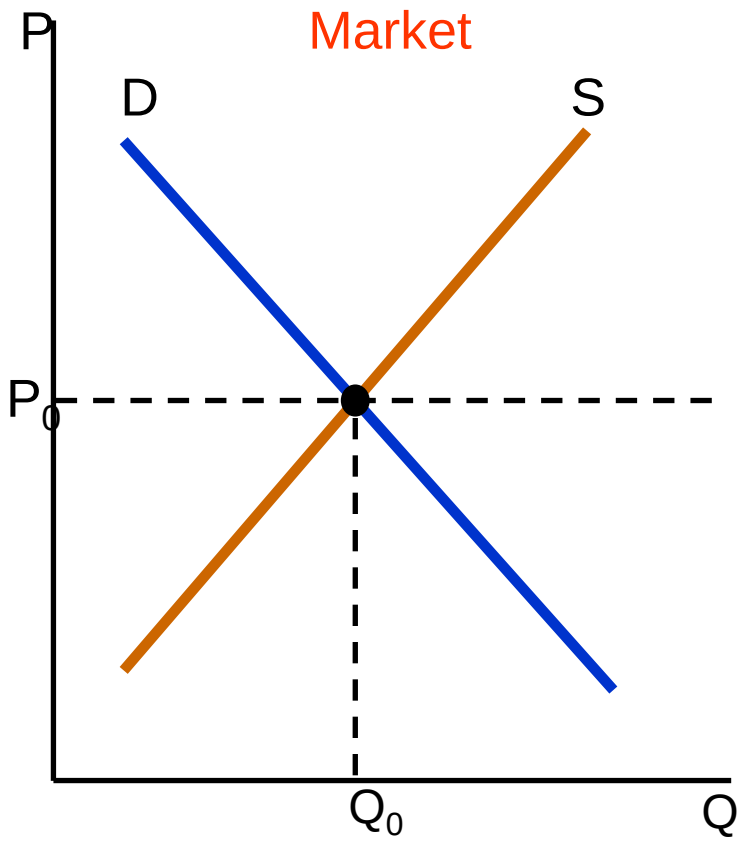
LECTURE 8: Market Power: Monopoly and Monopsony

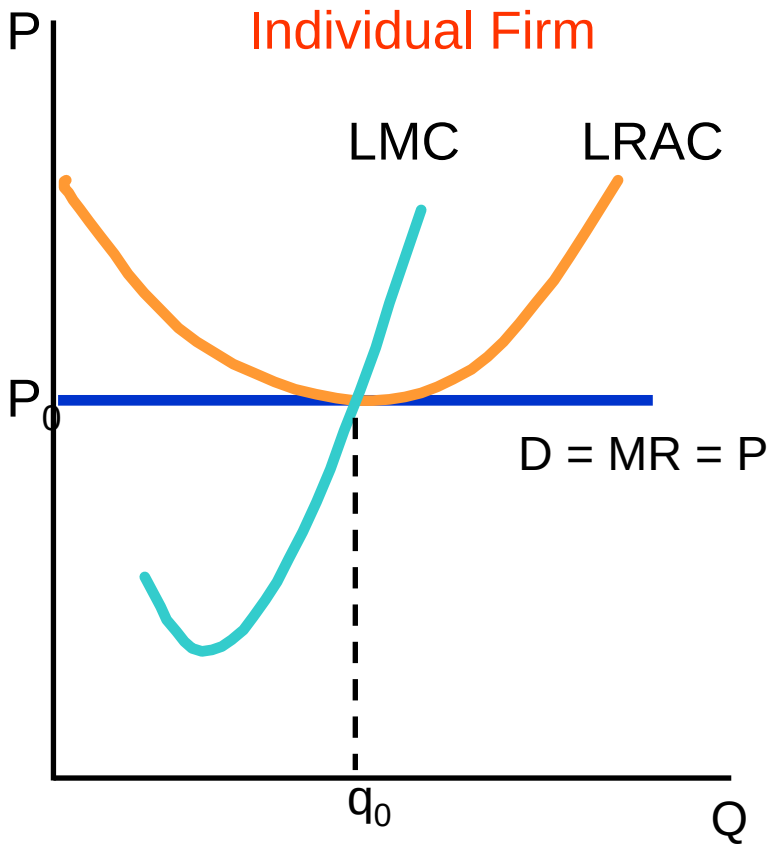
- Monopoly and Monopoly Power
- Sources of Monopoly Power
- The Social Costs of Monopoly Power
- Monopsony and Monopsony Power
- Limiting Market Power: The Antitrust Laws

Review of Perfect Competition

- P = LMC = LRAC
- Normal profits or zero economic profits in the long run
- Large number of buyers and sellers
- Homogenous product
- Perfect information
- Firm is a price taker

Review of Perfect Competition





Monopoly 독점

- Monopoly
  1. One seller - many buyers
  2. One product (no good substitutes)
  3. Barriers to entry
  4. Price Maker

Monopoly

- The monopolist is the supply-side of the market and has complete control over the amount offered for sale.
- Monopolist controls price but must consider consumer demand
- Profits will be maximized at the level of output where marginal revenue equals marginal cost.

Average & Marginal Revenue

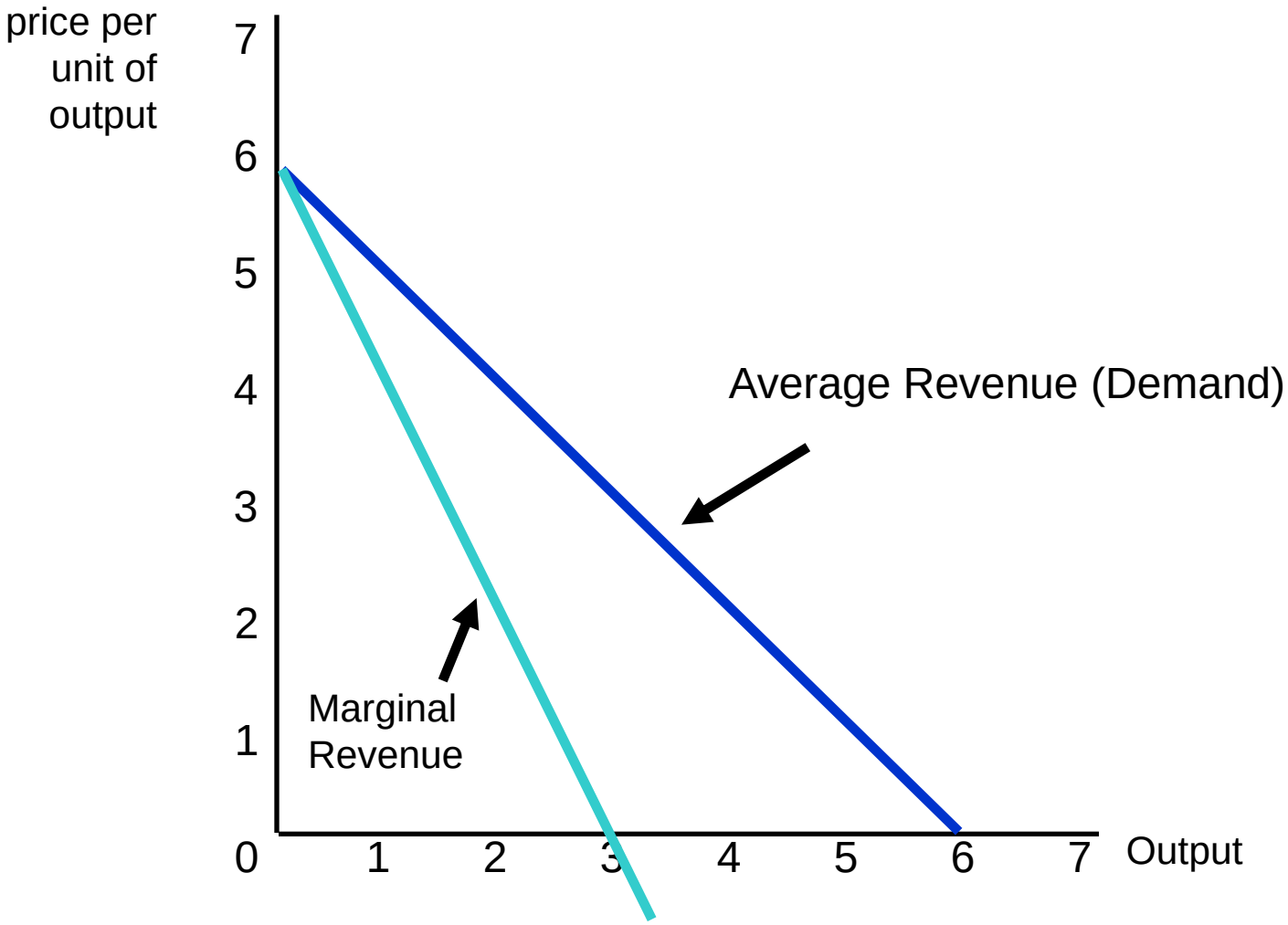
- The monopolist's average revenue, price received per unit sold, is the market demand curve.
- Monopolist also needs to find marginal revenue, change in revenue resulting from a unit change in output.

Average & Marginal Revenue

- Finding Marginal Revenue
  - As the sole producer, the monopolist works with the market demand to determine output and price.
  - An example can be used to show the relationship between average and marginal revenue
  - Assume a monopolist with demand:

$$P = 6 - Q$$

Average and Marginal Revenue



Monopoly

- Observations
  1. To increase sales the price must fall
  2. MR < P
  3. Compared to perfect competition
     - No change in price to change sales
     - MR = P

Monopolist's Output Decision

1. Profits maximized at the output level where MR = MC
2. Cost functions are the same

$$\pi(Q) = R(Q) - C(Q)$$

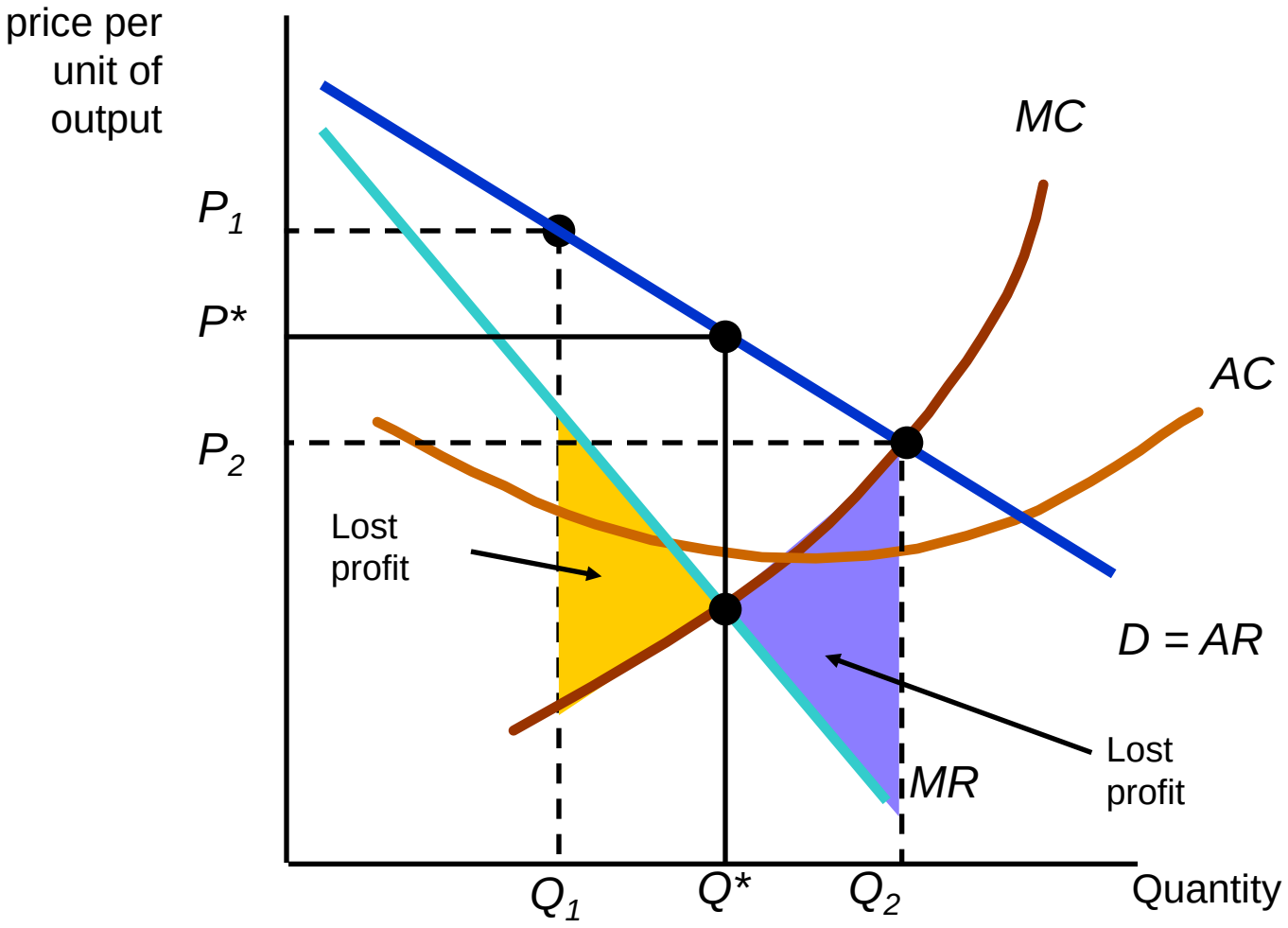
$$\Delta\pi / \Delta Q = \Delta R / \Delta Q - \Delta C / \Delta Q = 0 = MC - MR$$

$$or\ MC = MR$$

Monopolist's Output Decision

- At output levels below MR = MC the decrease in revenue is greater than the decrease in cost (MR > MC).
- At output levels above MR = MC the increase in cost is greater than the decrease in revenue (MR < MC)

