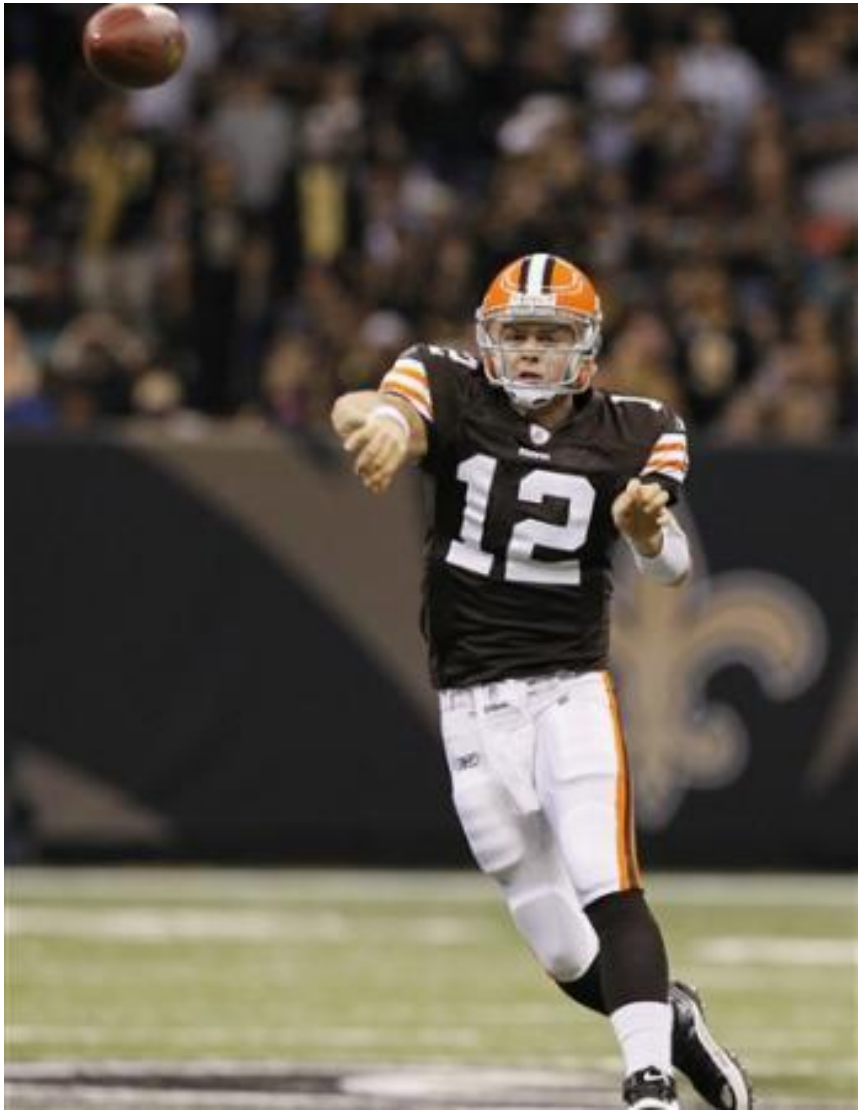
Chapter 15
Monopoly



Monopoly and Market Power

A monopoly has the following characteristics:

- one seller of a product.
- its product does not have close substitutes.
- the firm is a **price setter**.

Why Monopolies Arise

- The basic reason for monopoly is barriers to entry. There are three sources of these barriers.

1. A single firm owns a key resource that no other firm can access or has a close substitute for.
   In reality, this is rare because firms are big and international in scope.

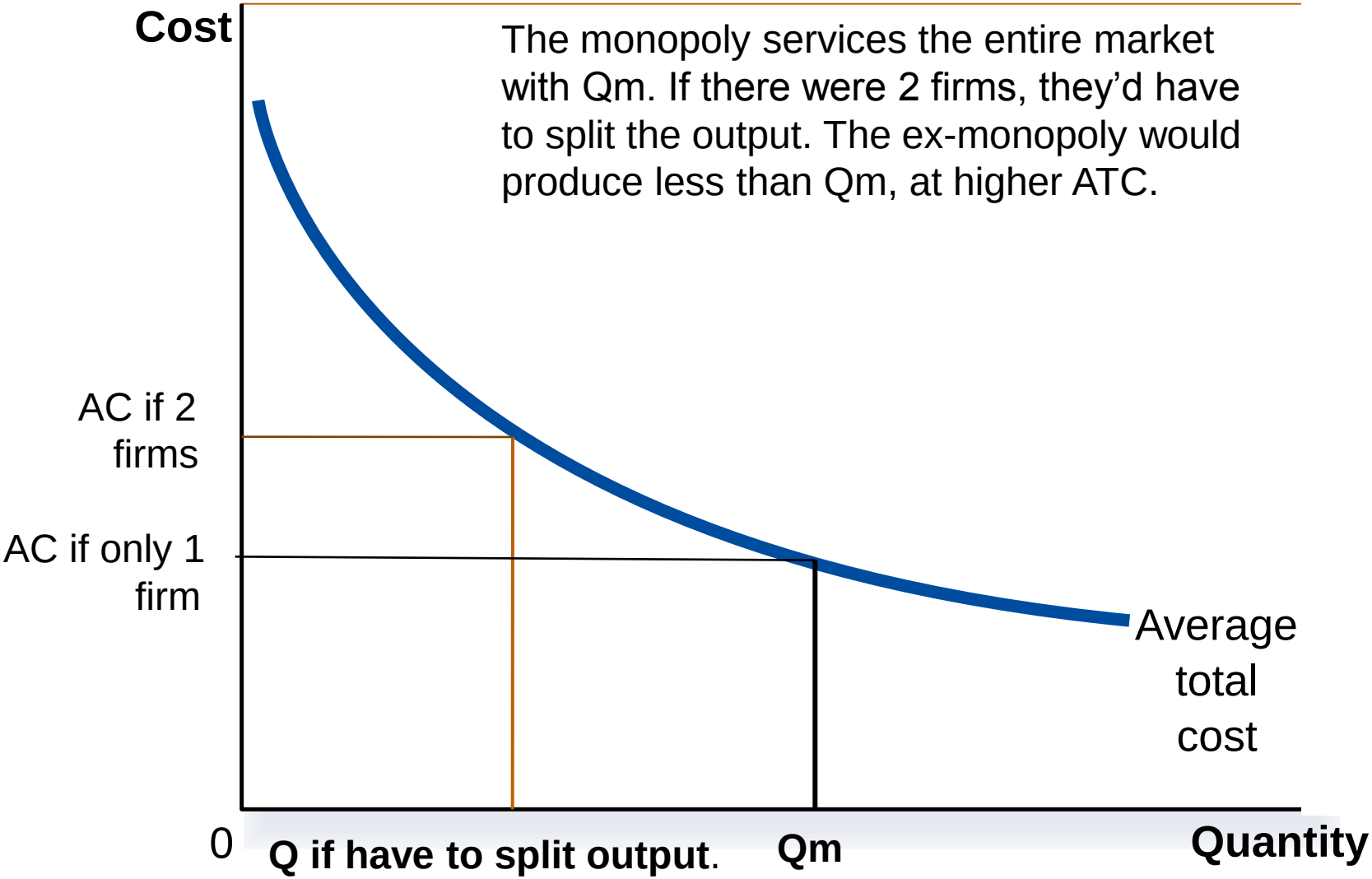
2. The government gives one firm the exclusive right to produce and sell some good.
   - Patents and copyrights are an example.
   - Can give a firm sole rights to sell in a particular market (eg., cable companies).

3. An industry is a natural monopoly when a single firm can supply a good or service to an entire market at a lower cost than could two or more firms.

- A natural monopoly arises when there are economies of scale over the relevant range of output.

- The firm operates on the downward sloping part of its average total cost curve.

Economies of Scale as a Cause of Natural Monopoly



If D increased significantly over time, may need more firms & the market would evolve from monopoly to more competitive.

Monopoly P & Q Decision

- Recall that a perfectly competitive firm is a price taker and faces a horizontal D curve.

- A monopoly is the only seller and has to service the entire market.
  - Its demand curve *is* the market demand curve.
  - So, the monopoly faces a downward sloping demand curve.

- The same revenue relationships hold for a monopoly:

- Total Revenue

$$P \times Q = TR$$

- Average Revenue

$$TR/Q = AR = P$$

- Marginal Revenue

$$\Delta TR/\Delta Q = MR$$

- Because the monopolist's demand curve is downward sloping, if the firm wants to increase the Q sold, it has to lower its P.
- Therefore, it gets less revenue for each additional good it sells. So,

MR is always lower than P

- The profit-maximizing monopolist will always choose to produce a level of output Q such that

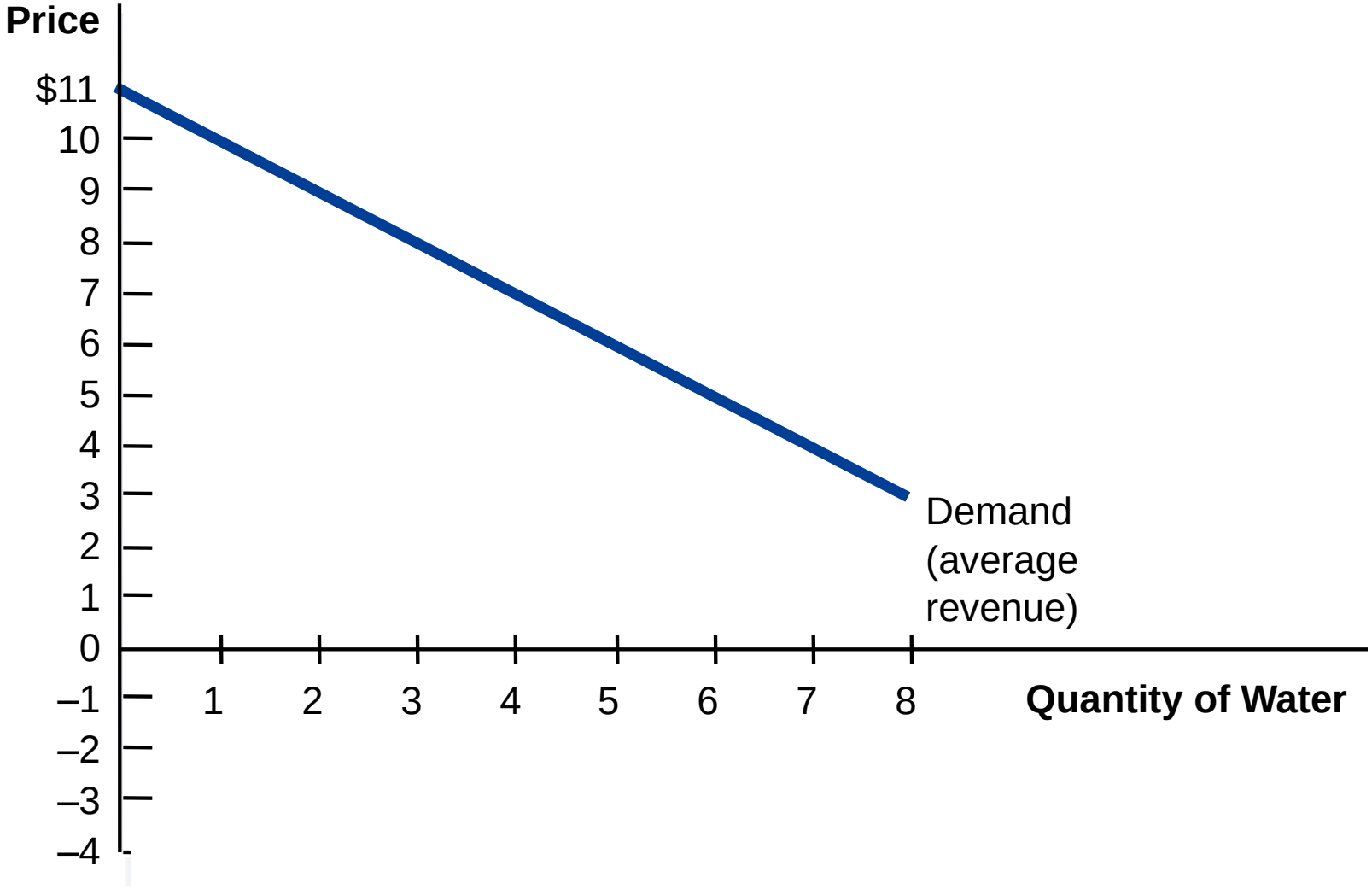
$$\mathbf{MR = MC < P}$$

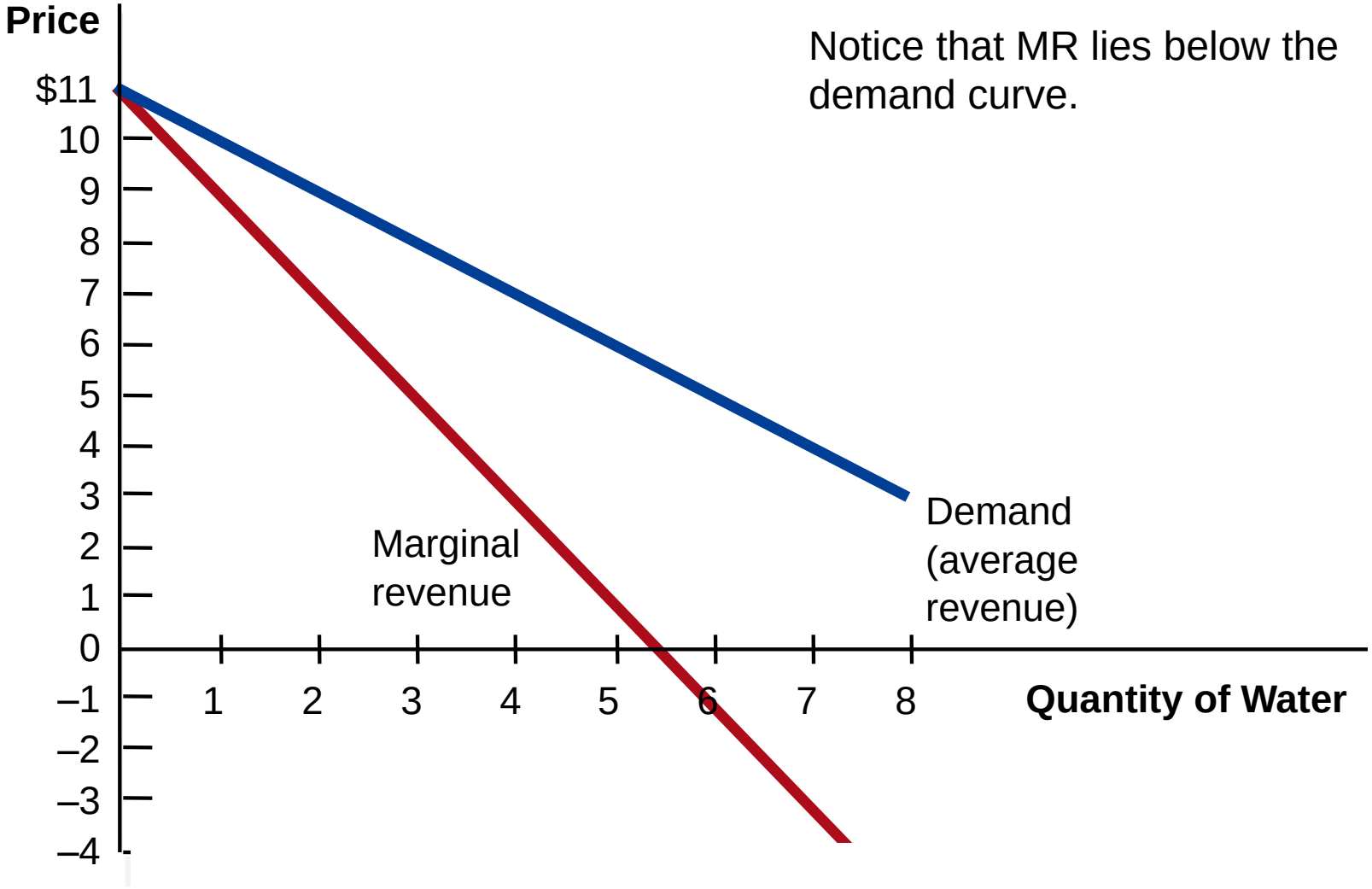
- Example:
- GB Water Company is the only producer of spring water in a small town (it owns the only well).
- GB faces the following demand schedule:

