The Firm and Its Customers

ECONOMICS

Dr. Kumar Aniket

UCL

Lecture 7

©Dr. Kumar Aniket

Previously

How workers decide how much they would like to *trade-off work* and *leisure (Unit 3)*

How institutions affect the *relative bargaining power* and *distribution of surplus* in society *(Unit 5)*

How firms need to pay *economic rents* in order to *incentivise* the workers to *supply effort*? *(Unit 6)*

©Dr. Kumar Aniket

Concepts

Marginal rate of Substitution (MRS)

rate at which a person is *willing to trade-off* consumption of one good for another

slope of the *indifference curve*

Marginal rate of transformation (MRT)

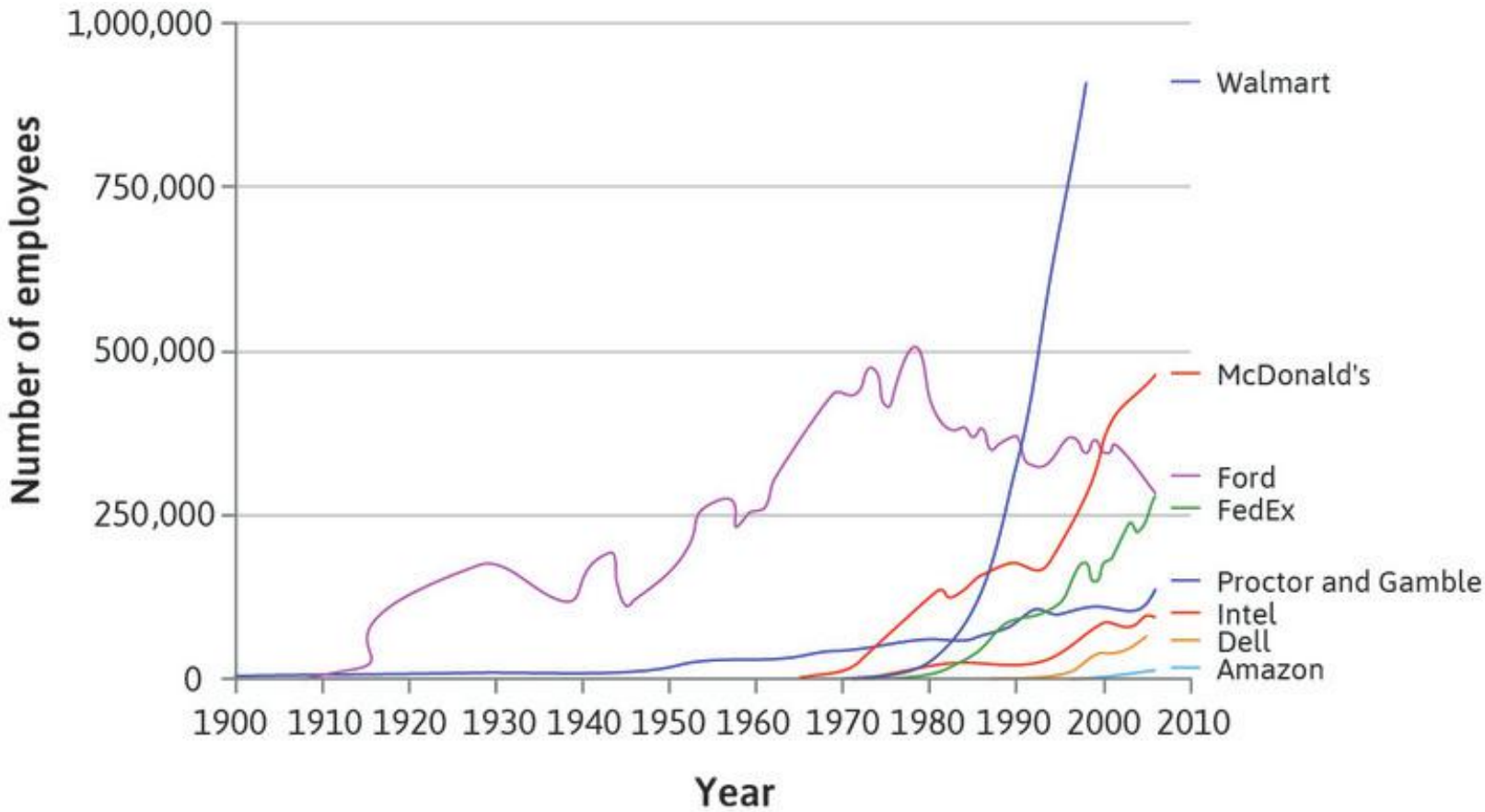
the rate at which production of one good can be *transformed* into another good

slope of the *feasible frontier*

©Dr. Kumar Aniket

In all developed countries, *most people work for large firms*. *Why?*

Why are the firms able to acquire *market power*?