Monopolist's Output Decision



Monopoly: An Example

$$Cost = C(Q) = 50 + Q^2$$

$$MC = \frac{\Delta C}{\Delta Q} = 2Q$$

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

$$R(Q) = P(Q)Q = 40Q - Q^2$$

$$MR = \frac{\Delta R}{\Delta Q} = 40 - 2Q$$

Monopoly: An Example

$$MC = MR$$

$$2Q = 40 - 2Q$$

$$4Q = 40$$

$$Q = 10$$

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

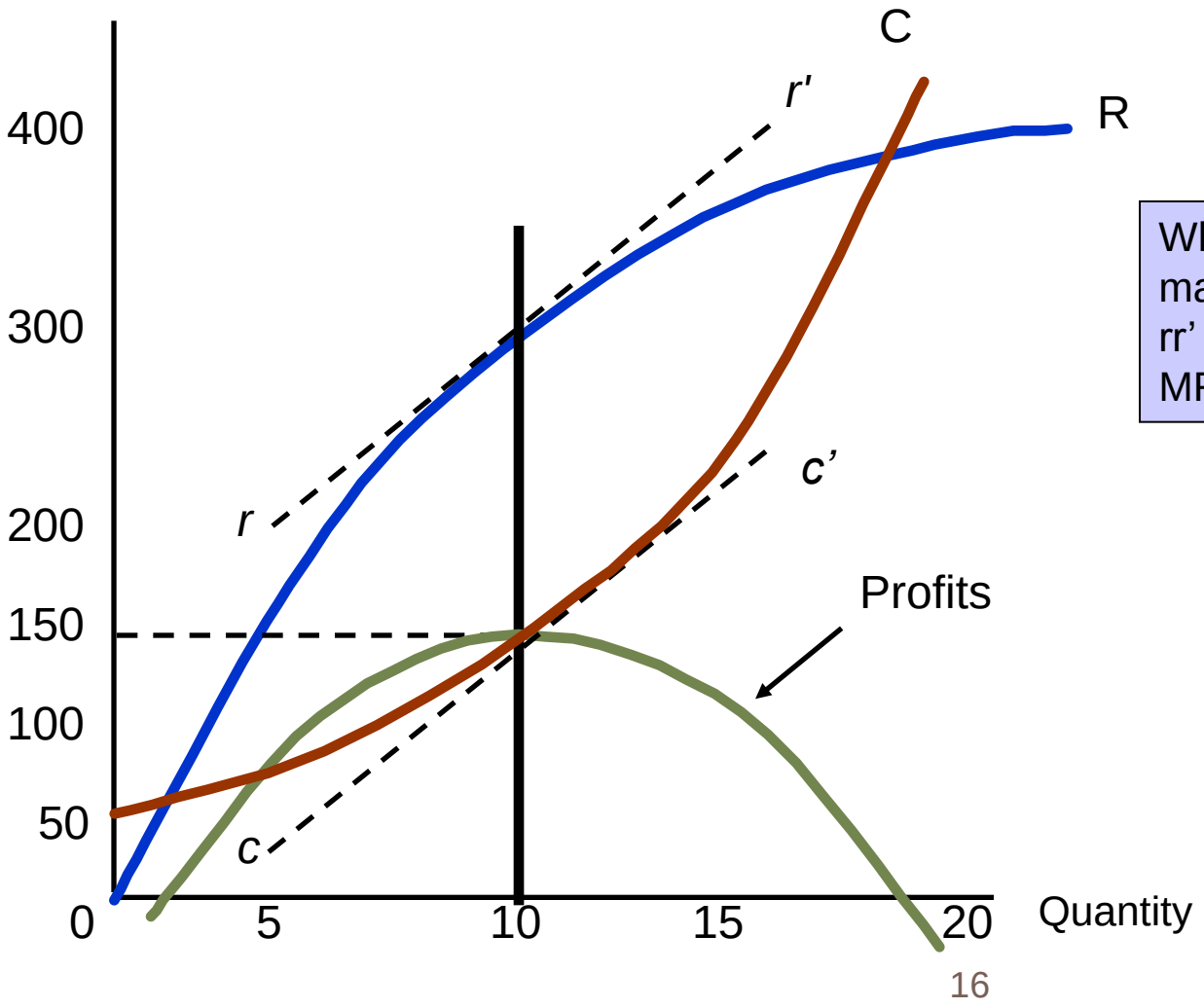
$$P(Q) = 40 - 10$$

$$P(Q) = 30$$

Monopoly: An Example

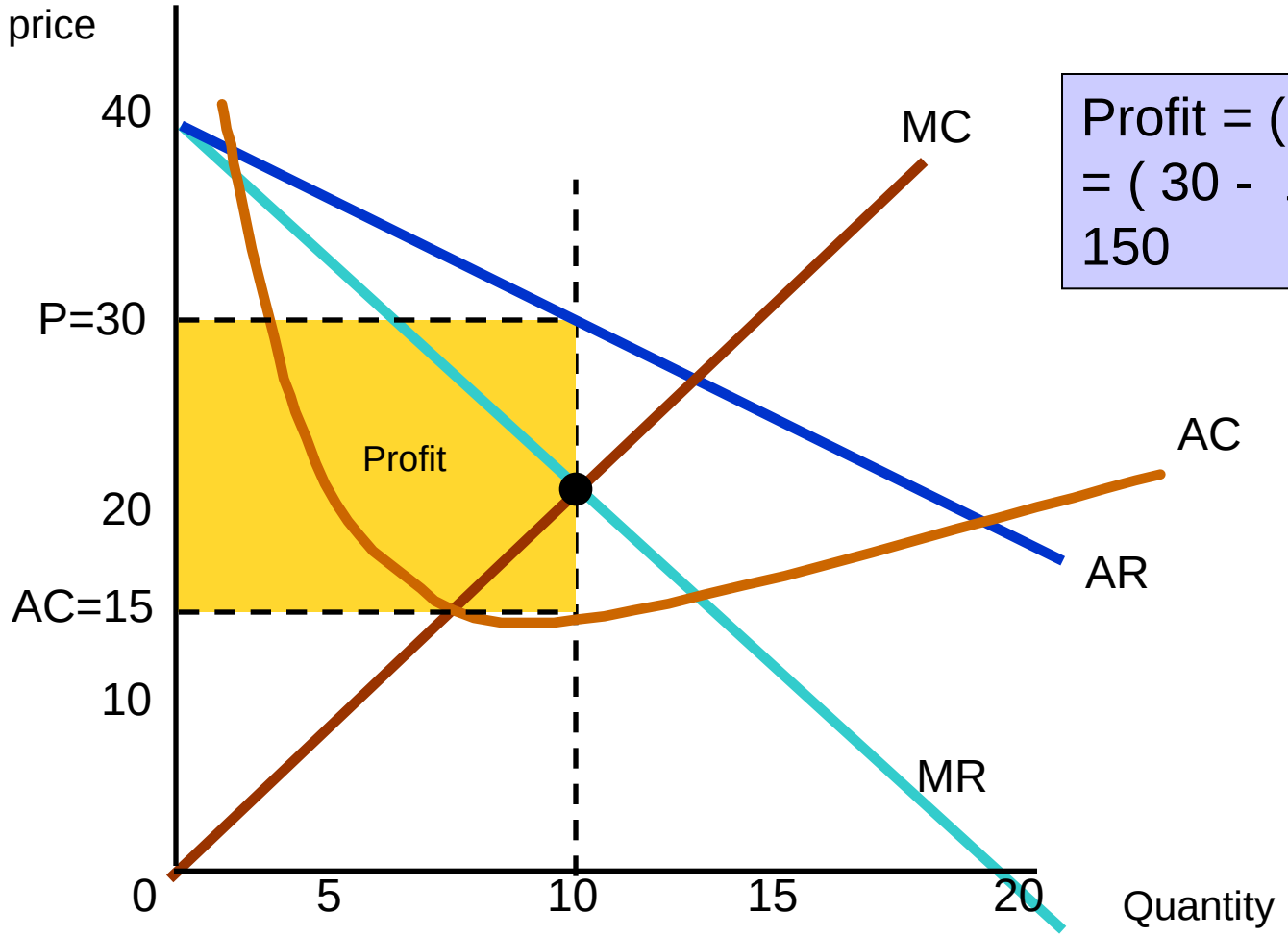
- By setting marginal revenue equal to marginal cost, we verified that profit is maximized at P = 30 and Q = 10.
- This can be seen graphically by plotting cost, revenue and profit
  - Profit is initially negative when produce little or no output
  - Profit increase and q increase, maximized at Q*=10

Example of Profit Maximization



When profits are maximized, slope of rr' and cc' are equal: MR=MC

Example of Profit Maximization



Profit = (P - AC) x Q
= (30 - 15)(10) =
150

Monopoly

- A Rule of Thumb for Pricing
  - We want to translate the condition that marginal revenue should equal marginal cost into a rule of thumb that can be more easily applied in practice.
  - Looking at Marginal Revenue we can see that it has two components

A Rule of Thumb for Pricing

$$1.\ \boldsymbol{MR} = \frac{\Delta \boldsymbol{R}}{\Delta \boldsymbol{Q}} = \frac{\Delta(\boldsymbol{PQ})}{\Delta \boldsymbol{Q}}$$

- Produce one more unit brings in revenue (1)(P) = P
- With downward sloping demand, producing and selling one more unit results in small drop in price $\Delta P/\Delta Q$.
  - Reduces revenue from all units sold, change in revenue: $Q(\Delta P/\Delta Q)$

A Rule of Thumb for Pricing

Thus

$$2.\ MR = P + Q\frac{\Delta P}{\Delta Q}$$

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

$$3.\ E_d = \left(P/Q\right)\left(\Delta Q/\Delta P\right)$$

A Rule of Thumb for Pricing

$$4.\left(Q/P\right)\left(\Delta P/\Delta Q\right)=\frac{1}{E_d}$$

$$5.\ MR=P+P\left(\frac{1}{E_d}\right)$$

A Rule of Thumb for Pricing

π is maximized where $MR = MC$

$$P + P\left[\frac{1}{E_D}\right] = MC$$

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

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

A Rule of Thumb for Pricing

- (P – MC)/P is the markup over MC as a percentage of price
- The markup should equal the inverse of the elasticity of demand.
- Price is expressed directly as the markup over marginal cost

A Rule of Thumb for Pricing

$$9.\ P = \frac{MC}{1 + \left(1 / E_d\right)}$$

$$Assume$$

$$E_d = -4 \quad MC = 9$$

$$P = \frac{9}{1 + \left(1 / -4\right)} = \frac{9}{.75} = \$12$$

Monopoly

- Monopoly pricing compared to perfect competition pricing:
  - Monopoly
    - P > MC
    - Price is larger than MC by an amount that depends inversely on the elasticity of demand
  - Perfect Competition
    - P = MC
    - Demand is perfectly elastic so P=MC

