

## Notes on Monopoly

A firm is called a monopoly if it is the only supplier of the good it produces. A pure monopoly is usually an abstraction, since in many countries (private) monopolies are illegal (except for the case of patents/copyrights).

A monopoly is constituted by **barriers to entry**:

### 1. Technical barriers:

(a) “Natural Monopolies” are monopolies where average costs are decreasing (due to fixed costs, as in the case of utilities, cable networks, phone, railway networks, etc).

→ also network externalities on the demand side: e.g. software, the more people use one software the better for me to do the same

(b) Spatial monopolies occur in case of significant transport costs: e.g. concrete or steel factories, (also: convenient stores).

### 2. Legal barriers:

(a) Patent law (e.g. medical drugs), copyrights (books, music)

(b) Government regulation: franchise to serve a market

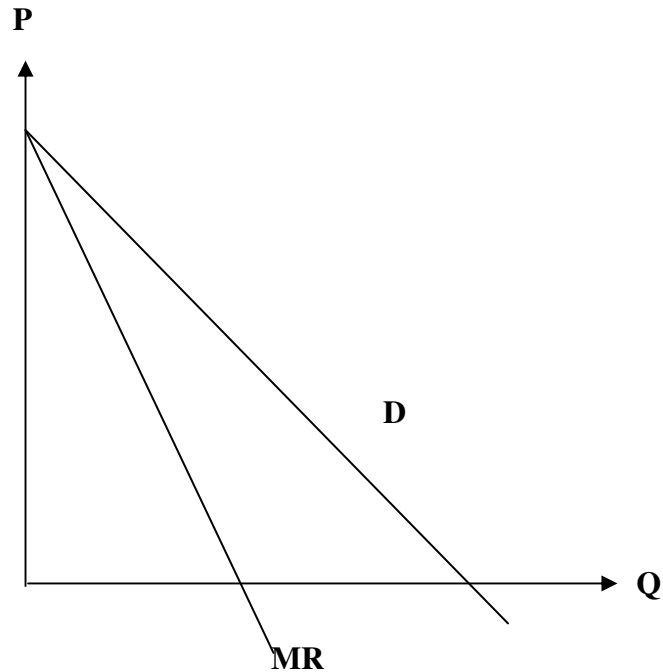
(c) Exclusive ownership of natural resources (e.g. DeBeers Diamond monopoly).

### 3. Other factors:

Monopolies could also arise from strategic behavior that prevents other firms to enter markets. However, if neither legal nor technological barriers to entry are present, such monopolies will be temporary at best.

## 1. Monopolist's maximization problem

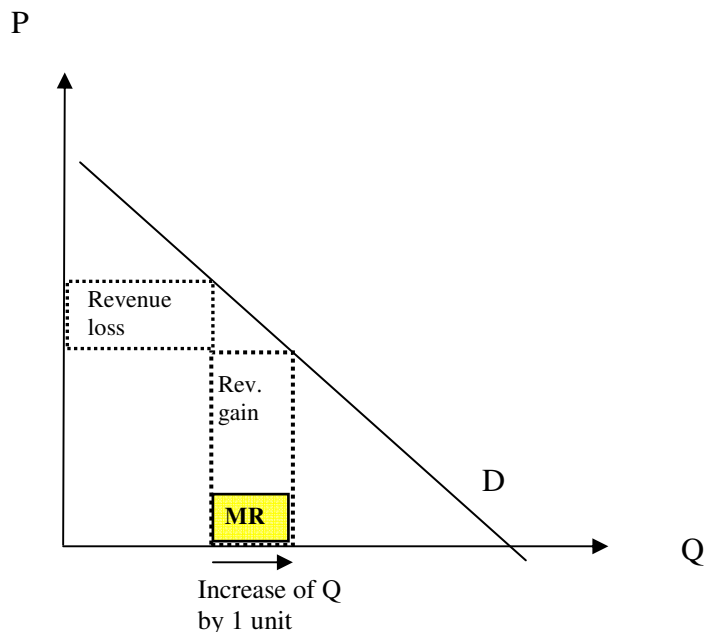
**Price making and the marginal revenue curve** A competitive firm takes the market price as given. In contrast, a monopolist takes the market demand behavior into account when choosing price and quantity. For now, we will assume that the firm chooses the quantity  $Q$ . Since price  $P$  and quantity  $Q$  are linked by the demand curve  $Q(P)$  the choice of an optimal  $Q$  implies the optimal price  $P$  (or vice versa). To better understand the interaction of  $Q$  and  $P$ , we will introduce a new curve, the marginal revenue (MR) curve:



In the competitive model, the MR was just the horizontal line given market price, since price did not depend on  $Q$  for the firm. For the monopolist, since it is the only firm in the market, quantity and price are not independent anymore.

