ECO2011 Basic Microeconomics

Mankiw Chapter 15 (Monopoly)
Pindyck Chapter 10 (Monopoly)

2025

Google's online search monopoly is illegal, US judge rules

- On August 5th, 2024, Judge Mehta ruled that Google acted illegally to crush its competition and maintain a monopoly on online search and related advertising.

- Google was sued by the US Department of Justice in 2020 over its control of about 90% of the online search market.

- Google's lawyers defended the company by saying that users are attracted to their search engine because they find it useful, and that Google is investing to make it better for consumers.

- Sources: BBC News, Google's online search monopoly is illegal, US judge rules
- Link: https://www.bbc.com/news/articles/c0k44x6mge3o

Google is an online advertising monopoly, judge rules

- On April 17th, 2025, District Judge Leonie Brinkema, of the US District Court for the Eastern District of Virginia ruled that Google has illegally built "monopoly power" with its web advertising business
- The ruling that Google violated antitrust law marks the US government's second major court victory over Google in less than a year amid claims the company has illegally monopolized key parts of the internet ecosystem, including online search. And it is the third such decision since a federal jury in December 2023 found that Google's proprietary app store is also an illegal monopoly.

- Source: CNN, Google is an online advertising monopoly, judge rules,
- Link: https://edition.cnn.com/2025/04/17/tech/google-adtech-trial-decision

Introduction

- Monopoly
  - A firm that is the sole seller of a product without close substitutes
  - Has market power
    - The ability to influence the market price of the product it sells
    - A competitive firm has no market power
  - Arise due to barriers to entry
    - Other firms cannot enter the market to compete with it

Internet photo

Three Barriers to Entry

1. Monopoly resources
   - A single firm owns a key resource.
     - E.g., DeBeers owns most of the world's diamond mines

Internet photo

2. Government regulation
   - The government gives a single firm the exclusive right to produce the good.
     - E.g., patents, copyright laws

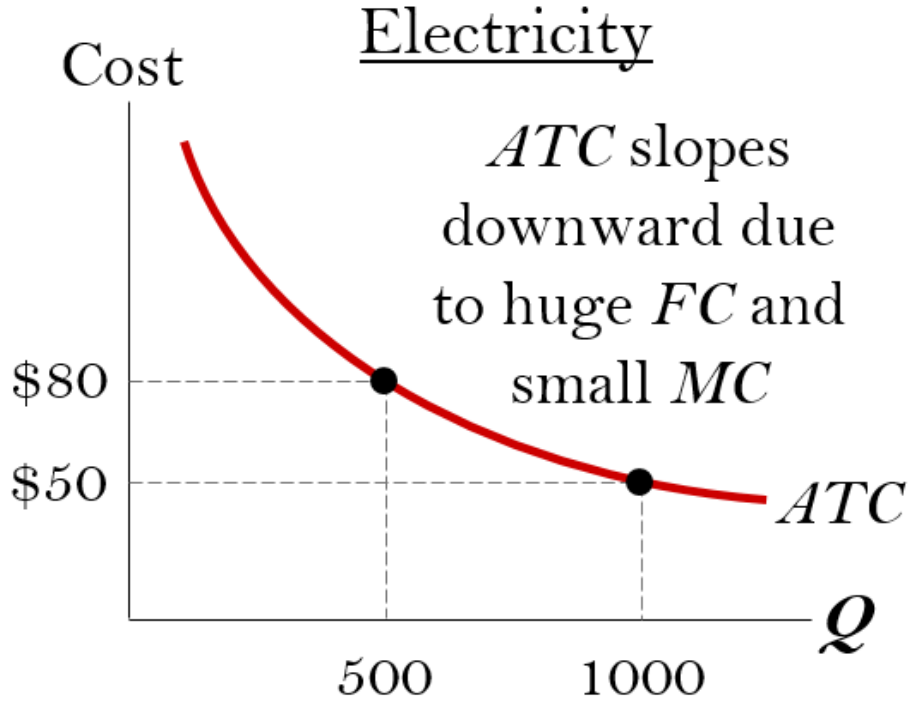
Internet photo

Three Barriers to Entry

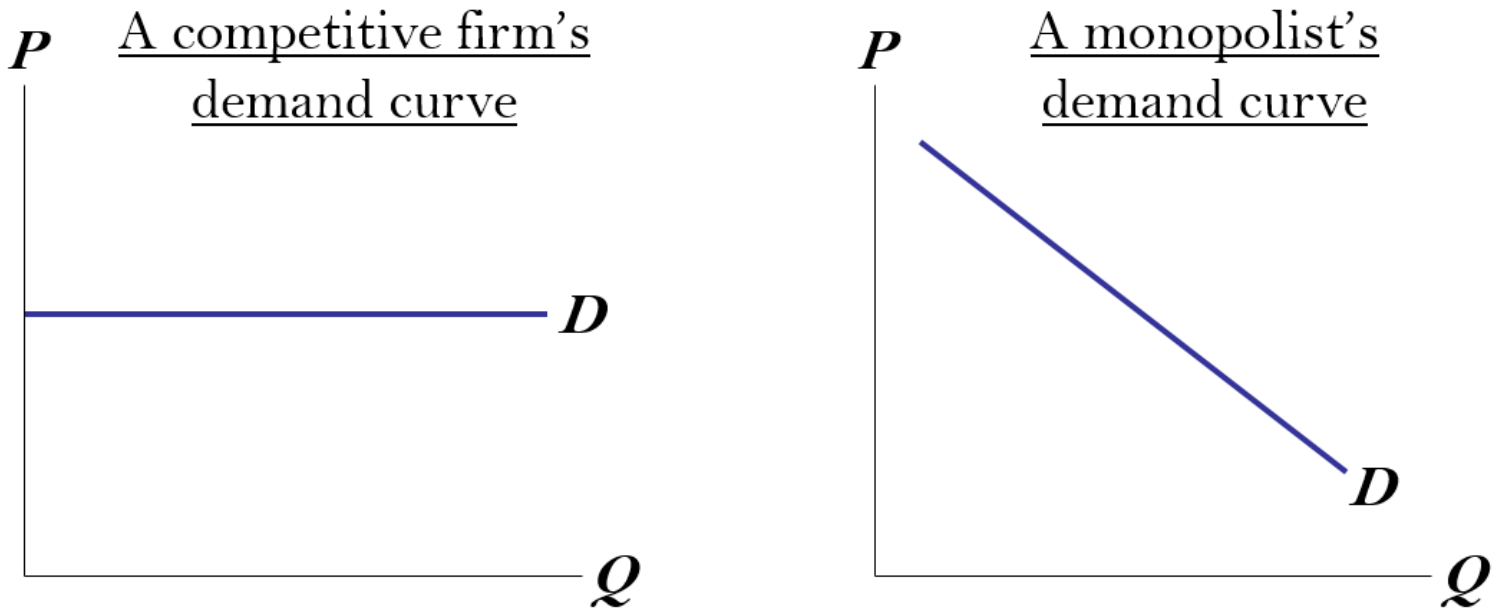
3. Natural monopoly: a single firm can produce the entire market Q at lower cost than could several firms

Example: 1000 homes need electricity.