US: Number of employees working for large firms

©Dr. Kumar Aniket

This Lecture

Market segment

Differentiated products within a market segment?

Interaction between customers and profit-maximising firms that produce *differentiated products*

Factors that affect the supply side, i.e., the *firm's choice* of *price* and *quantities* produced (costs, price elasticity, market power)

Surplus: measuring the gains from trade

©Dr. Kumar Aniket

Market segment

Firms decision process:

Consumer's *willingness to pay* in a particular *market segment*?

Market segment: consumers buying a particular set of products from firms that produce it.

Given available technology, what is the *fixed* and *variable cost* of production in the market segment?

Competitors in the *market segment*?

Cost and benefits of *creating an entirely new market segment* through innovation?

©Dr. Kumar Aniket

Pareto Optimality

Pareto Optimality

You can can't make someone better off without making someone else worse-off

All *opportunities* that create *surplus* are exploited.

Example: Producing coffee in erstwhile Soviet Union

Cost of producing coffee at the margin, i.e., one more cup \$3

Potential price of coffee

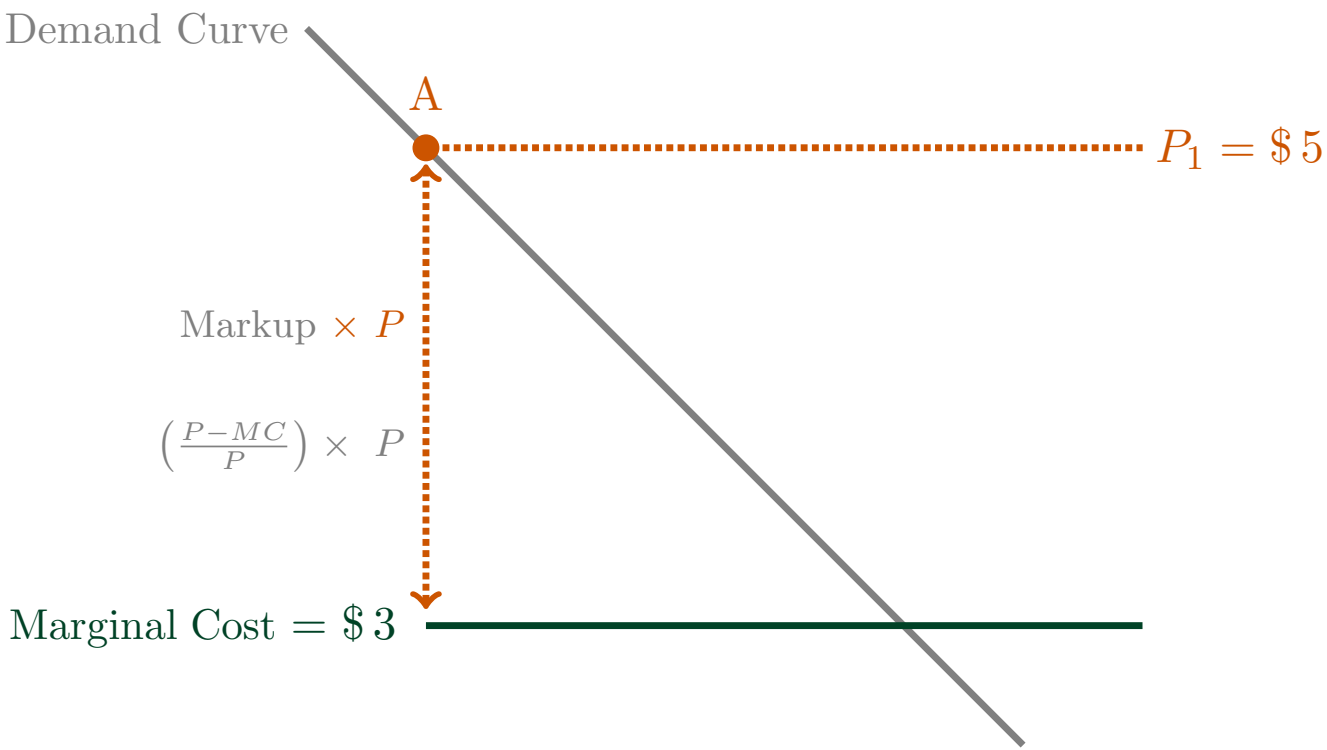
Case	Marginal cost	Price
A	\$3	\$5
B	\$3	\$4
C	\$3	\$3

