OBJECTIVES

- Explain how managers should set price and output when they have market power
- With monopoly power, the firm's demand curve is the market demand curve. A monopolist is the only seller of a product for which there are no close substitutes and which is protected by barriers to entry.
- Monopolistically competitive firms have market power based on product differentiation, but barriers to entry are modest or absent.

MONOPOLY

Characteristics

A single seller. A single firm produces all industry output The monopoly is the industry.

Unique Product- Monopoly output is perceived by customers to be distinctive and preferable to its imperfect substitutes

Blockaded entry and exit- Firms are heavily restricted form entering or leaving the industry

Imperfect dissemination of information- Cost, price, and product quality information are withheld from uninformed buyers.

A monopoly is the only firm in the industry therefore it faces the industry demand curve. Since it is likely to be downward sloping the monopoly can choice either price or quantity. In addition since the monopolist's demand curve isn't flat his Marginal Revenue curve will be below its demand curve.

PRICING AND OUTPUT DECISIONS IN MONOPOLY

- Example
  - Demand: $P = 10 – Q$
  - Total revenue: $TR = PQ = 10Q – Q^2$
  - Marginal revenue: $MR = 10 – 2Q$
  - Total cost: $TC = 1 + Q + 0.5Q^2$
  - Marginal cost: $MC = 1 + Q$
  - $MR = 10 – 2Q = 1 + Q = MC \Rightarrow Q = 3$
  - $P = 10 – 3 = 7$
  - Profit = $Q(P – ATC)$

TABLE 8.1

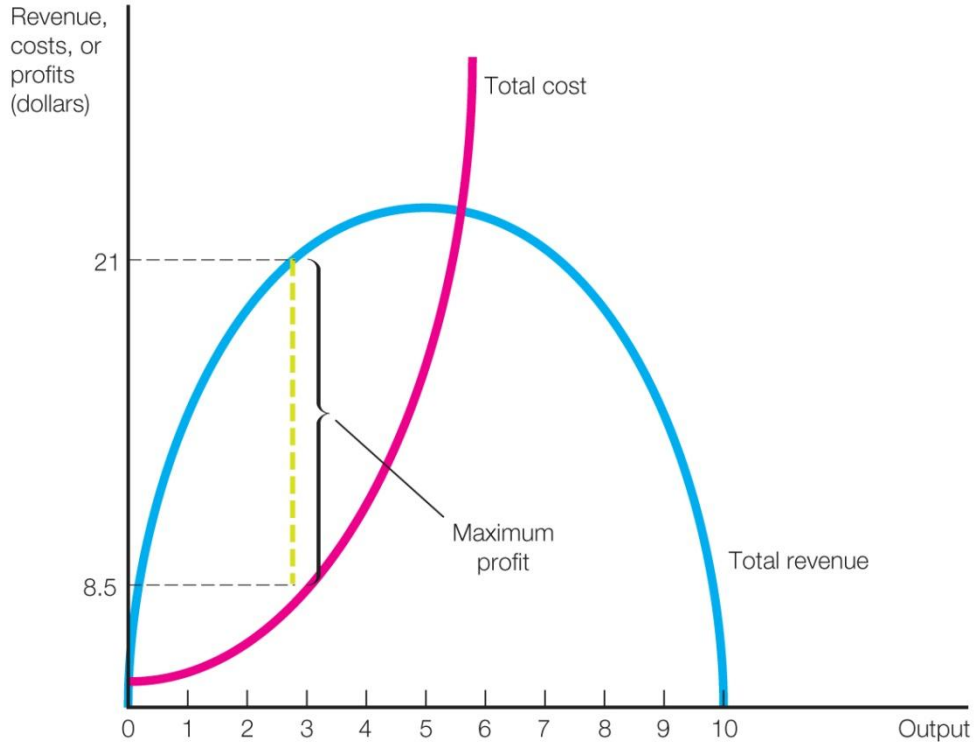
Cost, Revenue, and Profit of a Monopolist

Output	Price (Dollars)	Total Revenue (Dollars)	Variable Cost (Dollars)	Total Cost (Dollars)	Total Profit (Dollars)	Variable-Cost Profit (Dollars)
0	10	0	0	1	−1	0
1	9	9	1.5	2.5	6.5	7.5
2	8	16	4	5	11	12
3	7	21	7.5	8.5	12.5	13.5
4	6	24	12	13	11	12
4.5	*5.5*	*24.75*	*14.625*	*15.625*	*9.125*	*10.125*
5	5	25	17.5	18.5	6.5	7.5
6	4	24	24	25	−1	0
7	3	21	31.5	32.5	−11.5	−10.5
8	2	16	40	41	−25	−24
9	1	9	49.5	50.5	−41.5	−40.5
10	0	0	60	61	−61	−60

TOTAL REVENUE, TOTAL COST, AND TOTAL PROFI T OF A MONOPOLIST

FIGURE 8.1

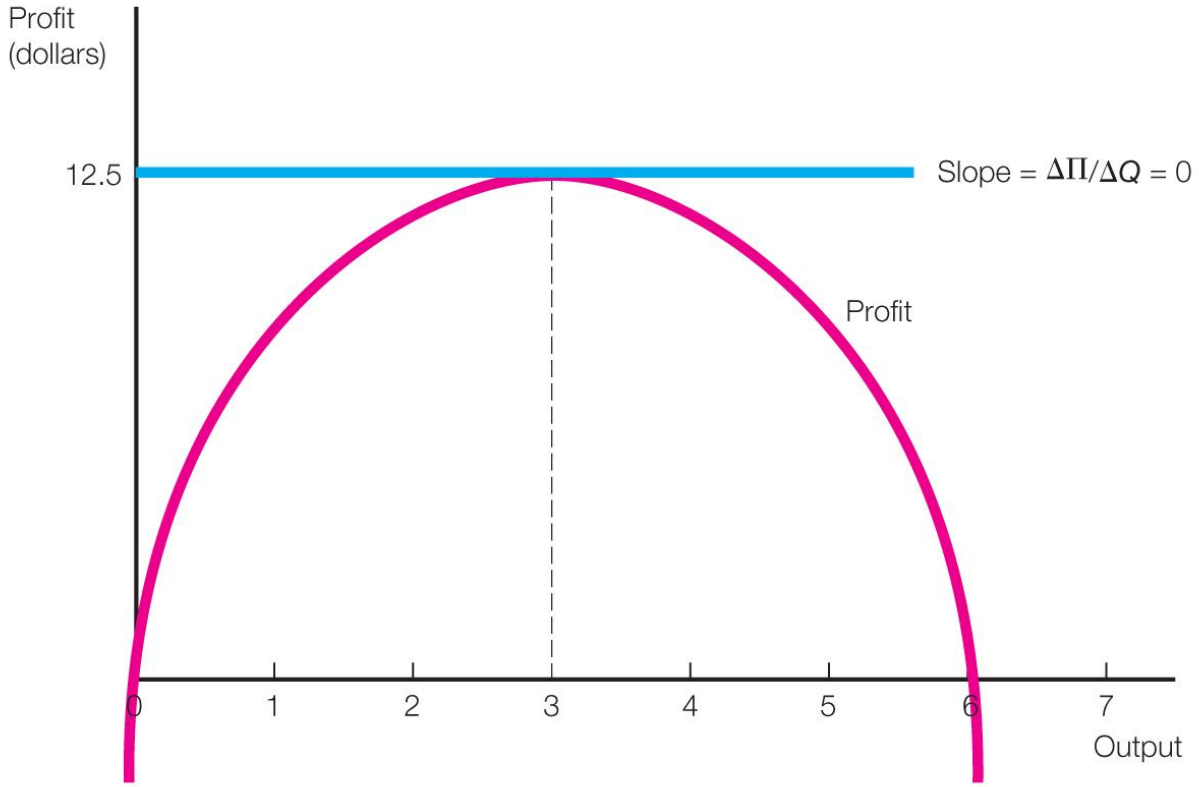
Total Revenue, Total Cost, and Total Profit of a Monopolist