ATC is lower if one firm services all 1000 homes than if two firms each service 500 homes.



Monopoly vs. Competition: Demand Curves



- In a competitive market, the market demand curve slopes downward. But the demand curve for any individual firm's product is horizontal at the market price. The firm can increase Q without lowering P, so MR = P for the competitive firm.
- A monopolist is the only seller, so it faces the market demand curve. To sell a larger Q, the firm must reduce P. Thus, MR ≠ P.

Active Learning 1 A monopoly's revenue

Common Grounds is the only seller of cappuccinos in town.

The table shows the market demand for cappuccinos.

Fill in the missing spaces of the table.

What is the relation between P and AR? Between P and MR?

Q	*P*	*TR*	*AR*	*MR*
0	$4.50		n.a.	
1	4.00			
2	3.50			
3	3.00			
4	2.50			
5	2.00			
6	1.50			

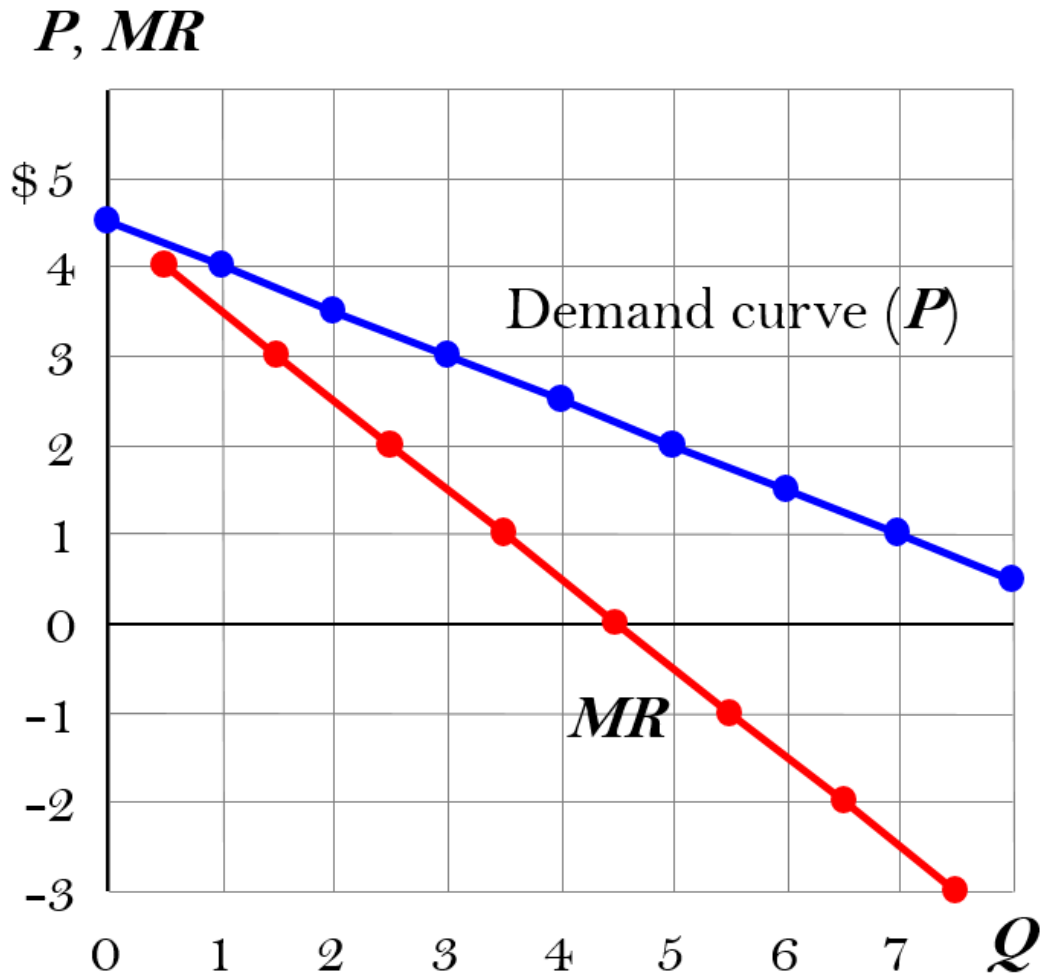
Active Learning 1 Answers

- P = AR,
  same as for a competitive firm.
- MR < P, whereas MR = P for a competitive firm.

Q	*P*	*TR*	*AR*	*MR*
0	$4.50	$ 0	n.a.	
				$4
1	4.00	4	$4.00	
				3
2	3.50	7	3.50	
				2
3	3.00	9	3.00	
				1
4	2.50	10	2.50	
				0
5	2.00	10	2.00	
				−1
6	1.50	9	1.50	

Common Grounds' D and MR Curves

Q	*P*	*MR*
0	$4.50	
1	4.00	$4
2	3.50	3
3	3.00	2
4	2.50	1
5	2.00	0
6	1.50	−1



Understanding the Monopolist's MR

- With limited knowledge of average and marginal revenue, we can derive a rule of thump that can be more easily applied in practice. First, write the expression for marginal revenue:

$$\text{MR} = \frac{\Delta R}{\Delta Q} = \frac{\Delta(PQ)}{\Delta Q}$$

- Note that the extra revenue from an incremental unit of quantity, $\Delta(\text{PQ})/\Delta\text{Q}$, has two components:
- 1. Producing one extra unit and selling it at price P brings in revenue (1)(P) = P.
- 2. But because the firm faces a downward-sloping demand curve, producing and selling this extra unit also results in a small drop in price $\Delta\text{P}/\Delta\text{Q}$, which reduces the revenue from all units sold (i.e., a change in revenue $\text{Q}[\Delta\text{P}/\Delta\text{Q}]$).
- Thus,

$$\text{MR} = P + Q\frac{\Delta P}{\Delta Q} = P + P\left(\frac{Q}{P}\right)\left(\frac{\Delta P}{\Delta Q}\right)$$