Monopoly

- If demand is very elastic, there is little benefit to being a monopolist
- The larger the elasticity, the closer to a perfectly competitive market
- Notice a monopolist will never produce a quantity in the inelastic portion of demand curve
  - In inelastic portion, can increase revenue by decreasing quantity and increasing price

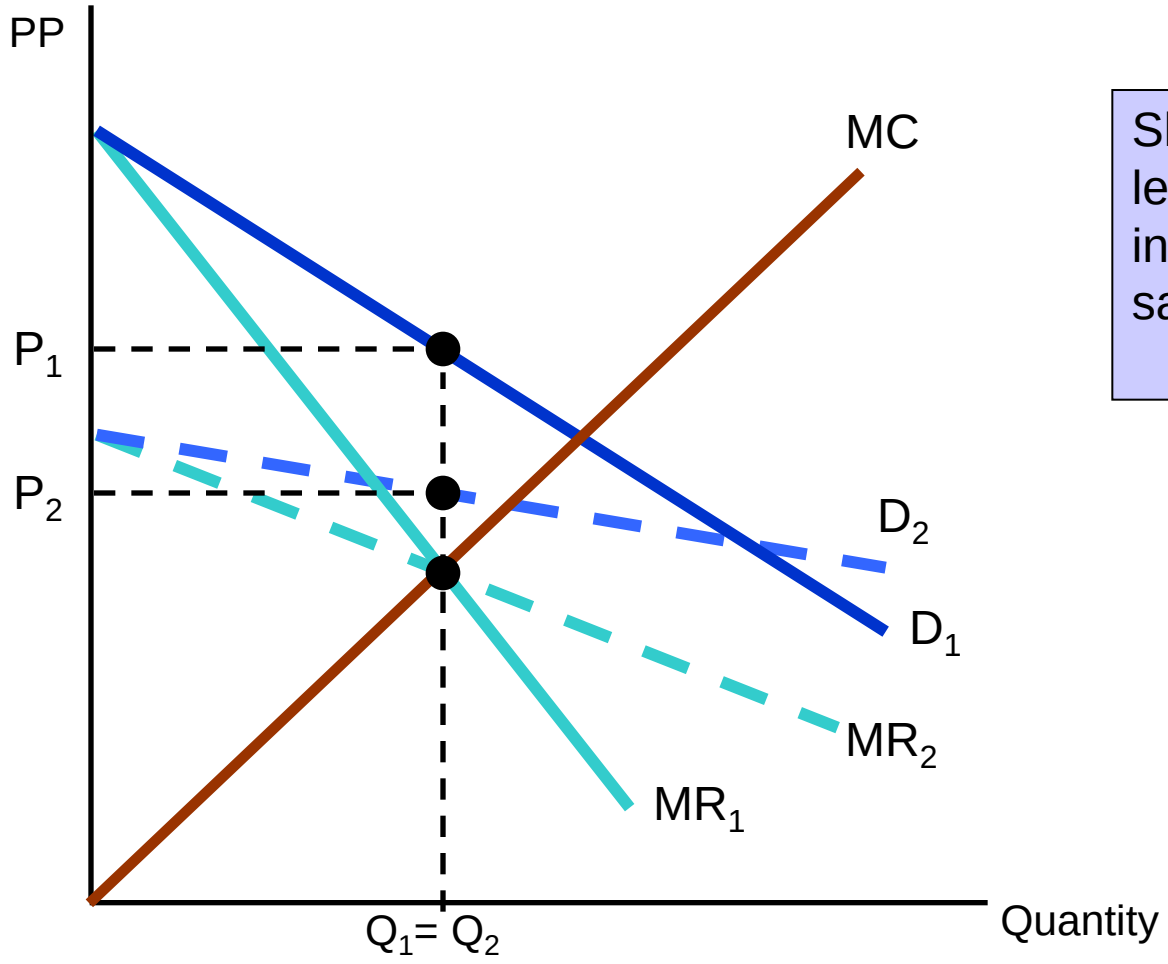
Shifts in Demand

- In perfect competition, the market supply curve is determined by marginal cost.
- For a monopoly, output is determined by marginal cost and the shape of the demand curve.
  - There is no supply curve for monopolistic market

Shifts in Demand

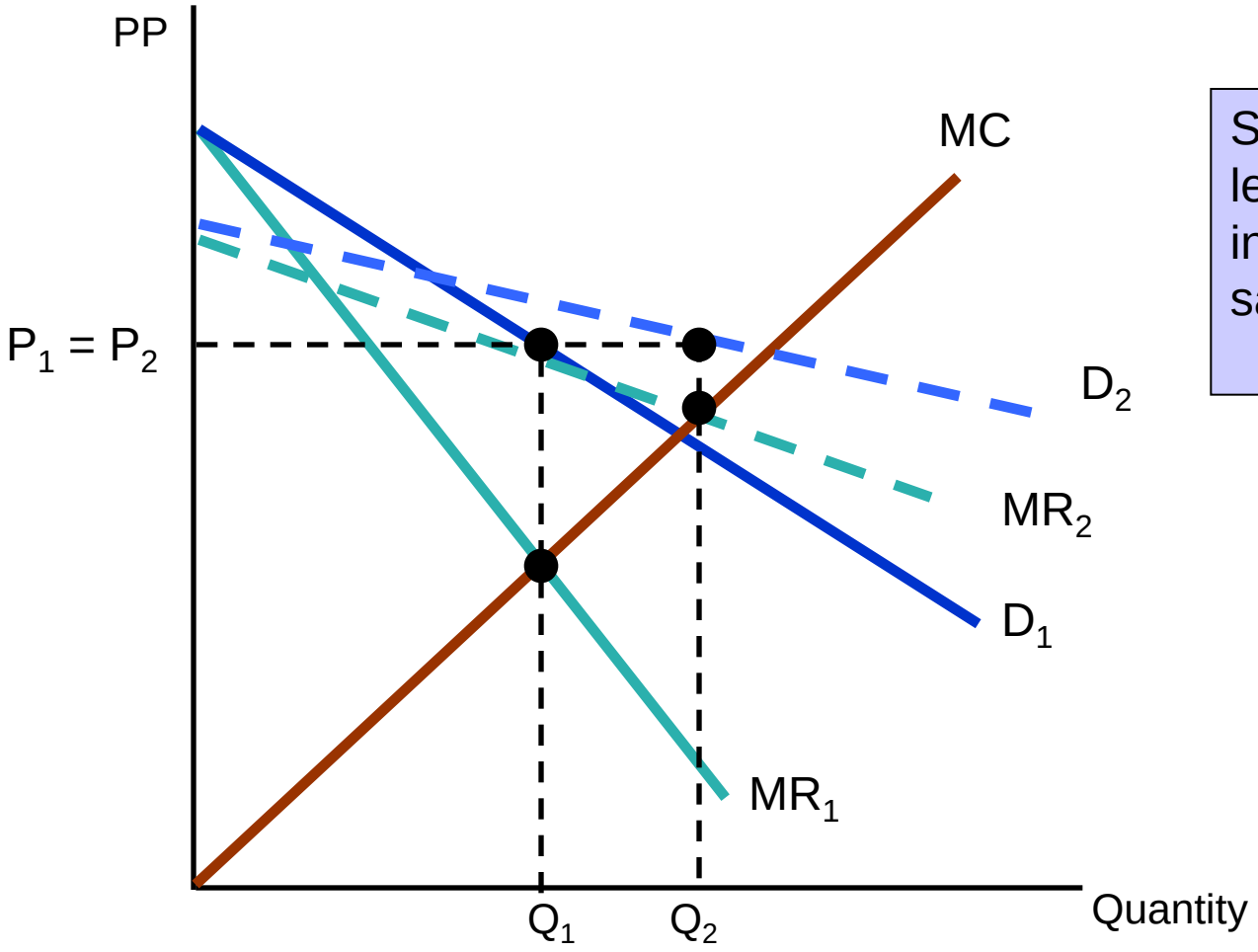
- Shifts in demand do not trace out price and quantity changes corresponding to a supply curve
- Shifts in demand lead to
  - Changes in price with no change in output
  - Changes in output with no change in price
  - Changes in both price and quantity

Shifts in Demand



Shift in demand leads to change in price but same quantity

Shifts in Demand



Shift in demand leads to change in quantity but same price

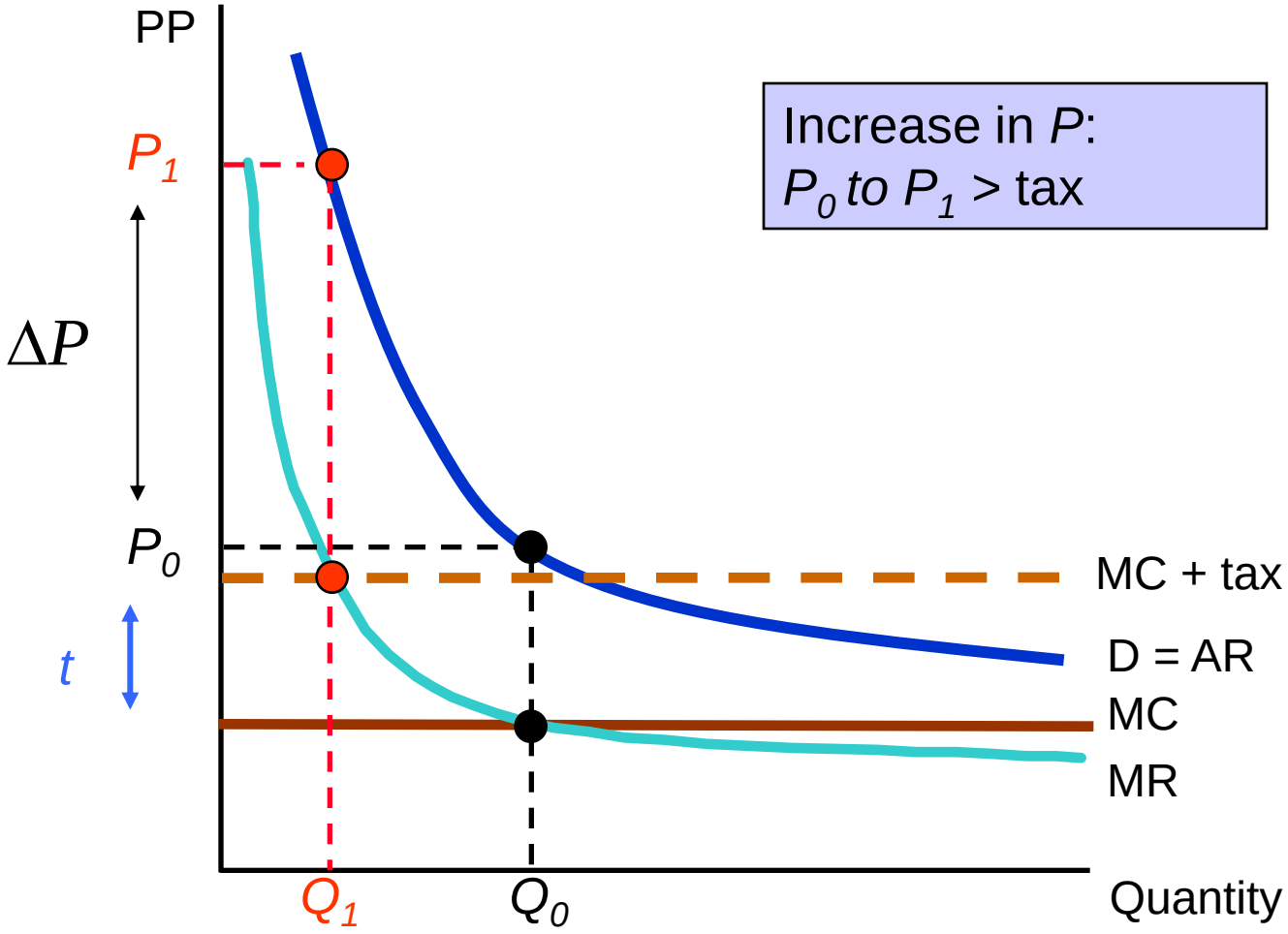
Monopoly

- Shifts in demand usually cause a change in both price and quantity.
- Example show how monopolistic market differs from perfectly competitive market
- Competitive market supplies specific quantity a every price
  - This relationship does not exist for a monopolistic market

The Effect of a Tax

- In competitive market, a per-unit tax causes price to rise by less than tax: burden shared by producers and consumers
- Under monopoly, price can sometimes rise by more than the amount of the tax.
- To determine the impact of a tax:
  - t = specific tax
  - MC = MC + t