©Dr. Kumar Aniket

Pareto Optimality

Opportunities to make people better off

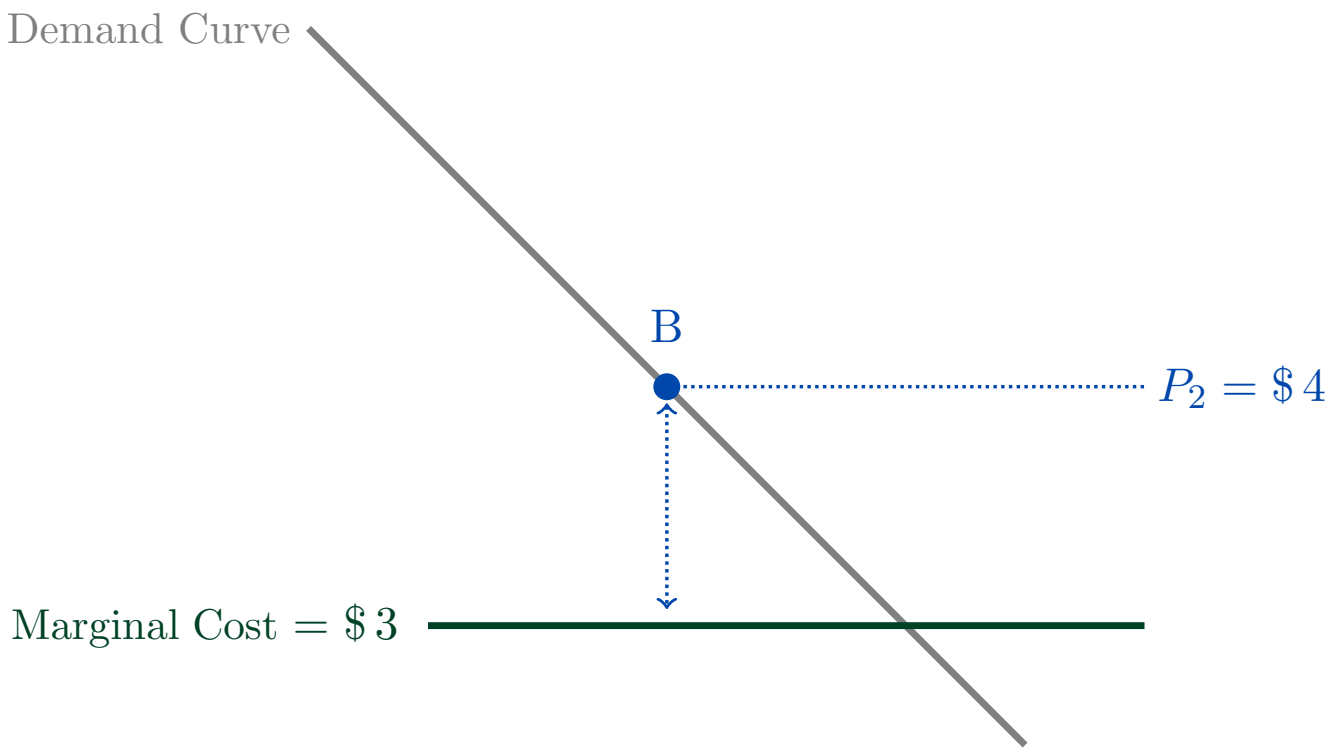
i.e., people who can't afford coffee at $\$5$