Understanding the Monopolist's MR

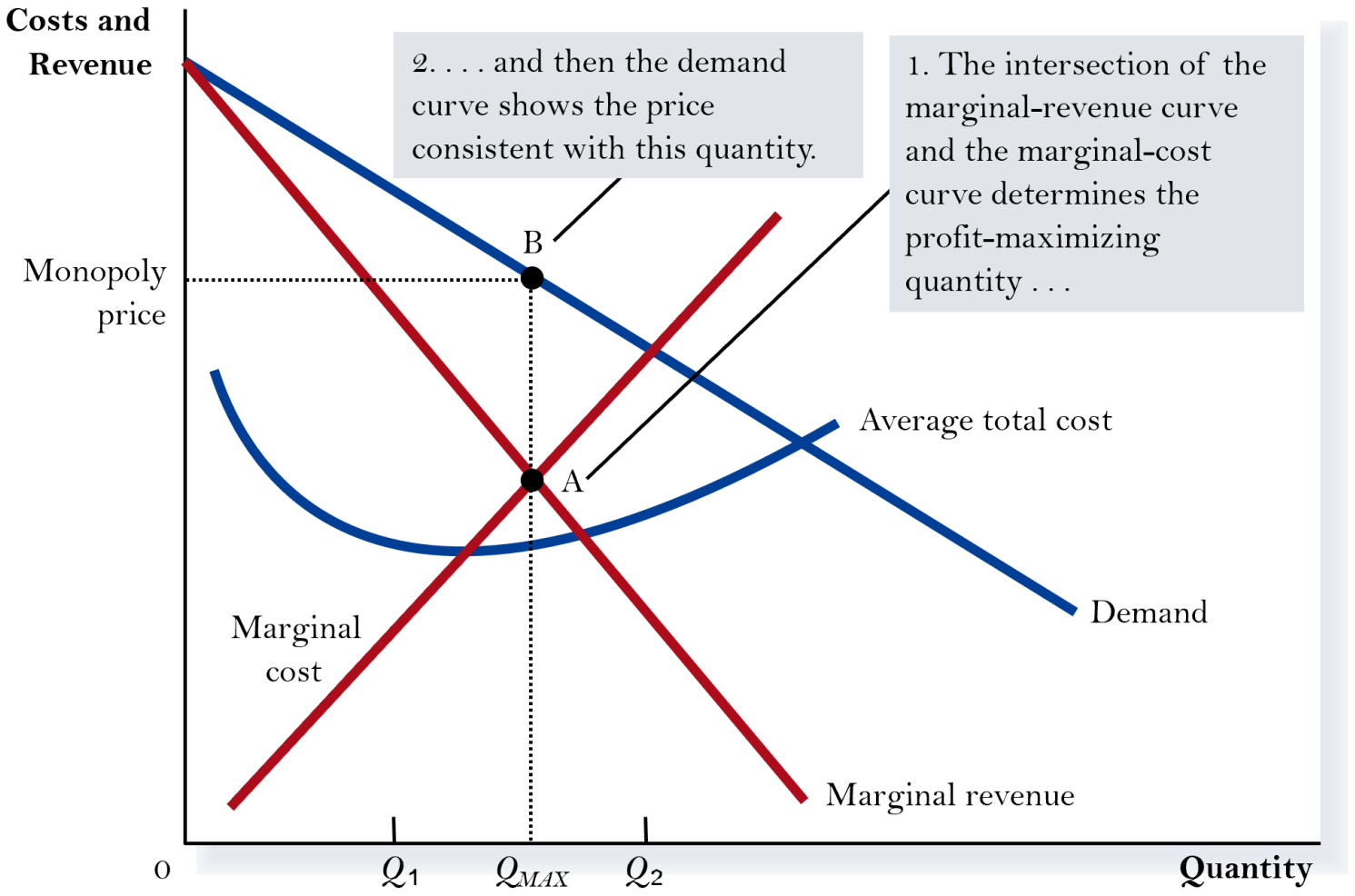
- Increasing Q has two effects on revenue:
  - Output effect: higher output raises revenue
  - Price effect: lower price reduces revenue
- Marginal revenue, MR < P
  - To sell a larger Q, the monopolist must reduce the price on all the units it sells
  - Is negative if price effect > output effect
    - e.g., when Common Grounds increases Q from 5 to 6

Profit-Maximization

- Like a competitive firm, a monopolist maximizes profit by producing the quantity where MR = MC
  - Sets the highest price consumers are willing to pay for that quantity
  - It finds this price from the D curve