Effect of Excise Tax on Monopolist



Effect of Excise Tax on Monopolist

- The amount the price increases with implementation of a tax depends on elasticity of demand
- Price may or may not increase by more than the tax
- In a competitive market, the price cannot increase by more than tax
- Profits for monopolist will fall with a tax

The Multi-plant Firm

- For some firms, production takes place in more than one plant each with different costs
- Firm must determine how to distribute production between both plants
  1. Production should be split so that the MC in the plants is the same
  2. Output is chosen where MR=MC. Profits is therefore maximized when MR=MC at each plant

The Multi-plant Firm

- We can show this algebraically:
  - Q_1 and C_1 is output and cost of production for Plant 1
  - Q_2 and C_2 is output and cost of production for Plant 2
  - $Q_T = Q_1 + Q_2$ is total output
  - Profit is then:

$$\pi = PQ_T - C_1(Q_1) - C_2(Q_2)$$

The Multi-plant Firm

- Firm should increase output from each plant until the additional profit from last unit produced at Plant 1 equals 0

$$\frac{\Delta \pi}{\Delta Q_1} = \frac{\Delta (PQ_T)}{\Delta Q_1} - \frac{\Delta C_1}{\Delta Q_1} = 0$$

$$MR - MC_1 = 0$$

$$MR = MC_1$$

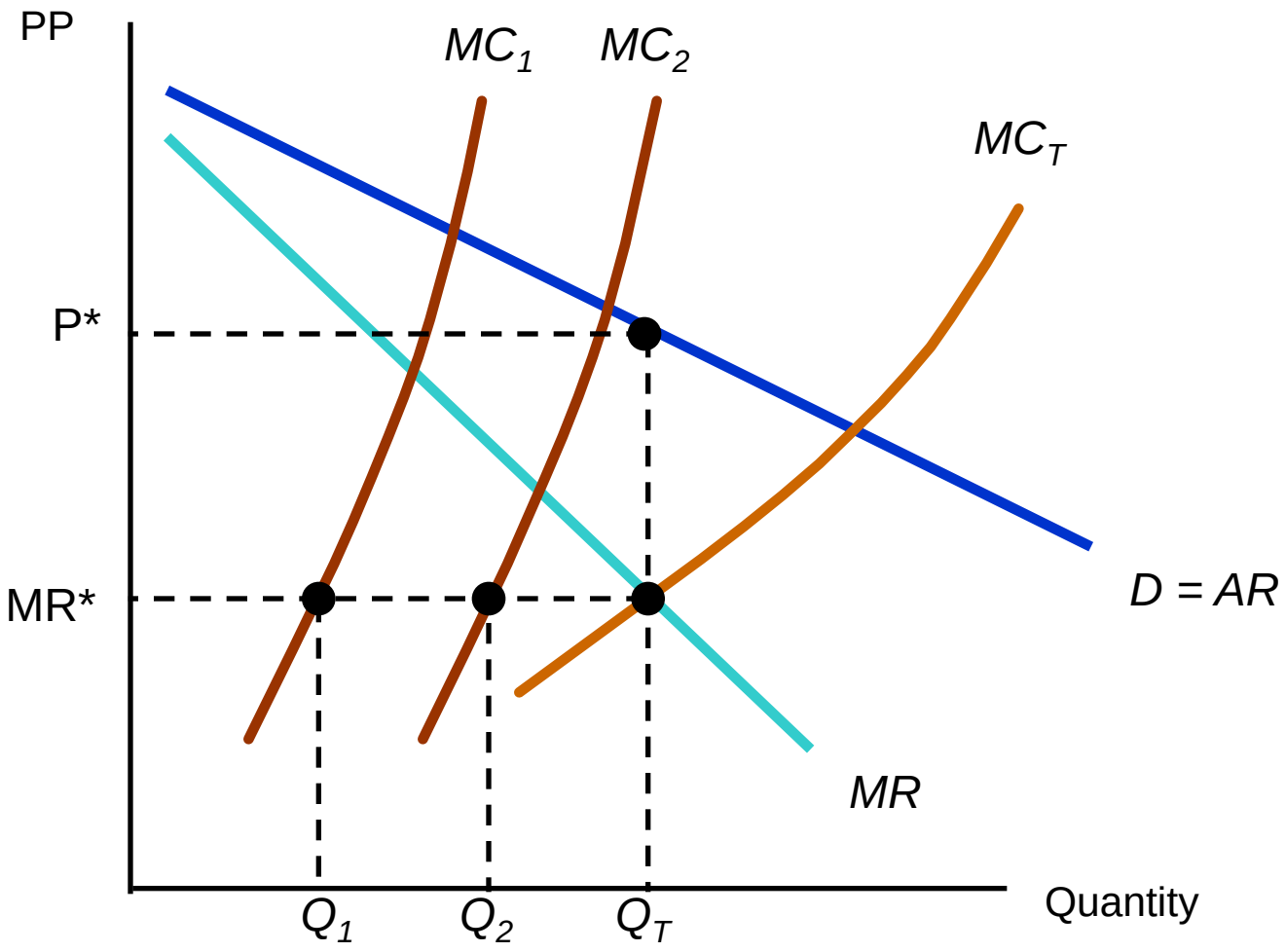
The Multi-plant Firm

- We can show the same for Plant 2
- Therefore we can see that the firm should choose to produce where

$$MR = MC_1 = MC_2$$

- We can show this graphically
  - $MR = MC_T$ gives total output
  - This point shows the MR for each firm
  - Where MR crosses MC_1 and MC_2 shows the output for each firm

Production with Two Plants



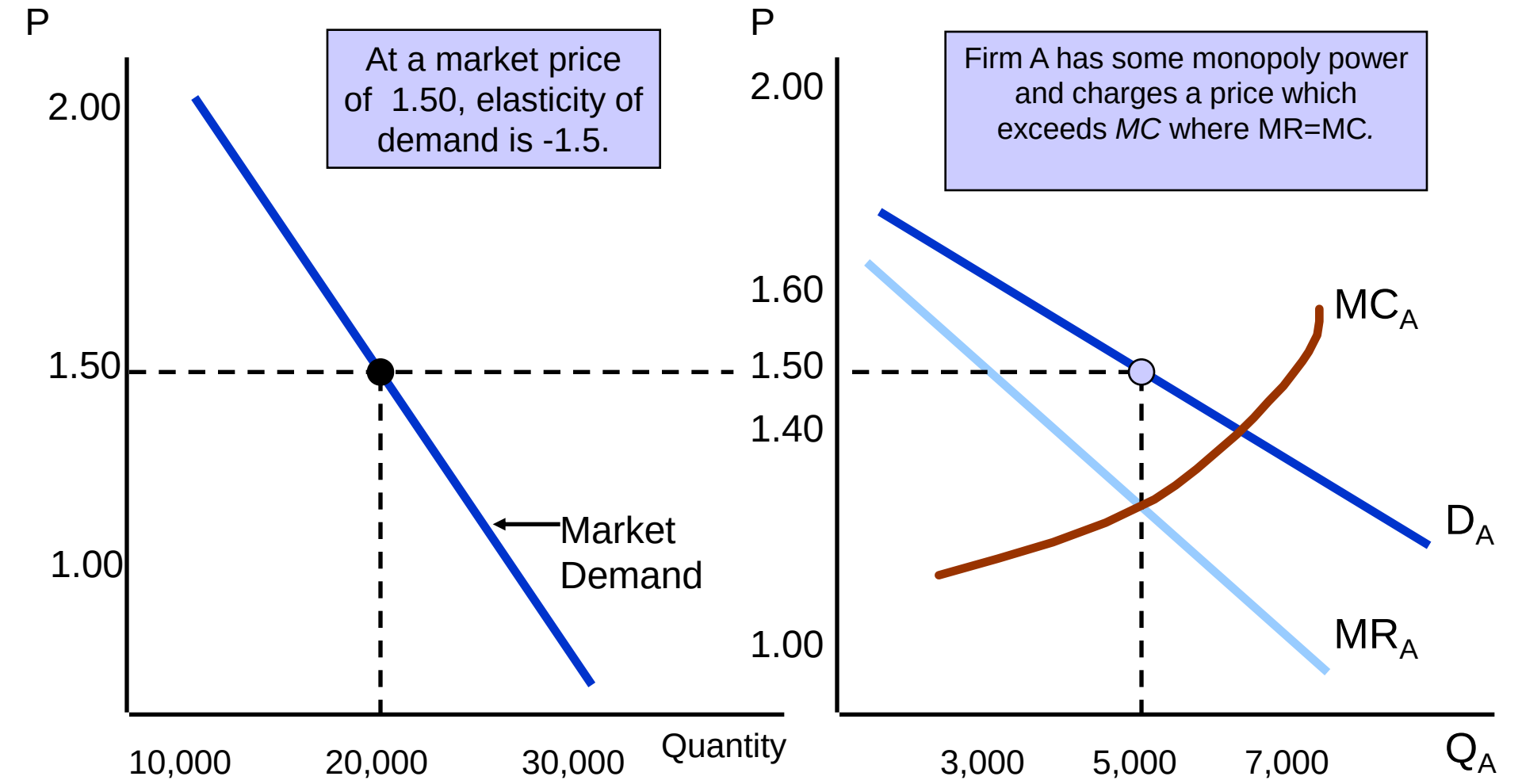
Monopoly Power

- Pure monopoly is rare.
- However, a market with several firms, each facing a downward sloping demand curve will produce so that price exceeds marginal cost.
- Firms often product similar goods that have some differences thereby differentiating themselves from other firms

Monopoly Power: Example

- Four firms with equal share a market for 20,000 toothbrushes at a price of 1.50.
- Profits maximizing quantity for each from is where MR – MC
- In our example that is 5000 units for Firm A with a price of 1.50 which is greater than marginal cost
- Although Firm A is not a pure monopolist, they have monopoly power

The Demand for Toothbrushes



Measuring Monopoly Power

- Our firm would have more monopoly power of course if it could get rid of the other firms
  - But the firm's monopoly power might still be substantial
- How can we measure monopoly power to compare firms
- What are the sources of monopoly power?
  - Why do some firms have more than others?

Measuring Monopoly Power

- Could measure monopoly power by the extent to which price is greater than MC for each firm
- Lerner's Index of Monopoly Power
  - $L = (P - MC)/P$
    - The larger the value of L (between 0 and 1) the greater the monopoly power.
  - L is expressed in terms of E_d
    - $L = (P - MC)/P = -1/E_d$
    - E_d is elasticity of demand for a firm, not the market

Monopoly Power

- Monopoly power, however, does not guarantee profits.
- Profit depends on average cost relative to price.
- One firm may have more monopoly power, but lower profits due to high average costs

