Bertrand Model

- Firms compete by setting prices rather than quantities.
- In this model, it is assumed that companies sell identical products and that consumers will always buy from the firm with the lowest price.
- The Bertrand model contrasts with the Cournot model, which focuses on quantity competition.
- **Price Competition Leads to Low Prices**: In the Bertrand model, firms compete by lowering prices
- **Consumer Benefits**: Because firms are incentivized to lower prices to attract consumers.
- **Market Structure Sensitivity**: The outcome of the Bertrand model is highly sensitive to the number of firms in the market.
- **Role of Product Differentiation**: If firms sell differentiated products rather than homogeneous ones, the outcome changes.
- **Incumbent Market Advantage**: The model highlights the difficulty of new entrants in the market. Established firms may have brand recognition or cost advantages that allow them to sustain lower prices for longer periods.
- The model leads to a Nash Equilibrium at the marginal cost, resulting in no economic profits when firms compete aggressively on price.
- there are n firms (i=1,2,…) competing in the market that produce homogenous goods; that is, identical products
- the market demand function Q=D(p) , where *Q* is the summation of quantity produced by firms $Q - \sum_{i=1}^{n} Q_i$, is continuous and downward sloping with $D'(p) < 0$
- the marginal cost is symmetric, c1=c2=….c
- it is a static game; firms simultaneously set price, without knowing the other firm's decision and
- firms don't have a capacity constraint; that is, each firm has the capability to produce enough goods to meet market demand.
- the firm that sets the lowest price will acquire the whole market; since, product is homogenous and there is no cost of switching for the customers and
- if the price set by the firms is the same, p1=p2=…=p, they will serve the market equally, p/n

The Bertrand duopoly equilibrium

In the Bertrand model, the competitive price serves as a Nash equilibrium for strategic pricing decisions. If both firms establish a competitive price at the marginal cost (unit cost), neither firm obtains profits. If one firm aligns its price with the marginal cost while the other raises its price above the unit cost, the latter earns nothing, as consumers opt for the competitively priced option. No other pricing scenario reaches equilibrium. Setting identical prices above unit cost leads to a destabilizing incentive for each firm to undercut the other, aiming to capture the entire market and significantly boost profits. This lack of equilibrium arises from the firms competing in a market with substitute goods, where consumers favor the cheaper product due to identical preferences. Additionally, equilibrium is not achieved when firms set different prices; the higher-priced firm earns nothing, prompting it to lower prices to undercut the competitor. Therefore, the sole equilibrium in the Bertrand model emerges when both firms establish a price equal to unit cost, known as the competitive price.

It is to highlight that the Bertrand equilibrium is a *weak* Nash-equilibrium. The firms lose nothing by deviating from the competitive price: it is an equilibrium simply because each firm can earn no more than zero profits given that the other firm sets the competitive price and is willing to meet all demand at that price.

Bertrand competition versus Cournot competition

The Bertrand and Cournot model focus on different aspects of the competitive process, which has led to the model identifying different set of mechanisms that vary the characteristics of the market demand that are exhibited by the firms. Cournot model assumes that the market allocates sales equal to whatever any given firm quantity produced, but at the price level determined by the market. Whereas the Bertrand model assumes that the firm with the lowest price acquires all the sales in the market.

When comparing the models, the oligopoly theory suggest that the Bertrand industries are more competitive than Cournot industries. This is because quantities in the Cournot model are considered as strategic substitutes; that is, the increase in quantity level produced by a firm is accommodated by the rival, producing less. Whereas the prices in the Bertrand model are strategic complements; a firm aggressively counters an increase in price level by reducing its price below the rivals.

Moreover, both models are criticised based on the assumptions that are made in comparison to the real-world scenario. However, the results from the classic models can be reconciled in a manner of thinking, as presented below. Considering the models appropriate application in the market:

- Cournot model is applicable in markets where the firm must make production decision in advance and must be committed to selling that quantity level; thus, unlikely to react to fluctuations in rival's quantity produced.
- Bertrand model is applicable in markets where capacity is sufficiently flexible and firms are capable to meet any market demand that arises at price level, which they set.

Neither model is necessarily "better" than the other. The accuracy of the predictions of each model will vary from industry to industry, depending on the closeness of each model to the industry situation. If capacity and output can be easily changed, Bertrand is generally a better model of duopoly competition. If output and capacity are difficult to adjust, then Cournot is generally a better model.

Under some conditions the Cournot model can be recast as a two-stage model, wherein the first stage firms choose capacities, and in the second they compete in Bertrand fashion.