PROFIT AND OUTPUT OF A MONOPOLIST

FIGURE 8.2

Profit and Output of a Monopolist



PRICING AND OUTPUT DECISIONS IN MONOPOLY

- Marginal revenue
  - Unlike perfect competition, MR is less than price and depends on Q.
  - $MR = P[1 + (1/\eta)] = P[1 – (1/|\eta|)] = P – P/|\eta|$

PRICING AND OUTPUT DECISIONS IN MONOPOLY

- MR = P[1 + (1/η)] = P[1 – (1/|η|)] = P – P/|η| (Continued)
  - A profit-maximizing monopolist will not produce where demand is inelastic; that is, where |η| < 1, because MR < 0.
  - MC = MR = P[1 – (1/|η|)]; so the profit-maximizing price is

$$MC = P\left[1 - \left(\frac{1}{|\eta|}\right)\right] \text{ or}$$

$$P = \frac{MC}{\left[1 - \left(\frac{1}{|\eta|}\right)\right]}$$

TABLE 8.2

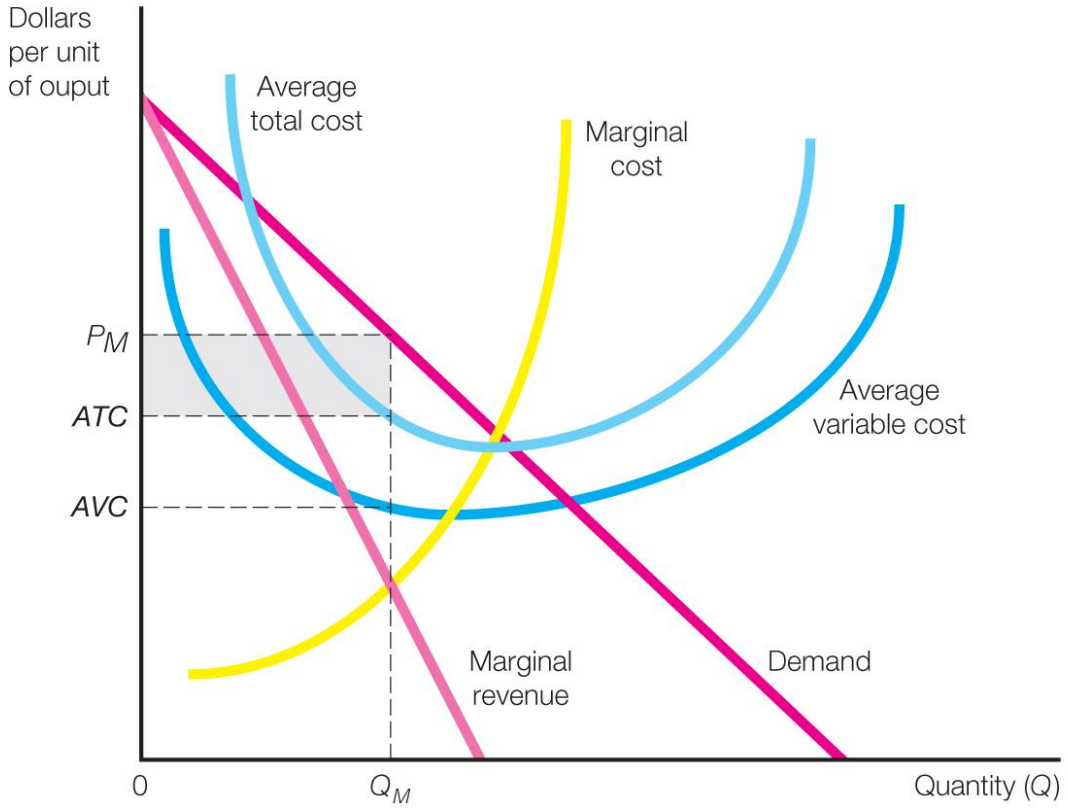
Marginal Cost and Marginal Revenue of a Monopolist

Price	Output	Marginal Cost[a]	Marginal Revenue[b]	Total Profit[c]	Elasticity
10	0	1	10	−1	$-\infty$
9	1	2	8	6.5	−9
8	2	3	6	11	−4
7	3	4	4	12.5	−2.33
6	4	5	2	11	−1.5
5.5	4.5	5.5	1	9.125	−1.22
5	5	6	0	6.5	−1
4	6	7	−2	−1	−0.67
3	7	8	−4	−11.5	−0.43
2	8	9	−6	−25	−0.25
1	9	10	−8	−41.5	−0.11
0	10	11	−10	−61	0

OUTPUT AND PRICE DECISIONS OF A MONOPOLIST

FIGURE 8.4

Output and Price Decisions of a Monopolist



The monopolist will still set MC = MR.

Consider the following Demand curve

$P = \$80 - \$0.0008Q$

$MR = \Delta TR/\Delta Q = \Delta(P*Q)/\Delta Q$

$= \Delta(Q(\$80 - \$0.0008Q))/\ \Delta Q = \$80 - \$0.0016Q$

Let set MC =20

MR=MC

$\Rightarrow$ $80 -$0.0016Q = $20

$\Rightarrow$ Q=37,500

We can solve for price by plugging the quantity back into the demand function.