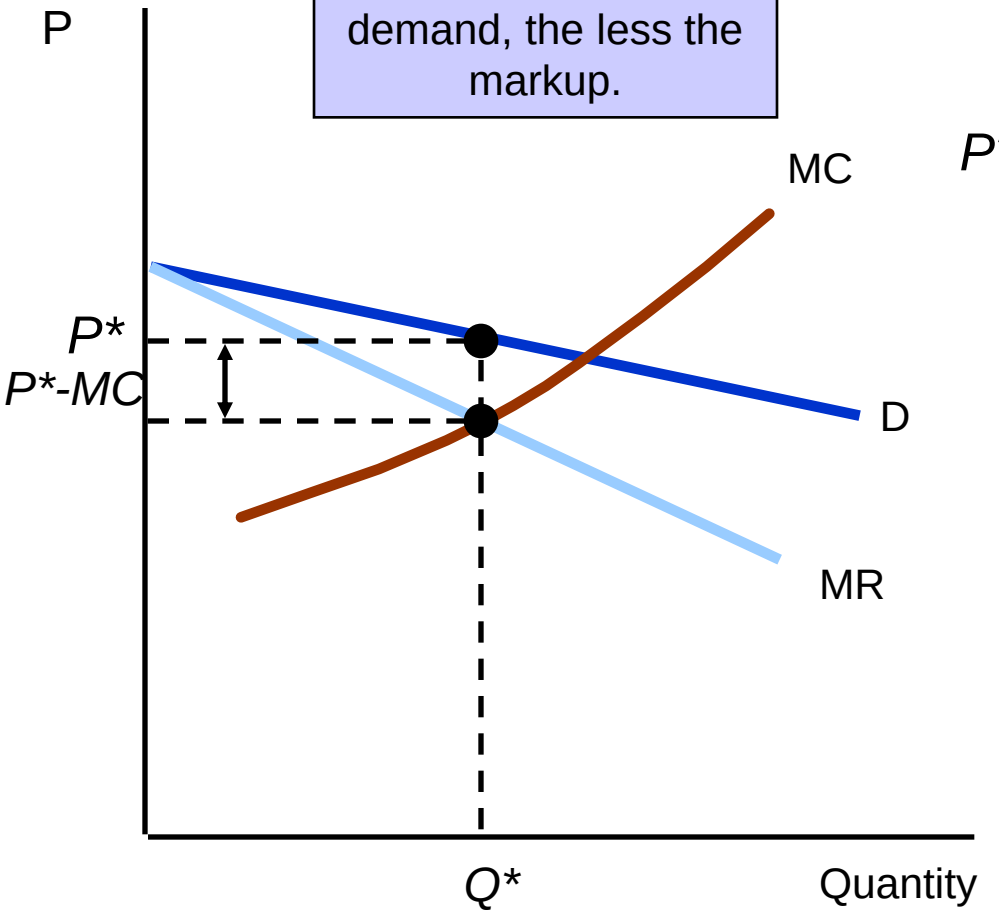
Rule of Thumb for Pricing

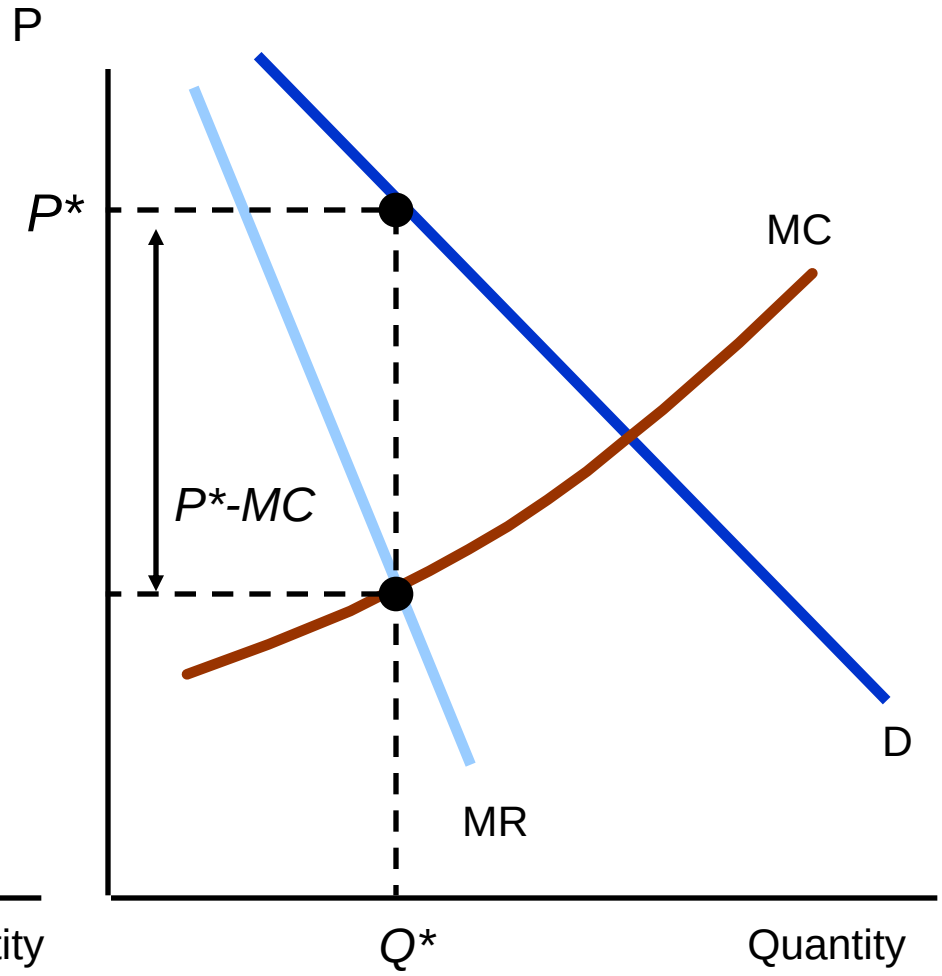
- Pricing for any firm with monopoly power
  - If E_d is large, markup is small
  - If E_d is small, markup is large

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

Elasticity of Demand and Price Markup

The more elastic is demand, the less the markup.





Markup Pricing: Supermarkets & Convenience Stores

- Supermarkets

1. Several firms
2. Similar product
3. $E_d = -10$ for individual stores
4. $P = \frac{MC}{1 + (1/-.1)} = \frac{MC}{0.9} = 1.11(MC)$
5. Prices set about 10 - 11% above MC.

Markup Pricing: Supermarkets & Convenience Stores

- Convenience Stores

1. Higher prices than supermarkets
2. Convenience differentiates them
3. $E_d = -5$
4. $P = \frac{MC}{1 + (1/-5)} = \frac{MC}{0.8} = 1.25(MC)$
5. Prices set about 25% above MC.

Markup Pricing: Supermarkets & Convenience Stores

- Convenience stores have more monopoly power.
- Convenience stores do have higher profits than supermarkets however.
  - Volume is far smaller and average fixed costs are larger

Sources of Monopoly Power

- Why do some firm's have considerable monopoly power, and others have little or none?
- Monopoly power is determined by ability to set price higher than marginal cost
- A firm's monopoly power, therefore, is determined by the firm's elasticity of demand.

Sources of Monopoly Power

- The less elastic the demand curve, the more monopoly power a firm has.
- The firm's elasticity of demand is determined by:
  1) Elasticity of market demand
  2) Number of firms in market
  3) The interaction among firms

Elasticity of Market Demand

- With one firm their demand curve is market demand curve
  - Degree of monopoly power determined completely by elasticity of market demand
- With more firms, individual demand may differ from market demand
  - Demand for a firm's product is more elastic than the market elasticity

Number of Firms

- The monopoly power of a firm falls as the number of firms increases all else equal
  - More important are the number of firms with significant market share
  - Market is highly concentrated if only a few firms account for most of the sales
- Firms would like to create barriers to entry to keep new firms out of market
  - Patent, copyrights, licenses, economies of scale

Interaction Among Firms

- If firms are aggressive in gaining market share by, for example, undercutting the other firms, prices may reach close to competitive levels.
- If firms collude (violation of antitrust rules), could generate substantial monopoly power
- Markets are dynamic and therefore, so is the concept of monopoly power

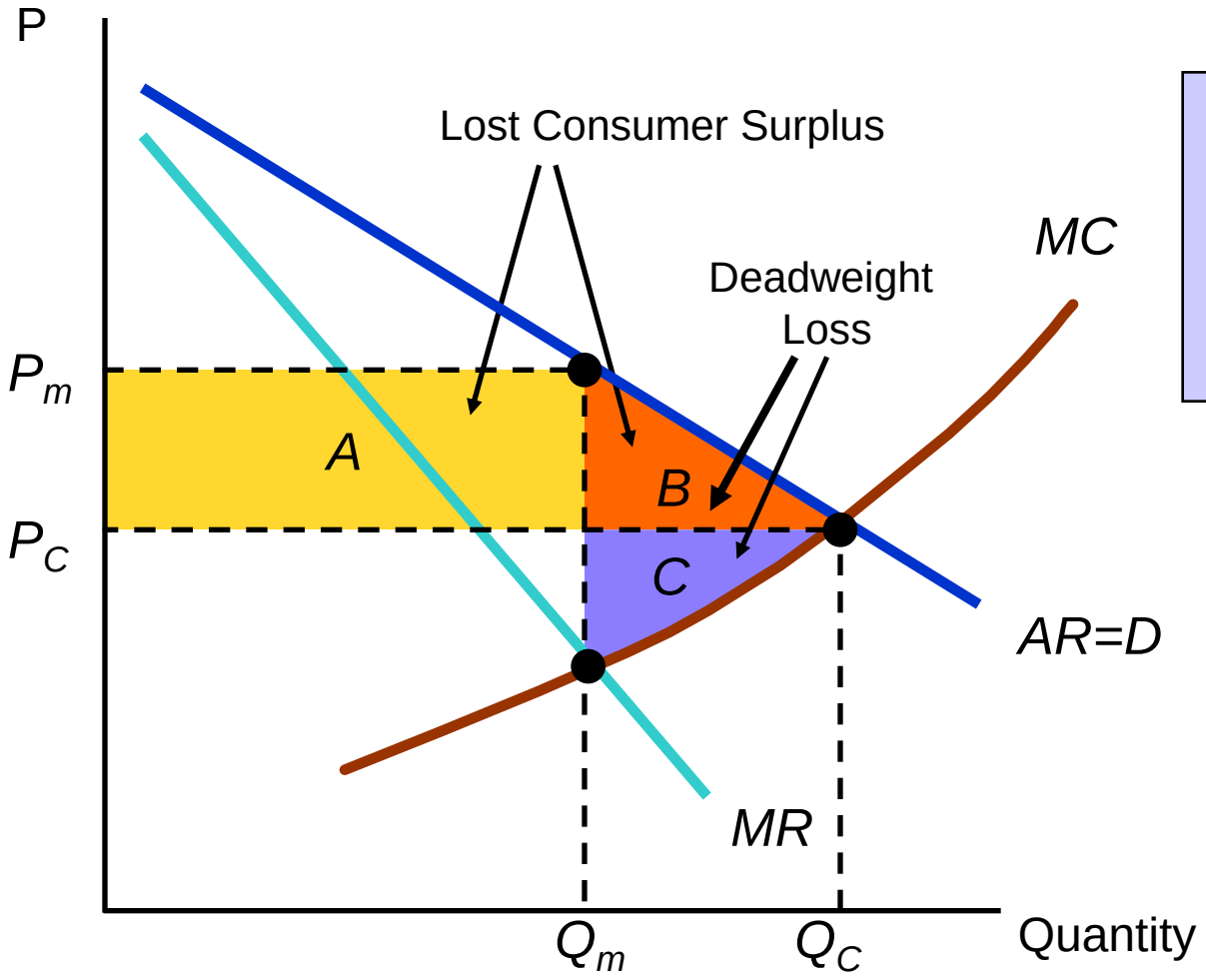
The Social Costs of Monopoly Power

- Monopoly power results in higher prices and lower quantities.
- However, does monopoly power make consumers and producers in the aggregate better or worse off?
- We can compare producer and consumer surplus when in a competitive market and in a monopolistic market

The Social Costs of Monopoly

- Perfectly competitive firm will produce where MC = D → PC and QC
- Monopoly produces where MR = MC, getting their price from the demand curve → PM and QM
- There is a loss in consumer surplus when going from perfect competition to monopoly
- A deadweight loss is also created with monopoly

Deadweight Loss from Monopoly Power



Because of the higher price, consumers lose *A+B* and producer gains *A-C.*

The Social Costs of Monopoly

- Social cost of monopoly is likely to exceed the deadweight loss
- Rent Seeking
  - Firms may spend to gain monopoly power
    - Lobbying
    - Advertising
    - Building excess capacity

The Social Costs of Monopoly

- The incentive to engage in monopoly practices is determined by the profit to be gained.
- The larger the transfer from consumers to the firm, the larger the social cost of monopoly.

