Chapter 11: Monopoly I: Uniform Price Monopoly

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Objectives

1. Optimal profit rule: $MR = MC$, but $P \neq MR$
2. Dead weight Loss from Monopoly
3. Regulation of Monopoly

Monopoly

- is the only seller (in a product market) of a good with no close substitutes
- A monopolist can choose a high price but fewer people buy, but each pays more

Monopoly Profit Maximization

- Profit maximization condition is still:

$$\underbrace{MR}_{\substack{\text{Revenue of} \\ \text{selling additional unit}}} = \underbrace{MC}_{\substack{\text{Cost of} \\ \text{producing extra unit}}}$$

- But unlike for the competitive firm, MR is not equal to price!
  - Because the firm's price is reduced when the it sells one extra unit of output.

Monopolist MR and Price elasticity of demand

Let indirect demand be: $P(q)$

$$
\begin{aligned}
MR &= \frac{\Delta TR}{\Delta q} = \frac{\Delta(P \cdot q)}{\Delta q} \\
&= P + \frac{\Delta P}{\Delta q} \cdot q \qquad \text{(product and chain rule)} \\
&= P(1 + \frac{\Delta P}{\Delta q} \cdot \frac{q}{P}) \\
&= P(1 + \frac{1}{\varepsilon_D}) \\
&= P(1 - \frac{1}{|\varepsilon_D|})
\end{aligned}
$$

$$
\therefore \boxed{MR = P(1 - \frac{1}{|\varepsilon_D|})}
$$

MR, TR and Price Elasticity of Demand

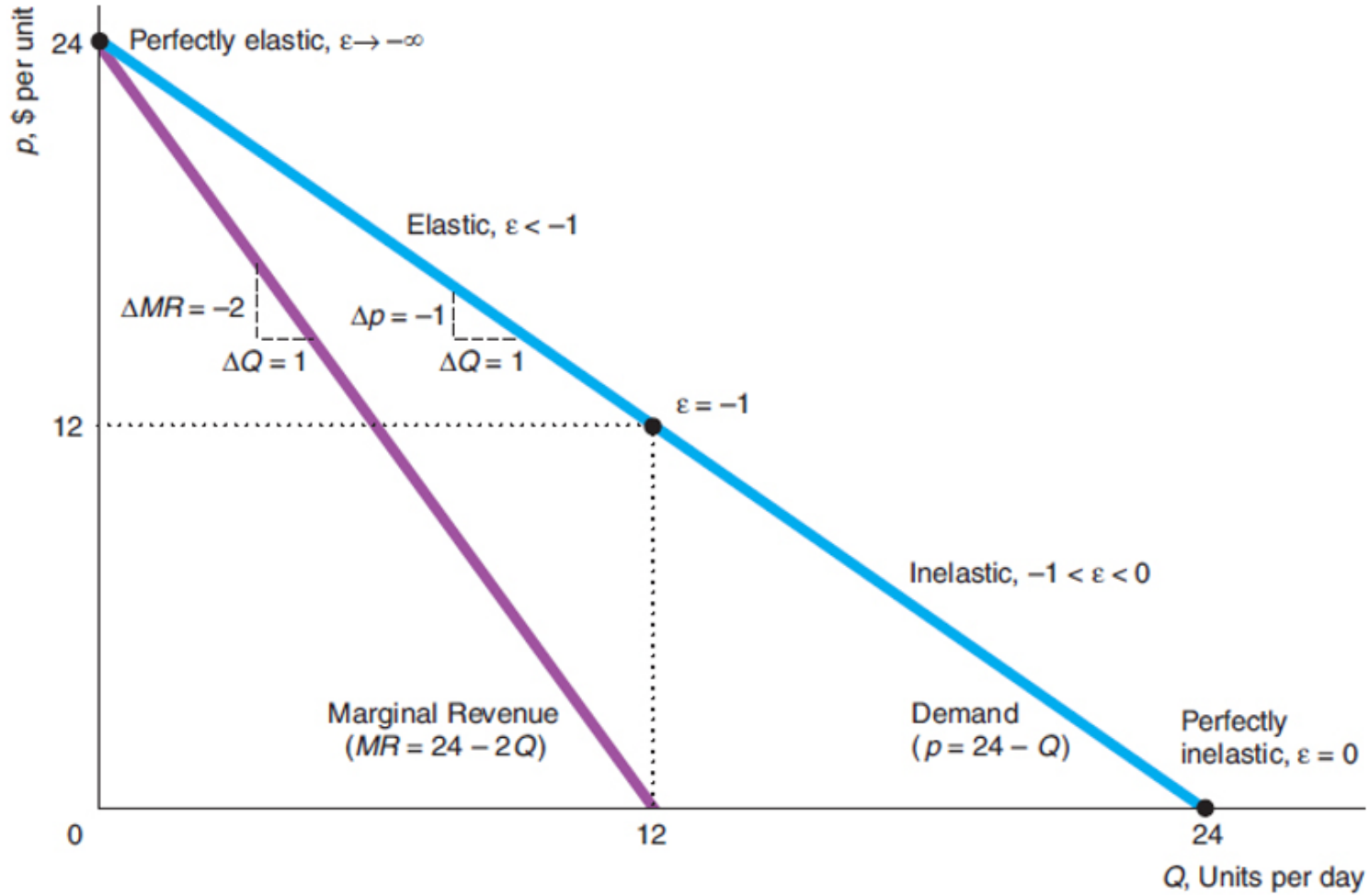
$$MR = P(1 - \frac{1}{|\varepsilon_D|})$$