GB Water Company: TR, AR and MR

Quantity of Water (Q)	Price (P)	Total Revenue ($TR = P \times Q$)	Average Revenue ($AR = TR/Q$)	Marginal Revenue ($MR = \Delta TR/\Delta Q$)
0 litres	$11	$ 0	—	
				$10
1	10	10	$10	
				8
2	9	18	9	
				6
3	8	24	8	
				4
4	7	28	7	
				2
5	6	30	6	
				0
6	5	30	5	
				−2
7	4	28	4	
				−4
8	3	24	3	

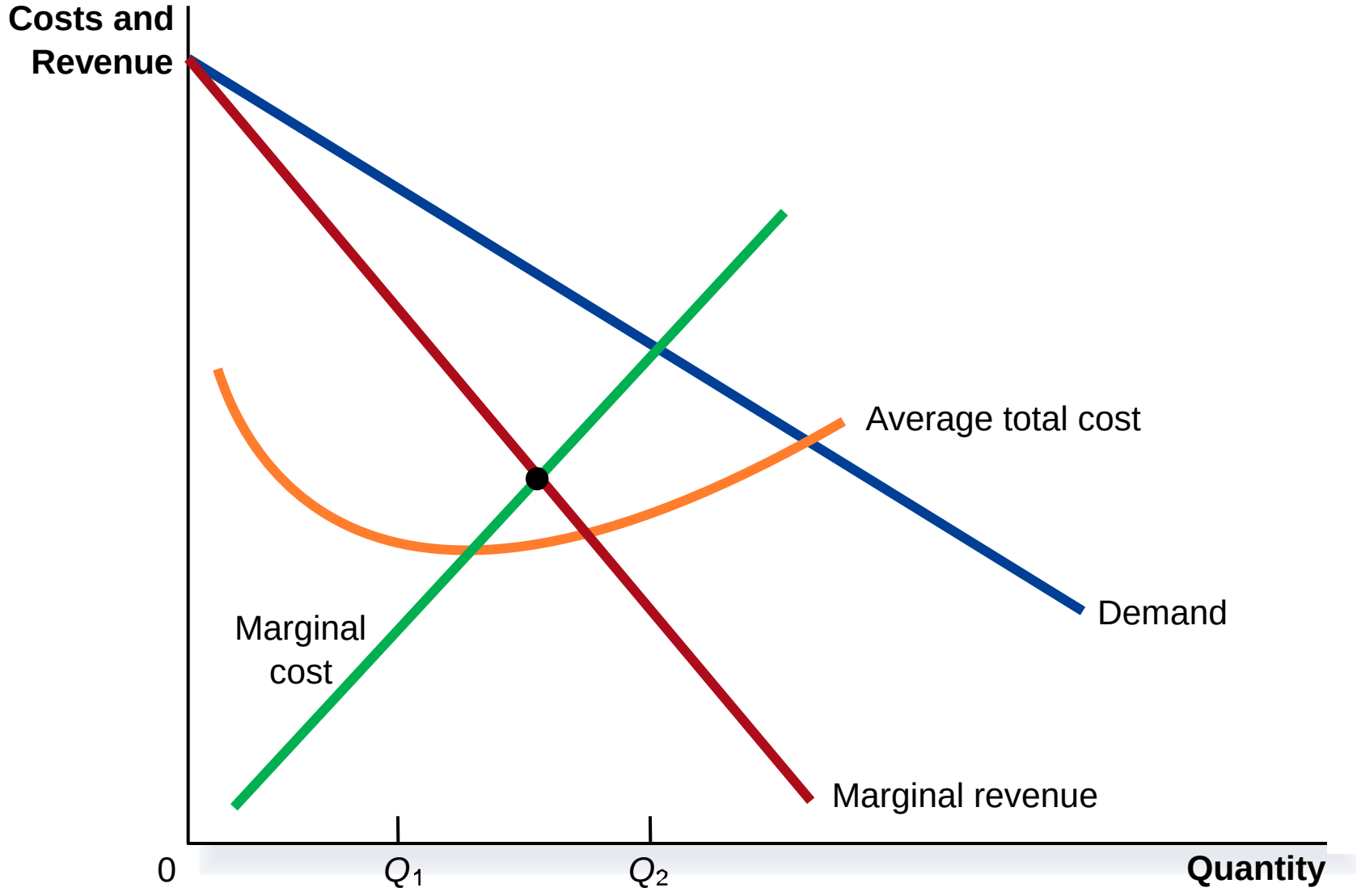
GB's Demand and Marginal Revenue Curves

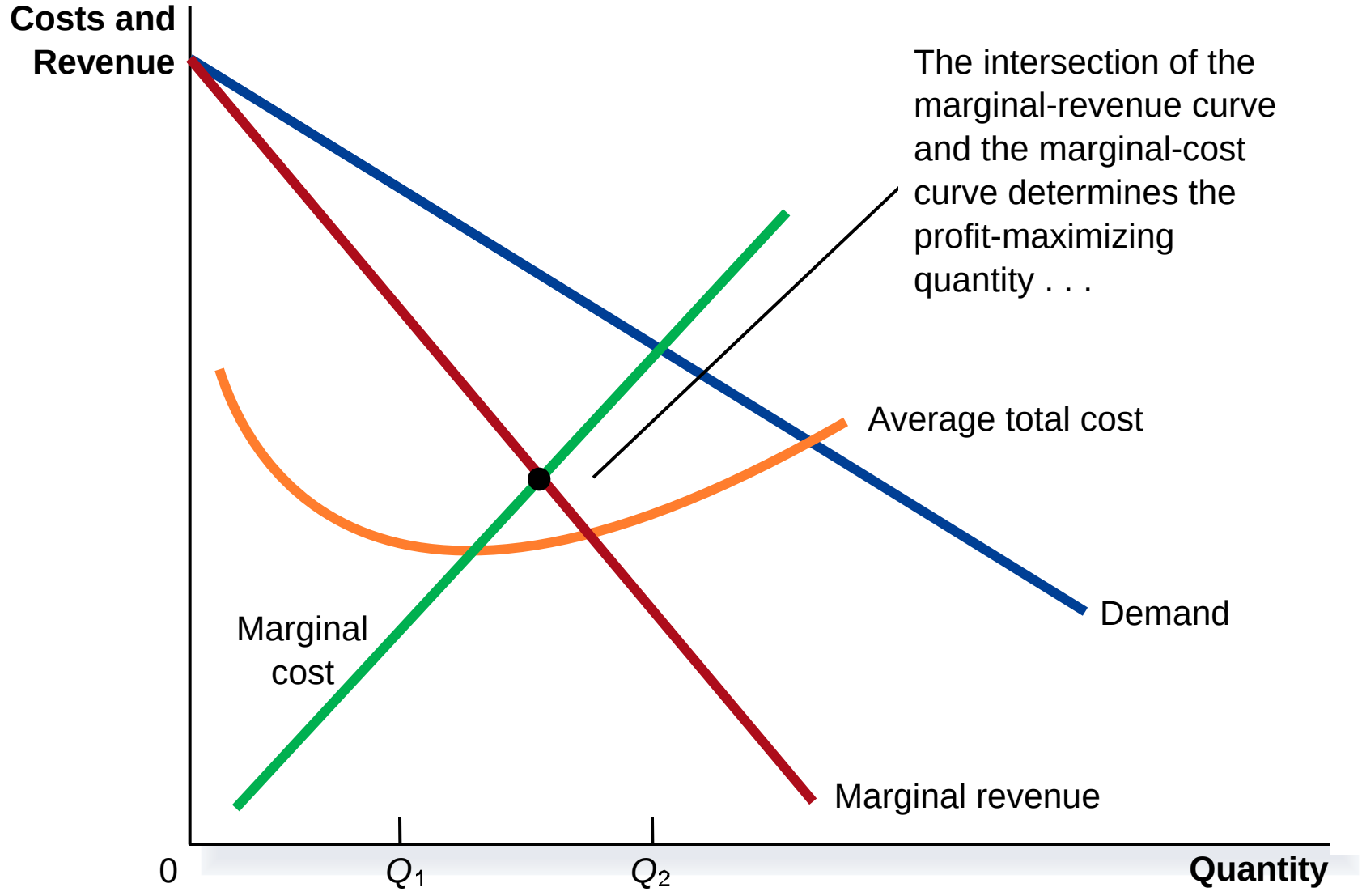


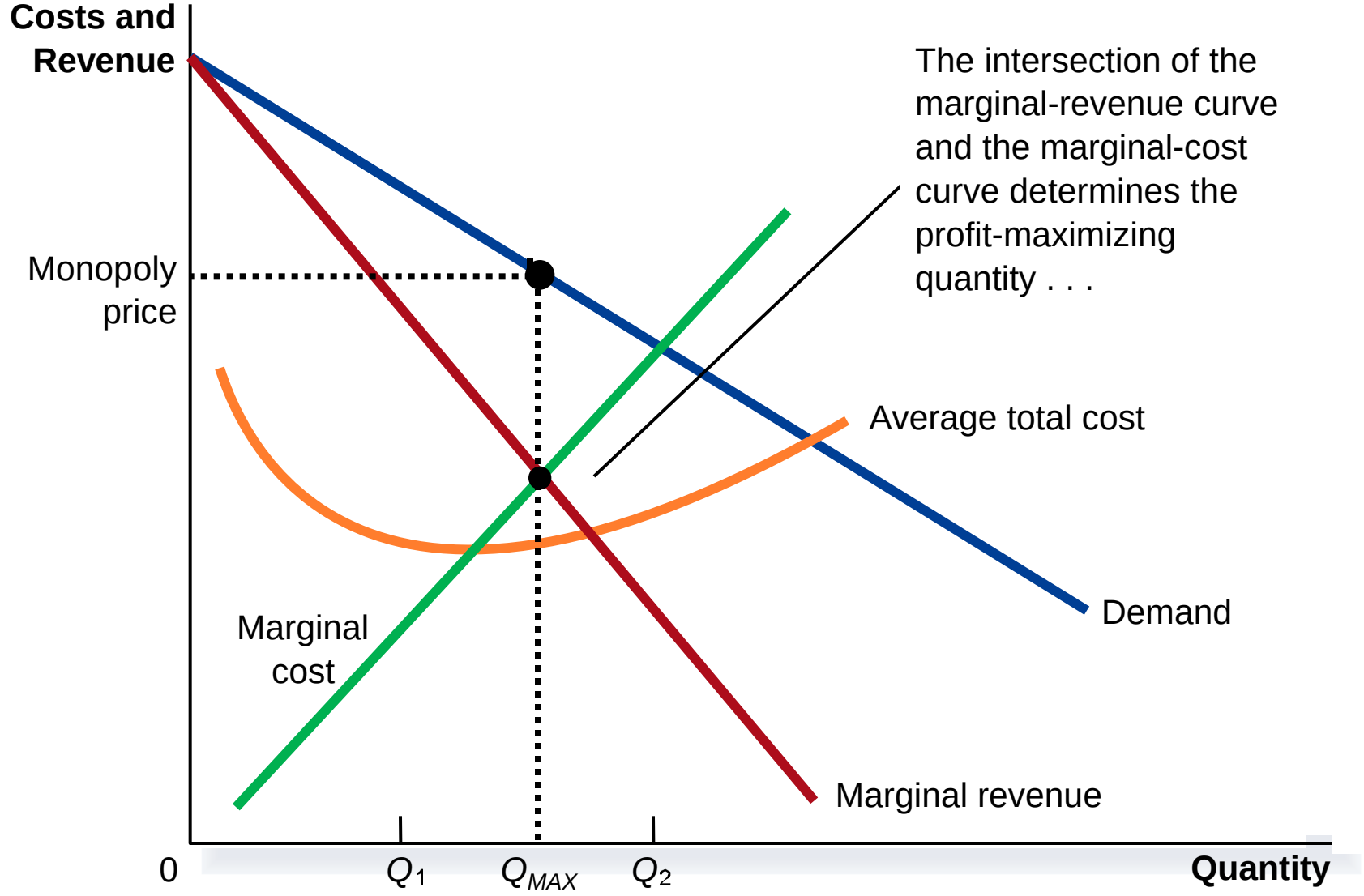

Price
$11
10
9
8
7
6
5
4
3
2
1
0
–1
–2
–3
–4
1
2
3
4
5
6
7
8
Quantity of Water
Notice that MR lies below the demand curve.
Demand (average revenue)
Marginal revenue