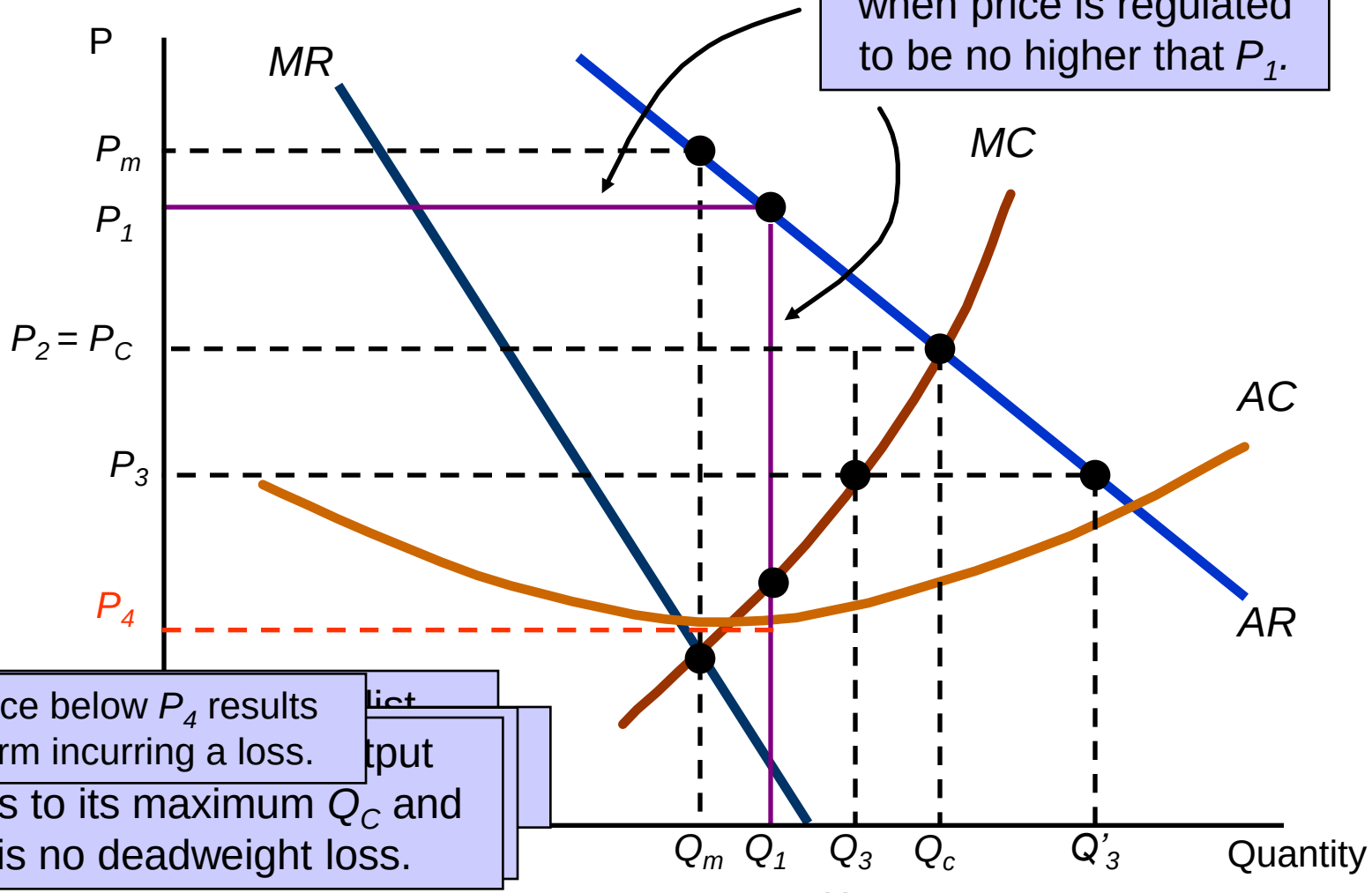
The Social Costs of Monopoly

- Example
  - 1996 Archer Daniels Midland (ADM) successfully lobbied for regulations requiring ethanol be produced from corn
  - Although ethanol is the same whether produced from corn, potatoes, grain or anything else, ADM had a near monopoly on corn based ethanol production.

The Social Costs of Monopoly

- Government can regulate monopoly power through price regulation
  - Recall that in competitive markets, price regulation created a deadweight loss.
  - Price regulation can eliminate deadweight loss with a monopoly
  - We can show the effect of the regulation can be shown graphically

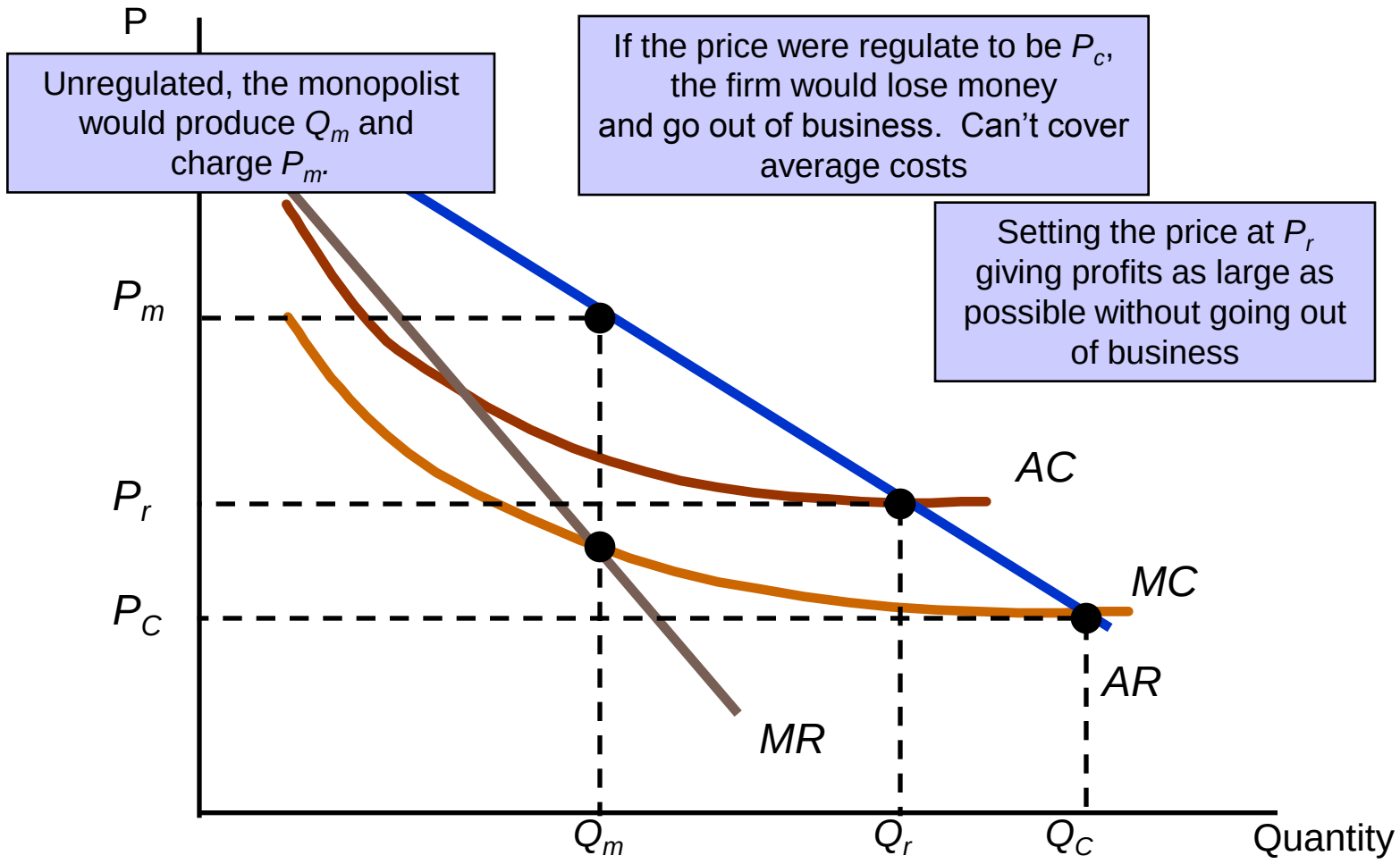
Price Regulation



The Social Costs of Monopoly Power

- Natural Monopoly
  - A firm that can produce the entire output of an industry at a cost lower than what it would be if there were several firms.
  - Usually arises when there are large economies of scale
  - We can show that splitting the market into two firms results in higher AC for each firm than when only one firm was producing

Regulating the Price of a Natural Monopoly



The Social Costs of Monopoly Power

- Regulation in Practice
  - It is very difficult to estimate the firm's cost and demand functions because they change with evolving market conditions
  - An alternative pricing technique – *rate-of-return regulation* allows the firms to set a maximum price based on the expected rate or return that the firm will earn.

Regulation in Practice

- There are problems however with rate of return regulation
  1. Firm's capital stock is difficult to value
  2. "Fair" rate of return based on actual cost of capital, that cost is based on regulatory behavior (and investor's perception of allowed rates in the future).

Regulation in Practice

- Rate of return regulation leads to lags in regulatory response to changes in cost and other market conditions
- Leads to long and expensive regulatory hearings.
- The hearing process creates a *regulatory lag* that may benefit producers (1950s & 60s) or consumers (1970s & 80s).

Regulation in Practice

- Government may also set price caps based on firms variable costs, past prices, and possibly inflation and productivity growth
- A firm is typically allowed to raise its price each year without approval from regulatory agency by amount equal to inflation minus expected productivity growth

Monopsony

- A monopsony is a market in which there is a single buyer.
- An oligopsony is a market with only a few buyers.
- Monopsony power is the ability of the buyer to affect the price of the good and pay less than the price that would exist in a competitive market.

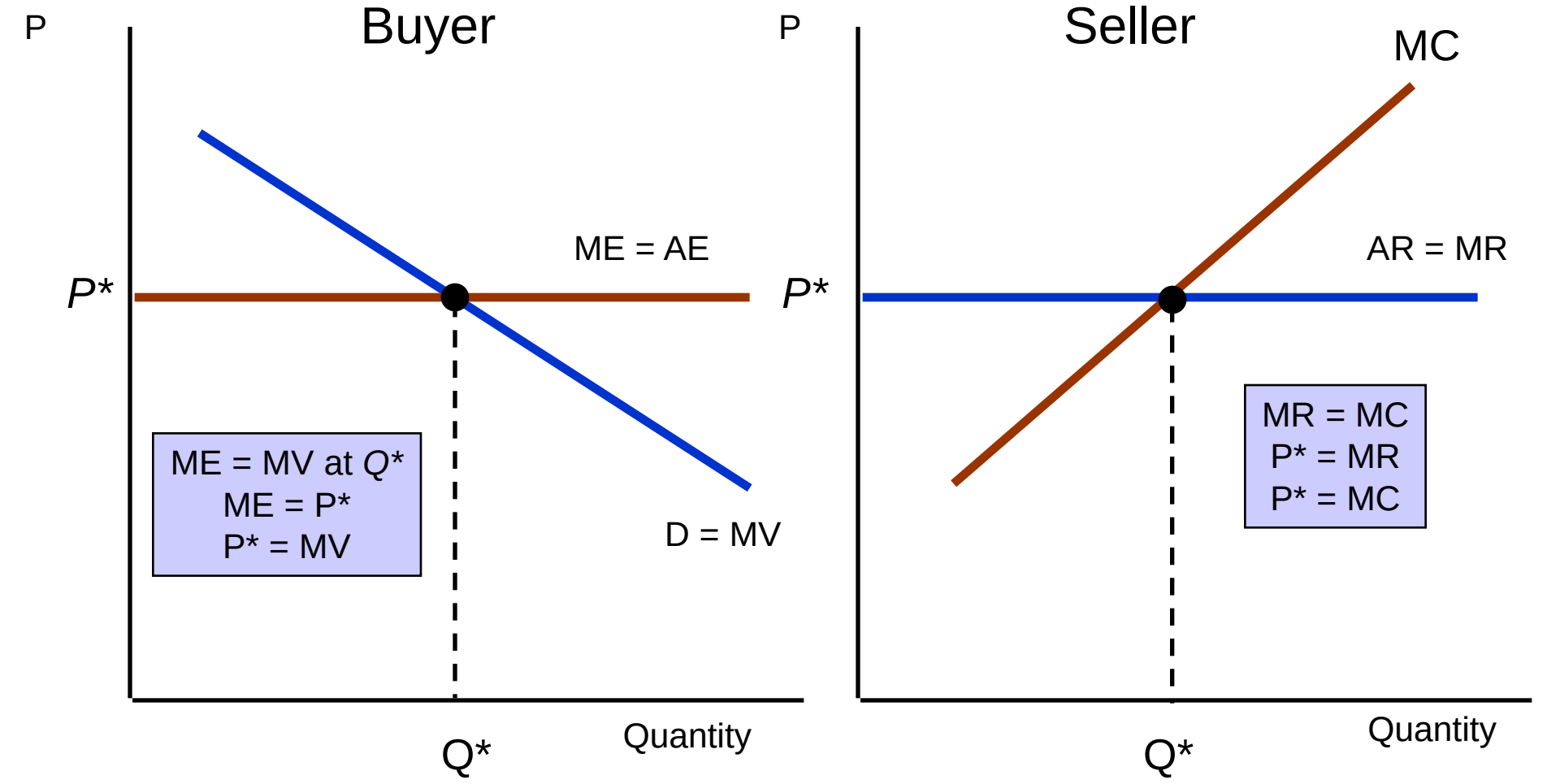
Monopsony

- Typically choose to buy until the benefit from last unit equals that unit's cost
- Marginal value is the additional benefit derived from purchasing one more unit of a good
  - Demand curve – downward sloping
- Marginal expenditure is the additional cost of buying one more unit of a good
  - Depends on buying power