P= $80 - $0.0008(37,500) = $50.

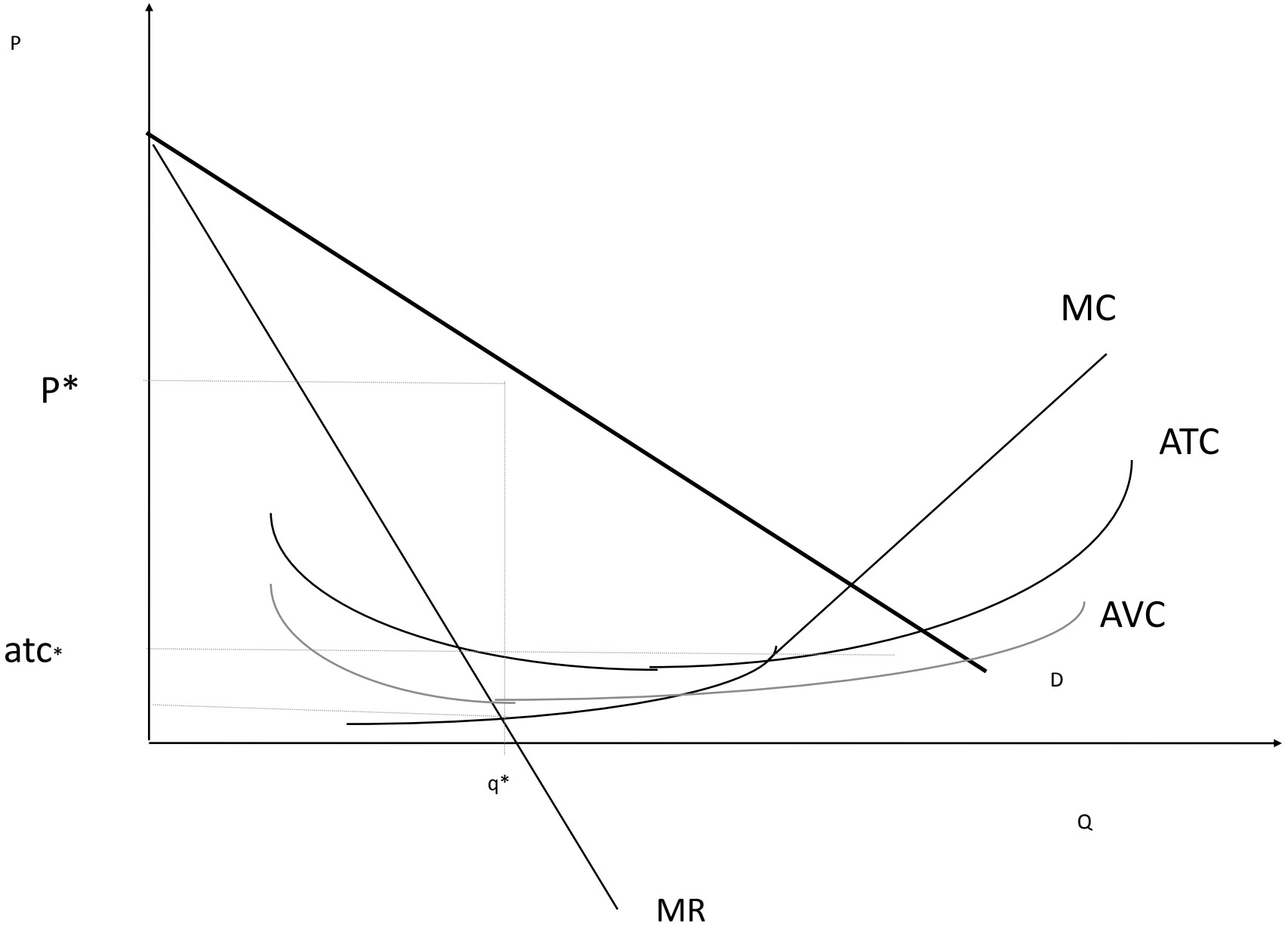
Profit.

π=TR-TC

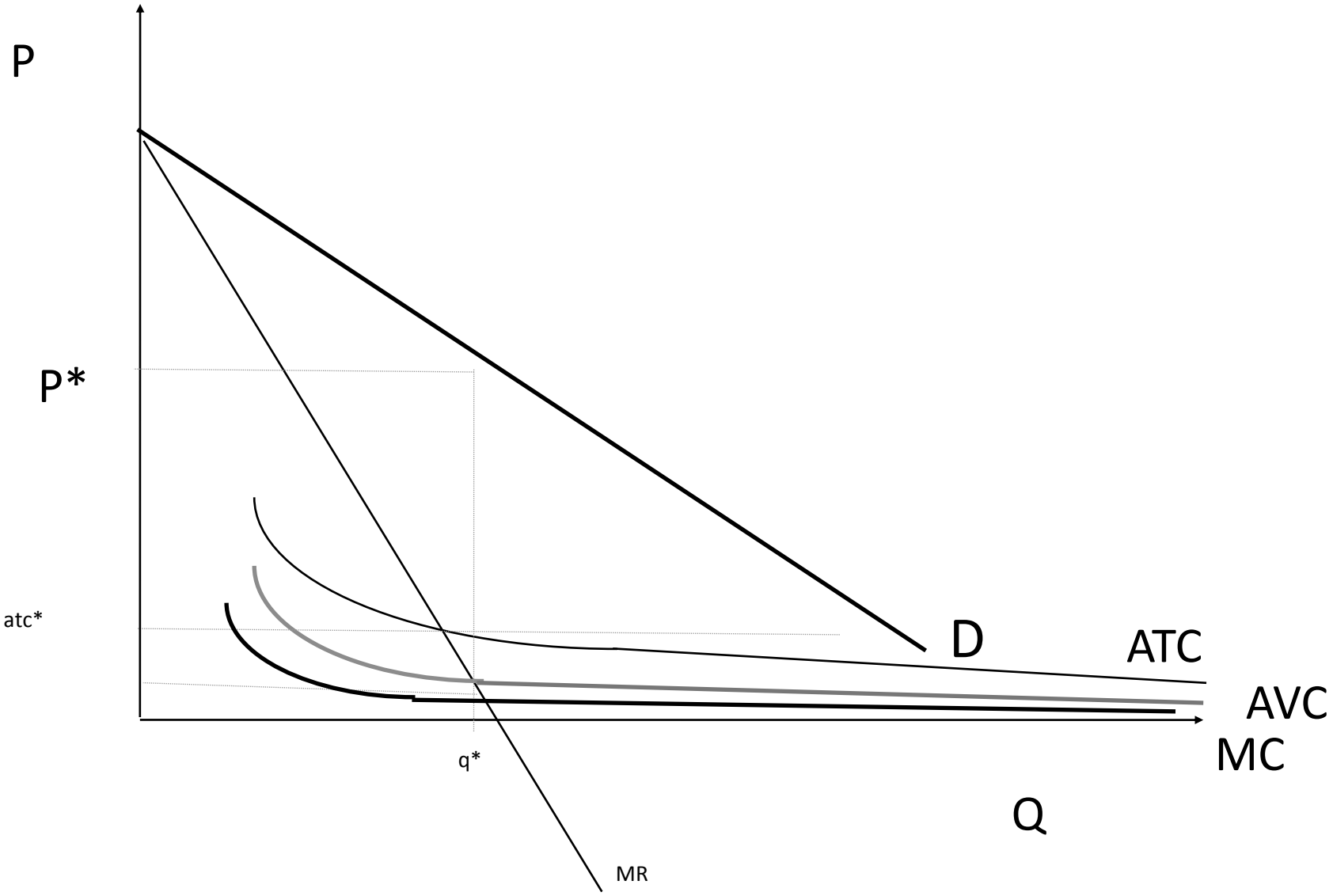
π= PQ-AC*Q, since AC=MC when flat (fixed).