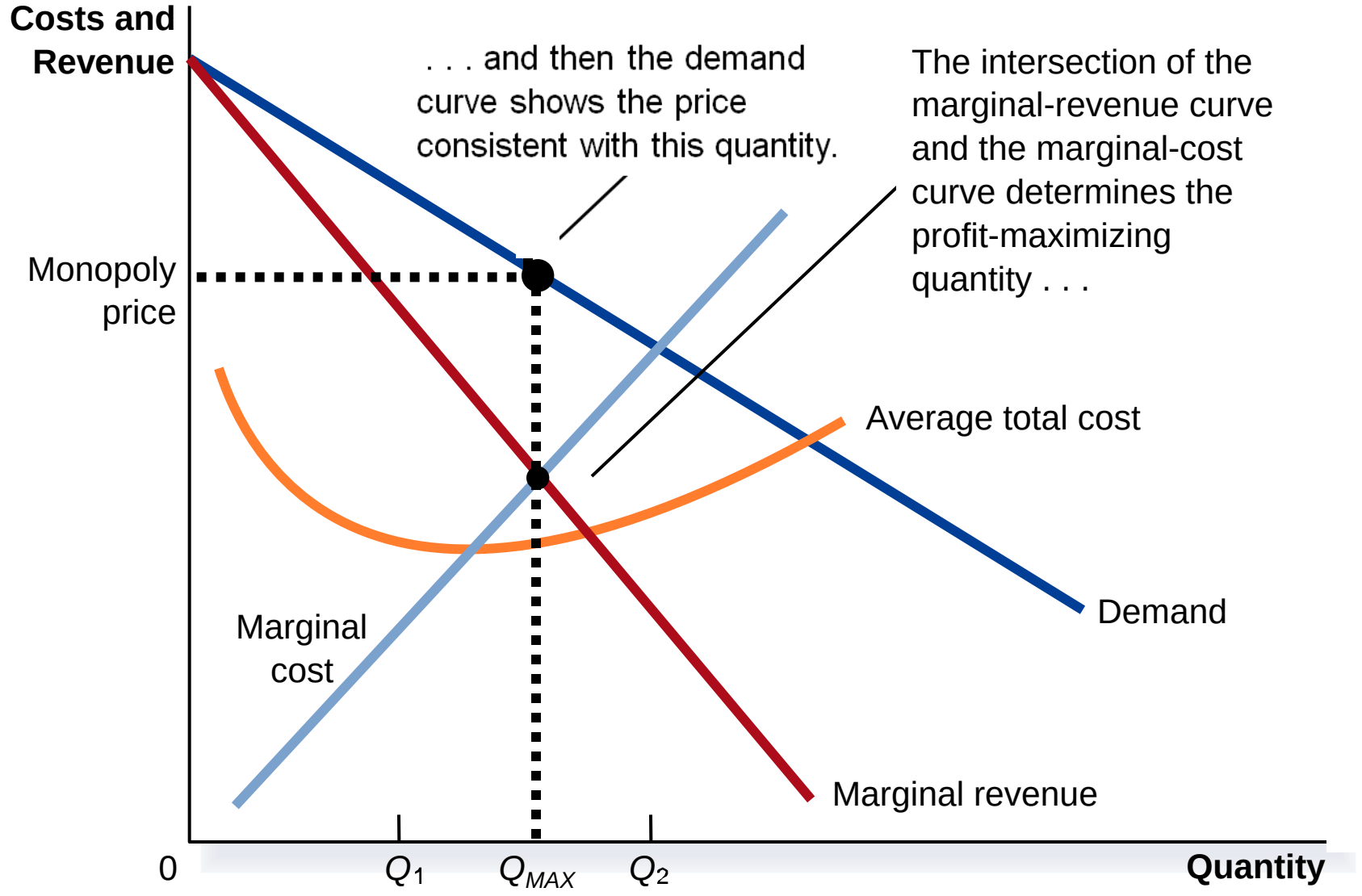
- A monopoly maximizes profit by producing Q where MR = MC.
- It then uses the demand curve to find the price that will induce consumers to buy that quantity.

Profit Maximization for a Monopoly



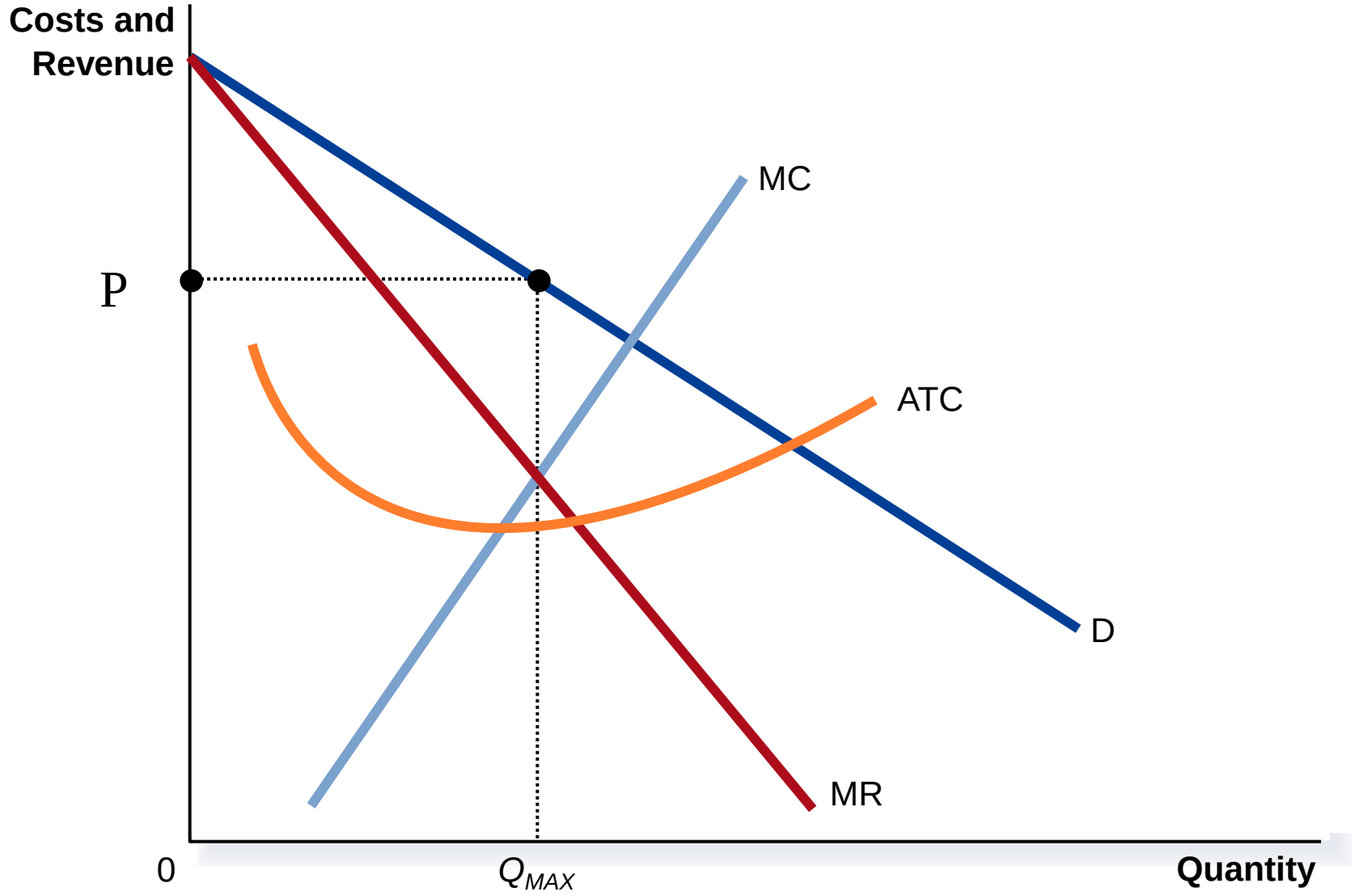

Costs and Revenue
The intersection of the marginal-revenue curve and the marginal-cost curve determines the profit-maximizing quantity . . .
Average total cost
Demand
Marginal cost
Marginal revenue
0
Q_1
Q_2
Quantity

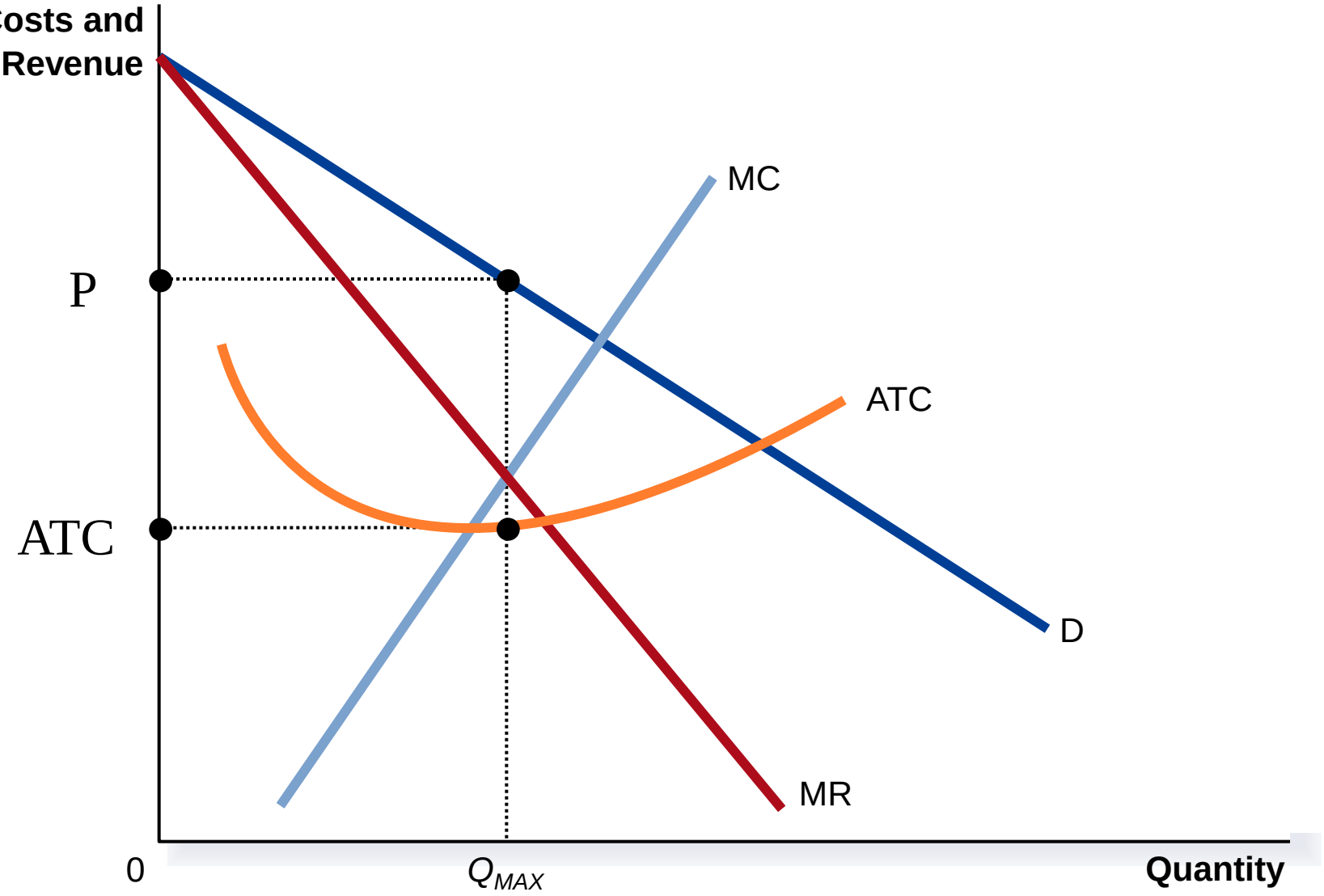

Costs and Revenue
Monopoly price
The intersection of the marginal-revenue curve and the marginal-cost curve determines the profit-maximizing quantity . . .
Average total cost
Demand
Marginal cost
Marginal revenue
0
Q_1
Q_{MAX}
Q_2
Quantity

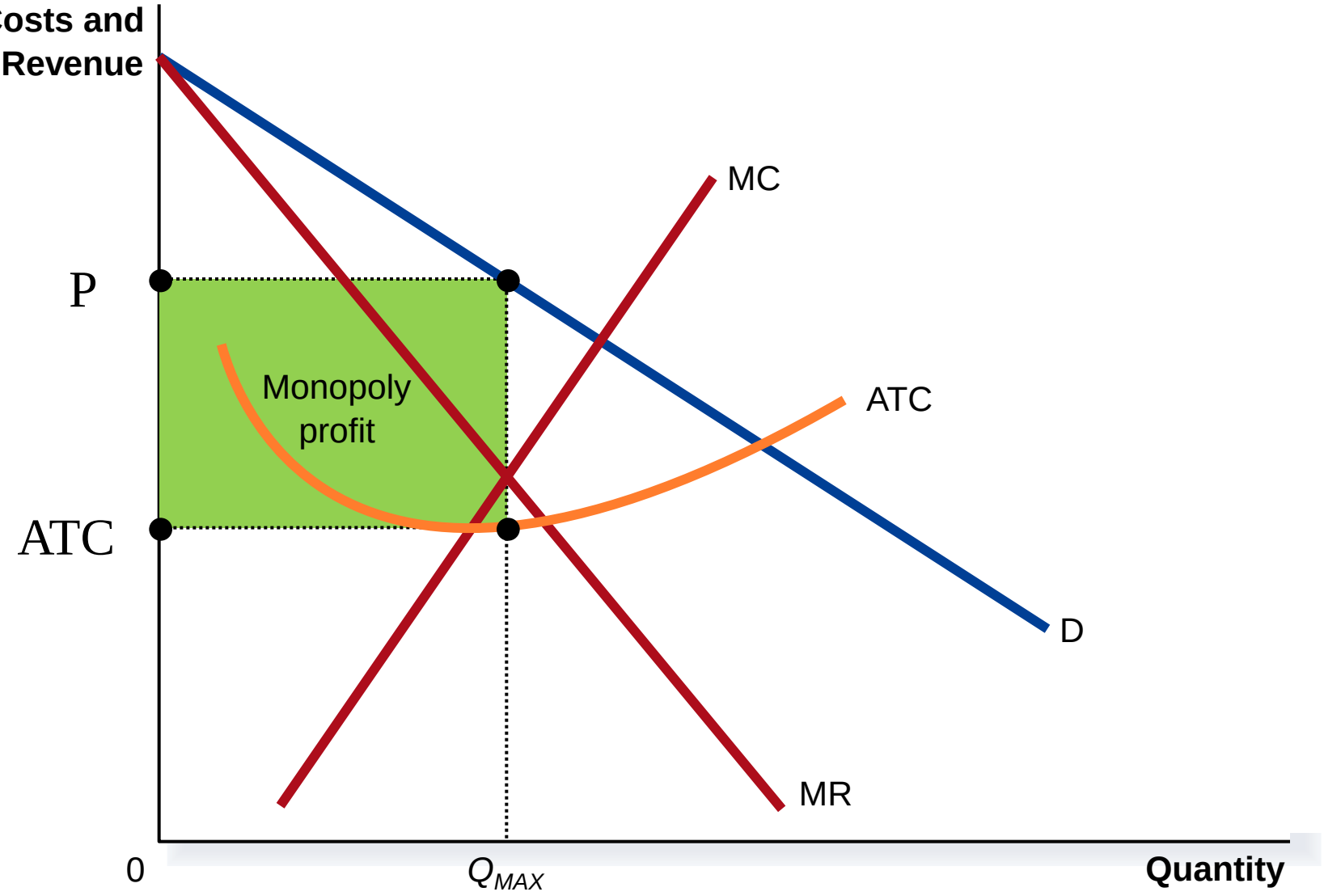

Costs and Revenue
. . . and then the demand curve shows the price consistent with this quantity.
The intersection of the marginal-revenue curve and the marginal-cost curve determines the profit-maximizing quantity . . .
Monopoly price
Average total cost
Demand
Marginal cost
Marginal revenue
0
Q_1
Q_{MAX}
Q_2
Quantity

- Monopoly profit is derived the same way as perfect competition profit (or any firm's profit)
- $\Pi = TR - TC$ so
- $\Pi = (P - ATC)*Q$