The next picture shows how to construct the marginal revenue. The area called ‘gain’ is the additional revenue the firm will get if  $Q$  is increased by 1 unit. However, at the same time there is also a loss coming from the fact that the demand curve is downward sloping, i.e. higher quantities can only be sold if the firm lowers the price. The small (yellow) area shows the difference between the marginal gain and loss, which is the marginal revenue at the given  $Q$  (the  $Q$  at the beginning of the arrow). Two observations can be made if we repeat this exercise for different  $Q$ s:

1. MR is becoming less and less and some point even negative (check this yourself)
2. MR is always below  $D$ .



### Optimal decision

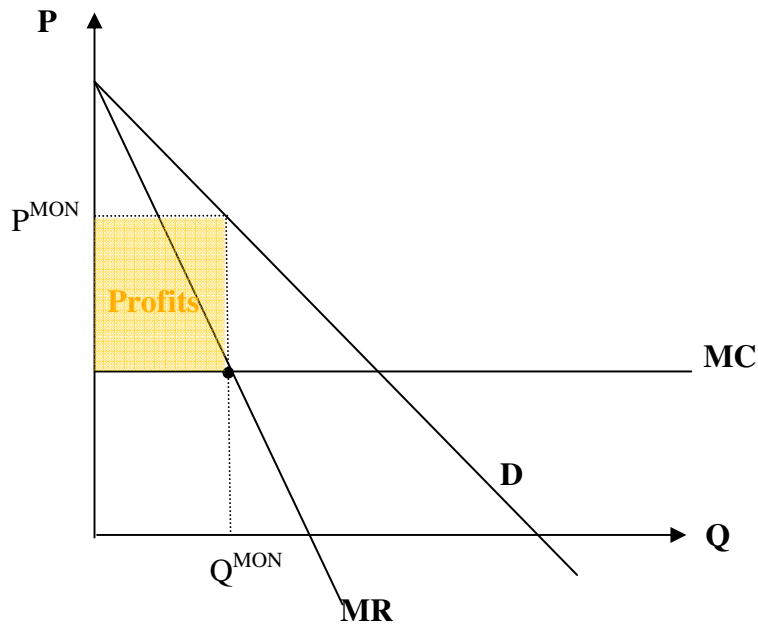
The optimal decision is exactly the same as for the case of a perfectly competitive firm: Pick  $Q$  such that  $MR=MC$ . The only difference is now that  $MR$  is not equal to some given market price but varies with  $Q$  according to the  $MR$  curve just derived.

For the remainder we will discuss two types of monopolies.

1. Regular monopolies:  $MC$  is a horizontal line and equals  $ATC$ . This means in this case there are no fixed costs.
2. Natural monopolies: Here  $ATC$  is ever decreasing in the relevant range (it may slope up for very high  $Q$ , but this doesn't matter for the optimal decision which is always made within the downward-sloping range).  $MC$  is either flat or approaches  $ATC$  from below in the relevant range.

Note, other cases are possible but we will not consider them.

## Illustration of a regular monopoly



### How to find the optimal Q and P?

1. Find Q such that  $MR=MC$
2. At this Q, look up the price from the demand curve.

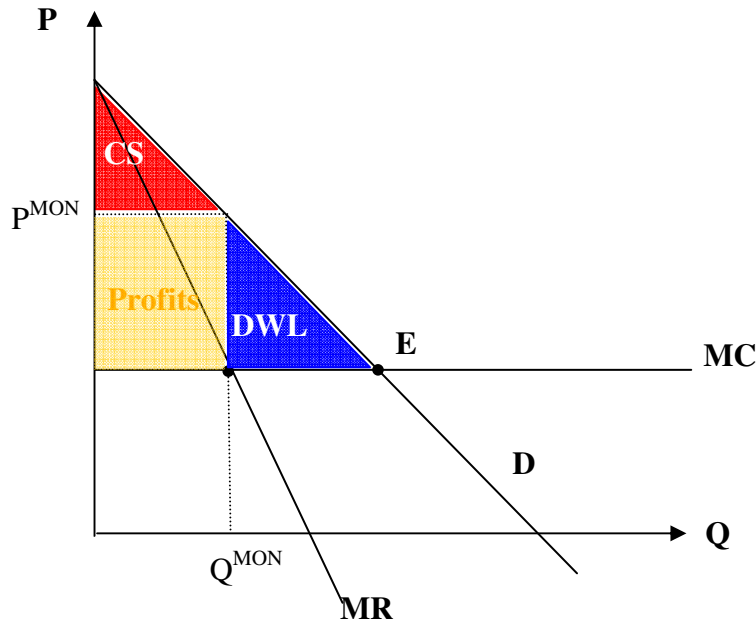
### 2. Monopoly and Efficiency

What is wrong with a monopoly? Why do most developed countries have a big bureaucracy dealing with the regulation of monopolies (and oligopolies, cartels, etc.)? One argument is that they are not efficient in the sense that the monopoly outcomes don't maximize the total surplus/