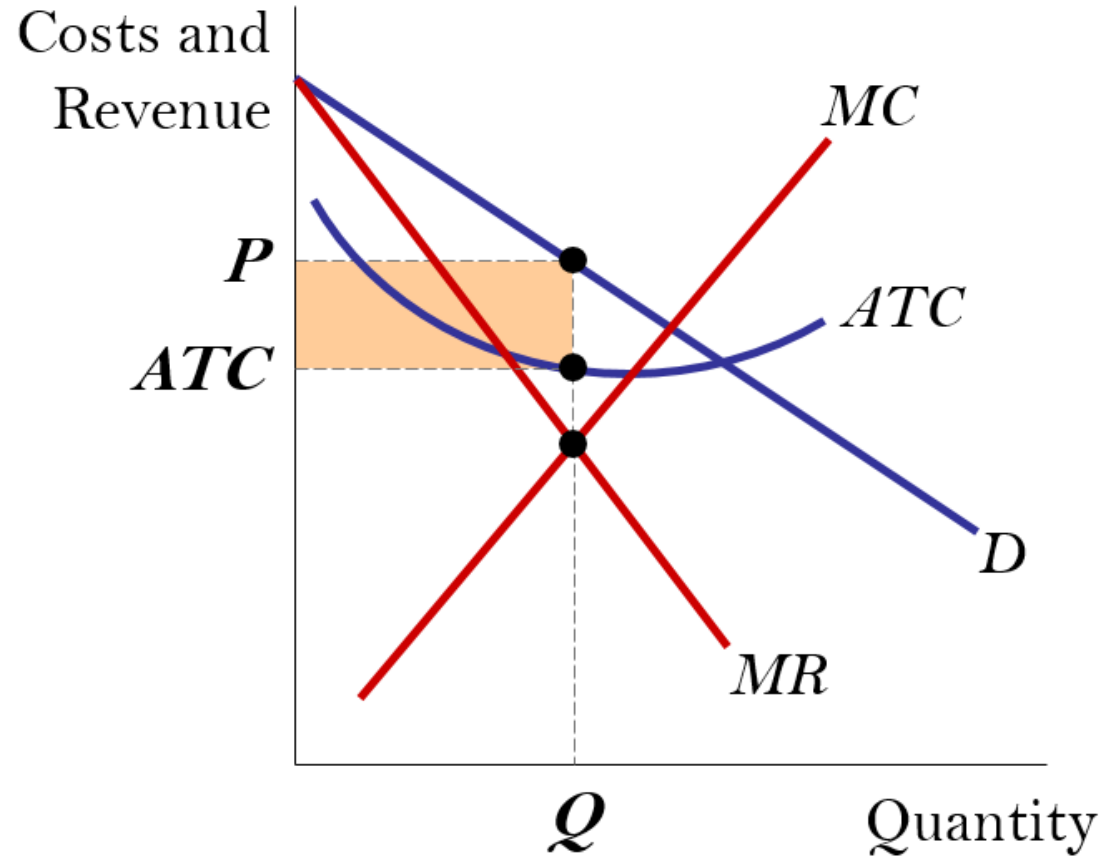
Internet photo

Profit-Maximization



The Monopolist's Profit

- As with a competitive firm, the monopolist's profit equals (P – ATC) x Q



An Example

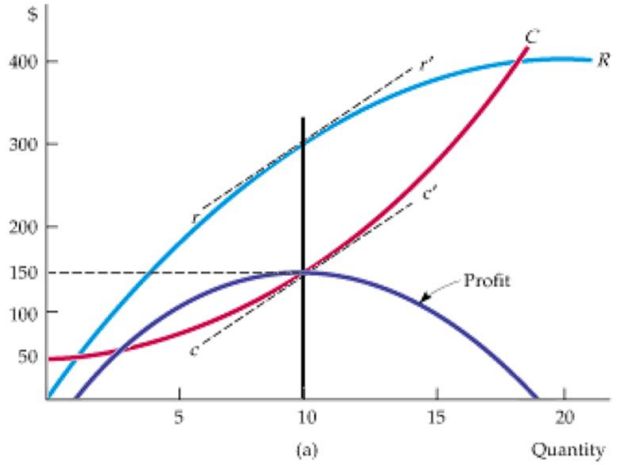
$$\text{Cost of production: } C(Q) = 50 + Q^2$$
$$\text{Demand: } P(Q) = 40 - Q$$

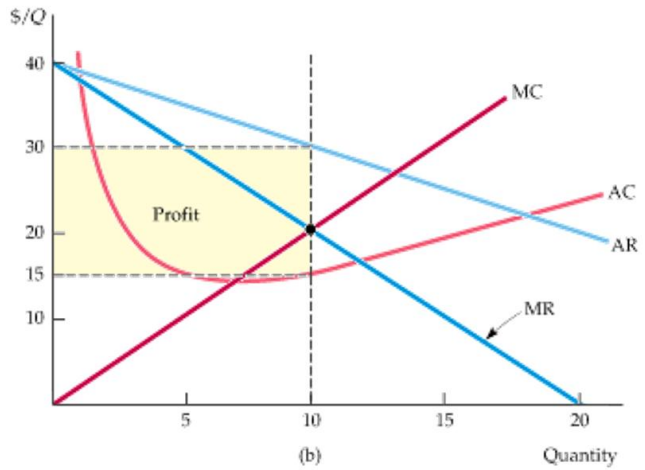
Derive total revenue, average revenue, and marginal revenue function.

Derive marginal cost and average cost function.

How much should the firm produce and charge?

How much is total profit? Is it maximized?





Why One Drug Company Held Back a Better Drug

- In 2004, a drug company called Gilead released a drug called Truvada, which is used for both preventing HIV and treating it. This drug was effective and very convenient to take (just 1 pill). Gilead had exclusive right to sell this product until 2017. And it costs around $22,000 a year during this period. Yet, this drug has some side effects on bones and kidney.

- In 2016, Gilead released a new HIV drug, This new drug contained a newer version of tenofovir —the active ingredient in Truvada. But this new formulation of tenofovir was different and don't cause the same side effects.

- Some lawyers claimed: "Gilead had been working on this newer version in the early 2000s. They also claim that even though there was good reason at the time to think that the newer version would turn out to be safer — that it wouldn't have those same kidney and bone side effects — Gilead still decided to delay bringing it to market."

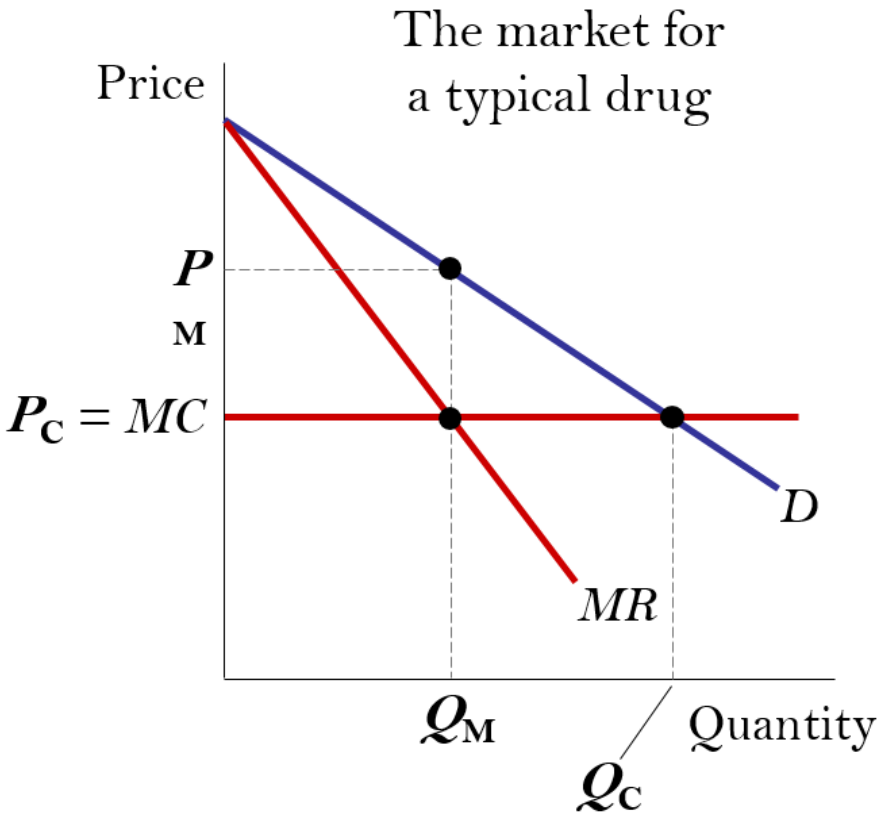
- Sources: New York Times, The Daily: Why One Drug Company Held Back a Better Drug
- Link: https://www.nytimes.com/2023/09/07/podcasts/the-daily/gilead-hiv-drug.html

Questions

- How did Gilead's situation with Truvada illustrate the concept of monopoly?
- What is likely to happen after the patent on Truvada expires for Gilead?
- Why do you think Gilead delay the release of the newer version drug?
- From a drug company's perspective, discuss the benefits and risks of delaying the release of better drug.
- From a government's perspective, discuss the benefits and risks of strict patent protection.

Case Study: Monopoly vs. Generic Drugs

- Patents on new drugs give a temporary monopoly to the seller.
- When the patent expires, the market becomes competitive, generics appear.