The Monopolist's Profit



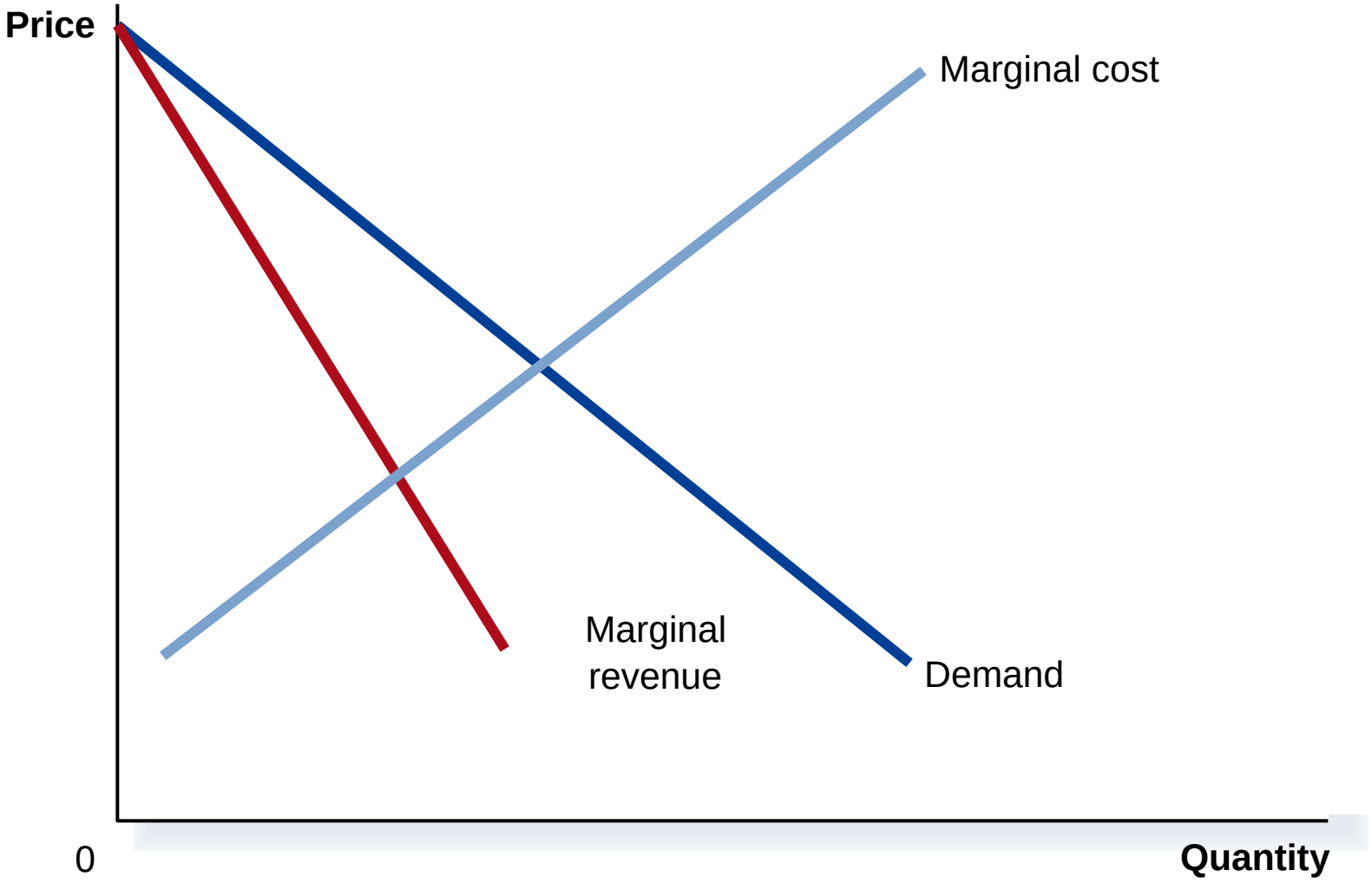

Costs and Revenue
MC
P
ATC
ATC
D
MR
0
Q_{MAX}
Quantity


Costs and Revenue
MC
P
Monopoly profit
ATC
ATC
D
MR
0
Q_{MAX}
Quantity

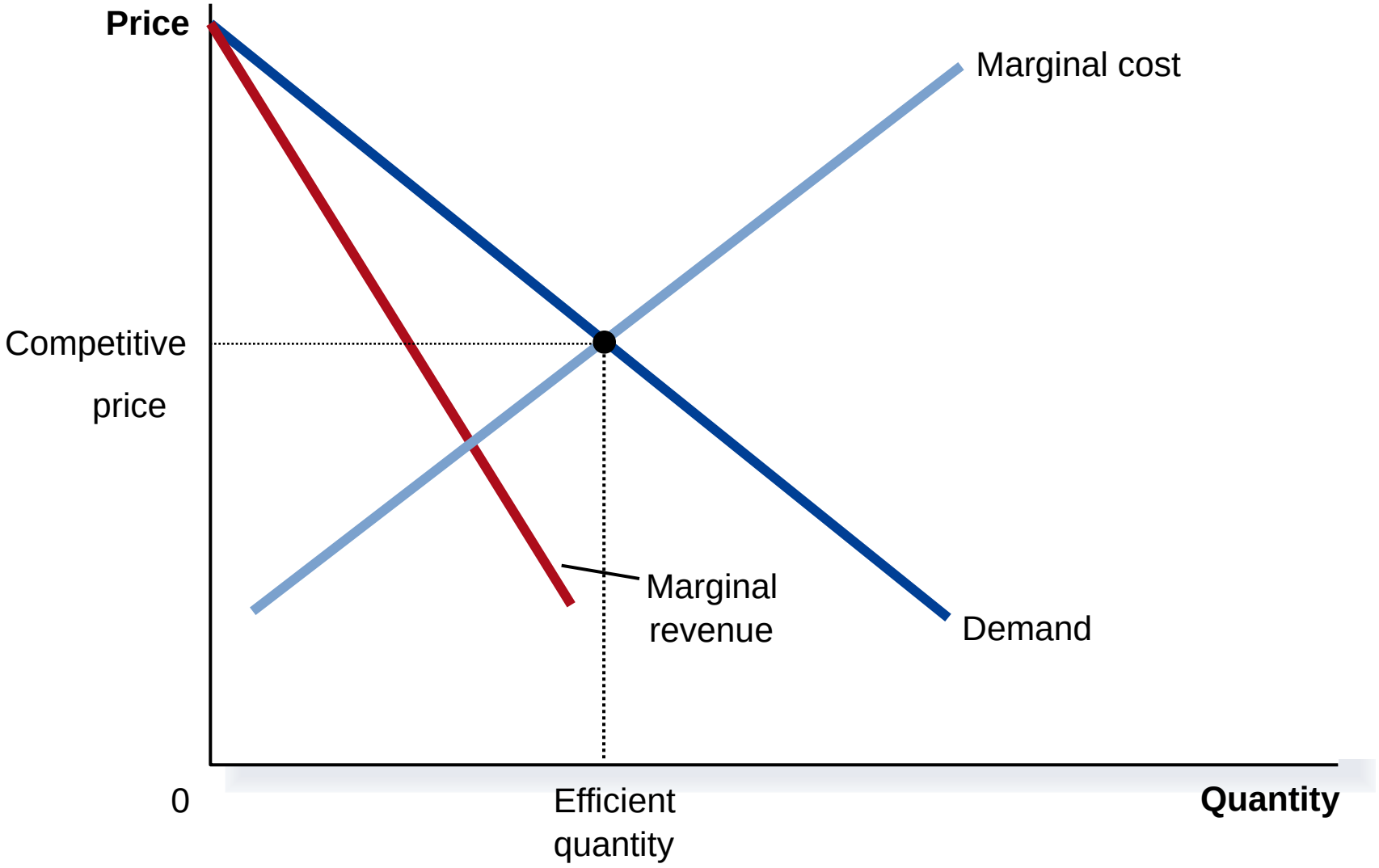
Deadweight Loss Due to Monopoly

- In contrast to a competitive firm, the monopoly charges a P > MC.
- From the standpoint of consumers, this high price makes monopoly undesirable.
- However, from the standpoint of the owners of the firm, the high price makes monopoly very desirable.

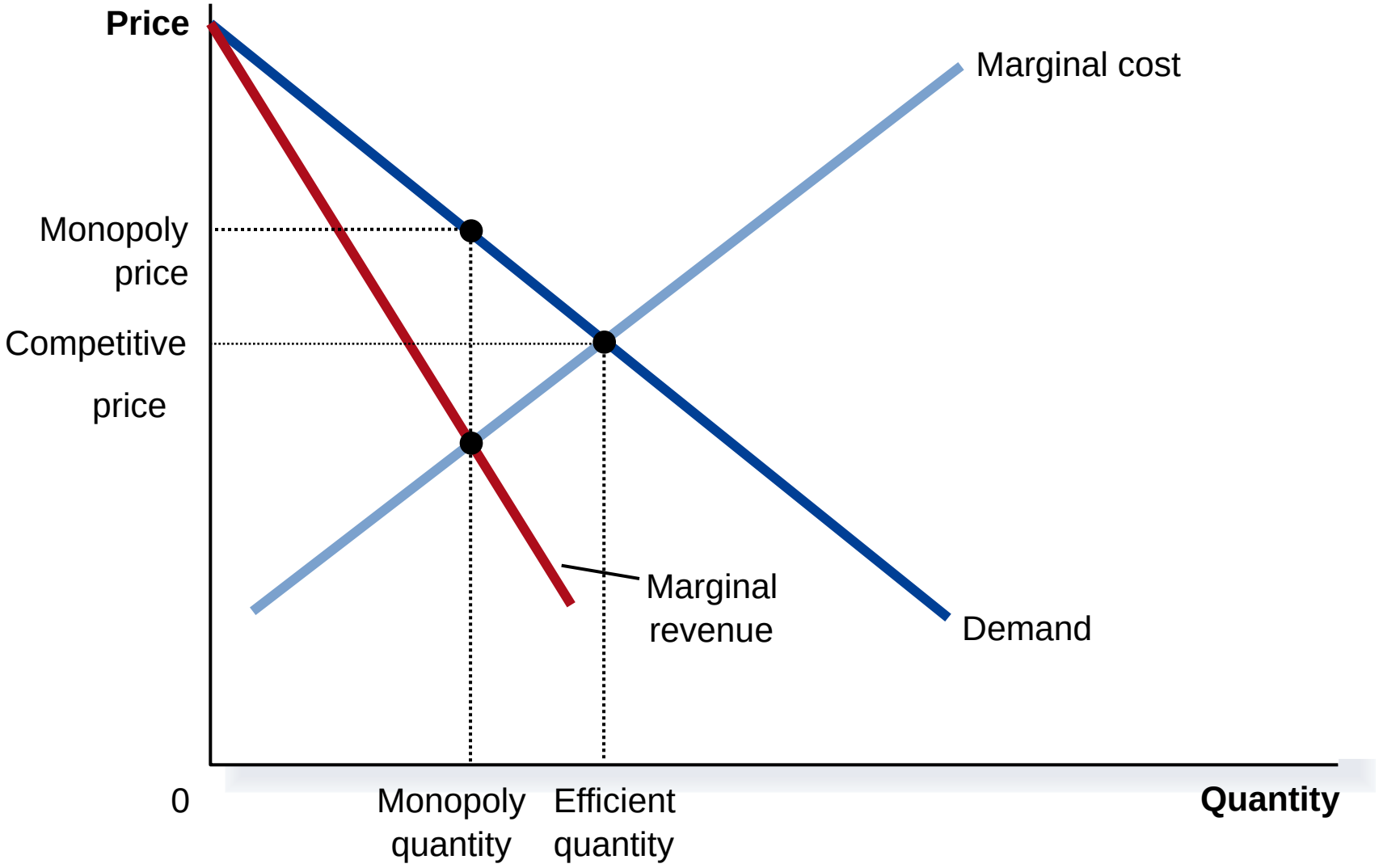
Monopoly Versus Competition



In Perfect Competition, P = MC



In Monopoly, P > MC



The Inefficiency of Monopoly

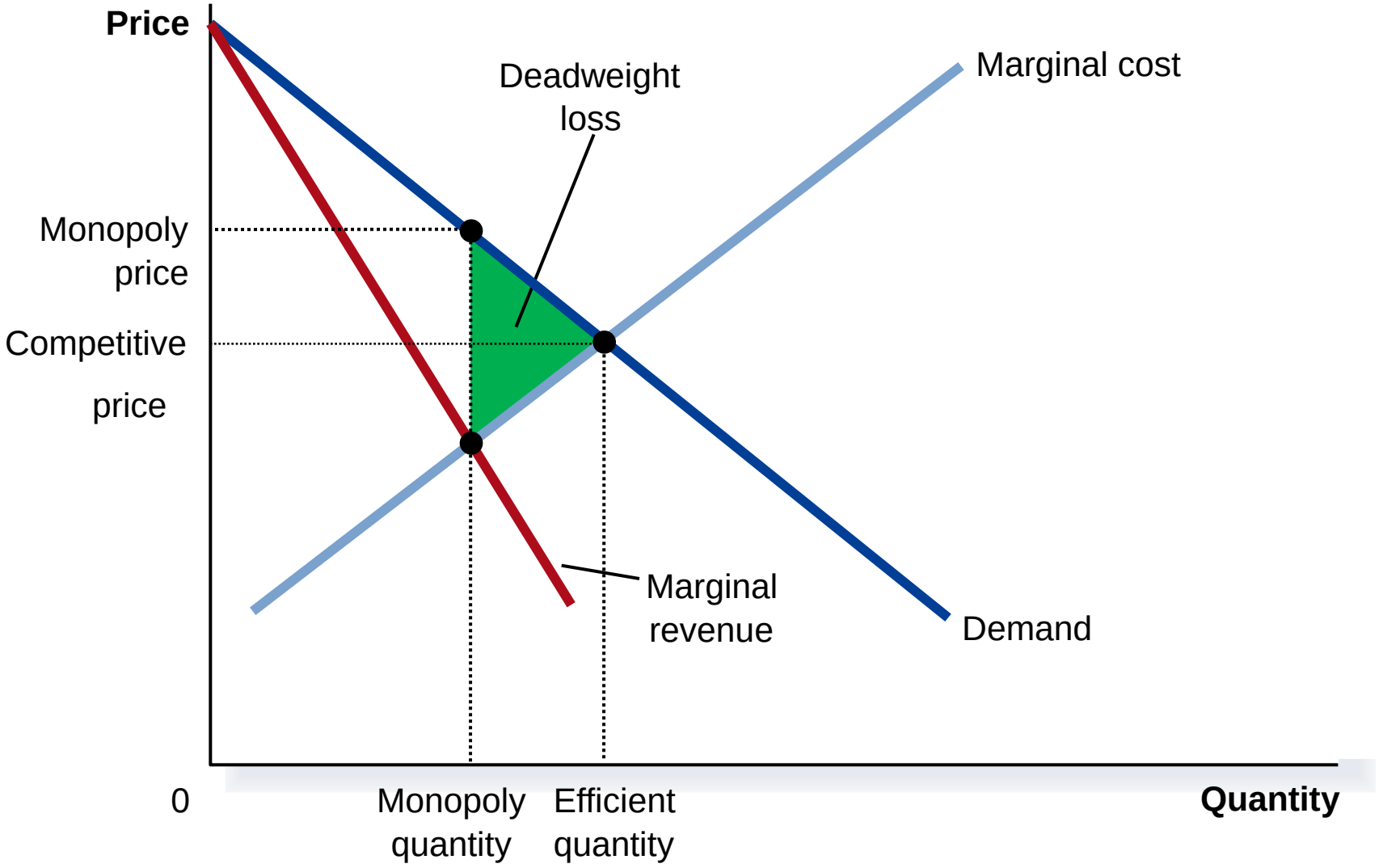
- We know a competitive equilibrium maximizes CS and PS, i.e., society's welfare is maximized.
- It sells where P = MC.
- The competitive outcome is the socially efficient level, Q.
- The monopolist produces less than the socially efficient quantity of output and charges a higher price for it.
- This means there will be a loss in total surplus in the market.