One advantage of this concept that the units of TS is in \$ (an area in the Q-P-diagram has the units P times Q). This allows us to compare different allocations by the size of the TS.

## Inefficiency of Monopolies

In comparison with the perfect competition case (which would arise if we could force the monopoly to set  $MC=D$ , which is the price taking allocation), given by the intersection of the MC curve and the Demand curve (point E), the monopoly has a smaller TS.



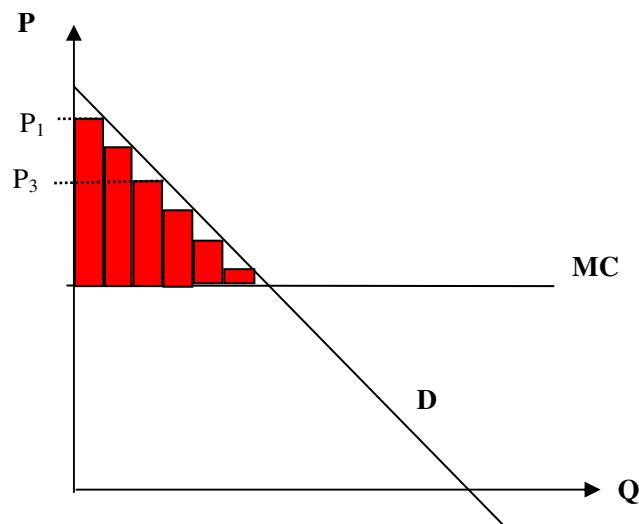
The difference between the TS of the price taking case and the TS of the monopoly is called dead weight loss (DWL).

Because of the DWL monopolies are inefficient (or welfare reducing). There are different opinions about the quantitative relevance of the DWL in real world monopolies. Early estimates claimed that the DWL of monopolies is tiny compared to GDP ( $<.1\%$ ). However, more recent estimates that use different methods claim that the DWL caused by monopolies (or quasi-monopolies) are non-negligible. E.g. a study by Thomas Lenard (*Journal of Regulatory Economics*, 6 (4), 1994) estimates the efficiency costs arising from the monopoly of USPS for bulk mail to be around \$950 million per year.

### 3. Price Discrimination

As can often be seen empirically, in monopolistic/oligopolistic markets different prices for essentially the same goods can occur (e.g. books, airplane tickets, etc.). Why does this happen? Do monopolies (or monopoly-like firms) just want to trick consumers? Perhaps yes, but their main goal is to increase profit by what is called value pricing in the business literature. The firm tries to set the price equal to the willingness to pay of individual consumers. But how can this happen? Why is there no arbitrage driving the price back to one single price? The answer is: The monopoly can separate different types of people (e.g. airline tickets are personalized goods for a specific time) and prevent them from trading among themselves (e.g. airplane tickets are personalized goods, i.e. non-transferable).

There are many different types of price discrimination. In this course we will only analyze one of them, which is called perfect (also called: first degree) price discrimination (your book illustrates one other case). Perfect price discrimination means that the firm can charge each consumer exactly the price he or she is willing to pay and thus extracts all consumer surplus.



Every consumer has to pay his or her willingness to pay. This implies that all CS becomes profit. In terms of efficiency there will be no dead weight loss (and assuming hypothetical that profits go back to the consumers this will result in no loss for