©Dr. Kumar Aniket

Pareto Optimality

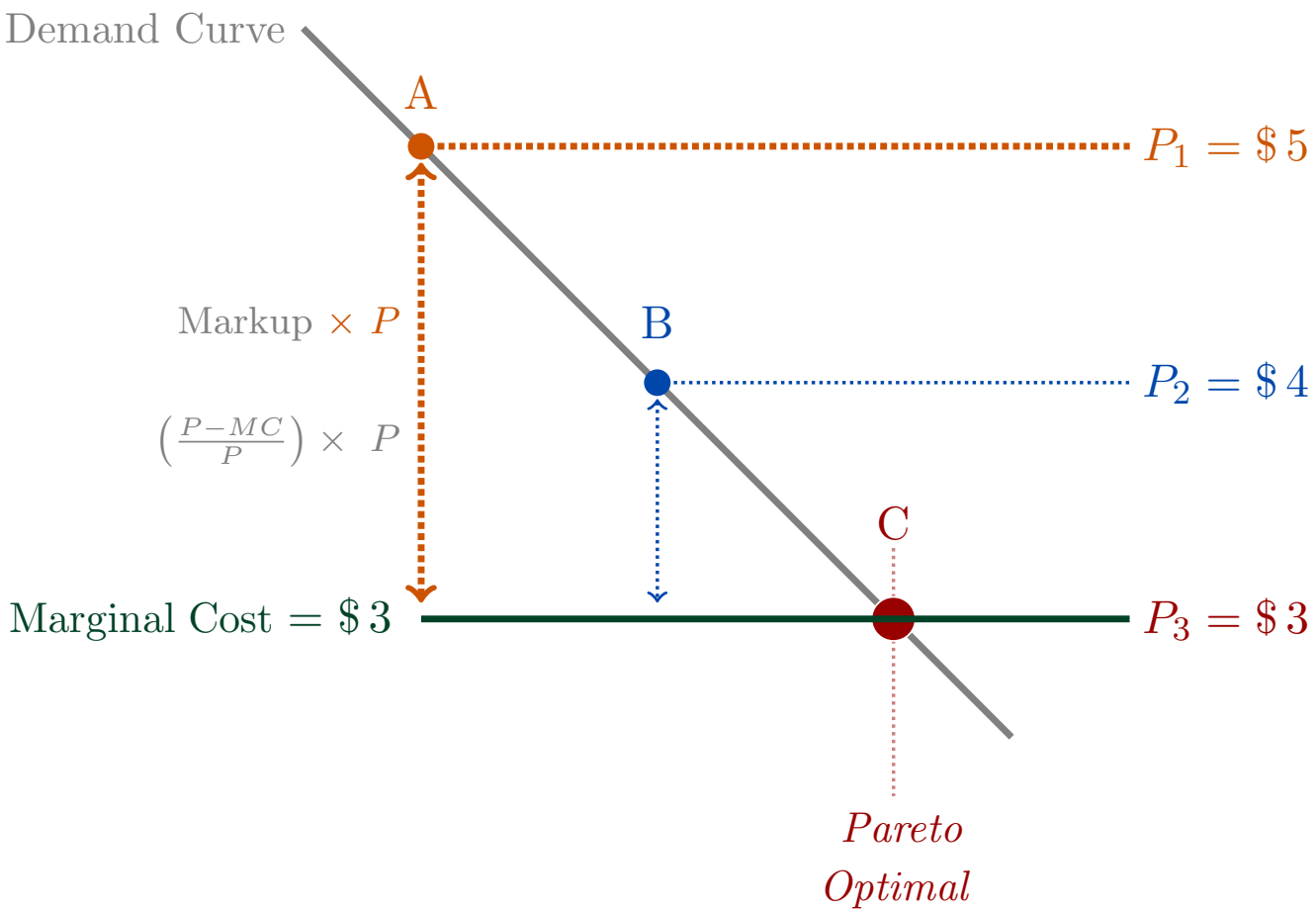
If the price of coffee is $\$4$, then what is the surplus and who keeps the surplus? *(Bargaining power, Unit 5)*



©Dr. Kumar Aniket

Pareto Optimality

No opportunities to make people better off at $\$3$



©Dr. Kumar Aniket

Market Failure

Any situation where *Price* = *Marginal Cost* is *Pareto efficient*

Price = *Marginal Cost* occurs in a *market* only if there is *perfect competition*, i.e., competition leads to firms undercutting each other's price

---

Adam Smith insight

Markets with perfect competition are Pareto Efficient

Market failure

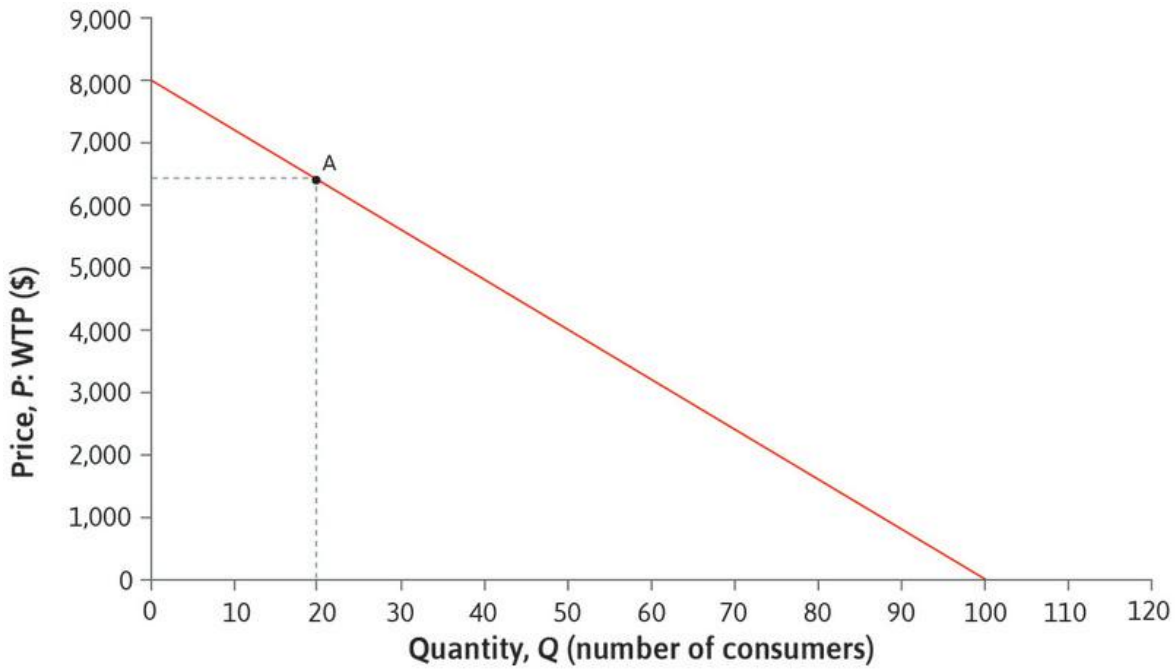
If *Price* > *Marginal Cost*, then the market is inefficient, i.e., market **fails** to work properly and leads to *deadweight loss*.