- Comparing perfect competition to monopoly:

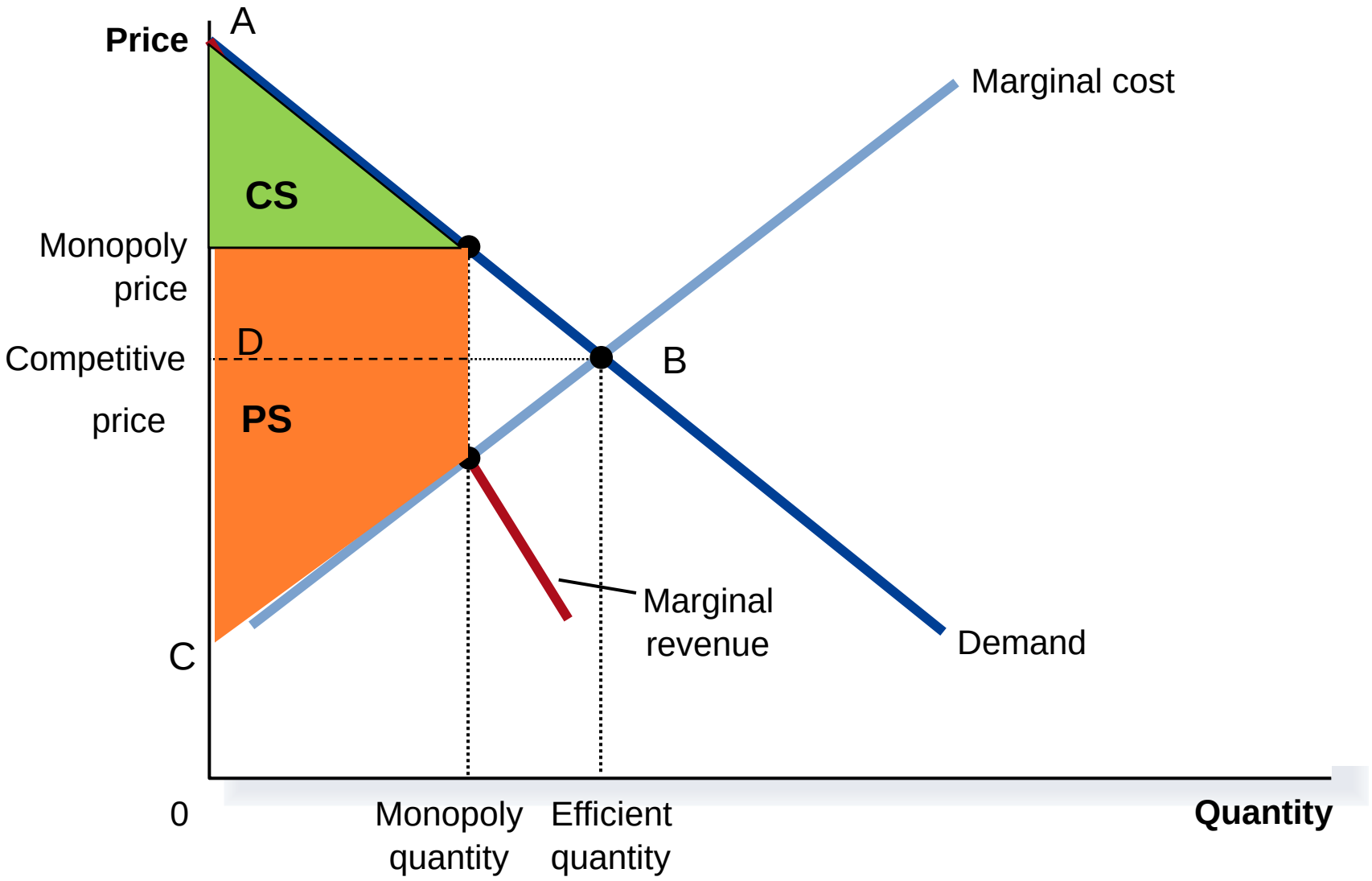
$$Q_m < Q_{pc}$$
$$P_m > P_{pc}$$

- The deadweight loss caused by a monopoly is similar to the deadweight loss caused by a tax.
- The difference between the two cases is that the government gets the revenue from a tax, whereas a private firm gets the monopoly profit.

Deadweight Loss Due to Monopoly



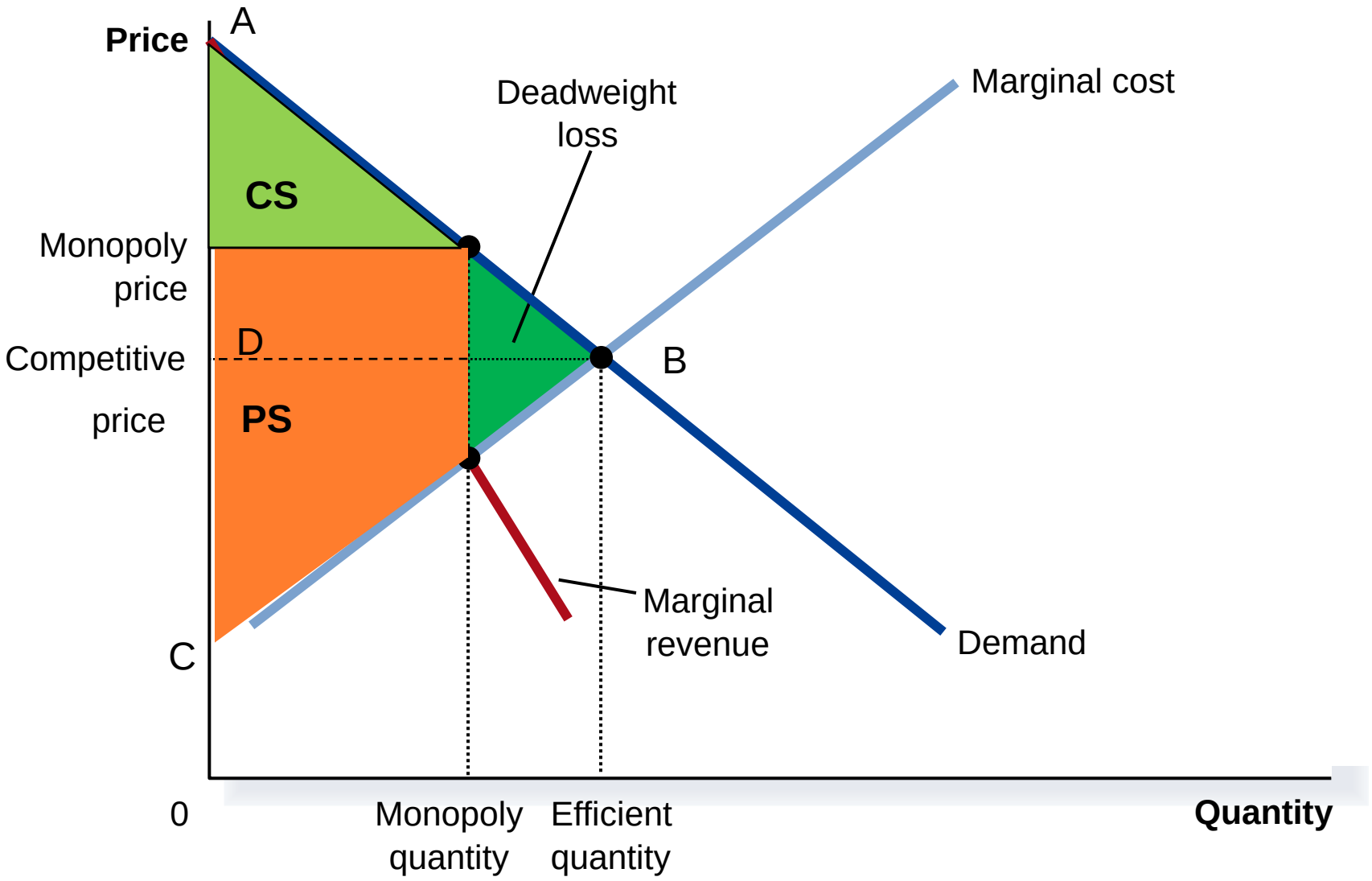
CS and PS in Monopoly



- If this were a competitive market,
  CS = △ABD and PS = △BCD
  Total surplus would be maximized.

- In a monopoly, CS is now the smaller GREEN△ and PS is the ORANGE trapezoid.
  Consumers lose surplus, the monopoly appropriates some surplus from consumers and some surplus no one gets (the DWL).

DWL due to Monopoly



Numerical Example

Suppose we are given the following information about a monopoly market:

Demand: $P = 50 - 3Q$

$MR = 50 - 6Q$

$MC = 8 + Q$

$ATC = 20$

What are the monopoly's profits?

Monopoly produces where MR = MC

$$50 - 6Q = 8 + Q$$

$$42 = 7Q$$

$$Q = 6$$

To get P, substitute Q = 6 into the demand equation:

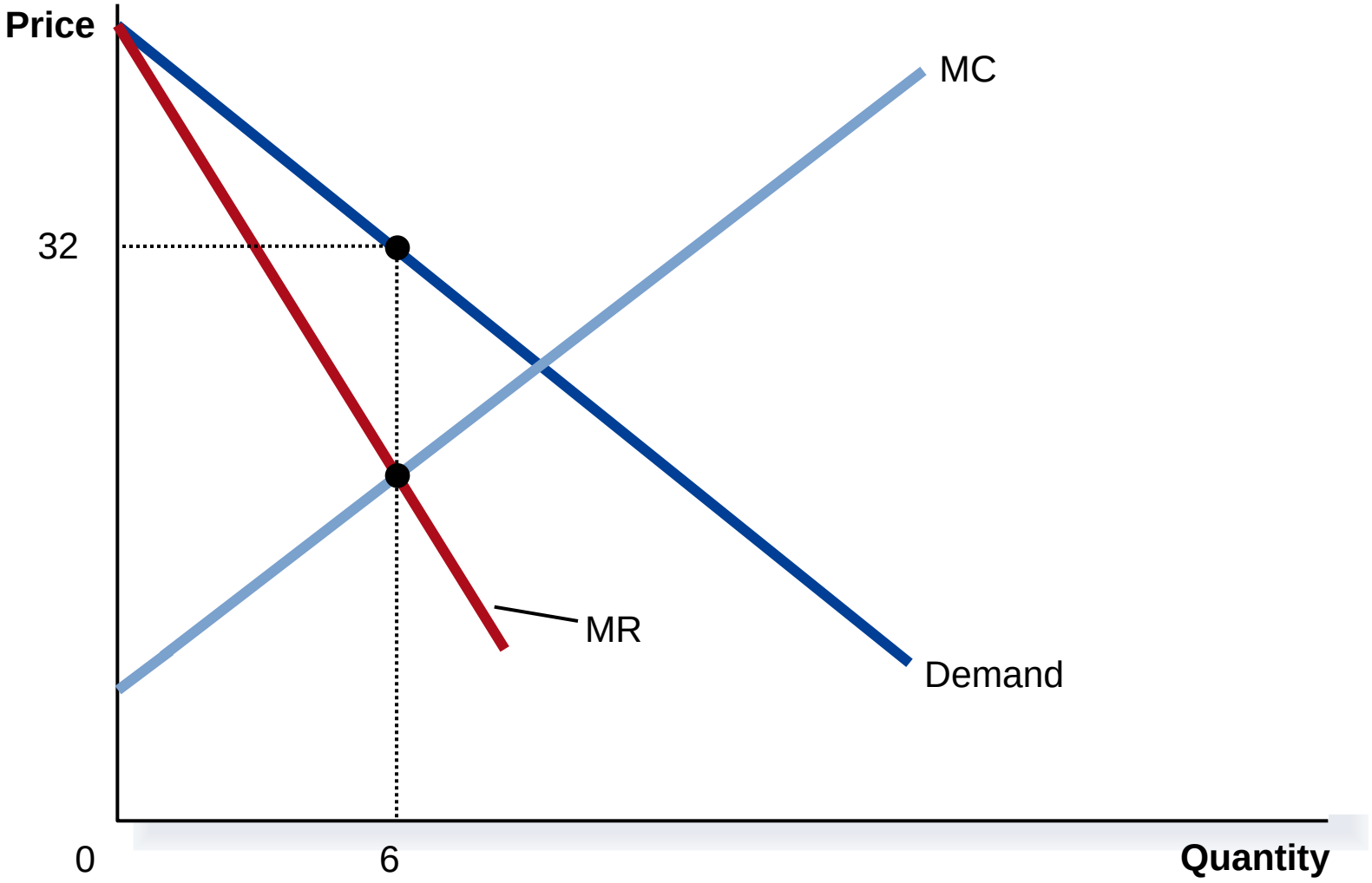
$$P = 50 - 3(6)$$
$$P = 50 - 18$$
$$P = 32$$