A Rule of Thumb for Pricing

- (Q/P)(ΔP/ΔQ) is the reciprocal of the elasticity of demand, 1/Ed, measured at the profit-maximizing output, and

$$\text{MR} = P + P(1/E_d)$$

- Now, because the firm's objective is to maximize profit, we can set marginal revenue equal to marginal cost:

$$P + P(1/E_d) = \text{MC}$$

- which can be rearranged to give us

$$\frac{P - \text{MC}}{P} = -\frac{1}{E_d}$$

- Equivalently, we can rearrange this equation to express price as:

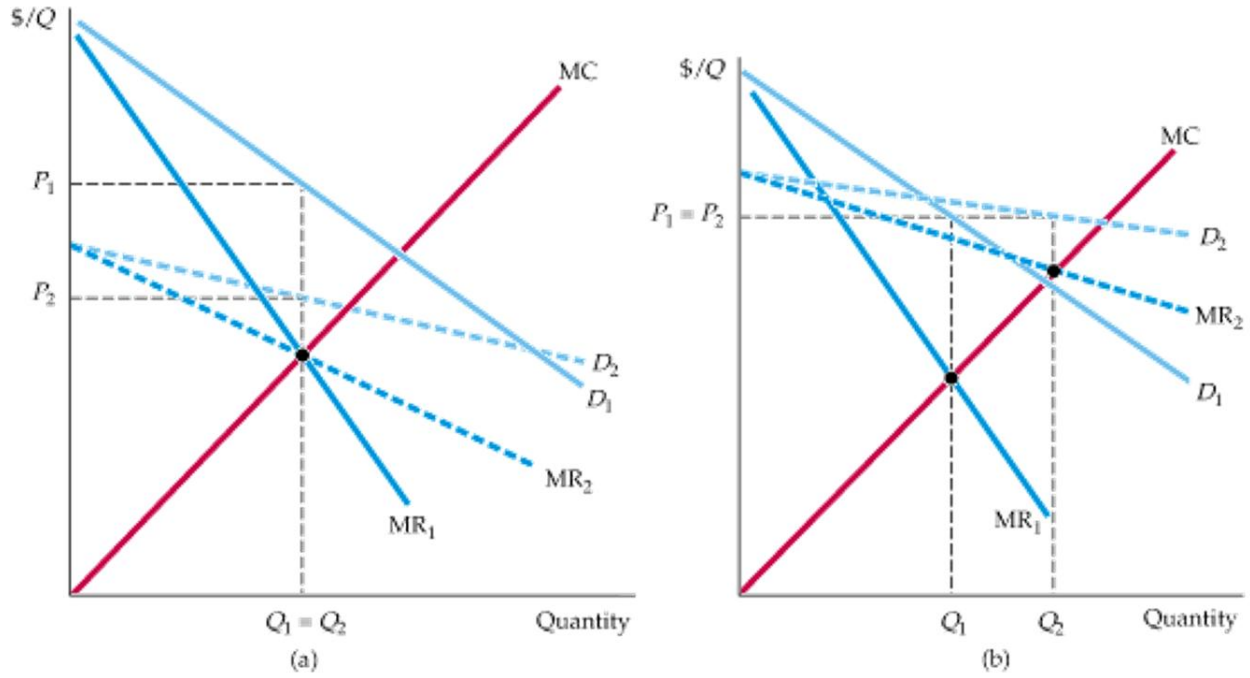
$$P = \frac{\text{MC}}{1 + (1/E_d)}$$

Case Study: Astra-Merck Prices Prilosec

- In 1995, Prilosec, represented a new generation of antiulcer medication. Prilosec was based on a very different biochemical mechanism and was much more effective than earlier drugs. By 1996, it had become the best-selling drug in the world and faced no major competitor. Astra-Merck was pricing Prilosec at about $3.50 per daily dose. The marginal cost of producing and packaging Prilosec is only about 30 to 40 cents per daily dose. The price elasticity of demand, ED, should be in the range of roughly −1.0 to −1.2.
- Does the pricing strategy of Prilosec fit to our rule of thumb for pricing?

A Monopoly Does Not Have an S Curve

- A competitive firm takes P as given
  - Has a supply curve that shows how its Q depends on P
- A monopoly firm is a "price-maker"
  - Q does not depend on P
  - Q and P are jointly determined by MC, MR, and the demand curve
  - Hence, no supply curve for monopoly.

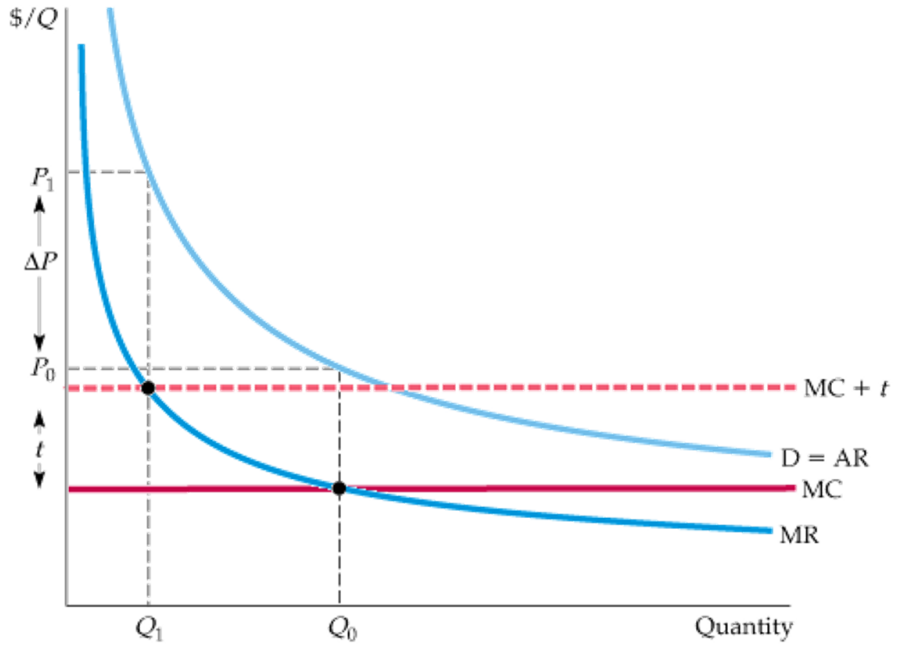


The Effect of a Tax

- Suppose a specific tax of t dollars per unit is levied, so that the monopolist must remit t dollars to the government for every unit it sells. If MC was the firm's original marginal cost, its optimal production decision is now given by

$$\mathrm{MR} = \mathrm{MC} + T$$

- For figure on the right, how does the tax change price and output? How much is the total tax revenue?



Questions

1. How can we measure monopoly power in order to compare one firm with another? (So far we have been talking about monopoly power only in qualitative terms.)

