SR profits.
- Failure rate is high because of overestimating demand potential

Monopoly
- IT revolution (internet, e-commerce) and market changes reduce the pricing power of monopolies
- Barriers to entry are less effective
- Deregulation & privatizations lead to the “extinction” of monopolies
- Generic brands increase competition