©Dr. Kumar Aniket

Demand Curve

Demand curve: quantity that consumers will buy at each price

describes consumer's quantity-price trade-off



Firms can estimate the shape of the demand curve for products through market research.

©Dr. Kumar Aniket

Elasticity of Demand

Elasticity of demand conveys information about consumers quantity price trade-off succinctly.

ε, the elasticity of demand measures how responsive the *quantity demanded* is to the *price of the good*.

$$\varepsilon = -\left(\frac{\%\text{ change in demand}}{\%\text{ change in price}}\right)$$

Demand is *elastic* if $\varepsilon > 1$

Demand is *inelastic* if $\varepsilon < 1$

©Dr. Kumar Aniket

Calculating the *% change in quantity* and *% change in price*.

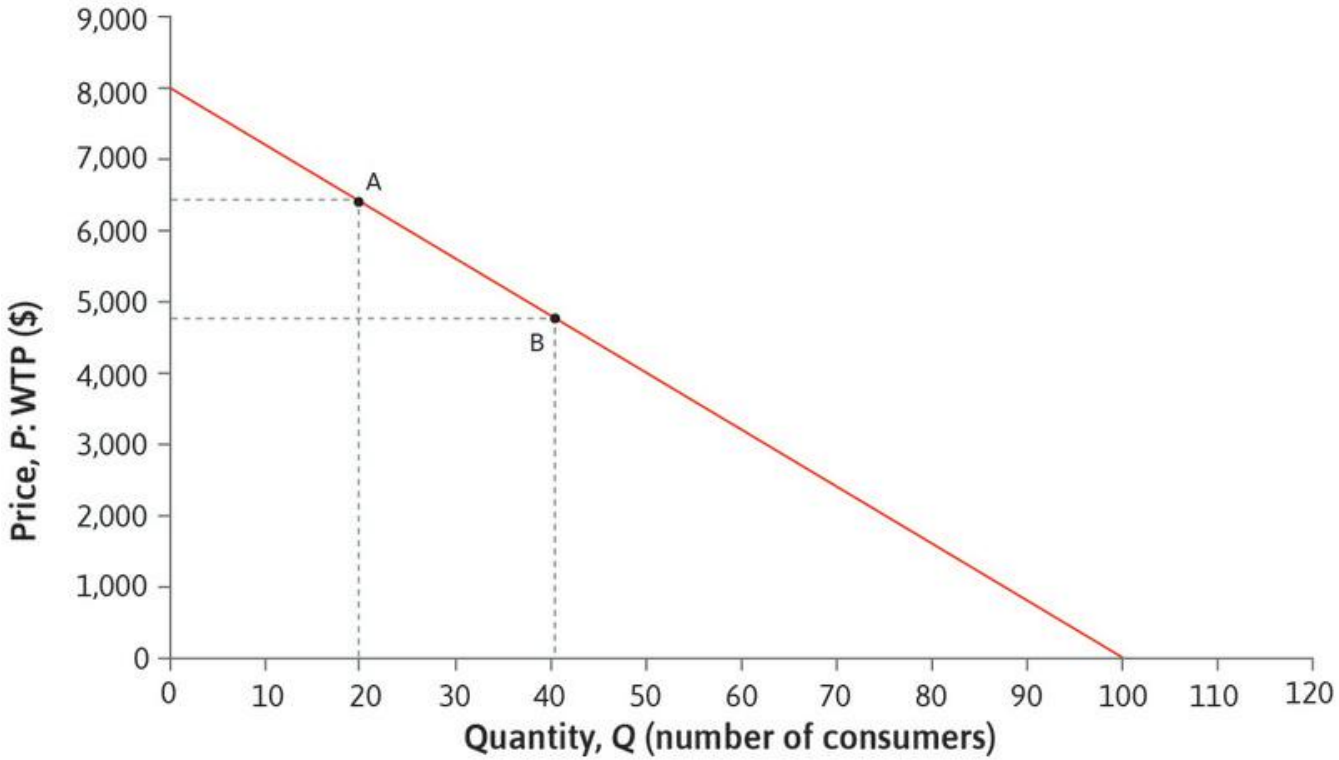
	A
P	6400
ΔP	-80
% change in P	-1.25%
	$\left(= \frac{-80}{6400} \times 100\right)$

	A
Q	20
ΔQ	1
% change in Q	5%
	$\left(= \frac{1}{20} \times 100\right)$

Calculating ε, *elasticity of demand* from *% change in quantity* and *% change in price*.