For linear demand curve:

- $\varepsilon_D = 1$, $MR = 0 \Rightarrow TR$ maximum
- $\varepsilon_D > 1$ (elastic portion), $MR > 0 \Rightarrow TR$ increases with price decrease
- $\varepsilon_D < 1$ (elastic portion), $MR < 0 \Rightarrow TR$ increases with price increase

Note that at the optimal quantity $q^*, MR = MC,$ and since MC ≥ 0, a monopolist should always produce at the elastic portion if it is maximizing profit.

MR, TR and Price Elasticity of Demand (Graphically)



Shortcut of Calculating MR when Demand is linear

Suppose demand is linear: $P = a - bQ$

- $TR = P \cdot Q = (a - bQ)Q = aQ - bQ^2$

  $\Rightarrow MR = a - 2bQ$

- has same y-intercept but twice the slope (half the x-intercept) as the demand function

Profit Maximization of Monopolist: Numerical Example

- Given the following:

  Demand: $P = 100 - q \Rightarrow MR = 100 - 2q$

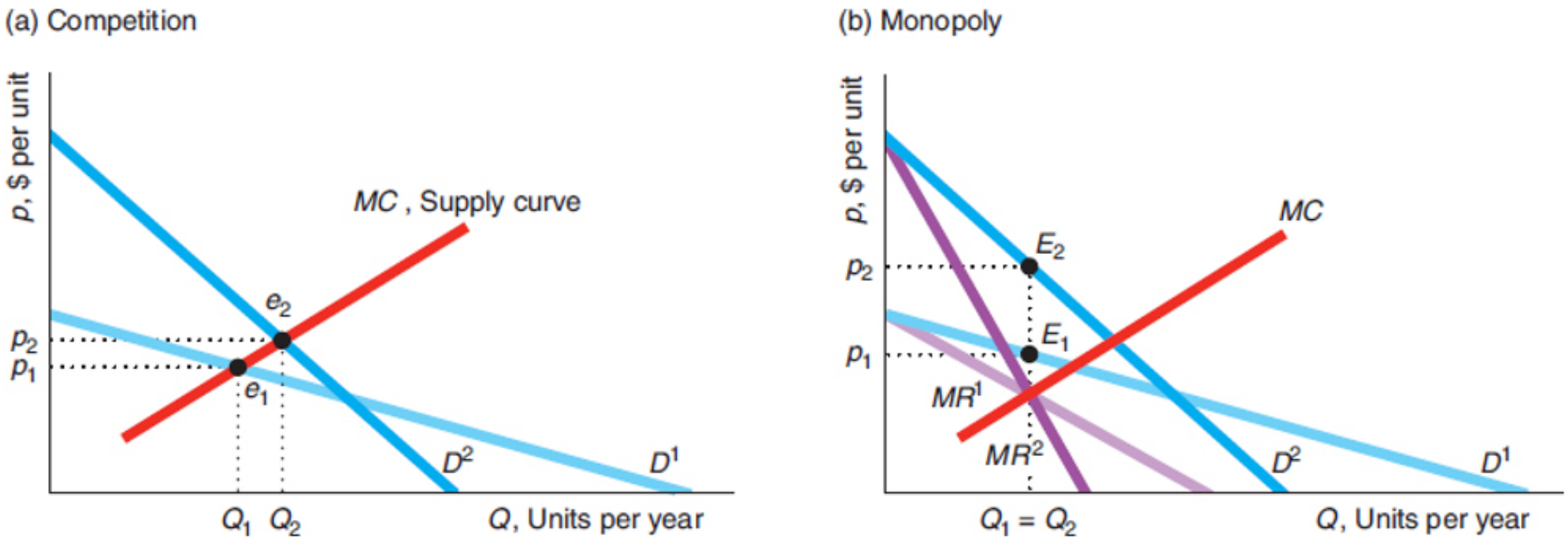
  Cost: $MC = 2q + 20$

a. Find P^*, q^*, π assuming $FC = 0$

Effects of a Shift of the Demand Curve

- Unlike a competitive firm, a monopoly does not have a supply curve because P isn't exogenous for the firm.
- A given quantity can correspond to more than one monopoly-optimal price.
  - A shift in the demand curve may cause the monopoly optimal price to stay constant and the quantity to change or both price and quantity to change.