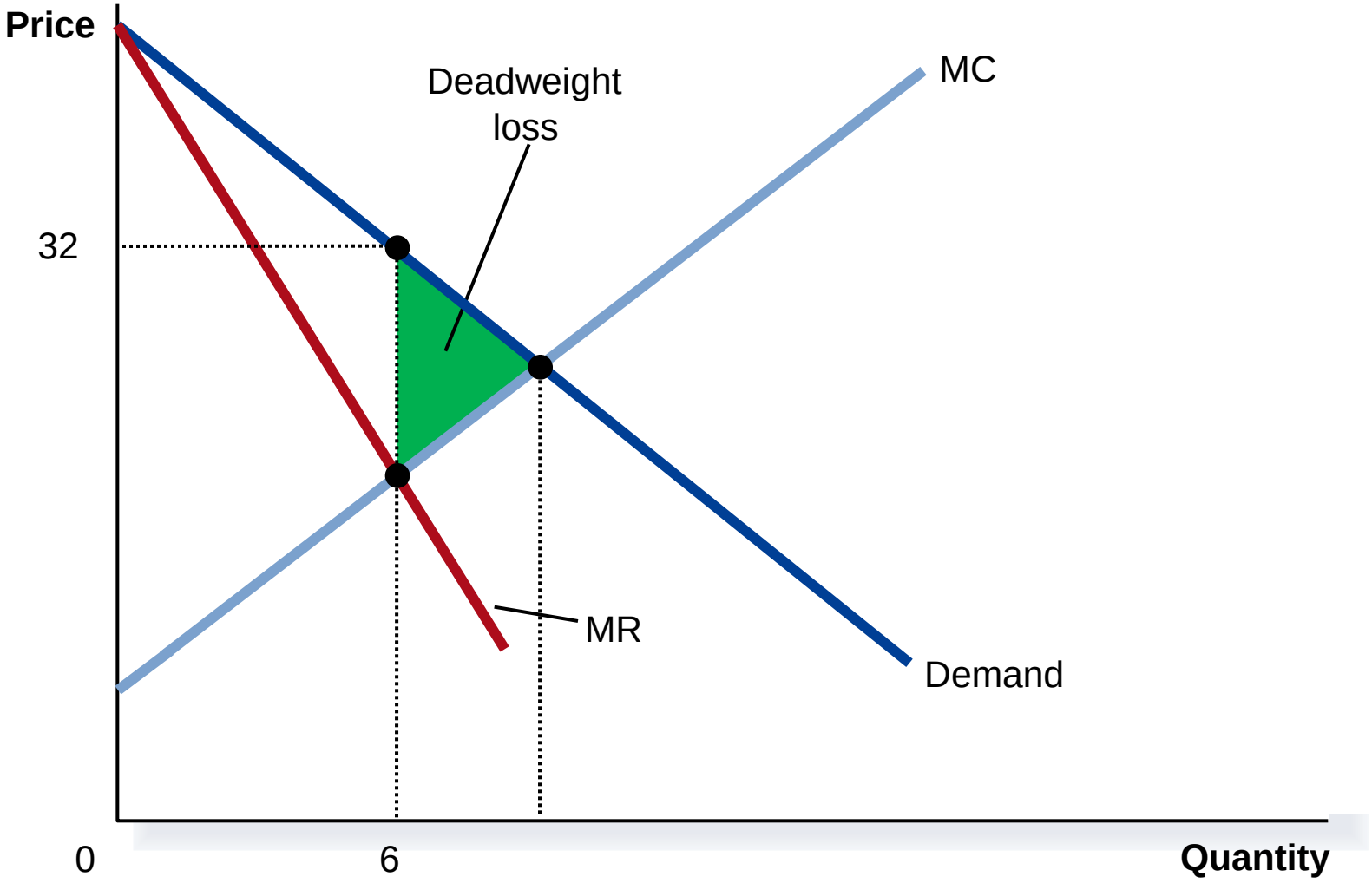
$$\Pi = (P - ATC)Q$$
$$= (32 - 20)6$$
$$= \$72$$

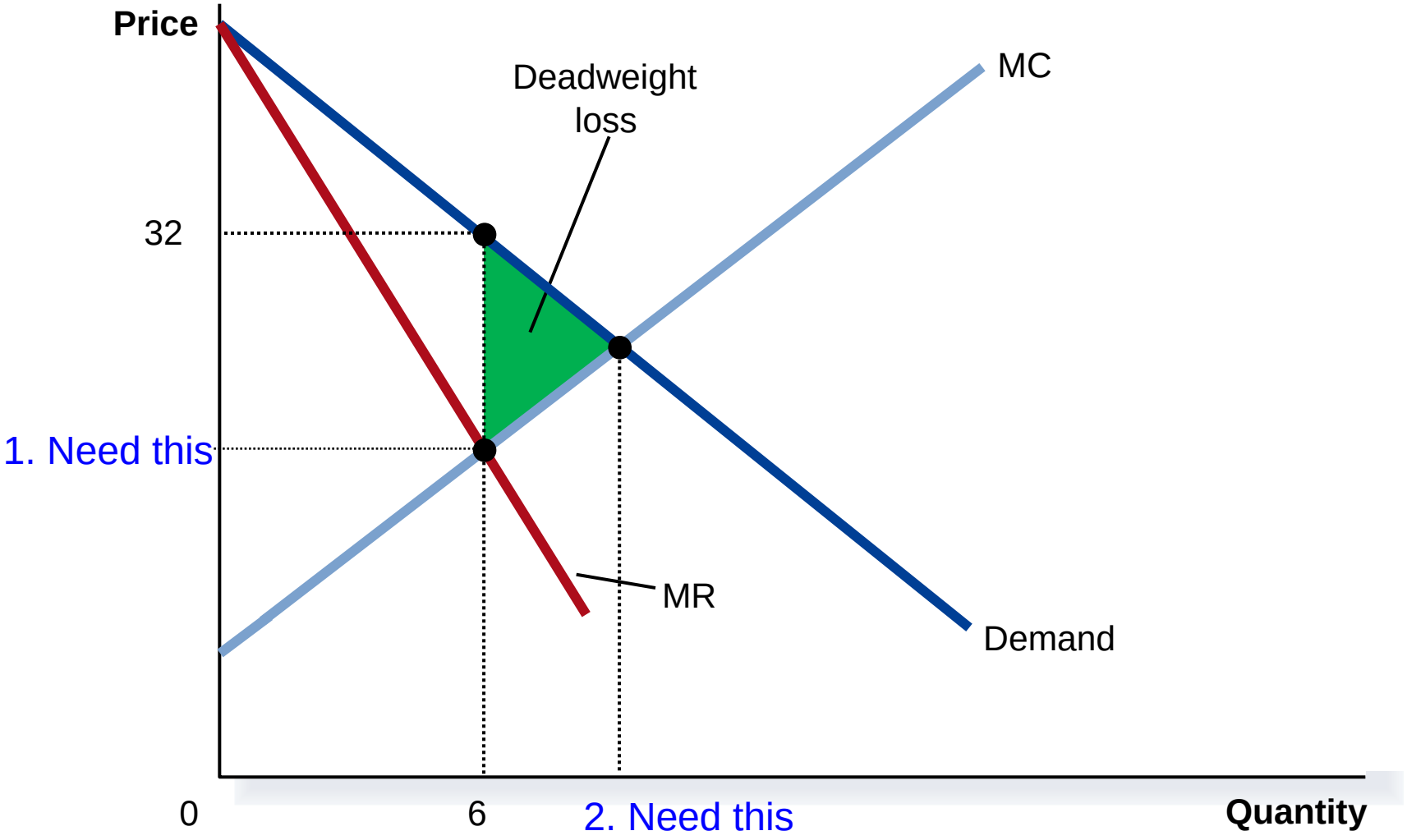
What is the DWL due to monopoly?

- This will be easier if we graph the situation first:

Numerical Example




Price
Deadweight
loss
MC
32
MR
Demand
0
6
Quantity


Price
Deadweight
loss
MC
32
1. Need this
MR
Demand
0
6
2. Need this
Quantity

- For #1, at Q = 6,

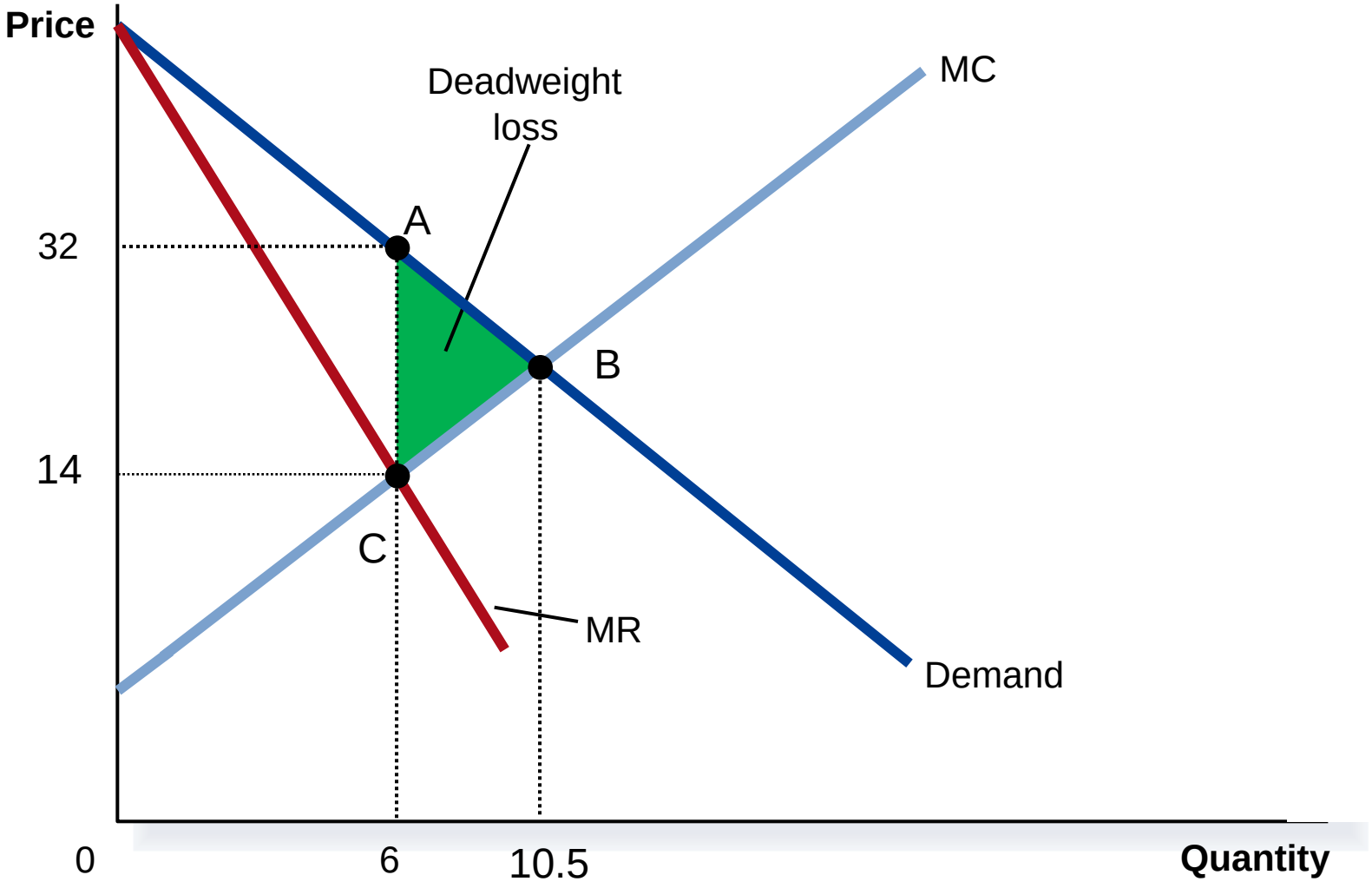
  $MC = 8 + 6 = 14$

- For #2, set MC = D

  $8 + Q = 50 - 3Q$

  $4Q = 42$

  $Q = 10.5$


Price
Deadweight
loss
MC
A
32
B
14
C
MR
Demand
0
6
10.5
Quantity

- DWL = area of $\triangle ABC$

  $= \frac{1}{2}(4.5)(18)$

  $= \$40.50$

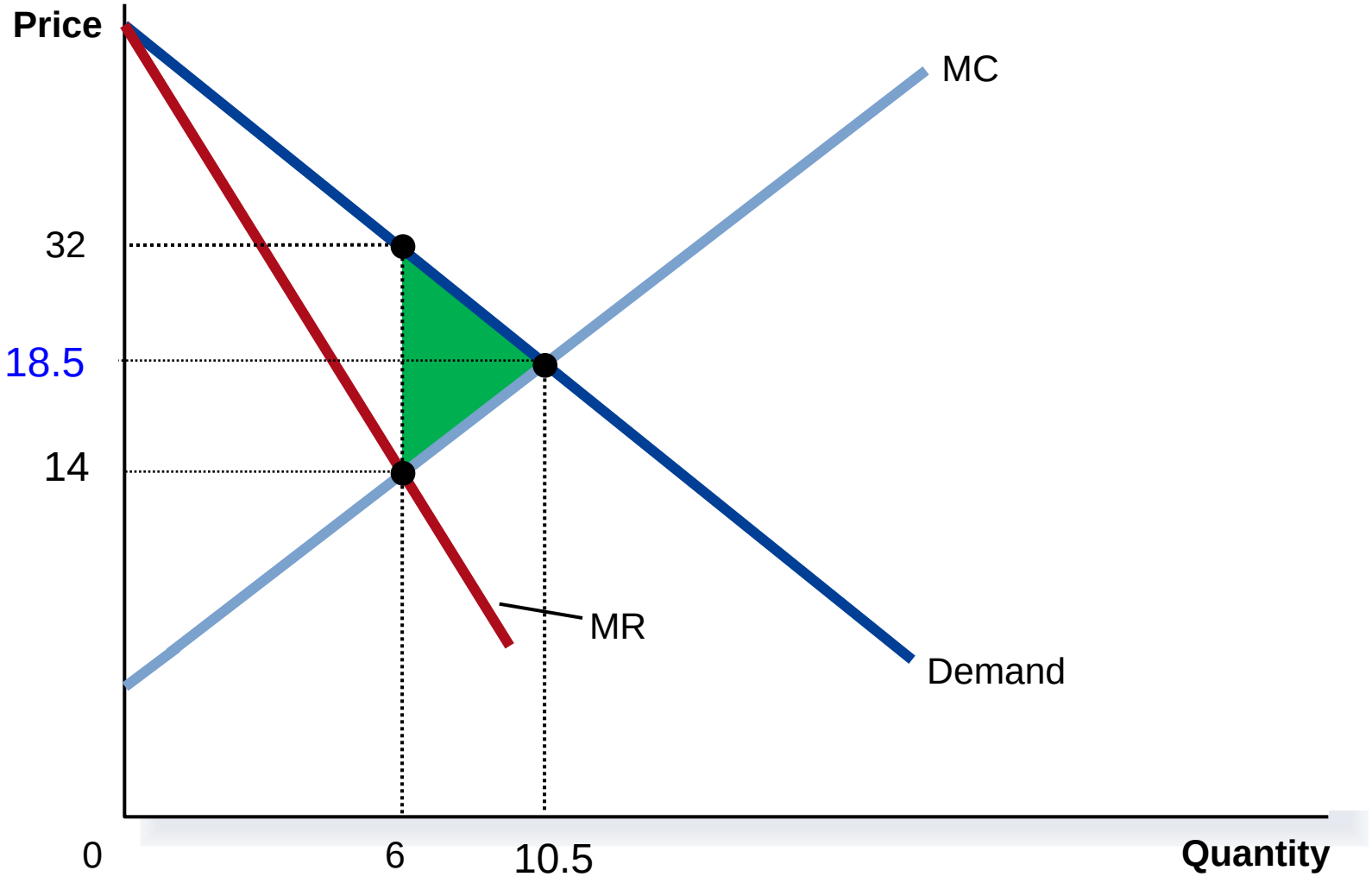
If this were a competitive market, what would price be?