	A
ε, elasticity of demand	4.00
	$\left(= -\frac{5}{-1.25}\right)$

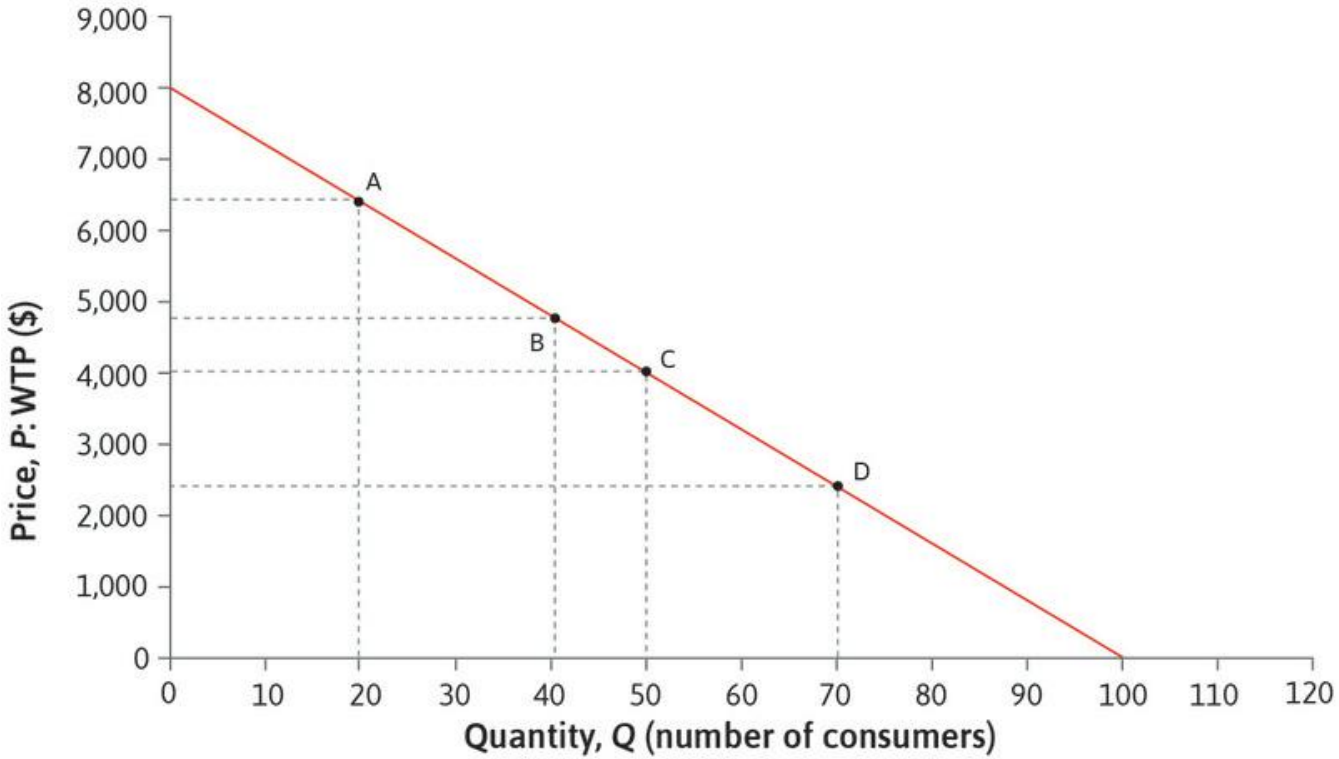
©Dr. Kumar Aniket



Why is elasticity of demand decreasing in quantity demanded?

	A	B
% change in Q	5.00	2.50
% change in P	-1.25	-1.67
Elasticity of Demand	4.00	1.50

©Dr. Kumar Aniket



Why is elasticity of demand decreasing in quantity demanded?

	A	B	C	D
% change in Q	5.00	2.50	2.00	1.43
% change in P	-1.25	-1.67	-2.00	-3.33
Elasticity of Demand	4.00	1.50	1.00	0.43

