

ECO2011 Basic Microeconomics

Mankiw Chapter 14 (Monopoly)

2023

Motivation

- What operating system do you use for your computer?
- Which search engine do you use most?

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



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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



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2. Government regulation

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



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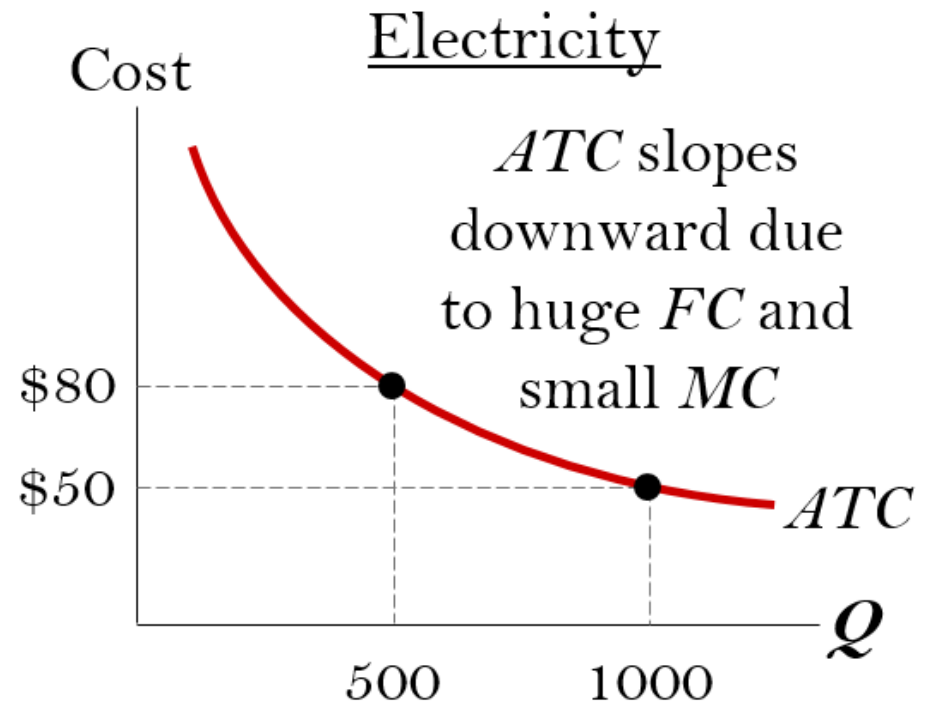
Three Barriers to Entry

3. Fill in The production process

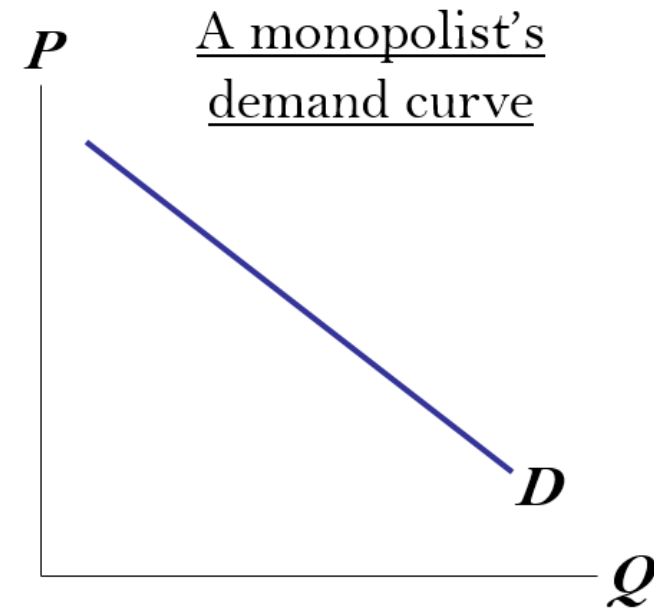
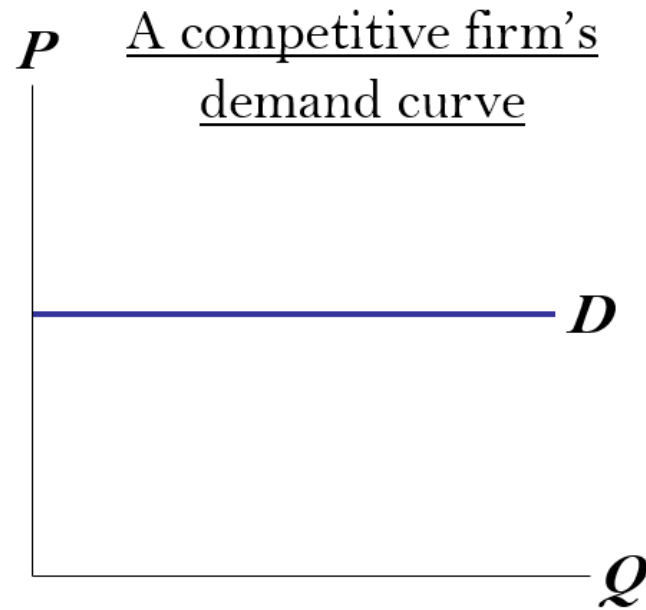
- Natural monopoly: a single firm can produce the entire market Q at lower cost than could several firms

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, $MR \neq P$.