π=$50(37,500) - $20(37,500)=1,125,000

Graphical Example for monopoly with “normal” cost function.



Natural Monopoly - An industry in which the market-clearing price occurs at a point at which the monopolist's long-run average costs are still declining.


P
P*
atc*
D
ATC
AVC
MC
q*
Q
MR

Underproduction- A situation that occurs where a monopolist curtails production to a level at which marginal cost is less than price.

Countervailing power- Buyer market power that offsets seller market power and vice versa.

COST-PLUS PRICING

- Cost-plus pricing: Simplistic strategy that guarantees that price is higher than the estimated average cost
  - Studies of pricing behavior suggest that many managers who use cost-plus pricing do not price optimally.
  - Markup = (Price – Cost)/Cost
  - Price = (Cost)(1 + Markup)
  - Example: Price = 6, Cost = 4, Markup = 0.50

COST-PLUS PRICING

- Profit margin: Price of a product minus its cost
  - Profit margin = Price – Cost

COST-PLUS PRICING

- Target Return: What managers hope to earn and what determines the markup
  - $P = L + M + K + (F/Q) + (\pi A/Q)$
    - L = unit labor cost
    - M = unit material cost
    - K = unit marketing cost
    - F = total fixed costs
    - Q = units to produce
    - A = gross operating assets
    - π = desired profit rate (%)

COST-PLUS PRICING AT THERMA-STENT

- Factory cost = $2,300
- Markup = 40% = $920
- Price = $3,220

COST-PLUS PRICING AT THERMA-STENT

- Cost-plus pricing is widely used in medical group purchasing organizations.
  - Factory cost = $2,300
  - 40% markup = $920
  - Price = $3,220
- Using the heuristic eases the complexity of setting price by ignoring market considerations.

COST-PLUS PRICING AT INTERNET COMPANIES AND GOVERNMENT-REGULATED INDUSTRIES

- Cost-plus pricing is used often used by Internet companies and government-regulated industries.
- The danger of such a pricing scheme in a government-controlled industry is that when the profit is guaranteed, firm managers may lose the incentive to be cost efficient.

CAN COST-PLUS PRICING MAXIMIZE PROFIT?

- Optimal markup = $1/(|\eta| - 1)$
- Optimal markup is higher is demand is less elastic
- Table 8.3: Relationship between Optimal Markup and Price Elasticity of Demand

TABLE 8.3

Relationship between Optimal Markup and Price Elasticity of Demand

Price Elasticity of Demand	Optimal Percentage Markup of Marginal Cost
−1.2	500
−1.4	250
−1.8	125
−2.5	66.67
−5.0	25
−11.0	10
−21.0	5
−51.0	2

THE MULTIPLE-PRODUCT FIRM: DEMAND INTERRELATIONSHIPS

- Multiple-product firm (Good X and Good Y)
  - Total revenue = TR = $TR_X + TR_Y$
    - $MR_X = \Delta TR/\Delta Q_X = \Delta TR_X/\Delta Q_X + \Delta TR_Y/\Delta Q_X$
    - $MR_Y = \Delta TR/\Delta Q_Y = \Delta TR_X/\Delta Q_Y + \Delta TR_Y/\Delta Q_Y$
  - If the two goods are substitutes, then $\Delta TR_X/\Delta Q_Y$ and $\Delta TR_Y/\Delta Q_X$ are negative.
  - If the two goods are complements, then $\Delta TR_X/\Delta Q_Y$ and $\Delta TR_Y/\Delta Q_X$ are positive.