©Dr. Kumar Aniket

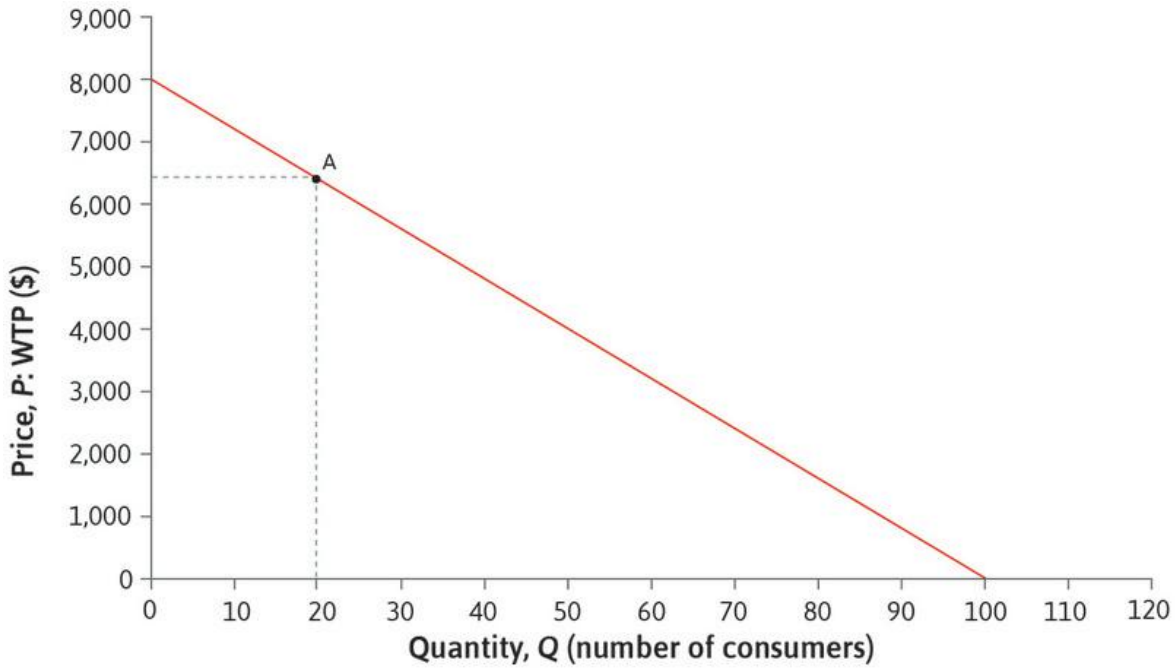
Marginal Revenue

Marginal revenue is the increase in firms's revenue if it sells an additional unit.

Marginal revenue	
positive	total revenue is *increasing* in quantity
zero	total revenue is *constant*
negative	total revenue is decreasing in quantity

©Dr. Kumar Aniket

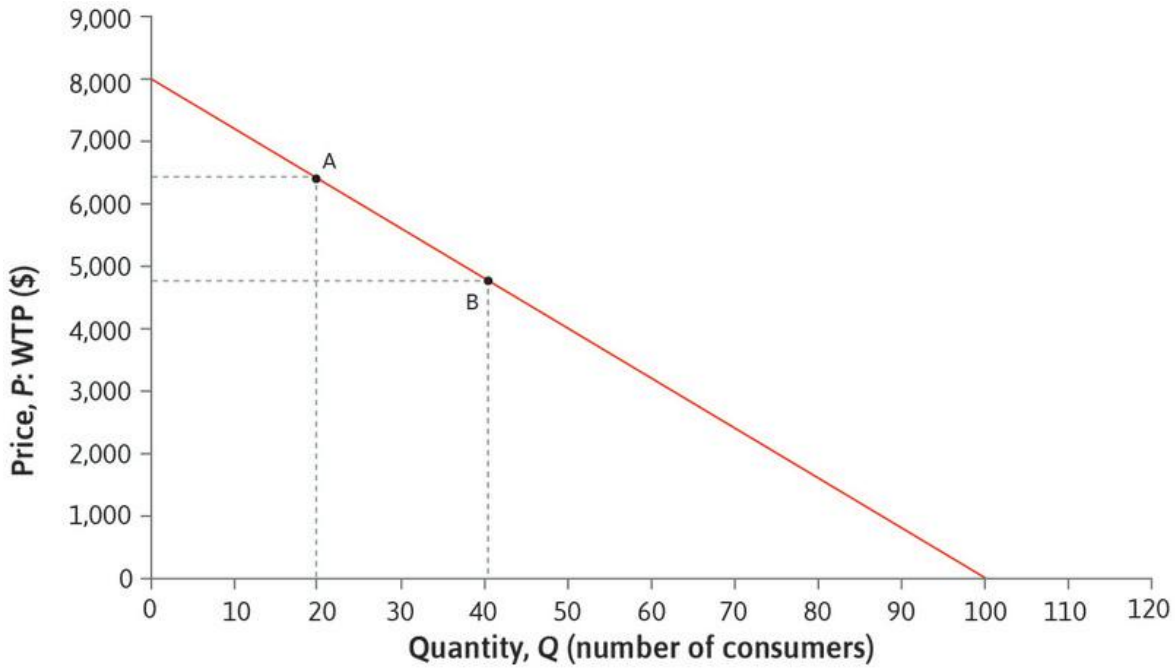
Marginal Revenue



		A	
Price	6,480	6,400	6,320
Quantity	19	20	21
Total Revenue	123,120	128,000	132,720
Marginal Revenue		4880	4720

©Dr. Kumar Aniket

Marginal Revenue



		B	
Price	4,880	4,800	4,720
Quantity	39	40	41
Total Revenue	190,320	192,000	193,520
Marginal Revenue		1,680	1,520

©Dr. Kumar Aniket

Marginal Revenue and Elasticity

Marginal revenue is the increase in seller's revenue if she sells an additional unit.