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

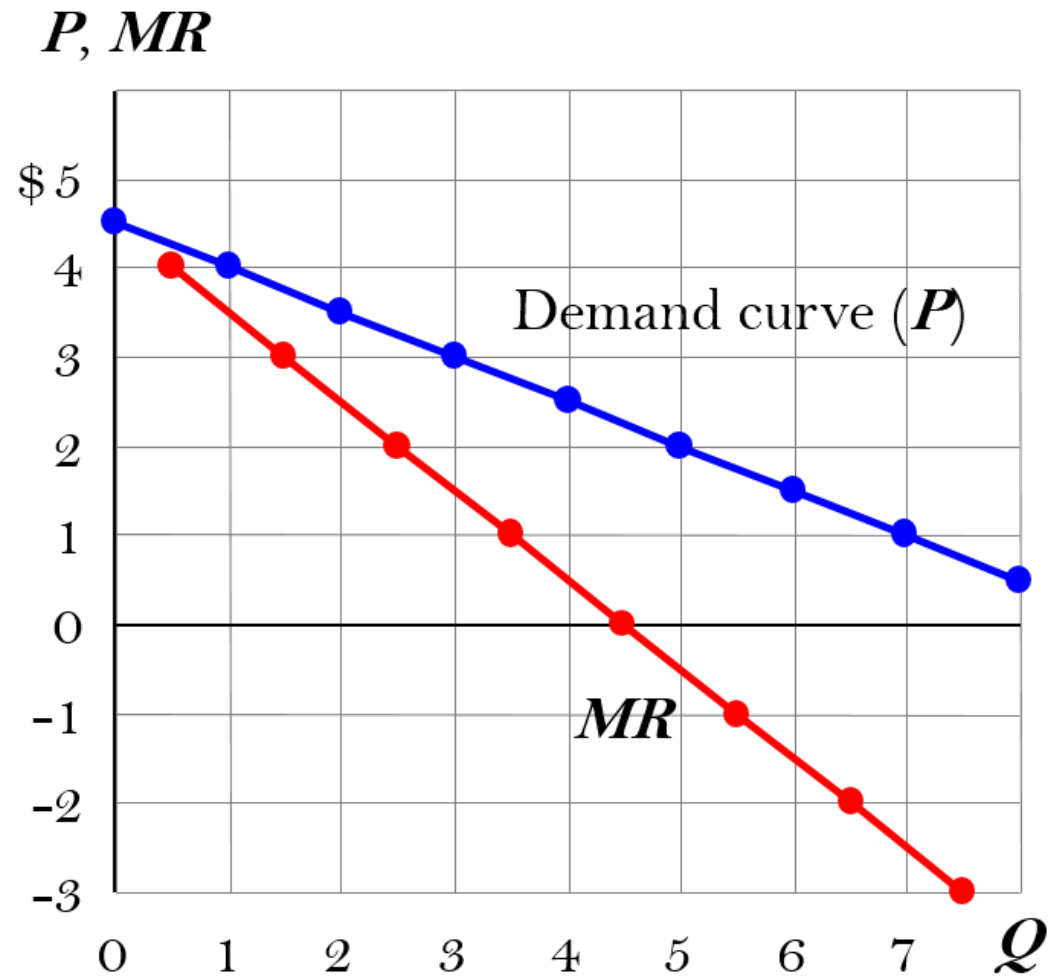
Answers

- $P = AR$,
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.	
1	4.00	4	\$4.00	\$4
2	3.50	7	3.50	3
3	3.00	9	3.00	2
4	2.50	10	2.50	1
5	2.00	10	2.00	0
6	1.50	9	1.50	-1