Effects of a Shift of the Demand Curve



Market Power & Mark-up

Market power: the ability of a firm to charge a price above marginal cost and earn a positive profit.

$$MR = MC$$

$$P(1 - \frac{1}{|\varepsilon_D|}) = MC$$

$$\boxed{P/MC = \frac{1}{1 - \frac{1}{|\varepsilon_D|}}}$$

- Thus, The size of the mark-up depends only of price elasticity of demand!

Lerner Index

- ***Lerner Index***: is the ratio of the difference between price and marginal cost to the price:

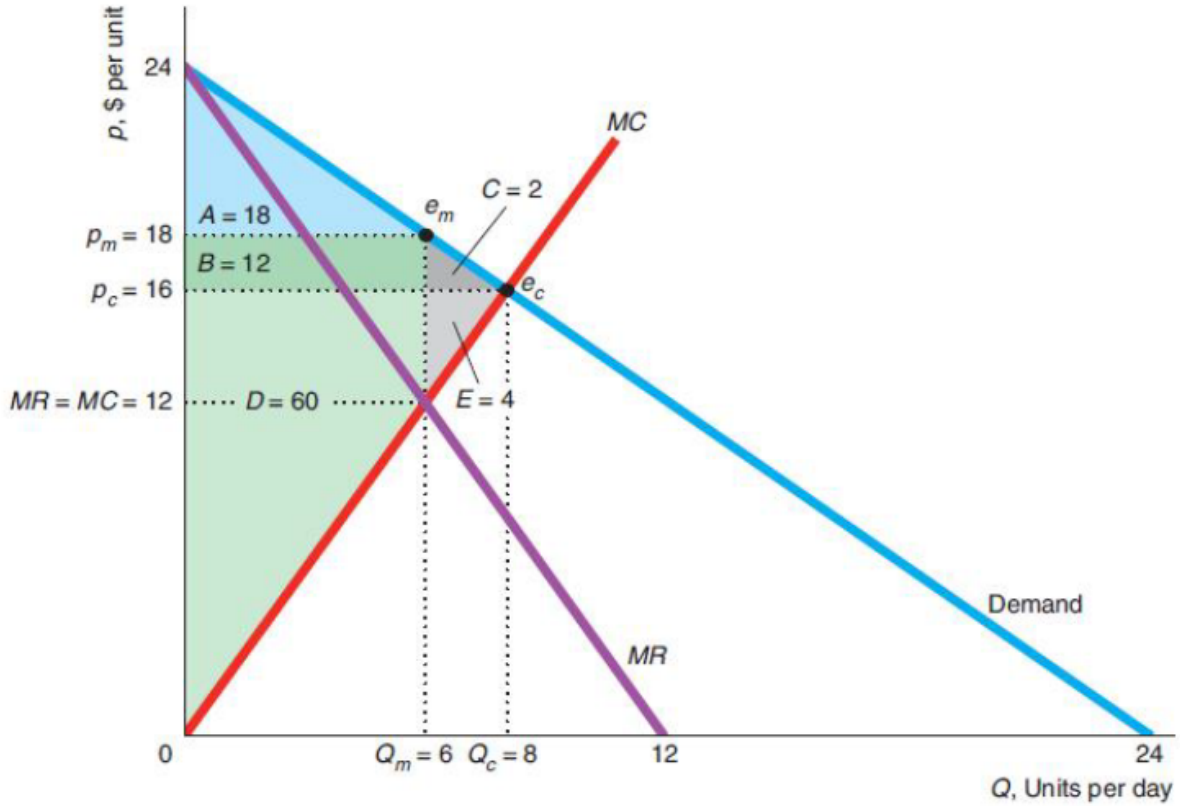
$$\frac{P - MC}{P}$$

- In terms of the elasticity of demand:

$$\boxed{\frac{P - MC}{P} = \frac{1}{|\varepsilon_D|}}$$

- Because $MC \geq 0$ and $p \geq MC$, $0 \leq (p - MC) \leq p$, so the Lerner Index ranges from 0 to 1 for a profit-maximizing firm.

