

FIRST MOVER ADVANTAGE – THE STACKELBERG MODEL

- **DUOPOLY** : a market in which two firms compete with each other.
- Assume that one firm can set its output first
- **2 QUESTIONS :**
 1. Is it advantageous to set output first ?
 2. How much will each firm produce?
- Assume both firms have zero MC and that the market demand curve is : $P = 30 - Q$
Where Q = total output

STACKELBERG MODEL :

- Firm 1 sets its output first
- Firm 2 observes Firm 1 and thereafter sets its output level.
- Firm 1 thus has to consider the reaction of Firm 2
- This model differs from the Cournot Model in which no firm has an opportunity to react.
- Consider Firm 2 first because it makes its output decision after Firm 1.
- Firm 2 accepts the output of Firm 1 as fixed
- Thus the profit – maximizing output of Firm 2 is given by its Cournot reaction curve
- = The Cournot reaction curve is derived from the equation
 $Q_2 = 15 - \frac{1}{2} Q_1$

- For Firm 1 to maximize profit it chooses Q_1 so that $MR = MC = 0$
- Revenue for Firm 1 is

$$R_1 = PQ_1 = 30 Q_1 - Q_1^2 - Q_2 Q_1$$
- Because R_1 depends on Q_2 , Firm 1 must anticipate how much Firm 2 will choose to produce.
- Firm 1 knows that Firm 2 will choose Q_2 according to the reaction curve $Q_2 = 15 - \frac{1}{2} Q_1$
- Substituting the above equation from Q_2 , the revenue of Firm 1 will be

$$\begin{aligned} R_1 &= 30 Q_1 - Q_1^2 (15 - \frac{1}{2} Q_1) \\ &= 15 Q_1 - \frac{1}{2} Q_1^2 \end{aligned}$$
- Thus MR is :

$$MR_1 = \Delta R / \Delta Q_1 = 15 - Q_1$$
- Setting $MR_1 = 0$ gives $Q_1 = 15$ and from the reaction curve of Firm 2 $Q_2 = 7.5$.
- Thus Firm 1 produces twice as much as Firm 2.
- Making the production decision first enables Firm 1 to produce with a strategic advantage.
- Firm 1 has created a fait accompli : to matter what the competitor (Firm 2) does, Firm 1 will produce a large output.
- To maximize profit the competitor (Firm 2) must accept the large output of Firm 1 as given and set a lower level of output for itself.
- Should Firm 2 set a large level of output it would drive the price down and both firms will lose income
- Unless Firm 2 considers getting even as more important than generating income (and profit) it would be irrational to produce a large amount.

CONCLUSION :

- First mover advantage occurs in many strategic situations
- The **Cournot and Stackelberg Models** are alternatives of oligopolistic behaviour
- Which model is more appropriate depends on the composition of the industry.
- In an industry where firms are roughly similar, where no one firm has a strong operating advantage, the **Cournot Model** is probably the more appropriate.
- In an industry where there is a price leader the **Stackelberg Model** is the more realistic.
- Several models have been developed to explain the prices and quantities of oligopoly markets but no one theory has been developed that can explain all the different types of behaviour in oligopoly markets.