Monopsony

- Competitive Buyer
  - Price taker
  - P = Marginal expenditure = Average expenditure
  - D = Marginal value
- Graphically can compare competitive buyer to competitive seller

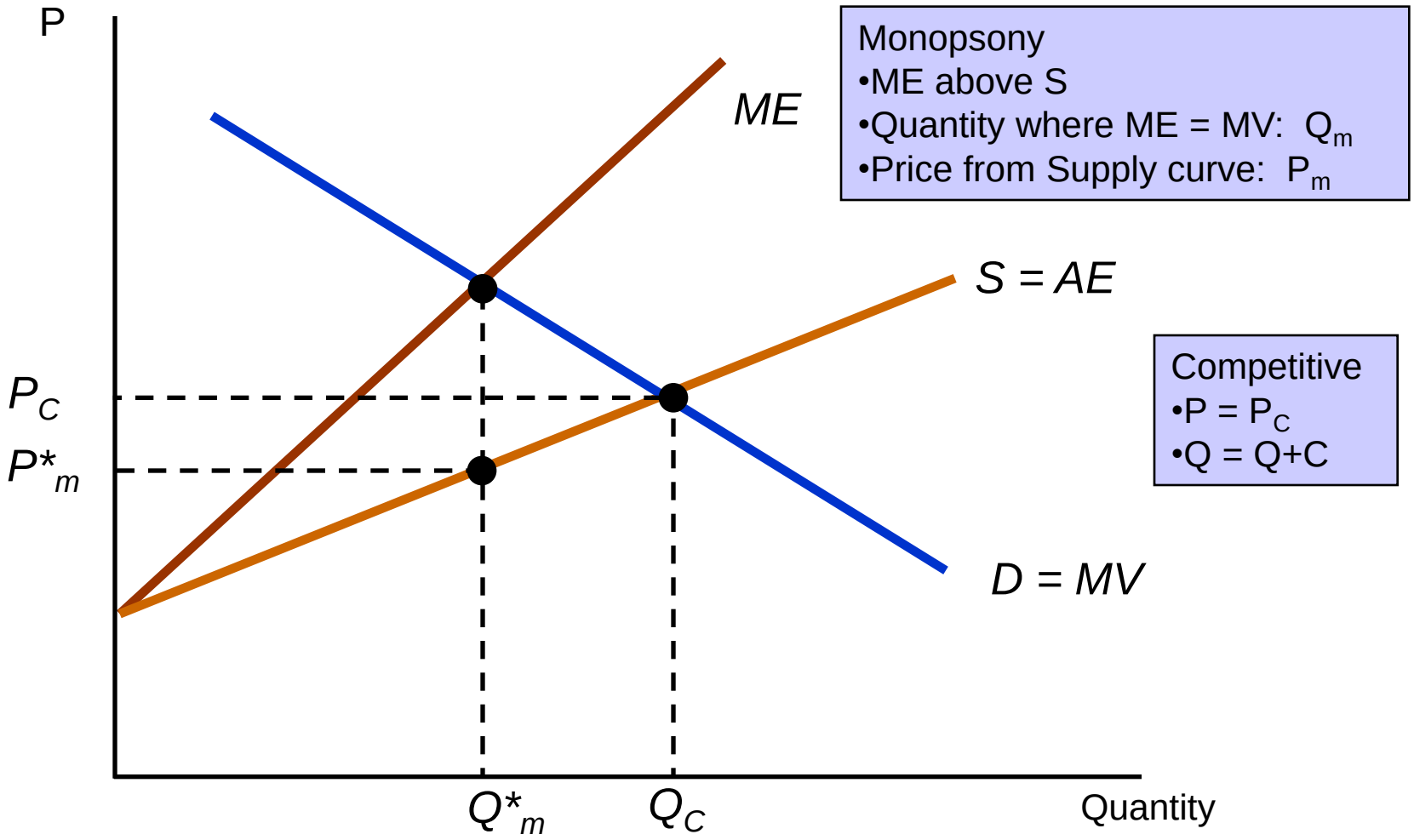
Competitive Buyer Compared to Competitive Seller



Monopsonist Buyer

- Buyer will buy until value from last unit equals expenditure on that unit.
- The market supply curve is not the marginal expenditure curve
  - Market supply show how much must pay per unit as a function of total units purchased
  - Supply curve is ***average*** expenditure curve
  - Upward sloping supply implies the marginal expenditure curve must lie above it
  - Decision to buy extra unit raises price paid for *all* units

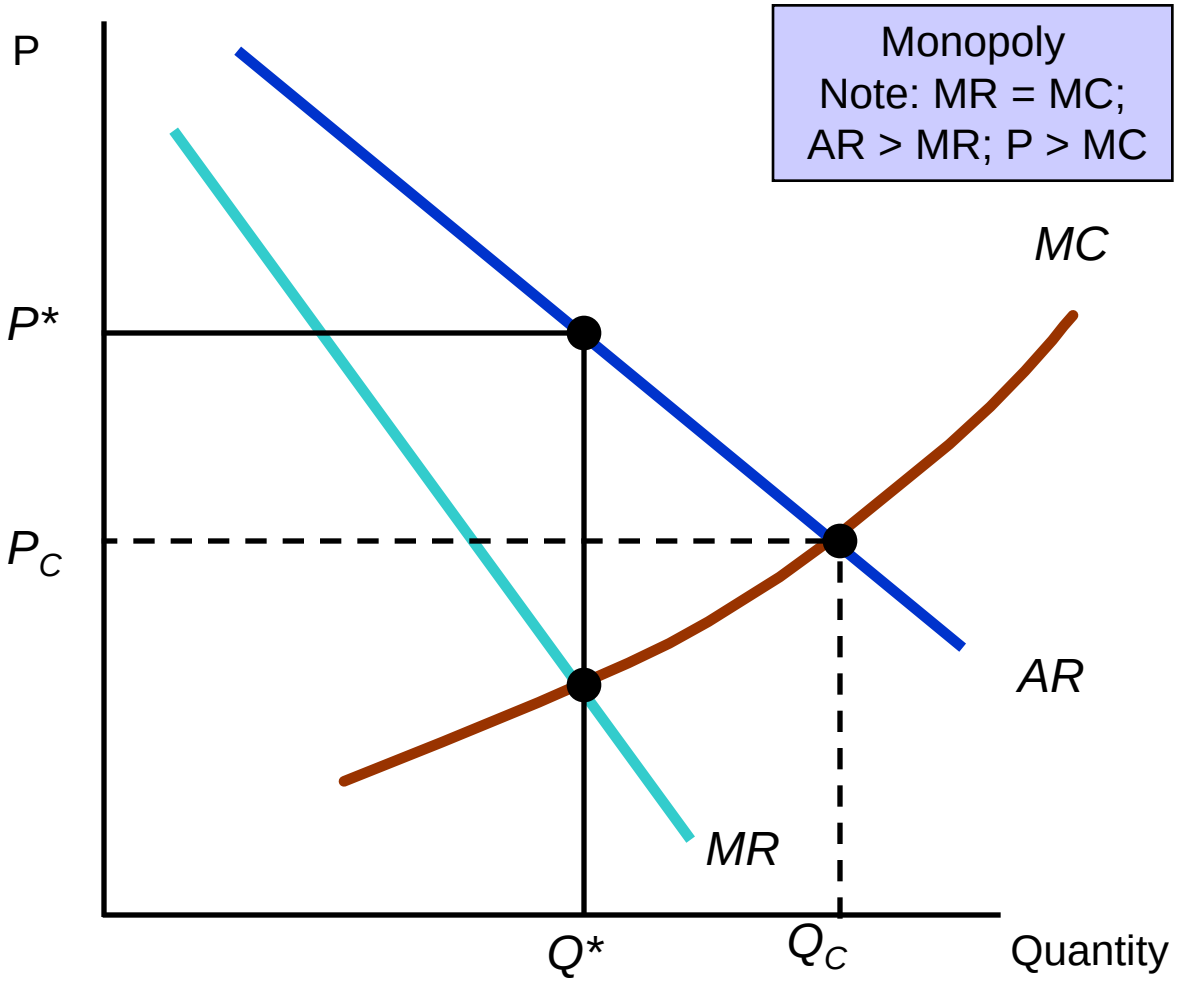
Monopsonist Buyer



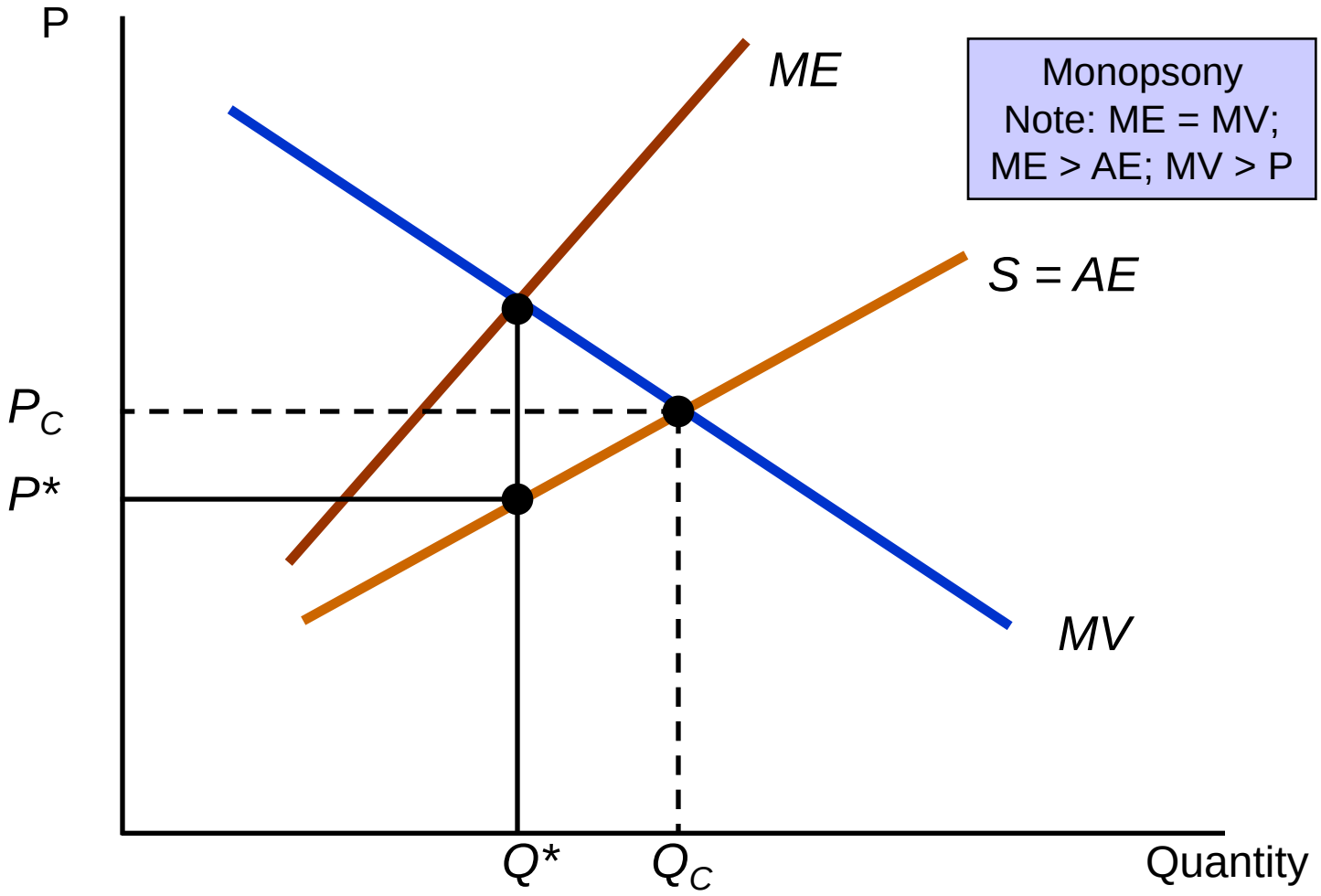
Monopoly and Monopsony

- Monopsony is easier to understand if we compare to monopoly
- We can see this graphically
- Monopolist
  - Can charge price above MC because faces downward sloping demand (average revenue)
  - MR < AR
  - MR=MC gives quantity less than competitive market and price that is higher

Monopoly and Monopsony



Monopoly and Monopsony



Monopoly and Monopsony

- Monopoly
  - MR < P
  - P > MC
  - Qm < QC
  - Pm > PC
- Monopsony
  - ME > P
  - P < MV
  - Qm < QC
  - Pm < PC

Monopsony Power

- More common than pure monopsony are a few firm competing among themselves as buyers so that each firm has some monopsony power
  - Automobile industry
- Monopsony power gives them the ability to pay a price that is less than marginal value.