2. What are the sources of monopoly power, and why do some firms have more monopoly power than others?

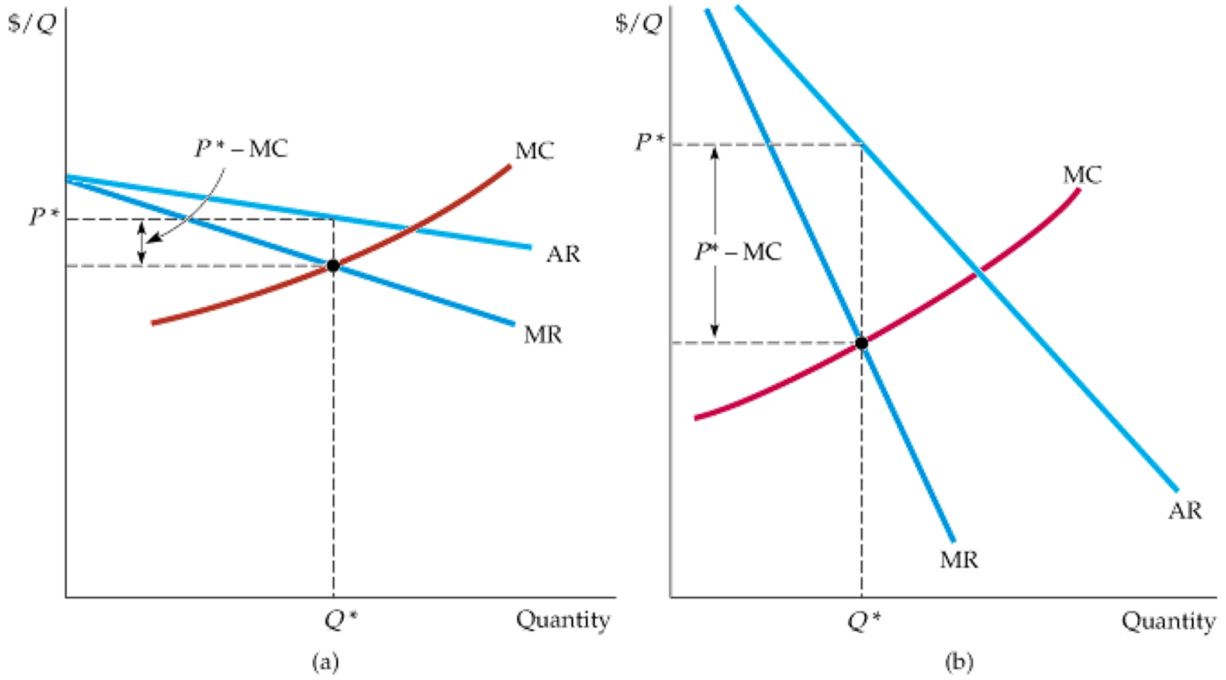
Measuring Monopoly Power

- Lerner Index of Monopoly Power: Measure of monopoly power calculated as excess of price over marginal cost as a fraction of price.
- Mathematically: $L = (P - \text{MC})/P$
- This index of monopoly power can also be expressed in terms of the elasticity of demand facing the firm.
- $$L = (P - \text{MC})/P = -1/E_d$$

Elasticity of Demand and Price Markup

- The markup (P − MC)/P is equal to minus the inverse of the elasticity of demand.
- If the firm's demand is elastic, as in (a), the markup is small and the firm has little monopoly power.
- The opposite is true if demand is relatively inelastic, as in (b).

$$P = \frac{\text{MC}}{1 + (1/E_d)}$$



Markup Pricing: Supermarkets to Designer Jeans

- Although the elasticity of market demand for food is small (about −1), no single supermarket can raise its prices very much without losing customers to other stores.
- The elasticity of demand for any one supermarket is often as large as −10. We find $P = MC/(1 - 0.1) = MC/(0.9) = (1.11)MC$.
- The manager of a typical supermarket should set prices about 11 percent above marginal cost.
- Small convenience stores typically charge higher prices because its customers are generally less price sensitive.
- Because the elasticity of demand for a convenience store is about −5, the markup equation implies that its prices should be about 25 percent above marginal cost.
- With designer jeans, demand elasticities in the range of −2 to −3 are typical. This means that price should be 50 to 100 percent higher than marginal cost.

Internet photo

Sources of Monopoly Power

- As shown earlier, the less elastic its demand curve, the more monopoly power a firm has. The ultimate determinant of monopoly power is therefore the firm's elasticity of demand.
- Three factors determine a firm's elasticity of demand.
  1. The elasticity of market demand. Because the firm's own demand will be at least as elastic as market demand, the elasticity of market demand limits the potential for monopoly power.
  2. The number of firms in the market. If there are many firms, it is unlikely that any one firm will be able to affect price significantly.
  3. The interaction among firms. Even if only two or three firms are in the market, each firm will be unable to profitably raise price very much if the rivalry among them is aggressive, with each firm trying to capture as much of the market as it can.

The Elasticity of Market Demand

- If there is only one firm—a pure monopolist—its demand curve is the market demand curve. In this case, the firm's degree of monopoly power depends completely on the elasticity of market demand.
- When several firms compete with one another, the elasticity of market demand sets a lower limit on the magnitude of the elasticity of demand for each firm.
- A particular firm's elasticity depends on how the firms compete with one another, and the elasticity of market demand limits the potential monopoly power of individual producers.
- Because the demand for oil is fairly inelastic (at least in the short run), OPEC could raise oil prices far above marginal production cost during the 1970s and early 1980s. Because the demands for such commodities as coffee, cocoa, tin, and copper are much more elastic, attempts by producers to cartelize these markets and raise prices have largely failed. In each case, the elasticity of market demand limits the potential monopoly power of individual producers.

The Number of Firms

- Other things being equal, the monopoly power of each firm will fall as the number of firms increases.
- When only a few firms account for most of the sales in a market, we say that the market is highly concentrated.

The Interaction Among Firms

- Firms might compete aggressively, undercutting one another's prices to capture more market share, or they might not compete much. They might even collude (in violation of the antitrust laws), agreeing to limit output and raise prices.
- Other things being equal, monopoly power is smaller when firms compete aggressively and is larger when they cooperate. Because raising prices in concert rather than individually is more likely to be profitable, collusion can generate substantial monopoly power.
- Remember that a firm's monopoly power often changes over time, as its operating conditions (market demand and cost), its behavior, and the behavior of its competitors change. Monopoly power must therefore be thought of in a dynamic context.
- Furthermore, real or potential monopoly power in the short run can make an industry more competitive in the long run: Large short-run profits can induce new firms to enter an industry, thereby reducing monopoly power over the longer term.