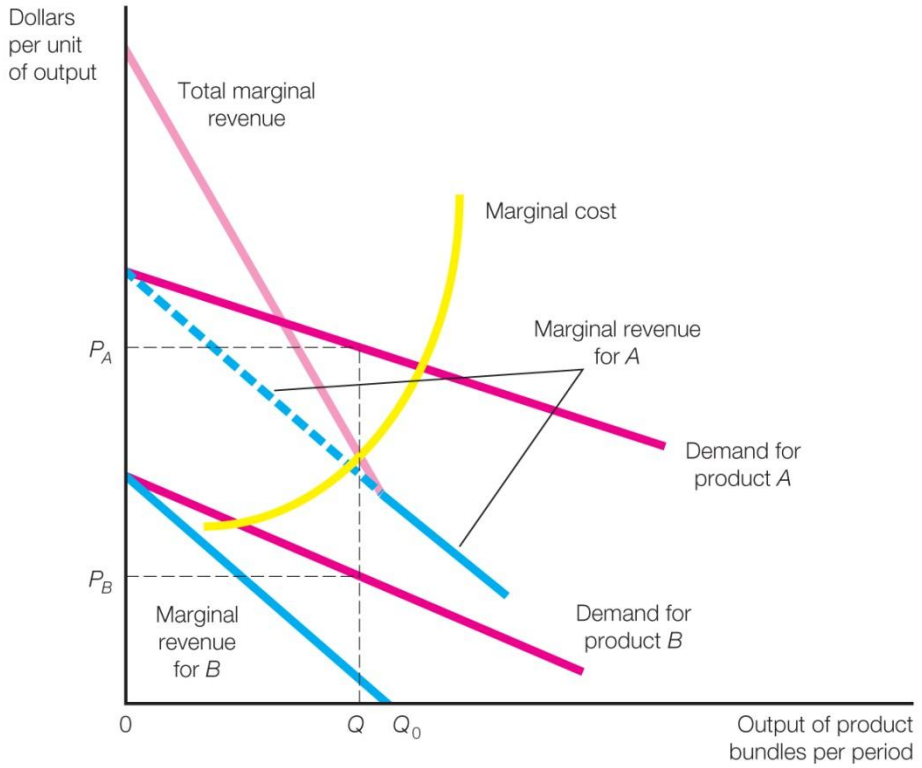
THE MULTIPLE-PRODUCT FIRM: DEMAND INTERRELATIONSHIPS

- Pricing of Joint Products: Fixed Proportions
  - Total marginal revenue curve: Vertical summation of the two marginal revenue curves for individual products
  - Figure 8.5: Optimal Pricing for Joint Products Produced in Fixed Proportions (Case 1)
    - Marginal revenue of both products is positive at the optimal level of output.

OPTIMAL PRICING FOR JOINT PRODUCTS PRODUCED IN FIXED PROPORTIONS (CASE 1)

FIGURE 8.5

Optimal Pricing for Joint Products Produced in Fixed Proportions (Case 1)



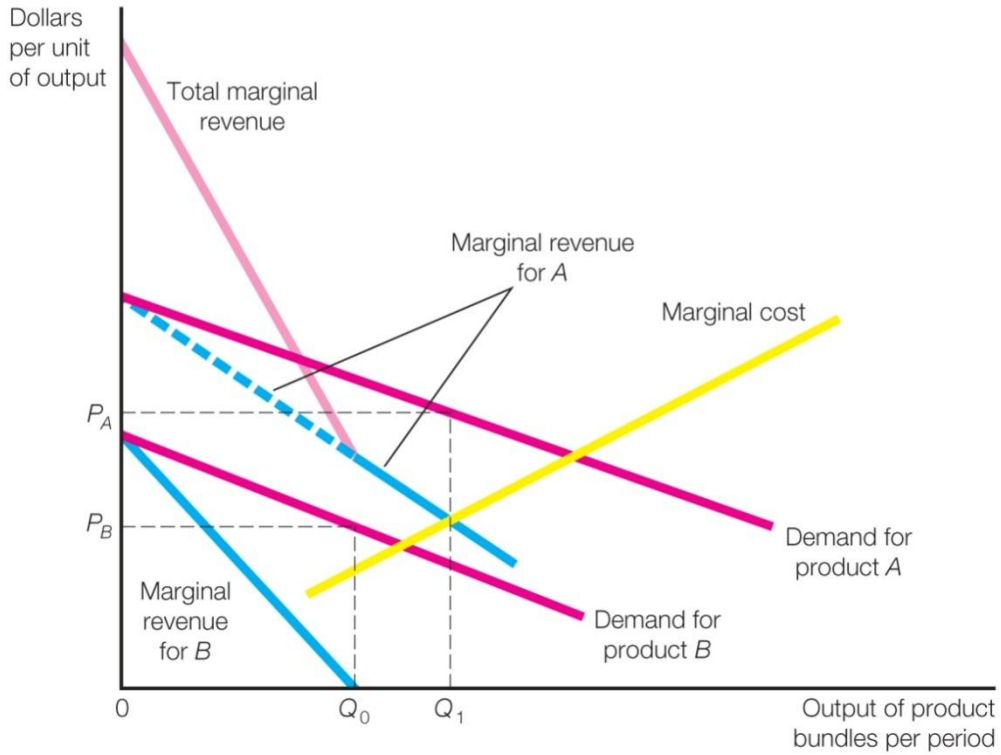
THE MULTIPLE-PRODUCT FIRM: DEMAND INTERRELATIONSHIPS

- Figure 8.6: Optimal Pricing for Joint Products Produced in Fixed Proportions (Case 2)
  - The marginal revenue of one product is negative at the optimal level of output.
  - If a product's marginal revenue is negative, then the firm will dispose of a quantity sufficient to bring marginal revenue to zero and thereby maximize revenue on that product.

OPTIMAL PRICING FOR JOINT PRODUCTS PRODUCED IN FIXED PROPORTIONS (CASE 2)

FIGURE 8.6

Optimal Pricing for Joint Products Produced in Fixed Proportions (Case 2)



THE MULTIPLE-PRODUCT FIRM: DEMAND INTERRELATIONSHIPS

- Output of Joint Products: Variable Proportions
  - Isocost curve: Curve showing the amounts of goods produced at the same total cost
  - Isorevenue lines: Lines showing the combinations of output of products that yield the same total revenue