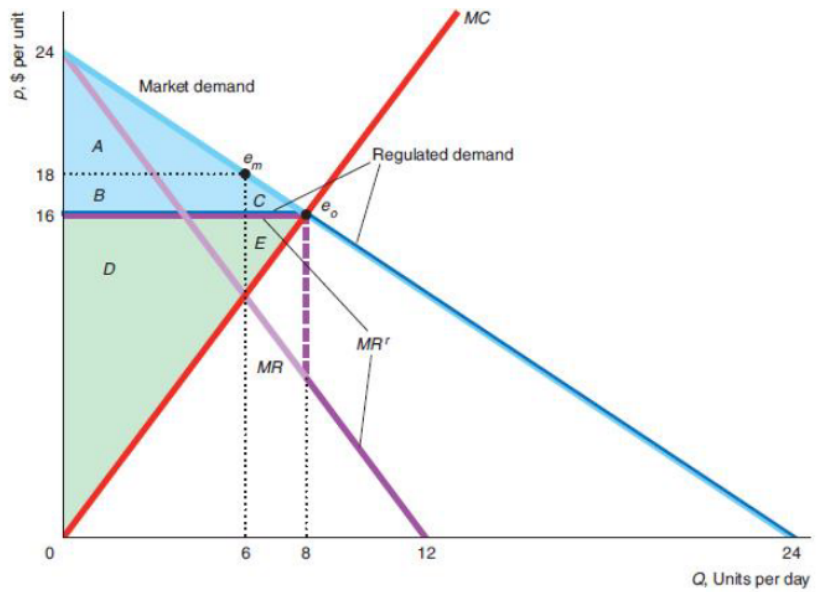
Welfare cost of monopoly



	Competition	Monopoly	Change
Consumer Surplus, CS	$A + B + C$	A	$-B - C = \Delta CS$
Producer Surplus, PS	$D + E$	$B + D$	$B - E = \Delta PS$
Welfare, $W = CS + PS$	$A + B + C + D + E$	$A + B + D$	$-C - E = \Delta W = DWL$

Optimal Price Regulation

- In some markets, the government can eliminate the deadweight loss of monopoly by requiring that a monopoly charge no more than the competitive price.



	Monopoly Without Regulation	Monopoly with Optimal Regulation	Change
Consumer Surplus, CS	A	$A+B+C$	$B+C=\Delta CS$
Producer Surplus, PS	$B+D$	$D+E$	$E-B=\Delta PS$
Welfare, $W=CS+PS$	$A+B+D$	$A+B+C+D+E$	$C+E=\Delta W$
Deadweight Loss, DWL	$-C-E$	0	$C+E=\Delta DWL$