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

- 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

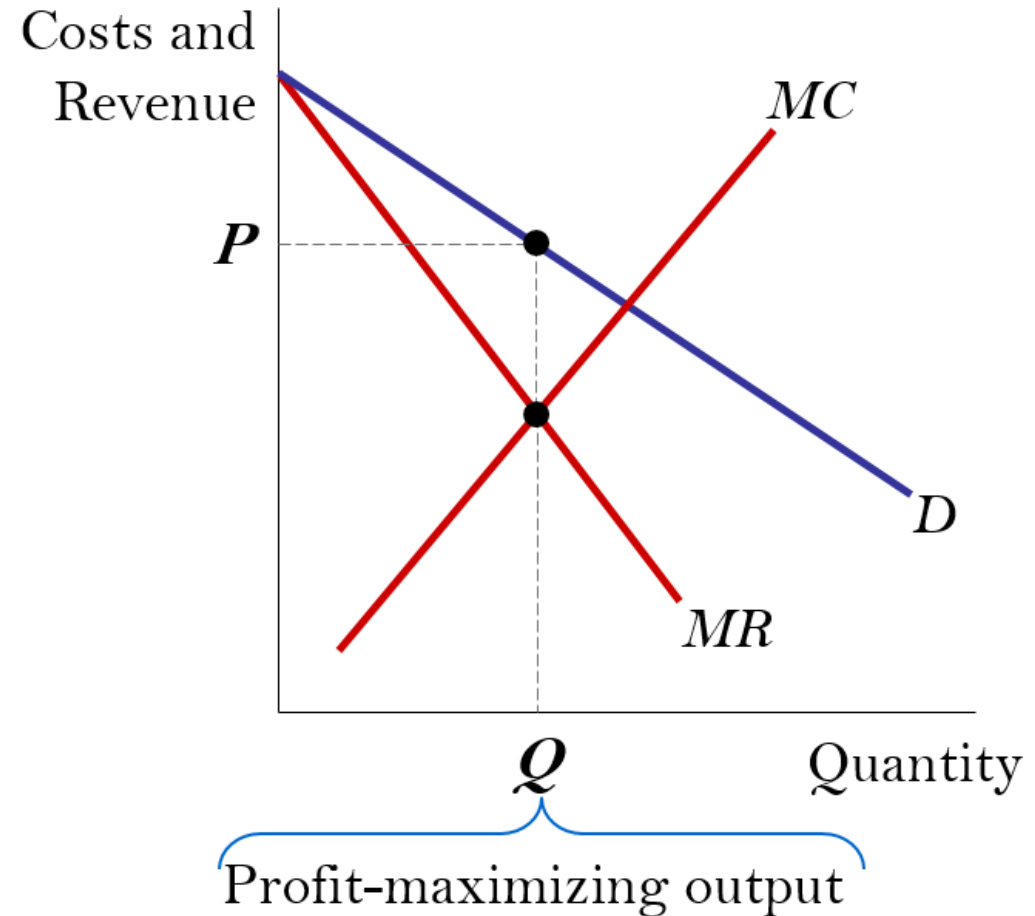


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Profit-Maximization

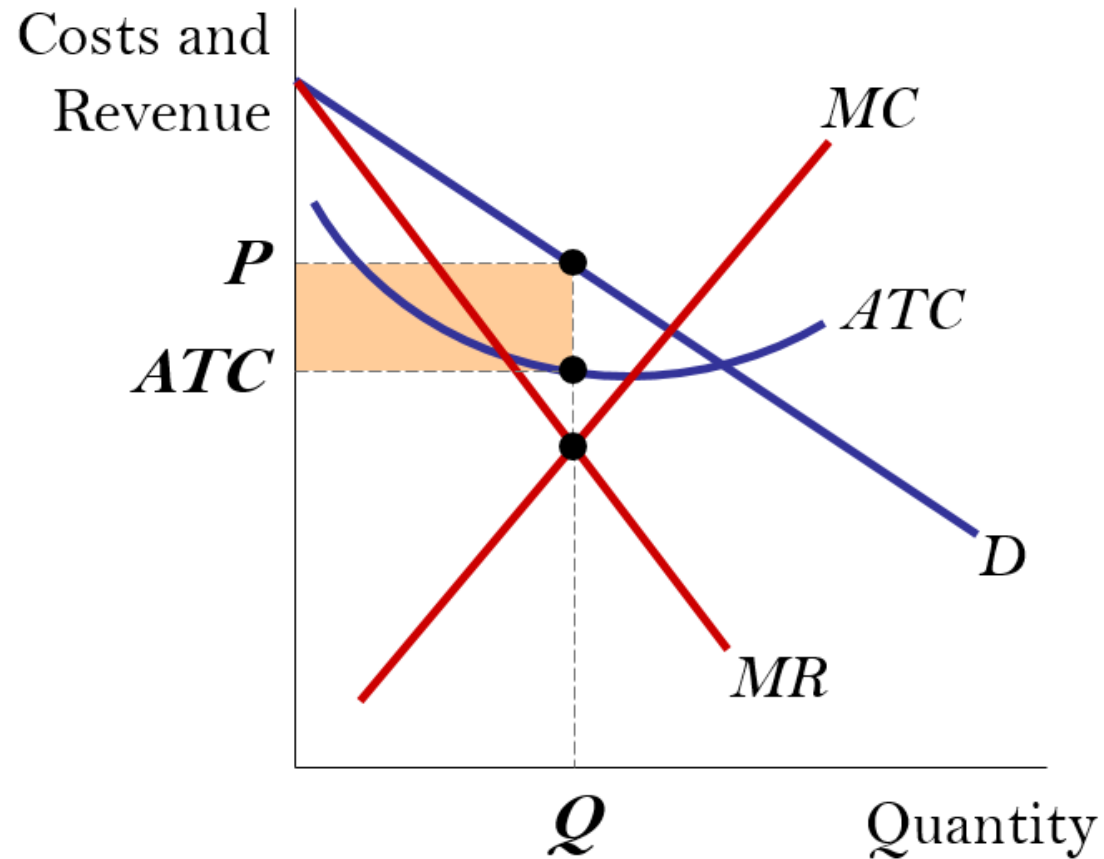
The profit-maximizing Q is
where $MR = MC$.