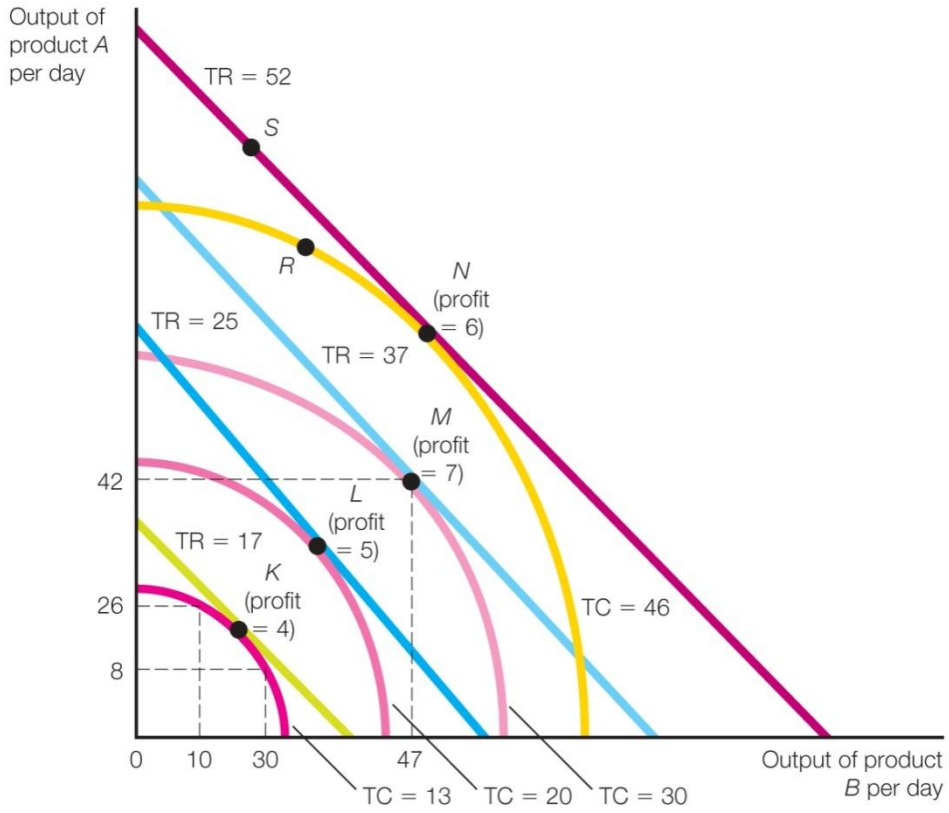
THE MULTIPLE-PRODUCT FIRM: DEMAND INTERRELATIONSHIPS

- Output of Joint Products: Variable Proportions (cont'd)
  - Optimal combinations of goods are found where isocost and isorevenue lines are tangent.
  - Optimal total production is found where profit is maximized, which occurs at a point of tangency where the difference between cost and revenue is maximized.

OPTIMAL OUTPUTS FOR JOINT PRODUCTS PRODUCED IN VARIABLE PROPORTIONS

FIGURE 8.7

Optimal Outputs for Joint Products Produced in Variable Proportions



MONOPSONY

- Monopsony: Markets that consist of a single buyer
  - Contrast with monopoly markets that consist of a single seller
  - Buyers in a competitive market face a horizontal supply curve; they are price takers.

MONOPSONY

- Monopsony: Markets that consist of a single buyer (cont'd)
  - There is only one buyer in a monopsony market, and this buyer faces the upward-sloping market supply curve, which means that marginal cost is above the supply price.
  - Under monopsony, the buyer will purchase a quantity where marginal cost is equal to marginal revenue product and pay a price below marginal cost.

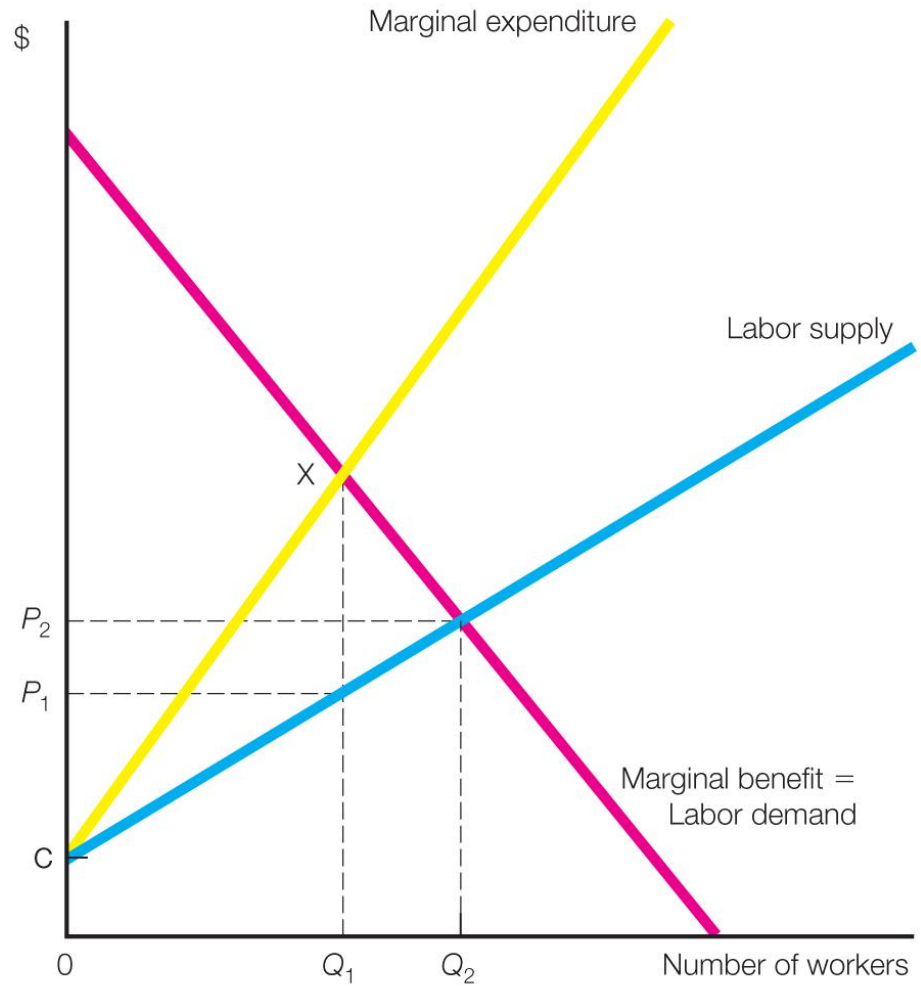
MONOPSONY

- Example: Monopsony labor market
  - Labor supply: $P = c + eQ$
  - Total cost: $C = PQ = (c + eQ)Q$
  - Marginal cost: $\Delta C/\Delta Q = c + 2eQ = MC$
  - Figure 8.8: Optimal Monopsony Pricing
  - The wage (P) and quantity hired (Q) are both less than at the competitive equilibrium

OPTIMAL MONOPSONY PRICING

FIGURE 8.8

Optimal Monopsony Pricing



Monopolistic Competition

A market structure characterized by a large number of sellers of differentiated products.

Characteristics

•Large # of buyers and sellers. Each firm in the industry produces a small portion of industry output, and each customer buys only a small part of the total.

•Product heterogeneity. The output of each firm is perceived by customers to be essentially different from, though comparable with, the output of other firms in the industry

•Free entry and exit. firms are not restricted from entering or leaving the industry

•Perfect dissemination of information. Cost, price, and product quality information is known by all buyers and all sellers in the market.

MONOPOLISTIC COMPETITION

- Characteristics of monopolistic competition
  - Product differentiation—products are not perceived as identical by consumers
  - Managers have some pricing discretion, but because products are similar, price differences a relatively small.
  - Competition takes place within a product group.
- Product group: Group of firms that produce similar products

MONOPOLISTIC COMPETITION

- Conditions that must be met, in addition to product differentiation, to define a product group as monopolistically competitive
  - There must be many firms in the product group.
  - The number of firms in the product group must be large enough that each firm expects its actions to go unheeded by its rivals and unimpeded by possible retaliatory moves on their part.