The Welfare Cost of Monopoly

- Recall:
  - Competitive market equilibrium: P = MC and total surplus is maximized
- Monopoly equilibrium, P > MR = MC
  - The value to buyers of an additional unit (P) exceeds the cost of the resources needed to produce that unit (MC)
  - The monopoly Q is too low – could increase total surplus with a larger Q.
  - Monopoly results in a deadweight loss

Internet photo

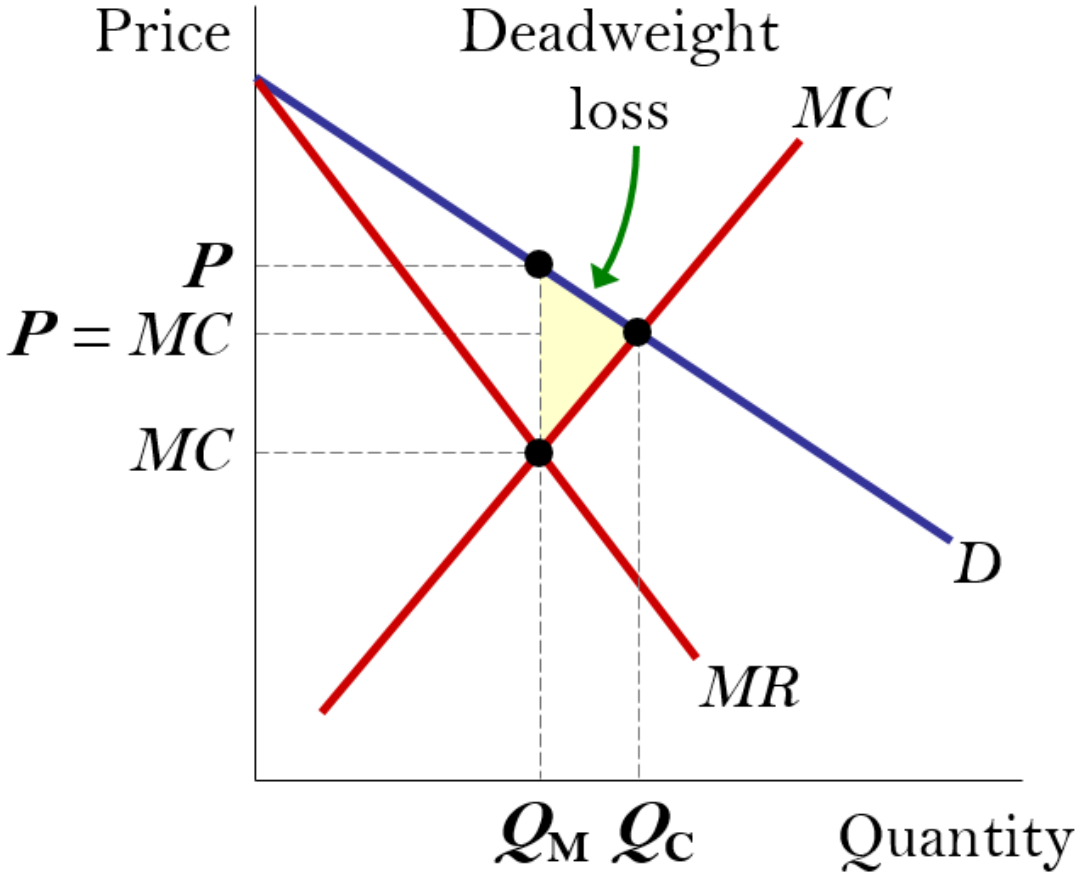
The Welfare Cost of Monopoly

Competitive equilibrium:

- quantity = QC
- P = MC
- total surplus is maximized

Monopoly equilibrium:

- quantity = QM
- P > MC
- deadweight loss



Price Regulation

If left alone, a monopolist produces Qm and charges Pm.

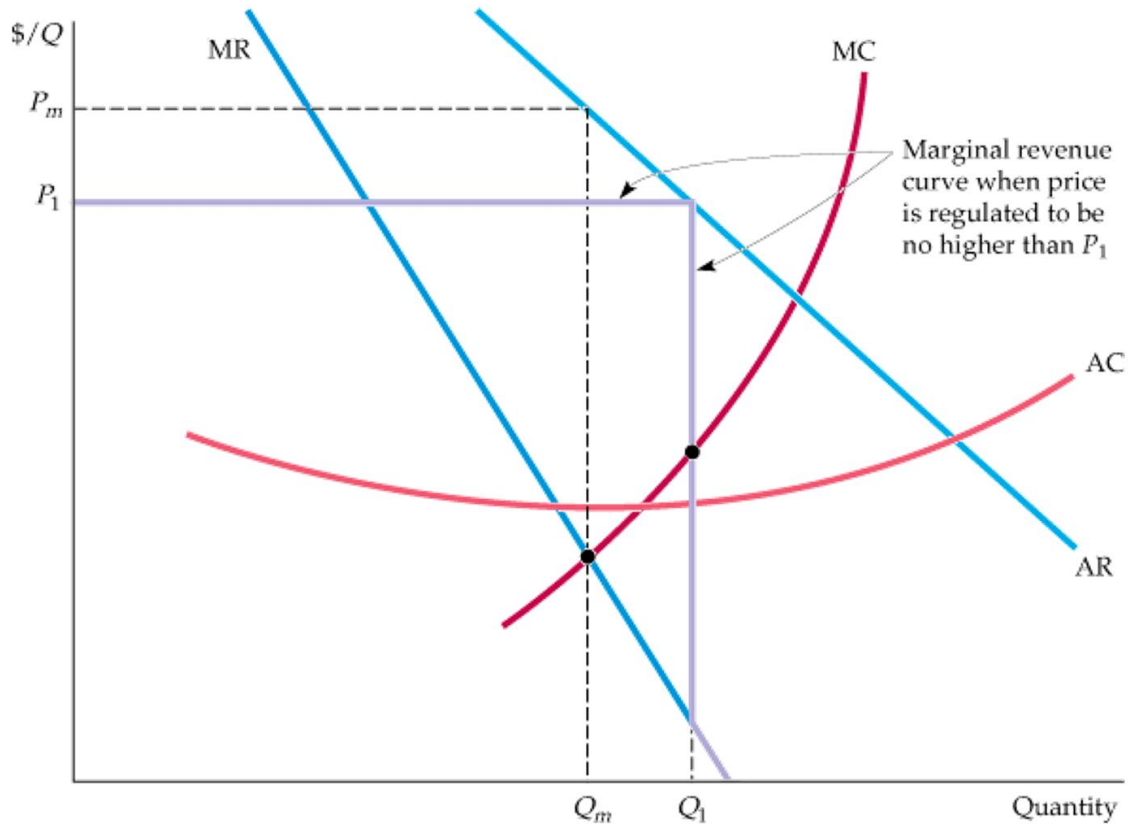
When the government imposes a price ceiling of P1 the firm's average and marginal revenue are constant and equal to P1 for output levels up to Q1.

For larger output levels, the original average and marginal revenue curves apply.

The new marginal revenue curve is, therefore, the dark purple line, which intersects the marginal cost curve at Q1.

Is DWL lower than no regulation?

Should government continue lower price?