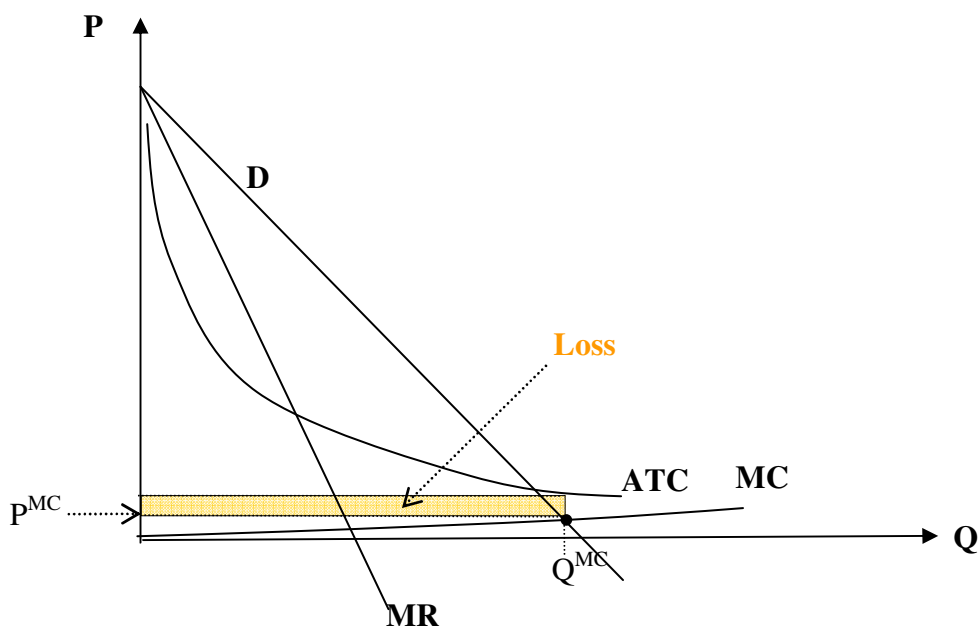
consumers). In reality however, due to arbitrage and information problems this case is unlikely to occur. Still, it is interesting as a theoretical benchmark.

#### 4. Regulation of Natural Monopolies: ATC vs. MC pricing

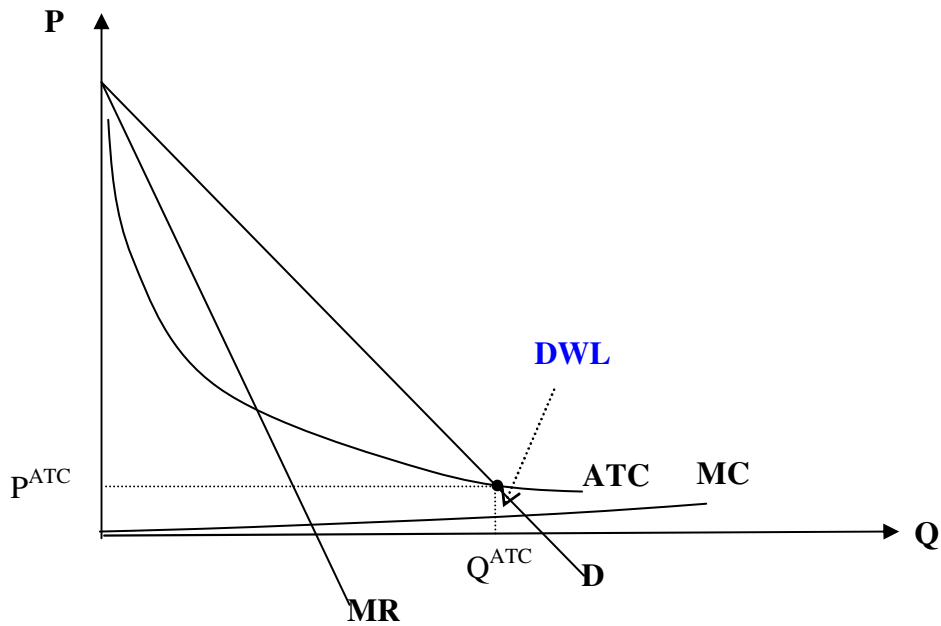
By definition a natural monopoly has decreasing ATC. Since the reason for the monopoly is implied by the technology (high set up cost for instance) it is difficult to increase competition. Therefore, governments sometimes opt for regulating the prices to improve efficiency. In all cases of regulation, one important problem is to get information about the firm's cost functions to find out efficient prices.

It should be noted, that applying the TS concept to the case of natural monopolies is problematic, because the producer surplus is no longer identical to profits. Why? Because with fixed cost the area below the MC curve is not identical to TC (remember that integrating a function is unique up to a constant). Thus it is not really surprising that the "efficient" MC pricing has the implication of negative profits as we will see.

**MC Pricing:** means setting  $P(Q)=MC(Q)$ . MC pricing is most efficient but will lead to losses for the firm and thus the government would have to subsidize the monopoly.



**ATC Pricing:** is  $P(Q)=ATC(Q)$ . ATC pricing implies zero profits for the firm (thus no losses as with MC pricing) but is not perfectly efficient because of a (small) DWL.



Note: In the book there is third type of regulation, called a price cap (see pages 270-71).