MONOPOLISTIC COMPETITION

- Conditions that must be met, in addition to product differentiation, to define a product group as monopolistically competitive (cont'd)
  - Entry into the product group must be relatively easy, and there must be no collusion, such as price fixing or market sharing, among managers in the product group.

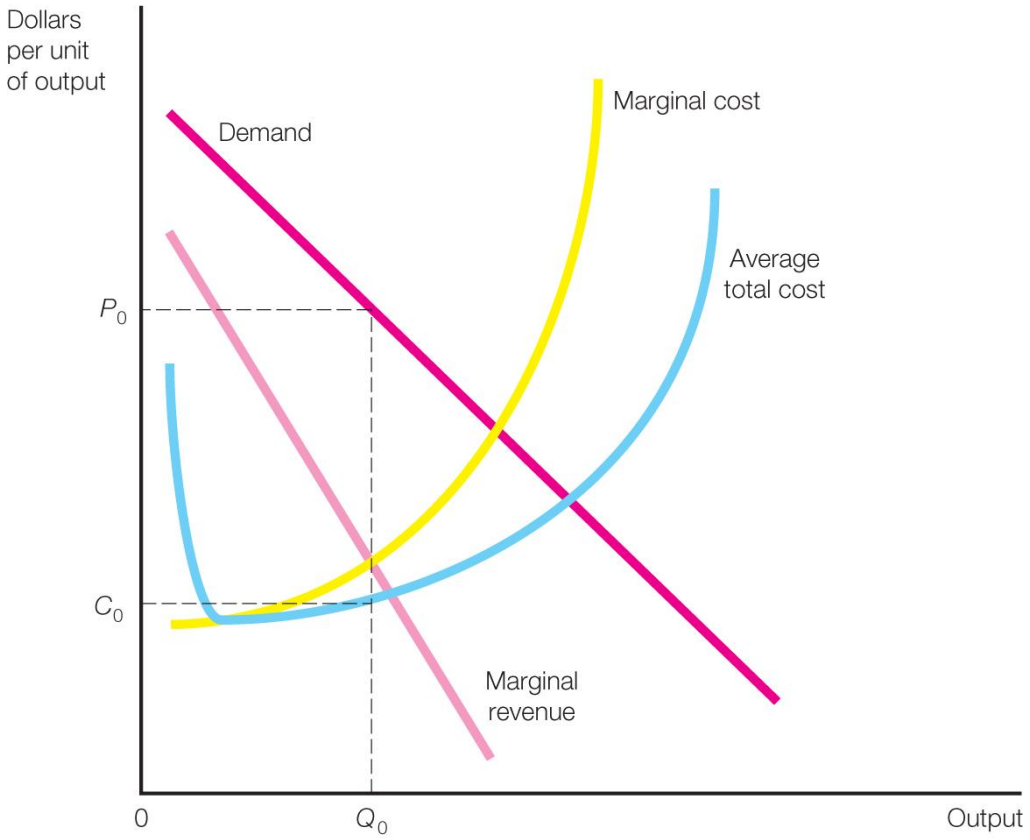
MONOPOLISTIC COMPETITION

- Price and Output Decisions under Monopolistic Competition
  - Figure 8.9: Short-Run Equilibrium in Monopolistic Competition.
    - Identical to short-run equilibrium under monopoly
  - Figure 8.10: Long-Run Equilibrium in Monopolistic Competition
    - Entry and exit of firms from the product group shifts individual firms' demand curves.
    - Long-run equilibrium occurs where profit is equal to zero.

SHORT-RUN EQUILIBRIUM IN MONOPOLISTIC COMPETITION

FIGURE 8.9

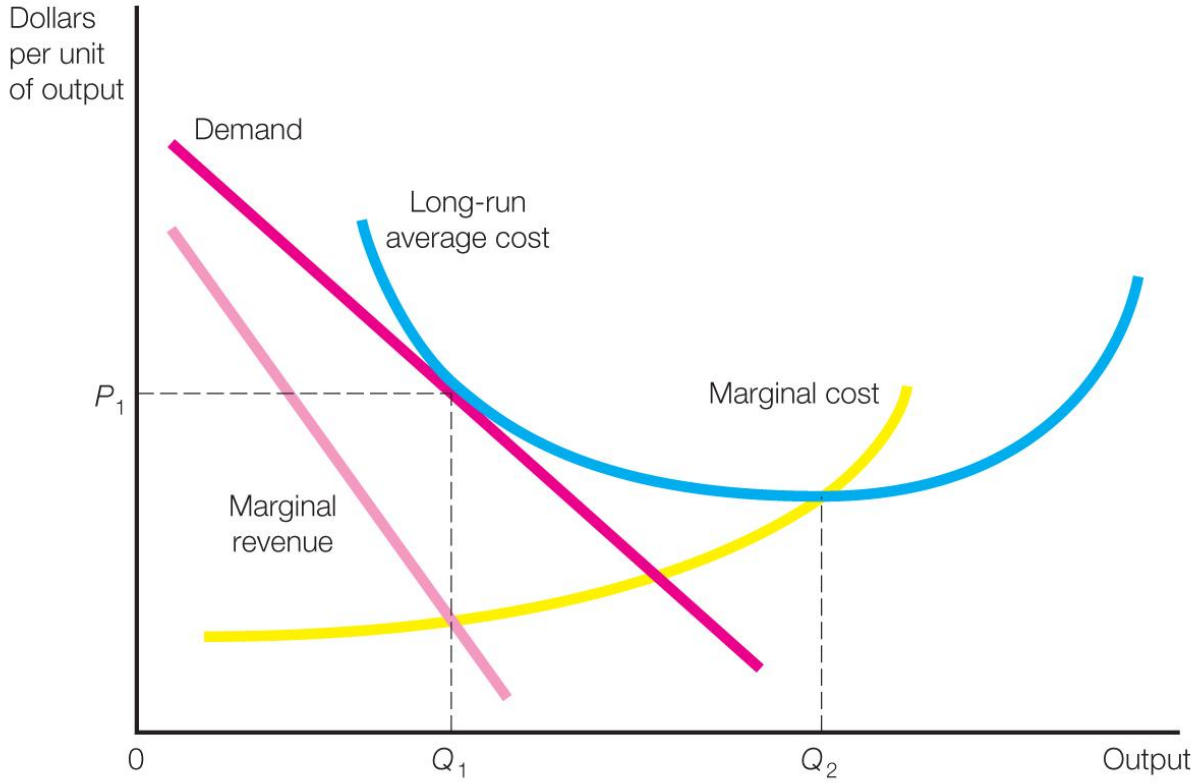
Short-Run Equilibrium in Monopolistic Competition