Find P from the demand curve
at this Q .



The Monopolist's Profit

- As with a competitive firm, the monopolist's profit equals $(P - ATC) \times Q$



An Example

Cost of production: $C(Q) = 50 + Q^2$

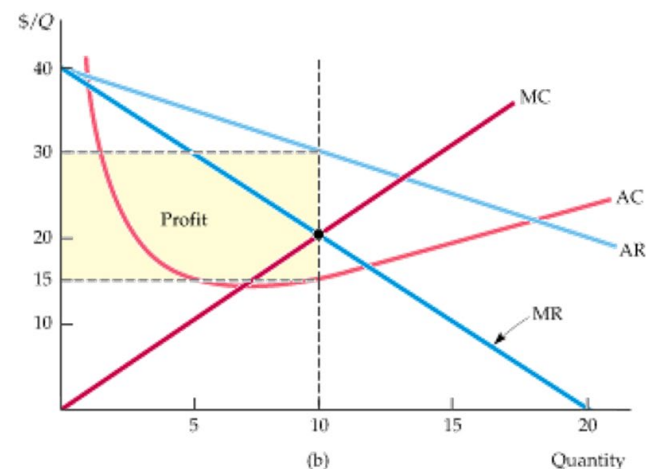
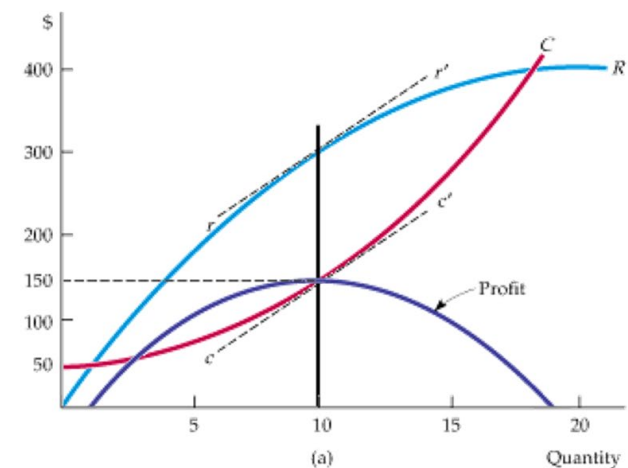
Demand: $P(Q) = 40 - Q$

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

Derive marginal cost and average cost function.

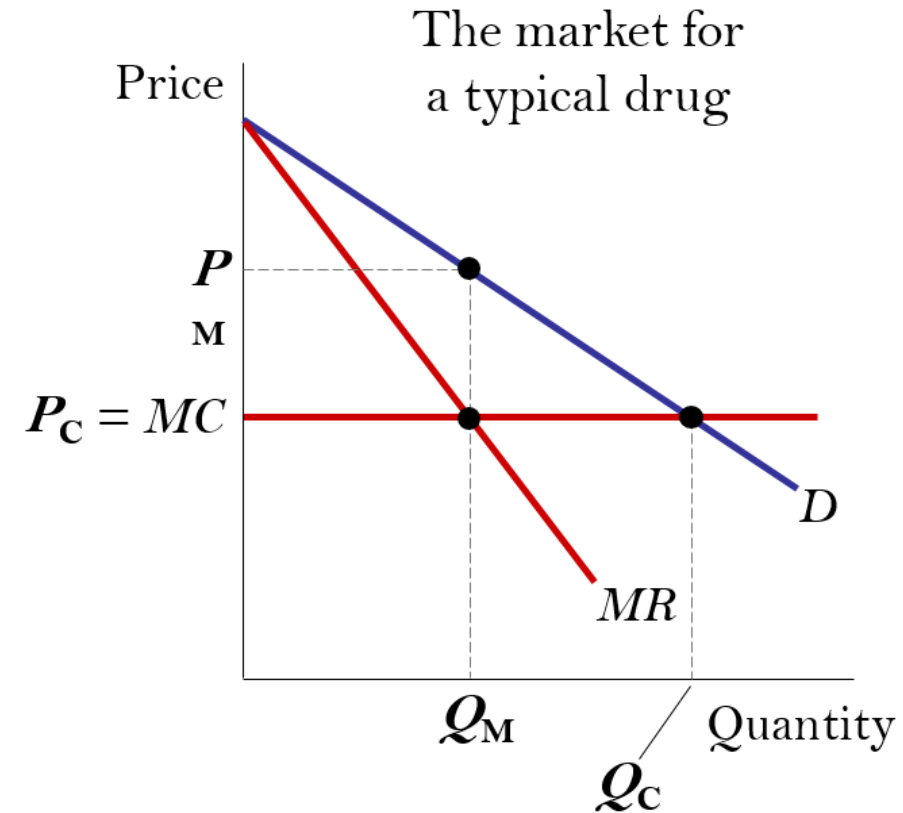
How much should the firm produce and charge?

