1 Market Structure 2: Monopoly

The opposite of perfect competition is an industry which is a monopoly (one seller, many buyers) or a monopsony (one buyer and many sellers). We will focus on the model of a Monopoly. The basic issue we have to deal with is that the firm now has market power, or the power to not only choose how much to produce, but by that choice they determine the market price. Thus a monopoly faces a downward sloping demand curve, the market demand!

As the monopolist has control over price, they may exploit this and generally produce less and charge more than if the market were competitive. This of course imposes a cost on society b/c fewer units are sold at a higher price and we have DWL's.

1.1 Monopoly Behavior

The decisions facing the monopolist are two fold:
1. Should they produce in the market or shut down?
2. What is the best price/quantity combination for them to choose?

We follow exactly the same method as for any other firm: the monopolist maximizes profits, based on the excess of their revenues R over their costs C, or

$$MR = MC$$

Our first step is to determine what are R to a monopolist because we already know the cost side well.

The price a monopolist receives per unit sold is just what consumers are willing to pay - the market demand curve. From the monopolists perspective the demand curve is their average revenue curve, AR, because

$$AR = \frac{R}{q} = \frac{p(q) * q}{q} = p(q)$$

$$p(q) = \text{inverse demand curve.}$$

But to determine their profit maximizing output level we need marginal revenues MR, or $\frac{\Delta R}{\Delta q}$.

$MR < P$ so at equilibrium, $P > MC$.

1.2   Derive the MR curve

As we know revenues are $R = pq$ and as $p = p(q)$ (the inverse demand curve) then $R = p(q)q$.

Average revenue is simply: $AR = \frac{R}{q} = \frac{p(q)q}{q} = p(q)$

Marginal revenue is: $MR = \frac{\Delta R}{\Delta q} = \frac{dR}{dq}$

Let's assume a linear demand such that the inverse demand is
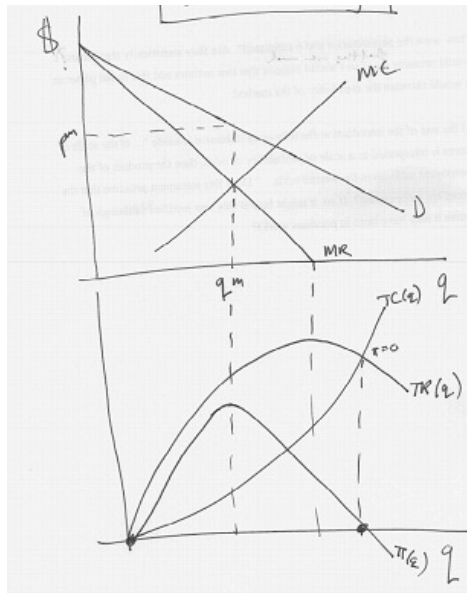
$$p(q) = \frac{a}{b} - \frac{1}{b}Q$$

then

$$R = p(q) * Q = \frac{a}{b}Q - \frac{1}{b}Q^2.$$

Since

$$MR = \frac{\Delta R}{\Delta q} = \frac{dR}{dq} = \frac{a}{b} - \frac{2}{b}Q$$

So the MR curve is twice the slope of the inverse demand curve.

And the graphical interpretation is clear....

Monopoly Model

The monopoly model is just another example of the marginal principle or the economic decision rule, under which profits are at a maximum when marginal costs exactly equate marginal revenues.

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To find the social cost of a monopoly, we simply compare the monopoly outcome with that from a competitive market, where we know $p = MC$ or just the intersection of the MC curve and the demand curve!

1.3   Market Power

Market power indicates the ability to charge a p above MC and earn $(+)$ profit.

In addition, we can write the MR curve in a different form:

$$MR = p(1 + \frac{1}{\epsilon})$$

At equilibrium,

$$MR = p(1 + \frac{1}{\epsilon}) = MC$$
$$\frac{p}{MC} = \frac{1}{(1 + \frac{1}{\epsilon})}$$

so the $\frac{p}{MC}$ ratio depends only on the elasticity, ϵ, at the profit maximizing q. Note: As ϵ increases, the closer to the competitive $MR = P$ we are so the demand curve is more elastic (more substitutes). We can also say that as ϵ approaches infinity, p approaches MC (i.e. competitive outcome).

We can also derive MR as:

$$MR = MC = p(1 + \frac{1}{\epsilon})$$
$$MC = p + \frac{p}{\epsilon}$$
$$\frac{p - MC}{p} = -\frac{1}{\epsilon}$$

Which tells us the firm maximizes profits by marking up price over marginal costs, and the markup as a percentage of price should be equal to the (negative) of the inverse of the own price elasticity of demand.

This measure, $\frac{P - MC}{p} = $ **Lerner Index** and for a competitive firm it is zero, but for a monopolist it is positive. The less elastic the demand curve, the higher the markup. Regulatory agencies use the Lerner Index as a measure of monopoly power. In the rubber industry it is 0.049. In the retail gas industry it is 0.100, coke's is .640 and pepsi's is .560. In the electricity industry it is 0.05 (close to competitively priced).

Note: as ϵ approaches infinity, the Lerner index approaches zero.

- The larger the number, the more market power
- The smaller the number, the more competitive

In addition, if MC = 0, it must mean ϵ = -1. If marginal cost is zero, maximizing profits is equivalent to maximizing revenue. Revenue is maximized when ϵ = -1.