Need to find P at MC = D

We've already found Q = 10.5

Substitute Q = 10.5 into either demand eqn. or MC eqn.:

MC = 8 + 10.5 = 18.5 = P in competition

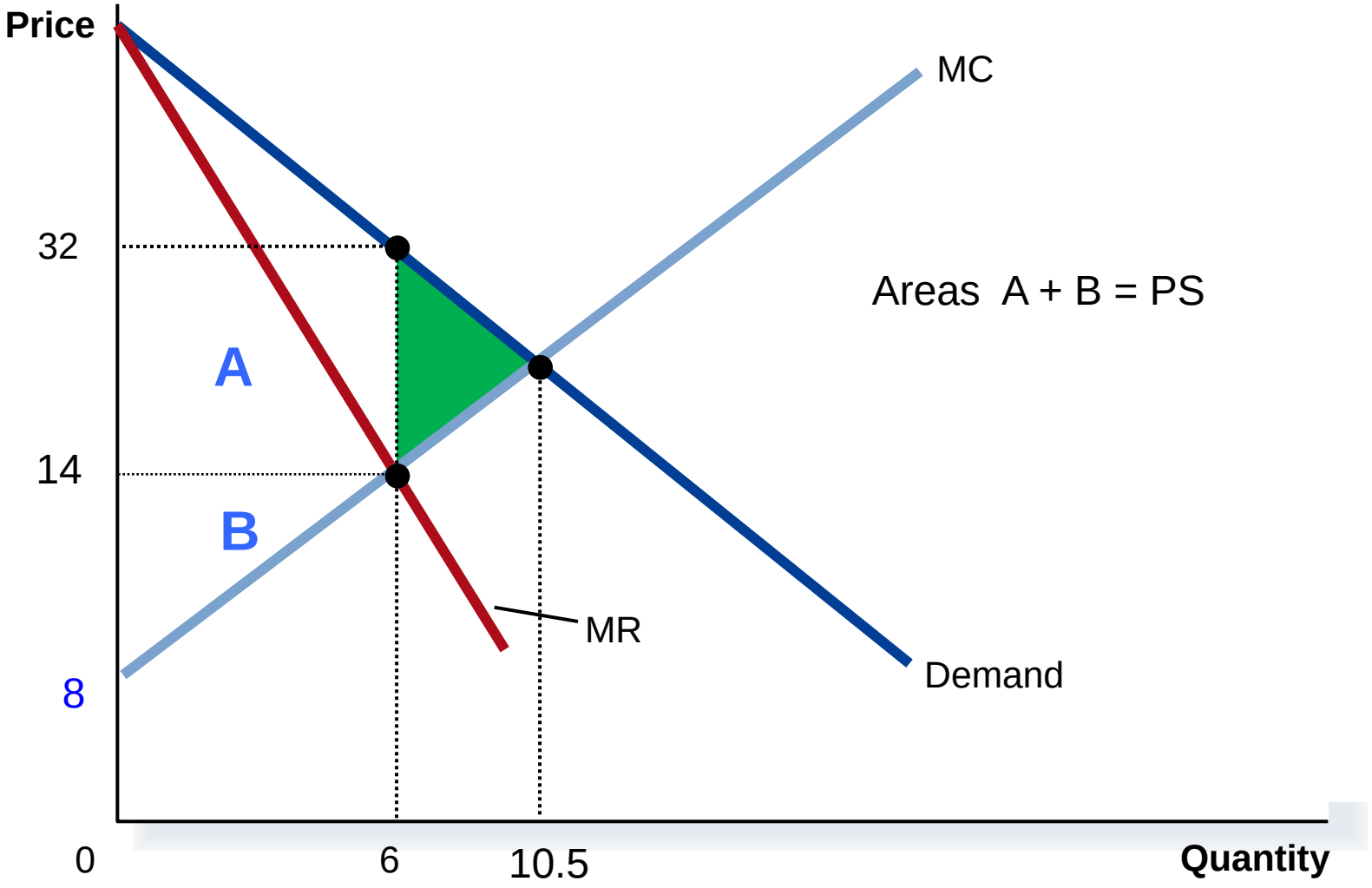

Price
MC
32
18.5
14
MR
Demand
0
6
10.5
Quantity

What is the monopolist's PS?

Need P-intercept for MC curve:

Set Q = 0 in MC eqn.:

$MC = 8 + 0 = 8$


Price
MC
32
Areas A + B = PS
A
14
B
MR
8
Demand
0
6
10.5
Quantity

PS = area of □A + area of △B

PS = 18(6) + ½(6)(6)

= $126

Public Policy Towards Monopoly

- Since monopolies are socially inefficient, sometimes the government gets involved in one of 4 ways:

1. Competition Law
   - legislation to prevent mergers that would make the market less competitive.
   -Canada has the Competition Act.

2. Regulation

-government agencies regulate the prices a monopoly may charge.

-often, will set P = MC.

-if this price means the monopoly would operate at a loss and leave the market, the gov't could subsidize the firm.

3. Public ownership

-gov't can run the monopoly itself.

-these are Crown Corporations in Canada.

-examples: Canada Post, CBC.

-these may not be run efficiently because the government may not care as much as private owners about keeping costs down.

4. Doing nothing

-if the inefficiency is small by society's standard, the gov't may stay out of it.

-may be political reasons, too.

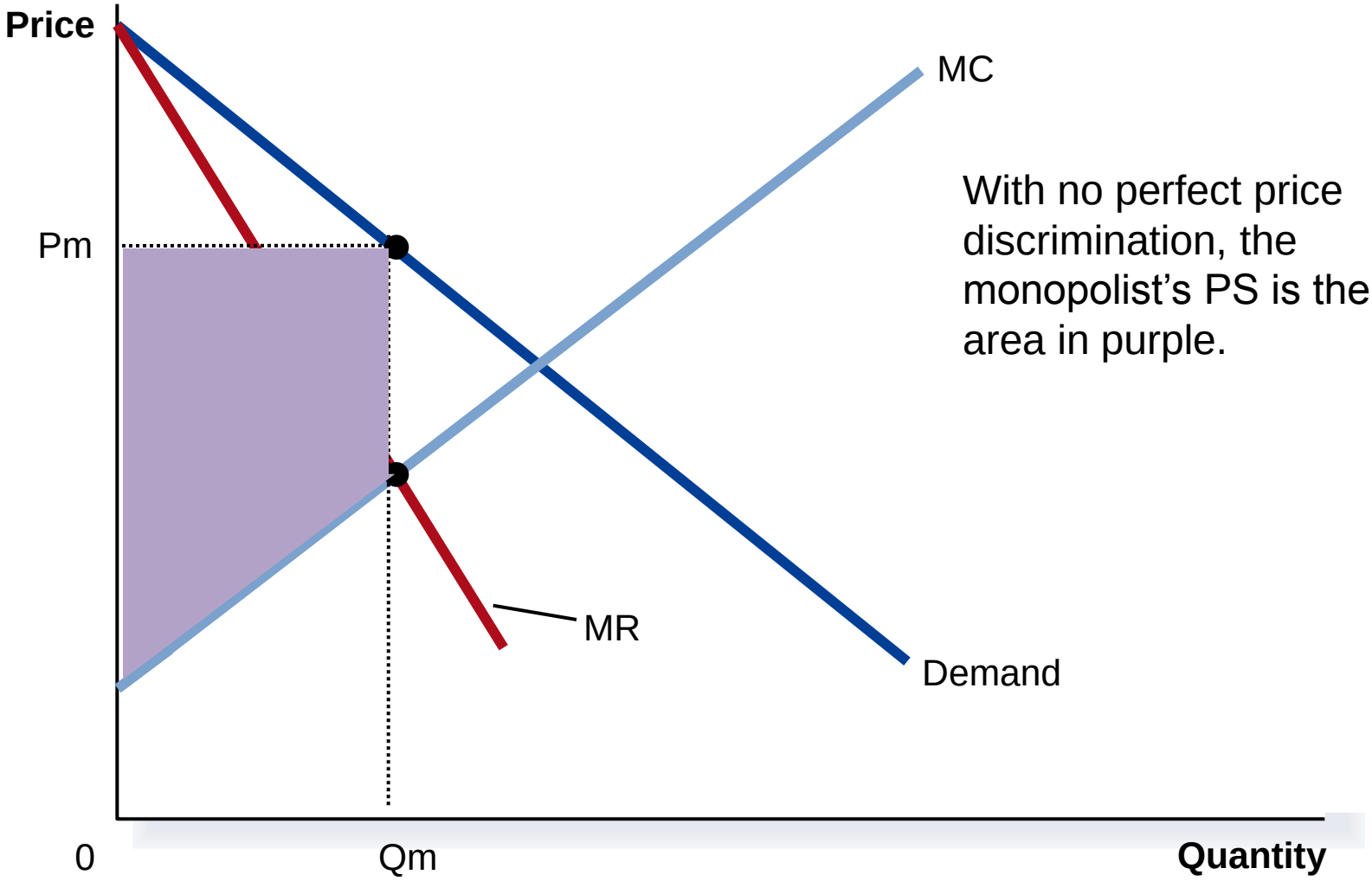
Price Discrimination

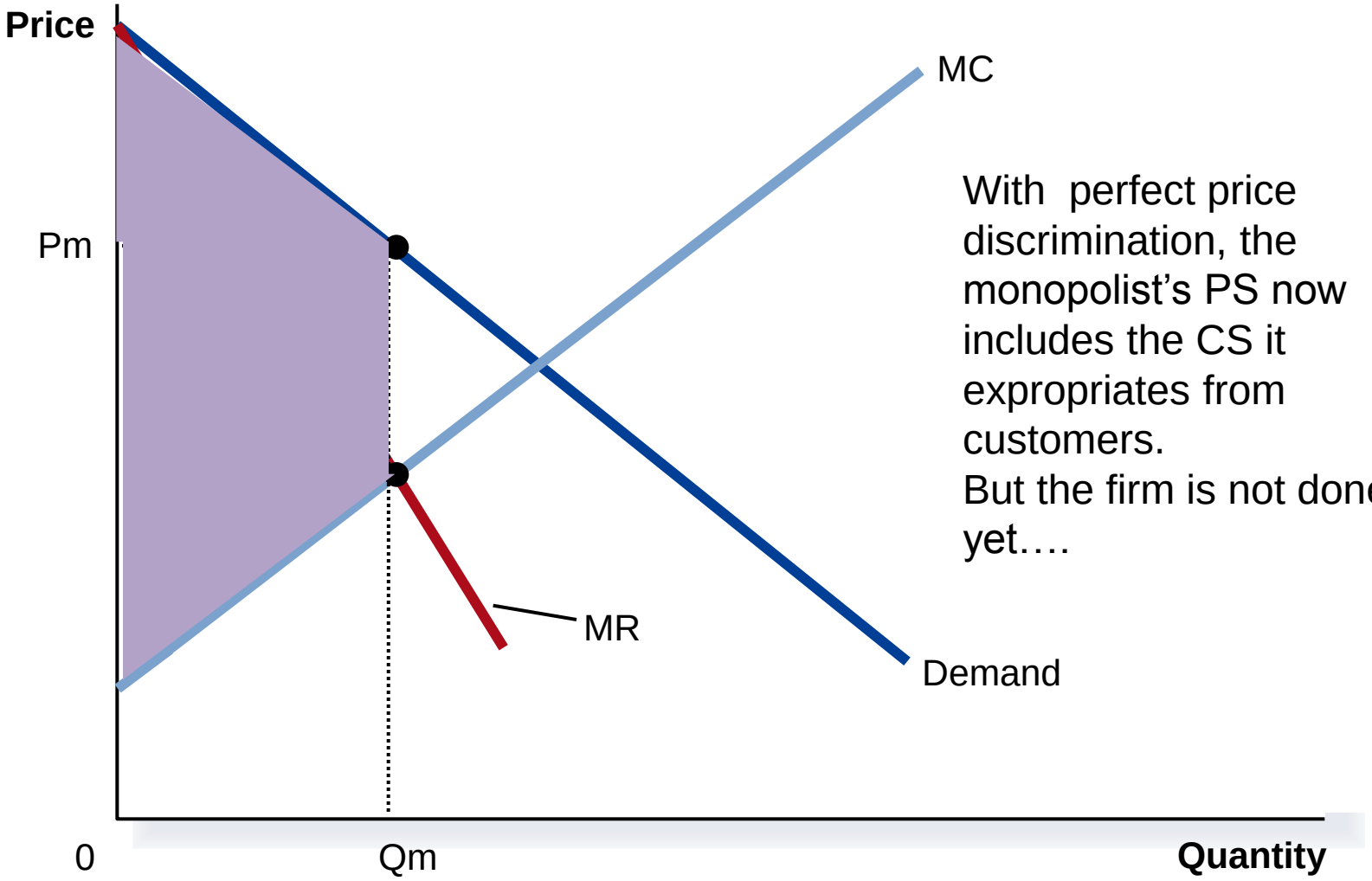
- Price discrimination is the business practice of selling the same good at different prices to different customers, even though the costs for producing for the two customers are the same.

- Price discrimination is not possible when a good is sold in a competitive market since there are many firms all selling at the market price.
- In order to price discriminate, the firm must have some market power and be able to segregate the market according to consumers' willingness-to-pay.

- If the monopolist knows *exactly* the willingness-to-pay of each customer, it can charge each customer a different price = exactly his/her willingness-to-pay.
- This is perfect price discrimination (also called first degree price discrimination).
  - Hard to do in practice.
  - Best example is an accountant who charges each client a different price for work done.