How much is total profit? Is it maximized?



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

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

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

- Note that the extra revenue from an incremental unit of quantity, $\Delta(PQ)/\Delta Q$, 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 $\Delta P/\Delta Q$, which reduces the revenue from all units sold (i.e., a change in revenue $Q[\Delta P/\Delta Q]$).
- Thus,

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

A Rule of Thumb for Pricing

- $(Q/P)(\Delta P/\Delta Q)$ is the reciprocal of the elasticity of demand, $1/E_d$, measured at the profit-maximizing output, and

$$MR = P + P(1/E_d)$$

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

$$P + P(1/E_d) = MC$$

- which can be rearranged to give us

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

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

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

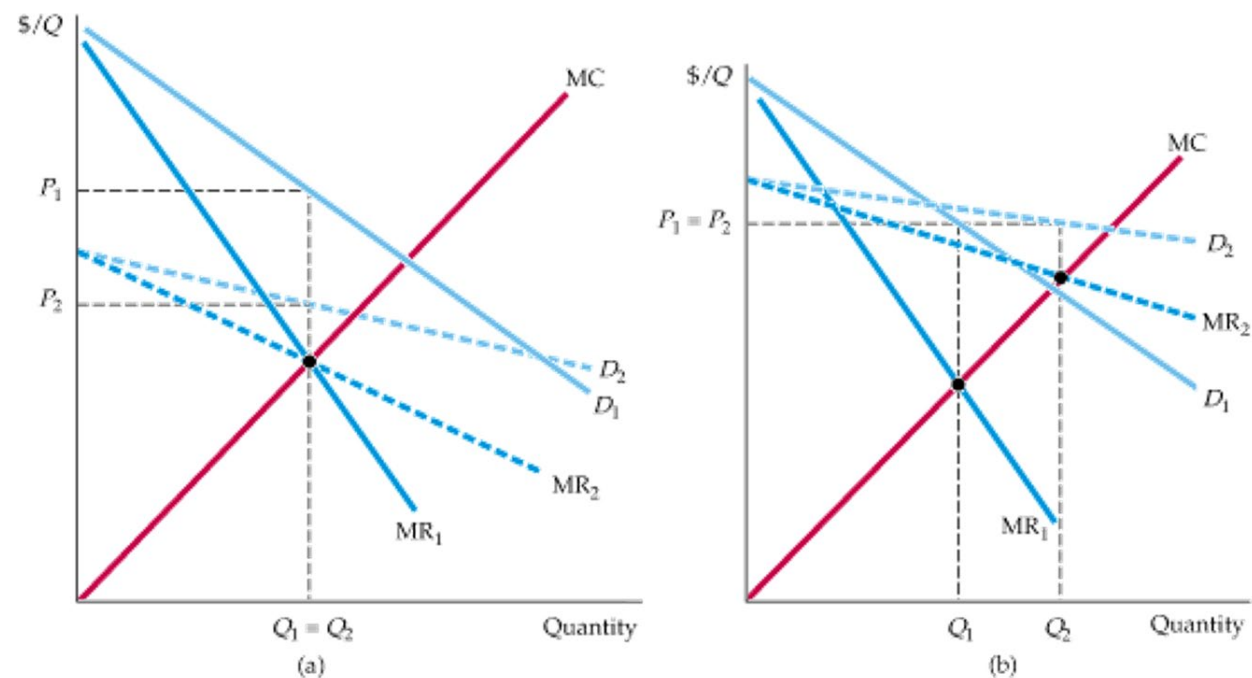
Case Study: Astra-Merck Prices Prilosec

- 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.