Since the price charged depends on the elasticity of demand there is no one-to-one relationship between price and quantity produced, i.e. *a monopolist has no supply curve.*

As a result, monopolies always produce where demand is elastic, not inelastic.

- That is, the region in which the price elasticity of demand is between -1 and -∞.
- Suppose the firm was operating in an inelastic region of the demand curve. It could raise price, reduce quantity, but the price effect would dominate the quantity effect and total revenue would increase. Since quantity goes down, total cost goes down.
- If revenue goes up and costs go down with a price increase in the inelastic region of the demand curve, keep doing it until you are in the elastic region

Remember:
The more consumers want a good, the less elatic the demand curve.
The better the available substitutes, the more elastic the demand curve.

1.4   Effect of a demand curve shift

Remember, a monopoly does not have a supply curve. Unlike competitive markets where there is only one p associated with a profit maximizing q (because we know the MC of the firm), a monopolies' outcomes are less predicable and less unique.

1.5   Monopoly, Welfare and Public Policy

The monopoly profit maximizing outcome reduces consumer surplus, increases producer surplus, and reduces social welfare by the DWL. Of course, this loss in social welfare is because the marginal value (from the demand curve) is greater than the marginal cost - and the efficient outcome is when they are in balance (i.e. $p = MC$) as in the competitive outcome.

Now the question becomes, what can we (with our policy maker hat's on) do about the social losses due to a monopoly?

1.5.1   Price Ceilings and Monopoly

What about simply laying on price ceilings or caps on monopoly producers?

Of course, what the price ceiling is made to be and if it can be enforced drives the outcome.

If the price ceiling put on the monopolist is the competitive price, the demand curve to the monopolist is effectively flat out to the competitive quantity (or where the ceiling price intersects MC). To the right of the competitive quantity (intersection with MC), the demand curve is as before as what people are willing to pay is less than the price ceiling.

In much the same fashion, in the region with flat demand at the price ceiling the monopolists MR curve is just this price (i.e. to the left of the intersection with the MC curve MR is the price ceiling); while to the right of the intersection with MC it is the original MR curve (i.e. there is a step in the curve). The monopolist still maximizes profits by choosing the q that equates their MR with MC just their MR curve is altered by the price ceiling.

If the ceiling is perfect, the outcome looks to be good (no DWL). But, the informational requirements upon the regulator to find the "right price" are very high, and the chances the ceiling is too high (with DWL) or too low (also with DWL) is high.

1.6   Causes of Monopolies

We will study just a few of many potential sources of monopoly power: natural monopoly, patents, resource monopolies, economies of scope, and other legal barriers to entry.

1.6.1   Natural Monopolies

A firm is a natural monopoly if it can produce market output at lower cost than several firms would (e.g. public utilities).

A pretty simplistic definition of a natural monopoly is if an industry in which firms' AC curves are decreasing at the point where it crosses demand, it is a natural monopoly. What then matters is the minimum efficient scale (MES) in relation to market demand - if MES is large relative to demand, there is likely to be significant market power as few firms can serve the market, operating at low AC, and if the MES is "to the right" of the demand curve, the industry is known as a natural monopoly. Under these conditions, a competitive industry cannot survive (why??) The industry can survive only if it is monopolized. So what will be the outcome of MC pricing?

Cost advantages arise from control of key input or better production processes/technology.

1.6.2 Patents

Patents are simply a government granted temporary monopoly (for 17 years). The welfare consequences are not clear: the incentives usually seem to be necessary to encourage innovation, but the granting of monopoly power has DWLs.....

Kremer's idea: grant the patent, have an auction, winning bidder only gets it if coin flip in their favor, else govt. pays the winning amount & put it in the public domain.

1.6.3 Resource Monopolies

If a single firm gains control of a critical resource - i.e. Alcoa - dominated Aluminum market for many years.

1.6.4 Economies of Scope

Often multiple products can be produced in the same factory using the same equipment. These economies of scope allow a firm to produce more efficiently than smaller and more specialized firms.

1.6.5 Other Legal Barriers to Entry

Many in addition to patents, ripe for corruption.....

1.7 Monopoly Behavior - Price Discrimination

Monopolies (noncompetitive firms) often charge non-uniform prices to make higher profits. The firm charges a higher p on customers who value the good more highly (thus, capturing their consumer surplus) then charges a lower p on customers who don't value the good as much (thus, capturing greater sales). This implies the firm can get a higher profit through price discrimination.

A firm can price discriminate if it has market power, knows the demand curve of its customers, and if it can prevent them from reselling.

If transaction costs are low, reselling may be easy. Measures (e.g. vertical integration) are taken to preven resale. The government also sets laws against it.

1.7.1 First (Perfect) Degree Price Discrimination

If the firm knows the willingness to pay (WTP) of each customer, then they can capture all of the consumer surplus (i.e. becomes producer surplus) and ends up selling the competitve efficient output.

MR is the demand curve.

This is an efficient outcome (maximum welfare; no DWL) but customers are hurt since there is no consumer surplus.

1.7.2 Quantity (Second Degree) Price Discrimination

Different prices for small and large quantities.

1.7.3 Multimarket (Third Degree) Price Discrimination

In 3rd degree price discrimination, the firm only has information on relative elasticities of demand of groups of its customers (rather than individuals').

This is the most common type of discrimination.

1.7.4 Two-part tariffs

Firms charge customers a fee for the right to buy, then customers can buy as much as they want at the specific p.

1.7.5 Tie-in sales

Here, firms require customers to buy some of the items together (bundling).