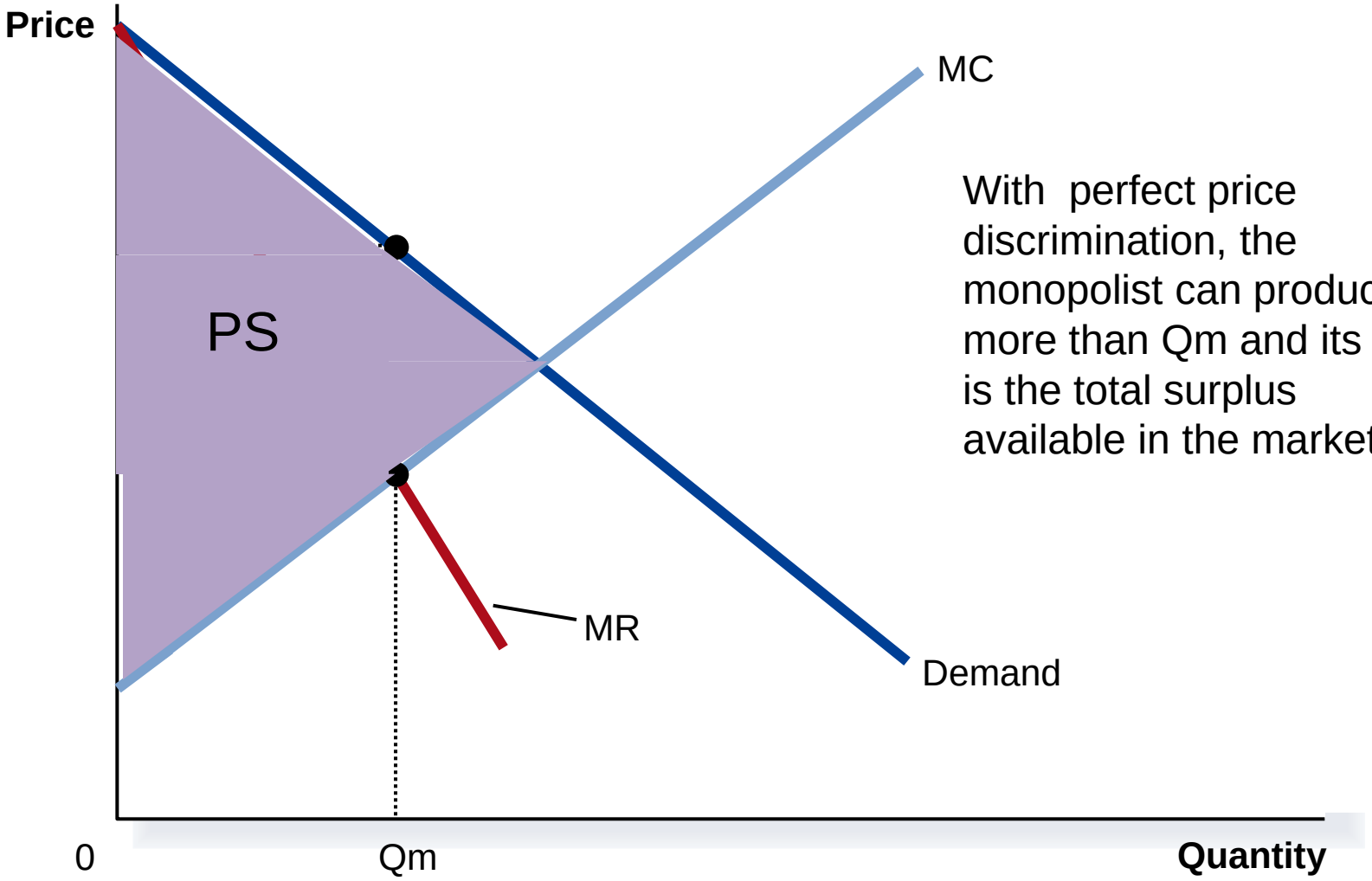
- If every customer pays the monopolist a price equal to their willingness-to-pay, the customer does not enjoy any benefits – no consumer surplus.
- The monopolist expropriates the entire consumer surplus.
- The monopolist's producer surplus is the area under the demand curve, above their marginal cost:


Price
MC
Pm
With no perfect price discrimination, the monopolist's PS is the area in purple.
MR
Demand
0
Qm
Quantity



With perfect price discrimination, the monopolist's PS now includes the CS it expropriates from customers.
But the firm is not done yet….

- The monopolist can keep selling its output as long as the price received covers the firm's MC (it would still be making a profit on each good).
- So, with perfect price discrimination, there is no deadweight loss!
- The monopolist's PS is the total surplus available in the market as if it were a perfectly competitive market.



With perfect price discrimination, the monopolist can produce more than Qm and its PS is the total surplus available in the market.

Third Degree Price Discrimination

- Also called ordinary price discrimination.

- Usually, a firm can distinguish between different markets for its good.
- It can then charge different prices in each market.
- Much easier to do in practice than perfect price discrimination and we see it all the time.

Examples of Price Discrimination

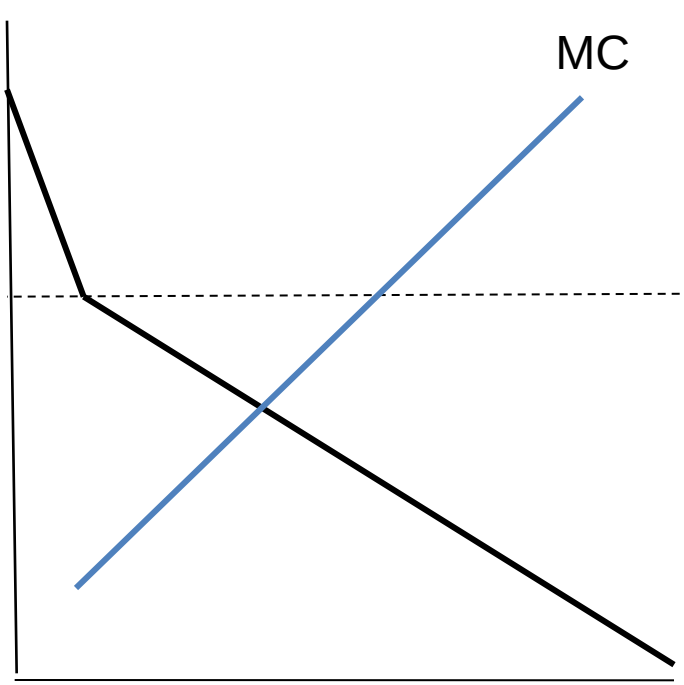
- Movie tickets
- Bus fares
- Discount coupons
- Financial aid
- Quantity discounts
- Ladies' nights at bars

Suppose we have an airline that sells business class and economy class seats.

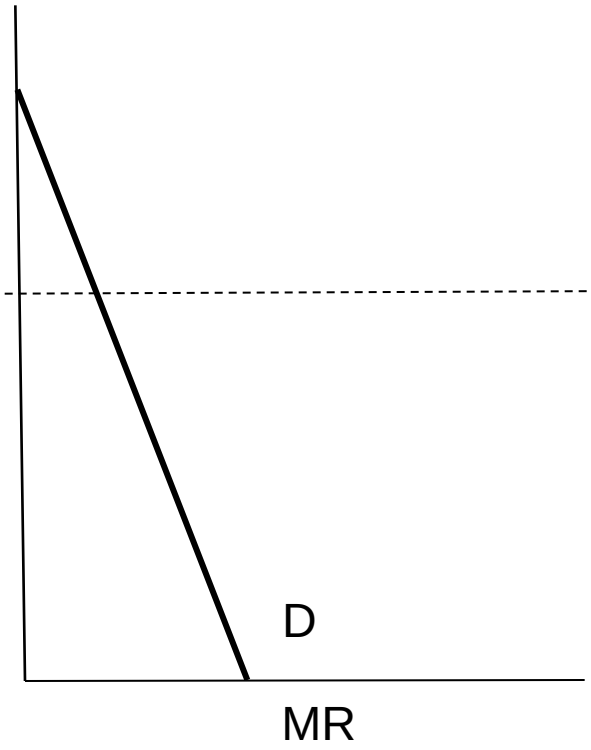
- Business people have to travel for work and have less choice (they'll pay whatever to get to Vancouver tomorrow to close that deal).
- Their demand is fairly inelastic.

- Economy flyers will travel when it's vacation time and will shop around for flights, being more flexible about air travel.
- Their demand is fairly elastic.

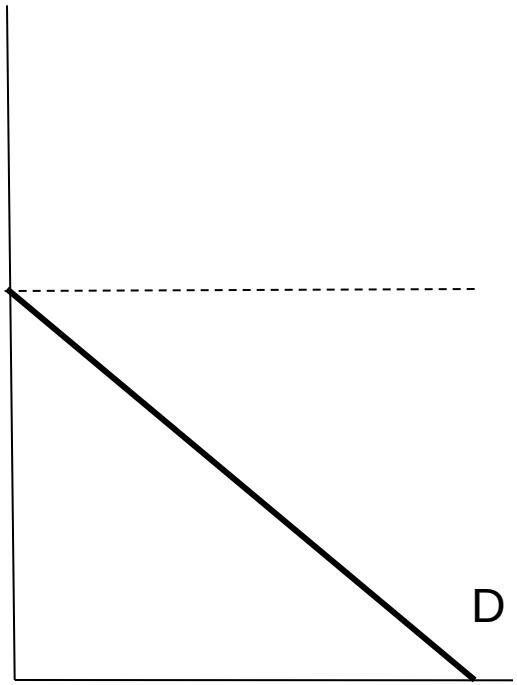
- Let's graph the 2 markets and the total demand for seats the airline faces, plus its MC:



Total market D for the airline

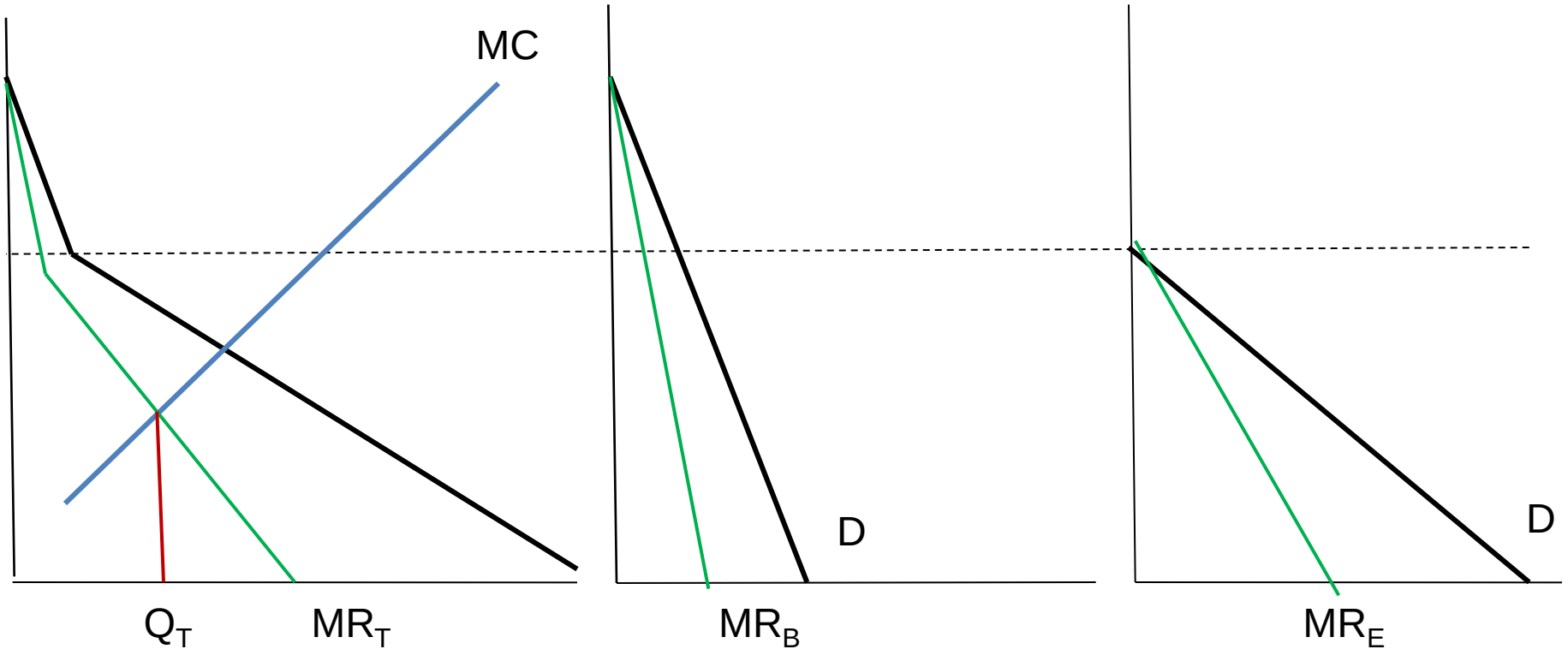


Business class



Economy class

The firm determines its MR in each market and aggregates them to derive one MR to equate with MC to find the profit-maximizing level of total output.

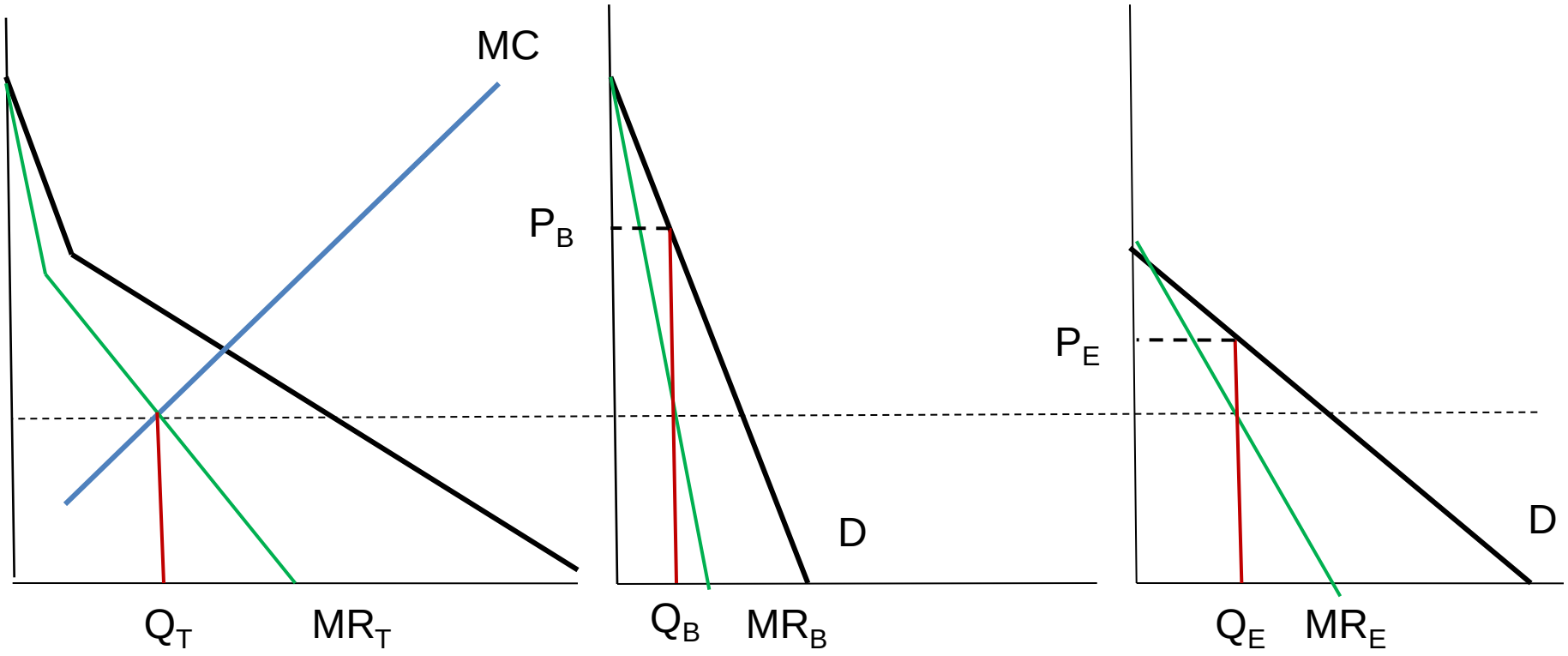


Total market D for the airline

Business class

Economy class

Next, the firm equates the MR in both markets, determines the level of output in each market and sets the price in each market.



Total market D for the airline

Business class

Economy class

- Note that:

1. Q bus + Q econ = Q total

2. The market with more inelastic demand will pay a higher price and be allocated less Q.

Monopoly Supply Curve

- Recall that a perfectly competitive firm's SR supply curve is its MC above min AVC.
- It chooses Q where P = MC.
- There's a clear relationship between Q and P.

- A monopolist doesn't have that clear relationship.
- It chooses Q where MR = MC and *then* chooses P.

- Because a monopolist can't link Q directly to a price level, the monopolist does not have a supply curve.