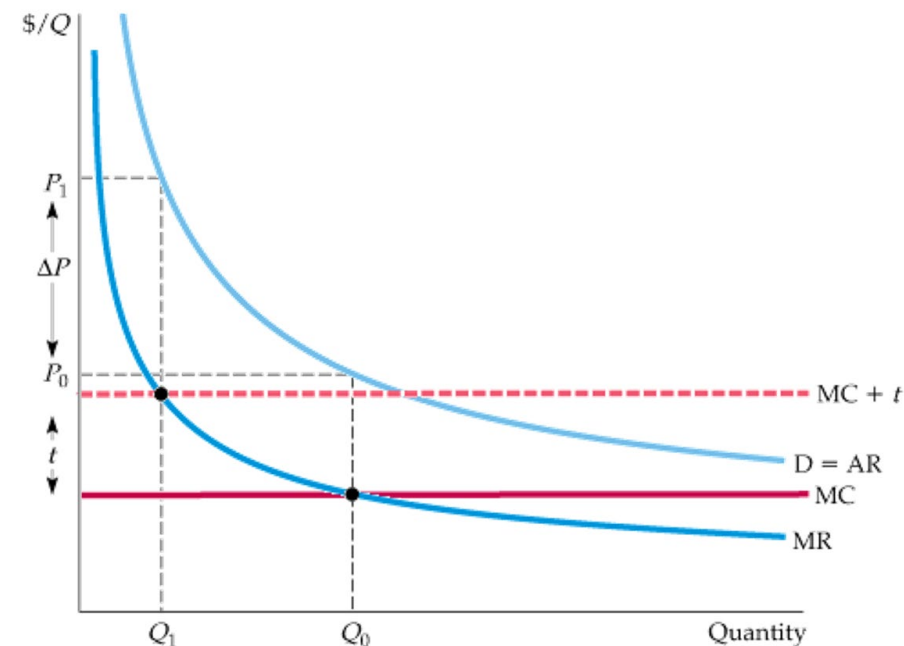


The Effect of a Tax

- 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

$$MR = MC + T$$

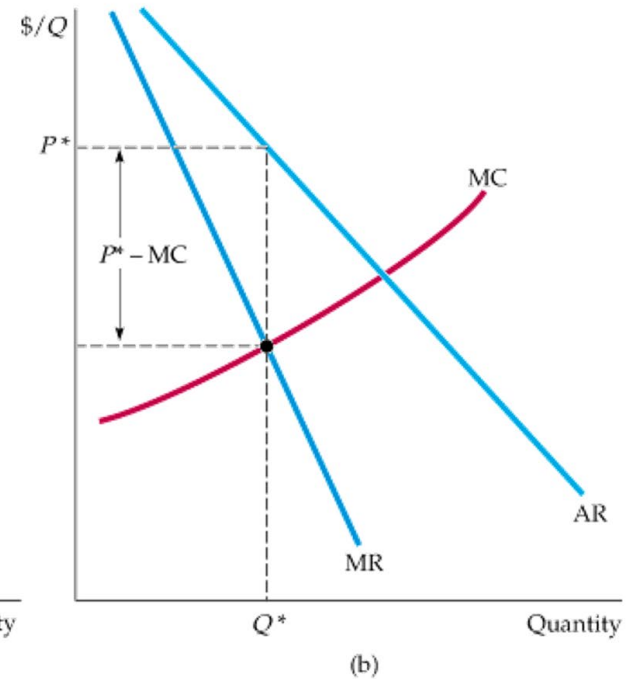
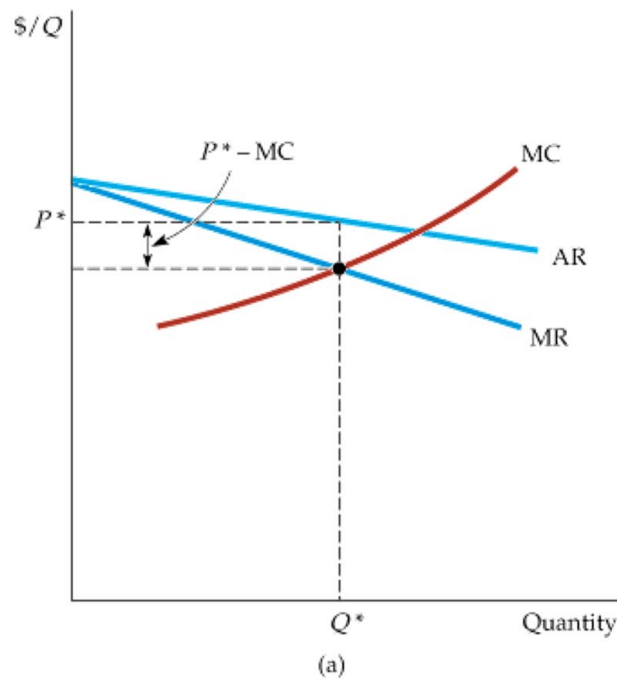
- For figure on the right, how does the tax change price and output? How much is the total tax revenue?



The Welfare Cost of Monopoly

- 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).

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



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.