Regulation 1: Taxing Monopolist: Example

$P = 12 - q$, $TC = q^2$

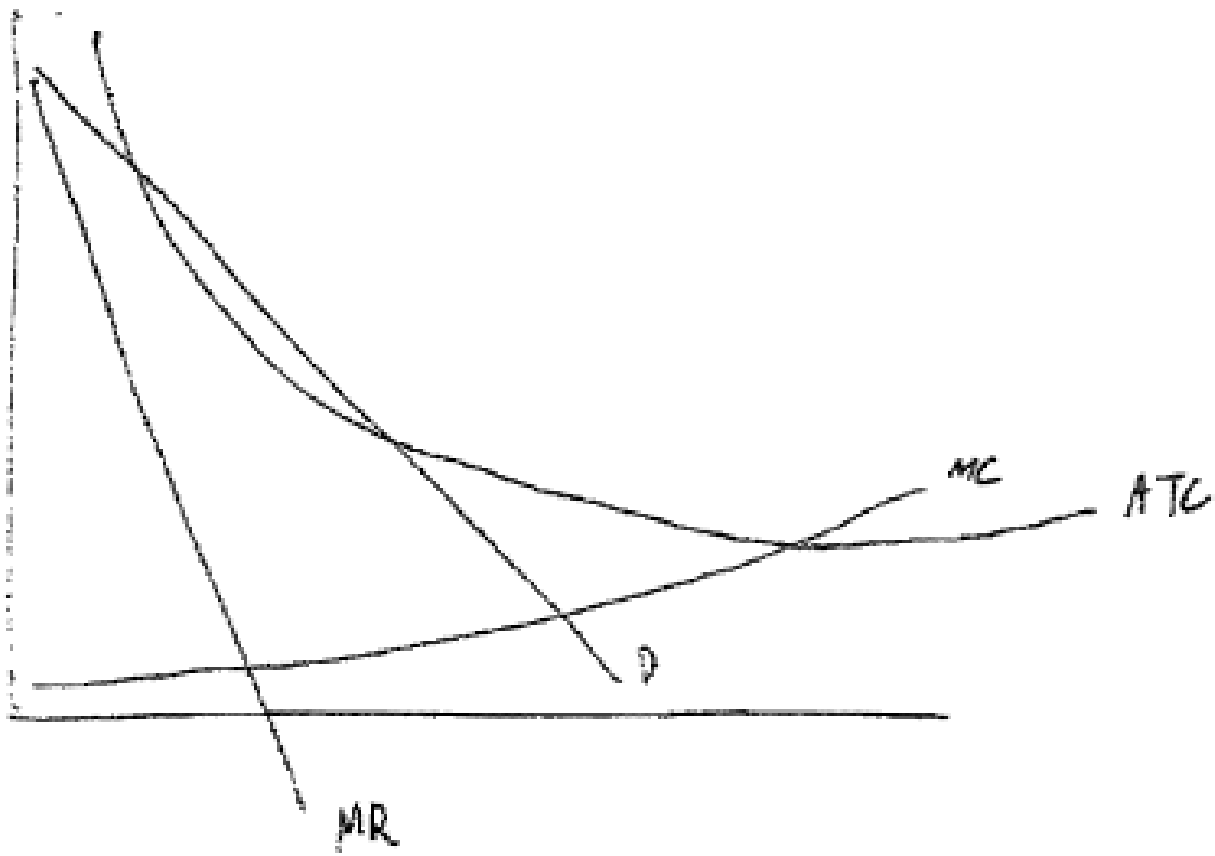
- Where does a Monoplist produce?

  Suppose gov't tax of \$2 for each unit

  $TC = q^2 + 2q$, $MC = 2q + 2$

  What are the optimal points of the monopolist

Regulation 2: Force monopolist to produce at $P = MC$



Regulation 2: Force monopolist to produce at $P = MC$

- there is slight problem: many monopolists pay a lot to get to produce (utilities, planes, OS)
- it makes sense to allow only one company to do it

NATURAL MONOPOLY:

- Forcing $P = MC$ would lead to negative profits
- So, more reasonable approach is set $P = ATC$

Networks, Dynamics and Behavioral Economics

- In some markets, decisions today affect demand or cost in a future period, creating a need for a dynamic analysis, in which firms explicitly consider relationships between periods.
- In such markets the monopoly may maximize its longrun profit by making a decision today that does not maximize its short-run profit.

Network Externalities

Network externality: the situation where one person's demand for a good depends on the consumption of the good by others.

Direct Size Effect

- Many industries exhibit positive network externalities where the customer gets a direct benefit from a largernetwork.
  - Example: the larger an ATM network such as the Plus network, the greater the odds that you will find an ATM when you want one, so the more likely it is that you will want to use that network.

Indirect Effect

- In some markets, positive network externalities are indirect.
- They stem from complementary goods that are offered when a product has a critical mass of users.
    - The more applications (apps) available for a smart phone, the more people want to buy that smart phone; however, many of these extra apps will be written only if a critical mass of customers buys the smart phone.

Network Externalities and Behavioral Economics

- ***Bandwagon effect***: the situation in which a person places greater value on a good as more and more other people possess it.
- ***Snob effect:*** the situation in which a person places greater value on a good as fewer and fewer other people possess it.

A Two-Period Monopoly Model

- A monopoly may be able to solve the chicken-and-egg problem of getting a critical mass for its product by initially selling the product at a low introductory price.
- By doing so, the firm maximizes its long-run profit but not its short-run profit (present value of profits).

Real Monopoly: DeBeer's

- Since most govt prohibit monopoly and intl trade makes it difficult for monopoly, there aren't many real monopolies
- DeBeers is one close to "pure" monopoly, it owns 80% of world's diamond mines for the past 60 years
- How? In addition to convincing countries with diamond mines:
  - if other firms try to undercut price, it floods the market to punish defector
  - bundle bad diamonds with good ones (won't allow individual orders)
  - it controls which are valuable and not, purposefully limit those valuable
  - advertises that diamonds are forever

Summary

The fact taht $P^M > MC$ creates odd tension

Some people have values just below P^M

If the monopolist could serve them "in back room" efficiency is gained

if $q^M \rightarrow q^C$ money to be made

but monopolist does not receive full benefits and thus under supplies

REMEDY: giving monopolist extra pricing tools will often lead monopolist to caputure leftover surplus