Monopoly and the Rate of Extraction of Non-Renewable Resources

A common perception is that a monopolist in control of an exhaustible resource would deplete the resource at a rate higher than the optimal rate and hence the resource will be exhausted in a shorter time period. However, a very simple economic rationale for monopoly behaviour dictates that the monopolist would restrict output and charge prices higher than those that would have prevailed under perfect competition. This implies that the initial optimal price will be higher in the case of monopolist. Also, since the price charged is higher, there will be a lower demand for the resource. Thus, the effect is to increase the life of the resource stock. Therefore, a monopolistic control over exhaustible resources tends to conserve the resource. The exact difference in the rate of exploitation (from a perfectly competitive market) however, can depend on the elasticity of the demand curve for the resource.

The fundamental results of the Hotelling model remain unchanged when the entire stock of the resource is owned by a single seller. In this case it is the marginal profit or the difference between the marginal revenue and marginal extraction cost that grows at r per cent per year. However, if in the presence of a static demand curve the price elasticity of demand decreases as the quantity extracted increases, the monopolist's production trajectory will be longer than that of the competitive resource owner when faced with identical costs, initial stock, and consumer demand. The monopolist takes advantage of the relatively lower price elasticity in the earlier periods to restrict output and charge a higher price than the perfectly competitive resource owner.

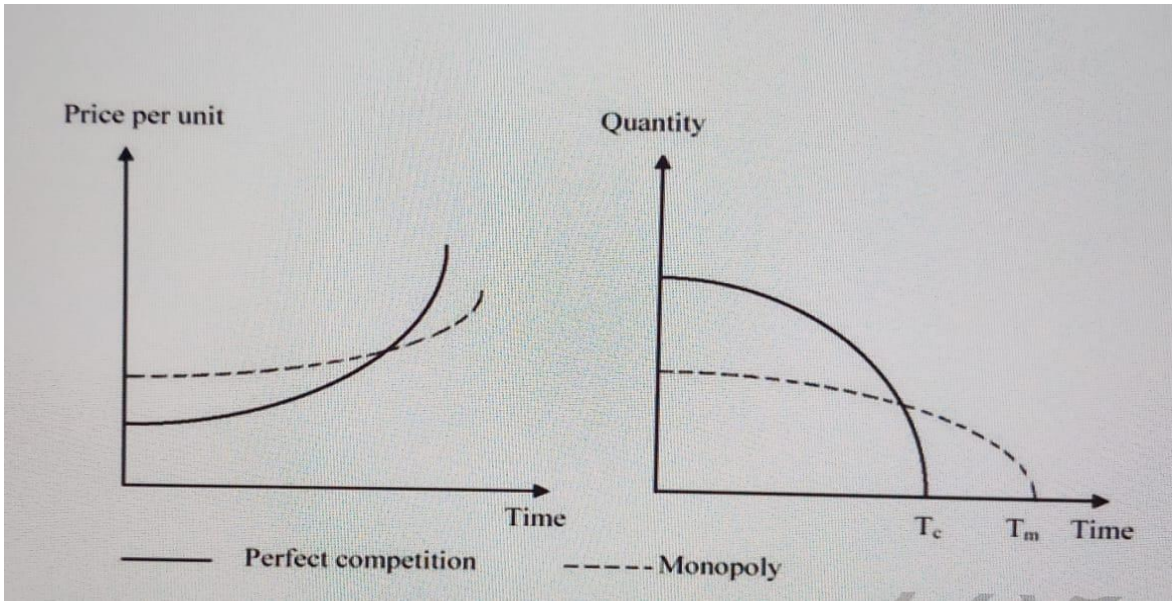

Figure 1: Monopoly vs. Competitive Equilibrium Price and Quantity Trajectories

The result is that the extraction path tends to get stretched out over time – that is, monopoly slows the depletion rate. This result has led to the adage, “a monopolist is a conservationist’s best friend”. The monopolistic and competitive price and quantity trajectories are compared in Figure 1, where Tc and Tm indicate exhaustion under competition and monopoly, respectively. One case where the competitive and monopoly equilibrium price and extraction paths are identical is when the resource owners face a constant elasticity demand curve that is unchanging over time, and when the extraction cost is independent of the quantity extracted in each period. The crucial feature of a constant elasticity demand curve, as opposed, say, to a linear demand curve, is that total revenue is the same at all points on the curve. No matter how much the monopolist raises the price of the resource, quantity demanded declines proportionately so that total revenue is constant. In this case, the monopolist cannot increase the present value of profits by restricting quantity and raising price in the earlier periods.