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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

DWL

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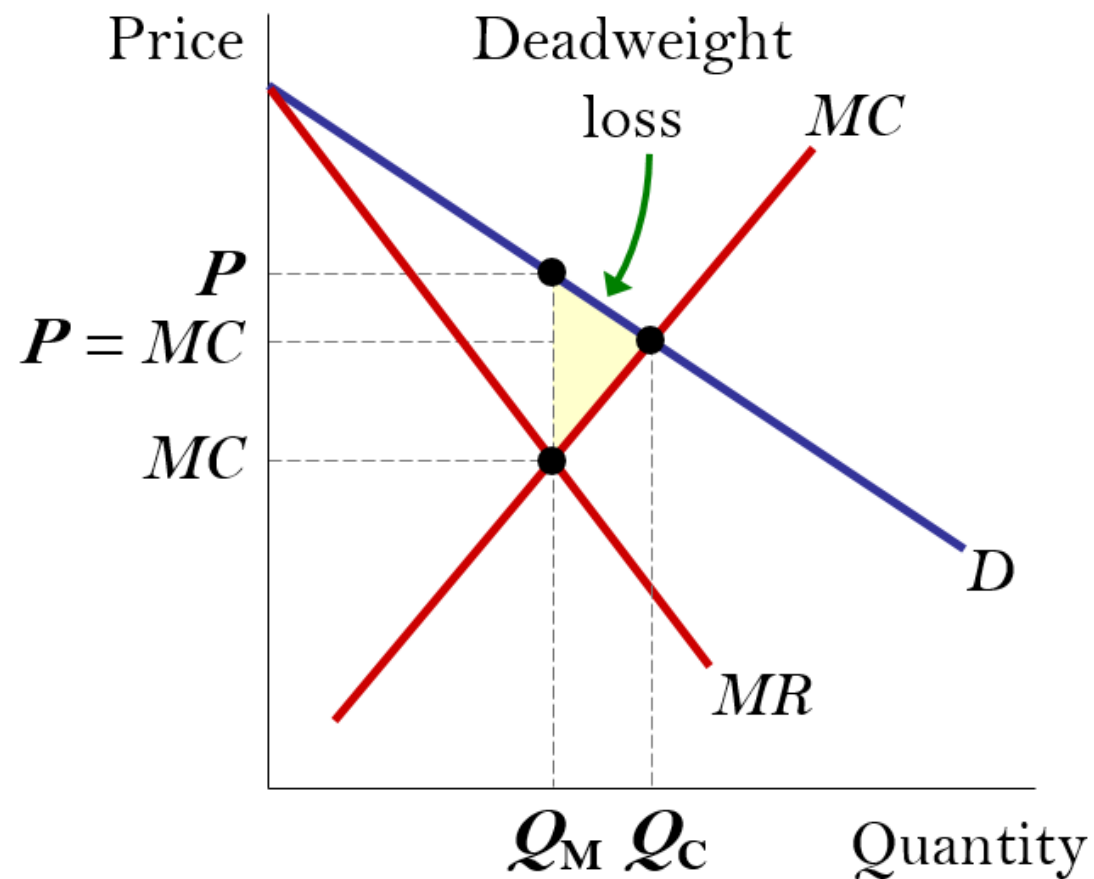
The Welfare Cost of Monopoly

Competitive equilibrium:

- quantity = Q_C
- $P = MC$
- total surplus is maximized

Monopoly equilibrium:

- quantity = Q_M
- $P > MC$
- deadweight loss



Price Regulation

If left alone, a monopolist produces Q_m and charges P_m .

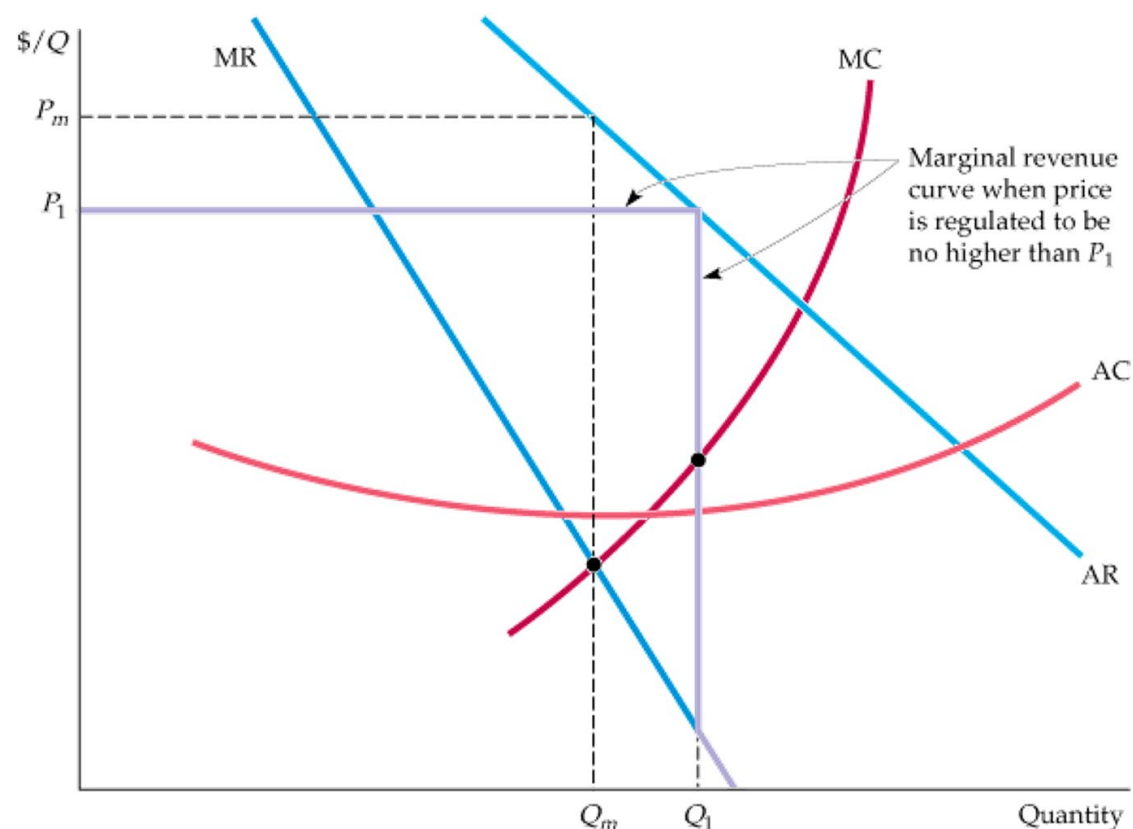
When the government imposes a price ceiling of P_1 the firm's average and marginal revenue are constant and equal to P_1 for output levels up to Q_1 .