LONG-RUN EQUILIBRIUM IN MONOPOLISTIC COMPETITION

FIGURE 8.10

Long-Run Equilibrium in Monopolistic Competition



ADVERTISING EXPENDITURES: A SIMPLE RULE

- How much should a profit-maximizing manager spend on advertising?
  - Assume diminishing returns to advertising expenditures.
  - Assume that quantity demanded depends only on price and advertising expenditures.
  - Table 8.4: Relationship Between Advertising Expenditures and Quantity
    - Illustrates diminishing marginal returns (see below) between advertising expenditures (A) and quantity demanded (Q)

TABLE 8.4

Relationship between Advertising Expenditures and Quantity

Advertising Expenditures (Millions of Dollars)	Quantity Sold of Product (Millions of Units)
0.8	15.0
0.9	17.0
1.0	18.5
1.1	19.5
1.2	20.0

ADVERTISING EXPENDITURES: A SIMPLE RULE

- Derivation
  - Net profit = P – MC (omitting advertising expenditures)
  - Advertising expenditures are optimal if the increase in net profit from an additional dollar spent on advertising is equal to one dollar.

ADVERTISING EXPENDITURES: A SIMPLE RULE

- Derivation (cont'd)
  - If ΔQ is defined as the number of extra units sold as a result of an additional dollar of advertising expenditures, then advertising expenditures are optimal when
    $\Delta Q(P - MC) = 1$
  - The above implies that the marginal revenue from an extra dollar of advertising = $|\eta|$ when advertising expenditures are optimal. Managers should therefore increase advertising expenditures until this condition is reached.

USING GRAPHS TO HELP DETERMINE ADVERTISING EXPENDITURE

- Figure 8.11: Optimal Advertising Expenditure
  - Curve A: Relationship between advertising expenditures and the absolute value of the price elasticity of demand—higher expenditures cause demand to become less elastic.
  - Curve B: Relationship between marginal revenue from an extra dollar of advertising expenditures and total advertising expenditures

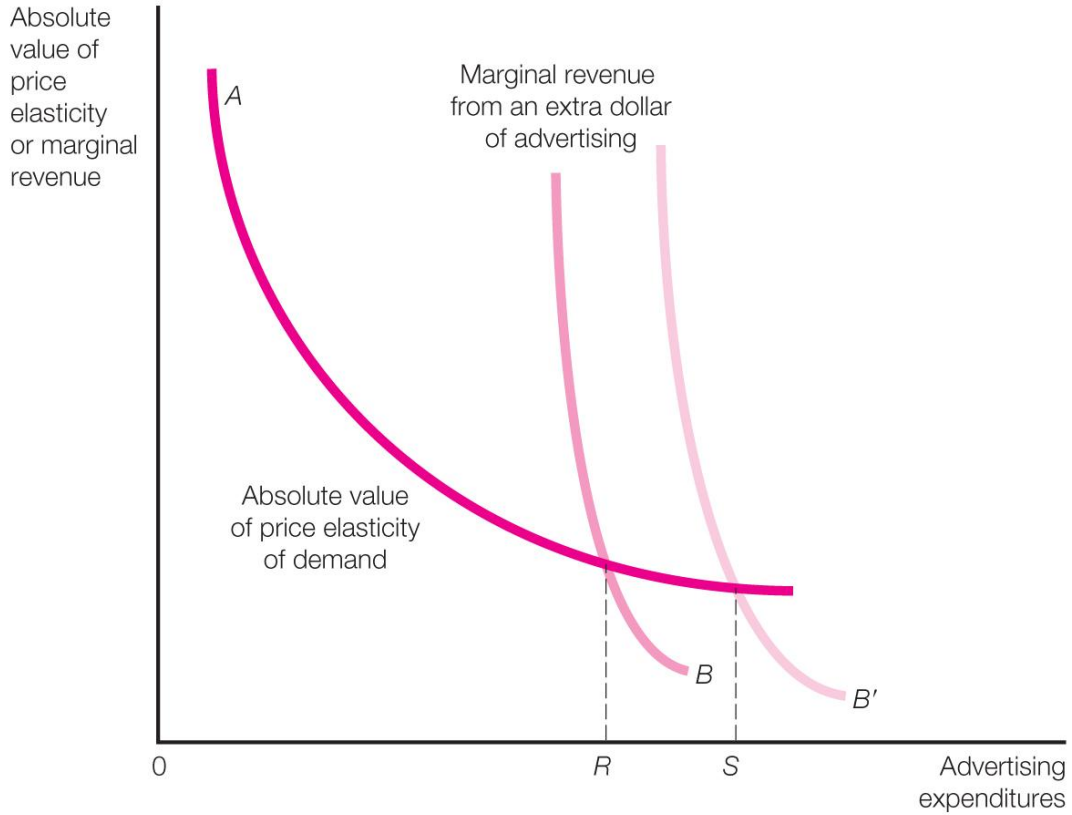
USING GRAPHS TO HELP DETERMINE ADVERTISING EXPENDITURE

- Figure 8.11: Optimal Advertising Expenditure (cont'd)
  - The intersection between Curve A and Curve B defines the optimal level of advertising expenditures.
  - Curve B' represents a shift in Curve B due to increasing advertising effectiveness. It results in an increase in advertising expenditures.

OPTIMAL ADVERTISING EXPENDITURE

FIGURE 8.11

Optimal Advertising Expenditure



ADVERTISING, PRICE ELASTICITY, AND BRAND EQUITY: EVIDENCE ON MANAGERIAL BEHAVIOR

- Promotions
  - Appeal to price sensitivity
  - Price-oriented message
  - Attempt to erode brand loyalty
  - Attempt to increase price elasticity and limit the premiums consumers are willing to pay for brand-name products

ADVERTISING, PRICE ELASTICITY, AND BRAND EQUITY: EVIDENCE ON MANAGERIAL BEHAVIOR

- Advertising
  - Attempts to build brand loyalty
  - Loyalty is measured as the frequency of repeat purchases
  - Product-quality oriented message

ADVERTISING, PRICE ELASTICITY, AND BRAND EQUITY: EVIDENCE ON MANAGERIAL BEHAVIOR

- Evidence
  - Promotions do increase the price elasticities of consumers.
  - Promotions have less effect on brand loyalists.
  - The effects of promotions decay over time.
  - Price elasticity of non-loyalists was found to be four times that of loyalists in one study.
  - The effects of advertising on brand loyalty erode over time and price becomes more important to consumers.