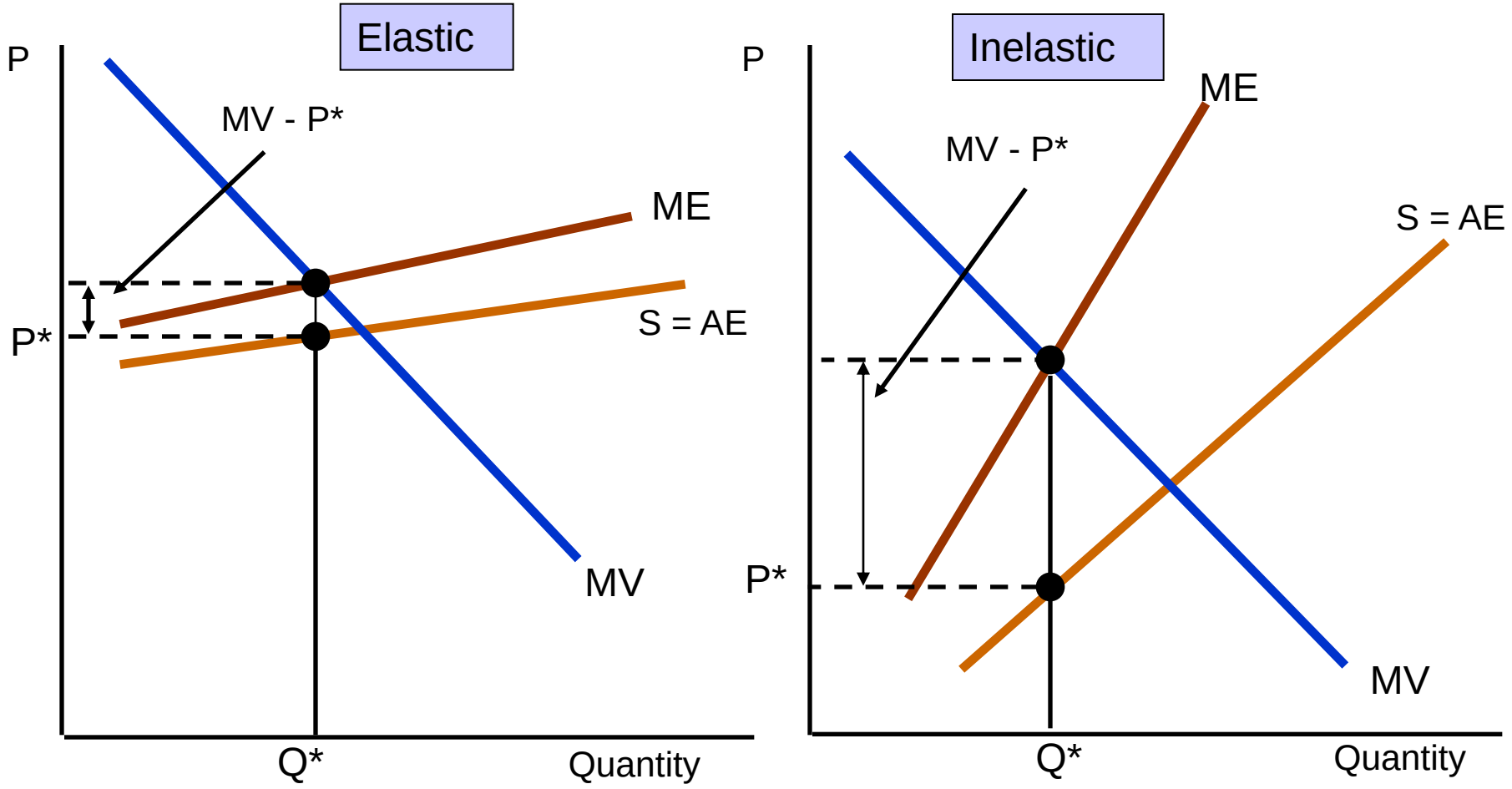
Monopsony Power

- The degree of monopsony power depends on three factors.
  1. Number of buyers
     - The fewer the number of buyers, the less elastic the supply and the greater the monopsony power.
  2. Interaction Among Buyers
     - The less the buyers compete, the greater the monopsony power.

Monopsony Power

- The degree of monopsony power depends on three similar factors.
  3. Elasticity of market supply
     - Extent to which price is marked down below MV depends on elasticity of supply facing buyer
     - If supply is very elastic, markdown will be small
     - The more inelastic the supply the more monopsony power

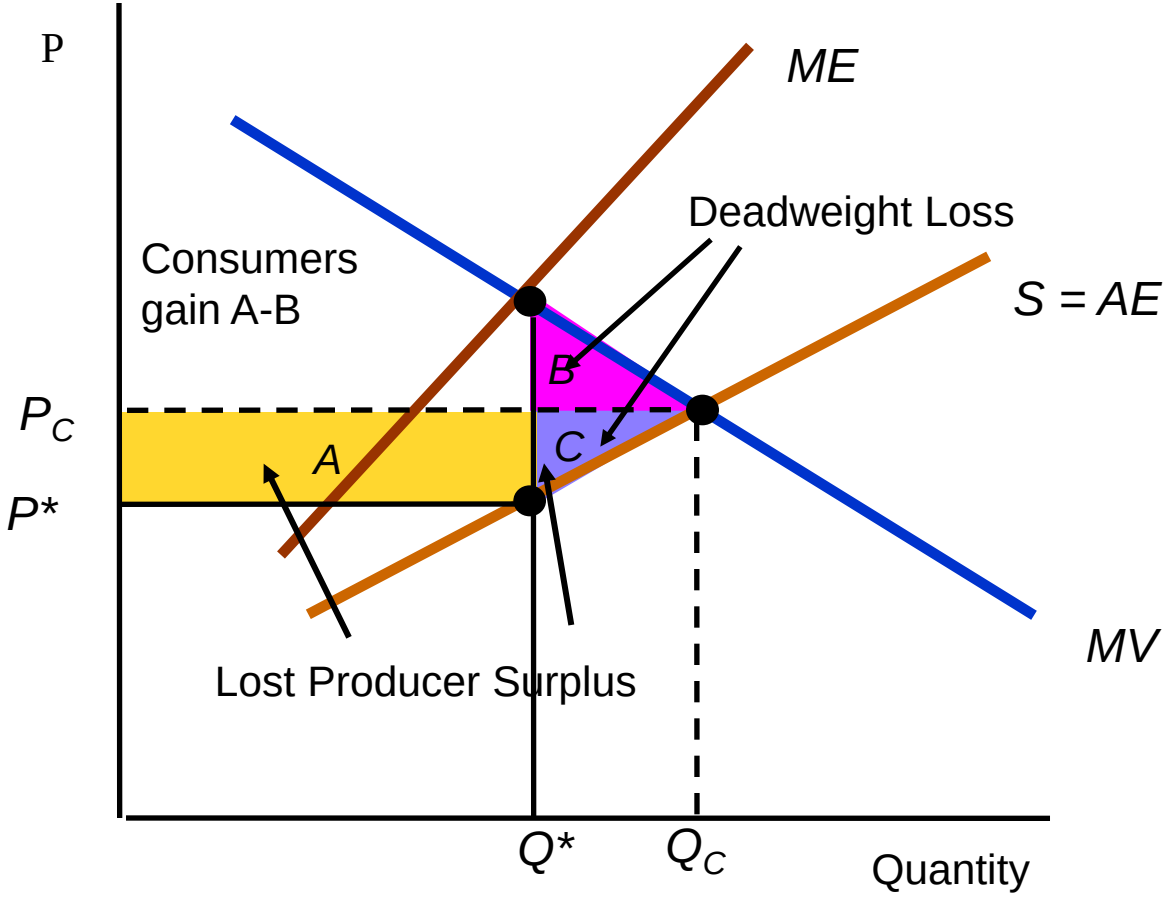
Monopsony Power: Elastic versus Inelastic Supply



Social Costs of Monopsony Power

- Since monopsony power gives lower prices and lower quantities purchased, we would expect sellers to be worse off and buyers better off
- We can show effects of monopsony power using producer and consumer surplus compared to competitive market
  - For sole monopsonist, quantity is where ME=MV and price is from demand
  - For competitive market, quantity and price where S=D

Deadweight Loss from Monopsony Power



Monopsony Power

- Bilateral Monopoly
  - Market where there is only one buyer and one seller
  - Bilateral monopoly is rare, however, markets with a small number of sellers with monopoly power selling to a market with few buyers with monopsony power is more common.
  - Even with bargaining, in general, monopsony and monopoly power will counteract each other

Limiting Market Power: The Antitrust Laws

- Market power harms some player in the market – buyer or seller.
- Market power reduces output leading to deadweight loss
- Excessive market power could raise problems of equity and fairness

Limiting Market Power: The Antitrust Laws

- What can we do to limit market power and keep it from being used anti-competitively?
  - Tax away monopoly profits and redistribute to consumers
    - Difficult to measure and find all those who lost
  - Direct price regulation of natural monopolies
  - Keep firms from acquiring excessive market power
    - Antitrust laws

The Antitrust Laws

- Rules and regulations designed to promote a competitive economy by:
  - Prohibiting actions that restrain or are likely to restrain competition
  - Restricting the forms of allowable market structures
- Monopoly power arises in a number of ways, each of which is covered by the antitrust laws

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- Sherman Act (1890) – Section 1
  - Prohibits contracts, combinations, or conspiracies in restraint of trade
    - Explicit agreement to restrict output or fix prices
    - Implicit collusion through parallel conduct
      - Form of implicit collusion in which one firm consistently follows actions of another
  - Example
    - In 1999, four of world's largest drug and chemical companies found guilty of fixing prices of vitamins sold in US

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- Sherman Act (1890) – Section 2
  - Makes it illegal to monopolize or attempt to monopolize a market and prohibits conspiracies that result in monopolization.
- Clayton Act (1914)
  1. Makes it unlawful to require a buyer or lessor not to buy from a competitor

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- Clayton Act (1914)
  2. Prohibits predatory pricing
     - Practice of pricing to drive current competitors out of business and to discourage new entrants in a market so that a firm can enjoy higher future profits.
  3. Prohibits mergers and acquisitions if they "substantially lessen competition" or "tend to create a monopoly"

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- Robinson-Patman Act (1936)
  - Amendment of the Clayton Act
  - Prohibits price discrimination if it causes buyers to suffer economic damages and competition is reduced

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- Federal Trade Commission Act (1914, amended 1938, 1973, 1975)
  1. Created the Federal Trade Commission (FTC)
  2. Supplements the Sherman and Clayton acts by fostering competition through set of prohibitions against unfair and anticompetitive practices
     - Prohibitions against deceptive advertising, labeling, agreements with retailer to exclude competing brands

Enforcement of Antitrust Laws

- Antitrust laws are enforced three ways:

1. Antitrust Division of the Department of Justice
   - A part of the executive branch – the administration can influence enforcement
   - Fines levied on businesses; fines and imprisonment levied on individuals

Enforcement of Antitrust Laws

2. Federal Trade Commission
   - Enforces through voluntary understanding or formal commission order
3. Private Proceedings
   - Can sue for *treble* damages (three fold damages)
   - Individuals or companies can also ask for injunctions to force wrongdoers to cease anticompetitive actions

Enforcement of Antitrust Laws

- US antitrust laws are stricter and more far reaching than the rest of the world
  - Some have claimed this has hindered US effectively competing in international markets
- With growth of European Union, methods of antitrust enforcement have evolved
  - Similar to US laws with some procedural and substantive differences
  - Europe only imposes civil penalties

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- Two Examples
  - American Airlines
    - Early 80's president and CEO accused of attempting to price fix
  - Microsoft
    - Monopoly power
    - Predatory actions
    - Collusion