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 Q_1 .

Is DWL lower than no regulation?

Should government continue lower price?

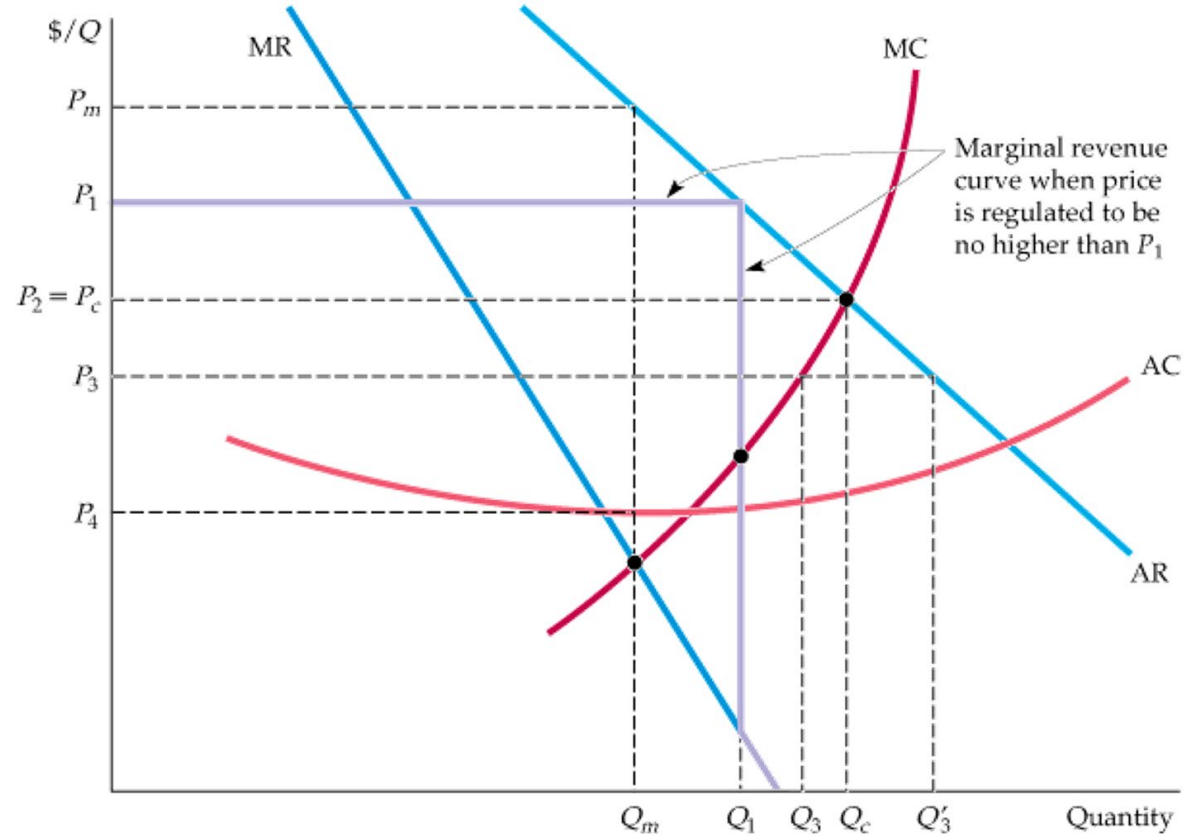


Price Regulation

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

Lowering price further, to P_3 , reduces output to Q_3 and causes a shortage, $Q'_3 - Q_3$.

What will firm do if P is lower than P_4 ?



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?



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End