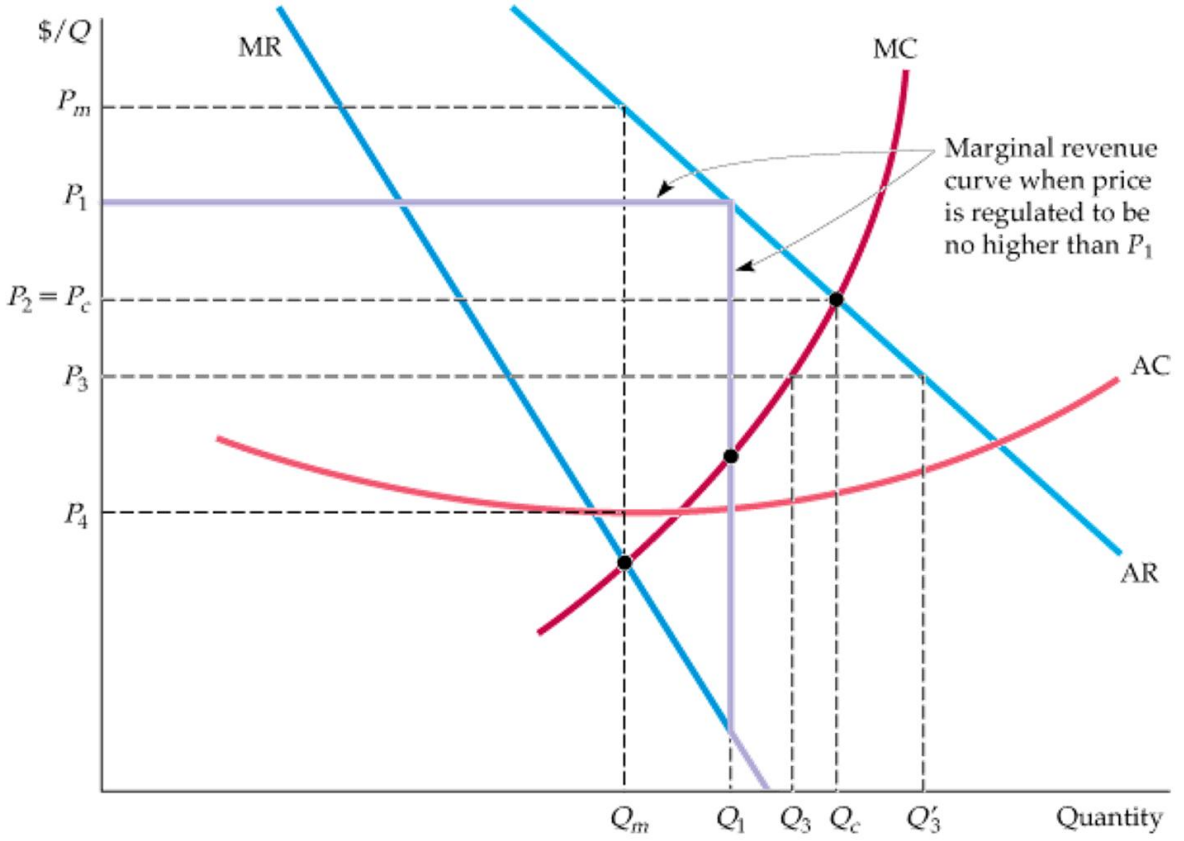


Price Regulation

When price is lowered to Pc, at the point where marginal cost intersects average revenue, output increases to its maximum Qc. This is the output that would be produced by a competitive industry.

Lowering price further, to P3, reduces output to Q3 and causes a shortage,
Q'3 – Q3.

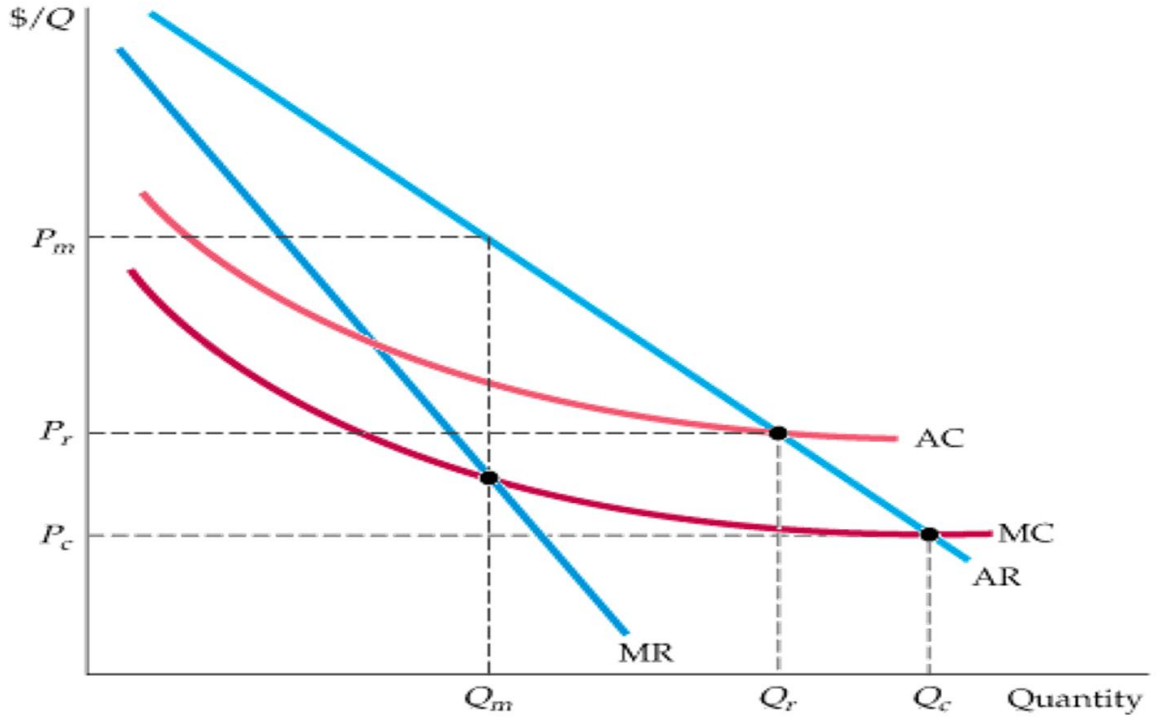
What will firm do if P is lower than P4?



Natural Monopoly

- Natural monopoly: Firm that can produce the entire output of the market at a cost lower than what it would be if there were several firms.

- A firm is a natural monopoly because it has economies of scale (declining average and marginal costs) over its entire output range.
- If price were regulated to be Pc the firm would lose money and go out of business.
- Setting the price at Pr yields the largest possible output consistent with the firm's remaining in business; excess profit is zero.



Can You Answer the Following Questions?

- Why do monopolies arise?
- Why is MR < P for a monopolist?
- How do monopolies choose their P and Q?
- How do monopolies affect society's well-being?
- What can the government do about monopolies?

Internet photo

End