MR		Elasticity
positive	total revenue is *increasing* in quantity	$\varepsilon > 1$
zero	total revenue is *constant*	$\varepsilon = 1$
negative	total revenue is decreasing in quantity	$\varepsilon < 1$

©Dr. Kumar Aniket

Marginal Revenue and Elasticity

MR		Elasticity
positive	total revenue is *increasing* in quantity	$\varepsilon > 1$
zero	total revenue is *constant*	$\varepsilon = 1$
negative	total revenue is decreasing in quantity	$\varepsilon < 1$

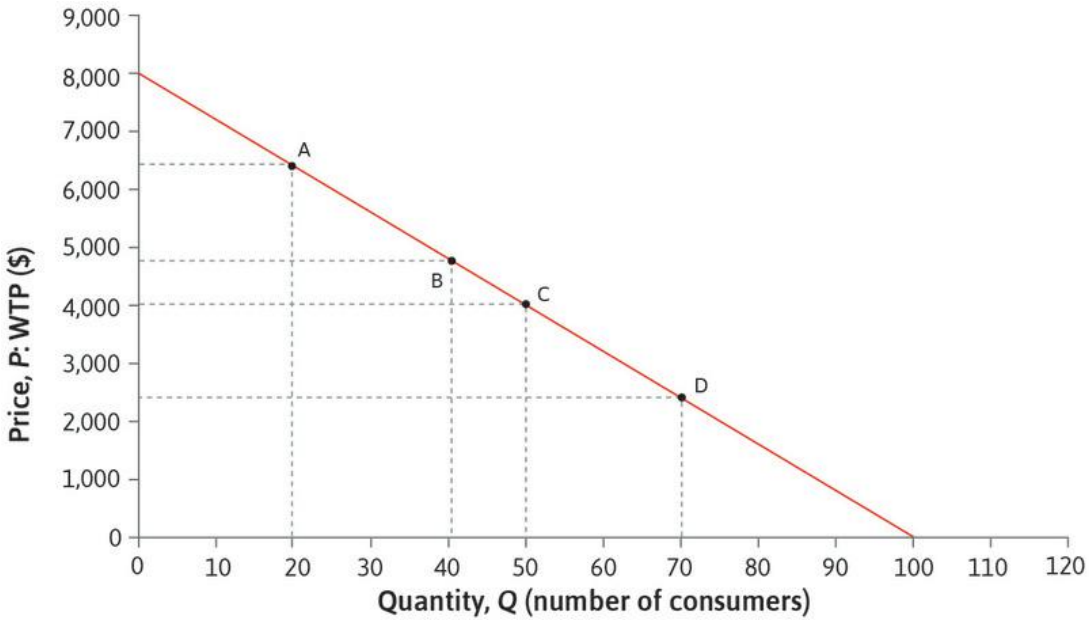
$$\varepsilon = -\left(\frac{\%\text{ change in demand}}{\%\text{ change in price}}\right)$$

Intuition: if elasticity is 1, % change in price and % change in quantity are equal, implying *revenue change from decreasing price* will *equal revenue change from increasing quantity*. Hence, marginal revenue would be zero.

If $\varepsilon > 1$, revenue change from increasing quantity is greater than revenue changes from decreasing price. Hence, marginal revenue is positive.

©Dr. Kumar Aniket

Elasticity of Demand and Marginal Revenue



	A	B	C	D
% change in Q	5.00	2.50	2.00	1.43
% change in P	-1.25	-1.67	-2.00	-3.33
Elasticity of Demand	*4.00*	*1.50*	*1.00*	0.43
Marginal Revenue	*4,880*	*1,680*	*80*	-3,210

©Dr. Kumar Aniket

Scale of Production

Small scale: something that is done in a limited manner.

e.g., making cake at home

Large scale: something was done in a grand or big manner.

e.g., making cake in a large factory

Fixed costs: Costs that are sunk before you start producing something. These costs don't vary with the quantity produced

e.g. buying a oven, cake pans.

Variable costs: Costs that vary closely with quantity produced

e.g. flour, eggs, cream.

©Dr. Kumar Aniket

Returns to Scale

Constant returns to scale: if you increase all inputs by a certain proportion, the *output increases by the same proportion*.

e.g., if you double the inputs, the *output also doubles*

Increasing returns to scale: if you increase all inputs by a certain proportion, the *output increases by a greater proportion*.

e.g., if you double the inputs, the *output more than doubles*

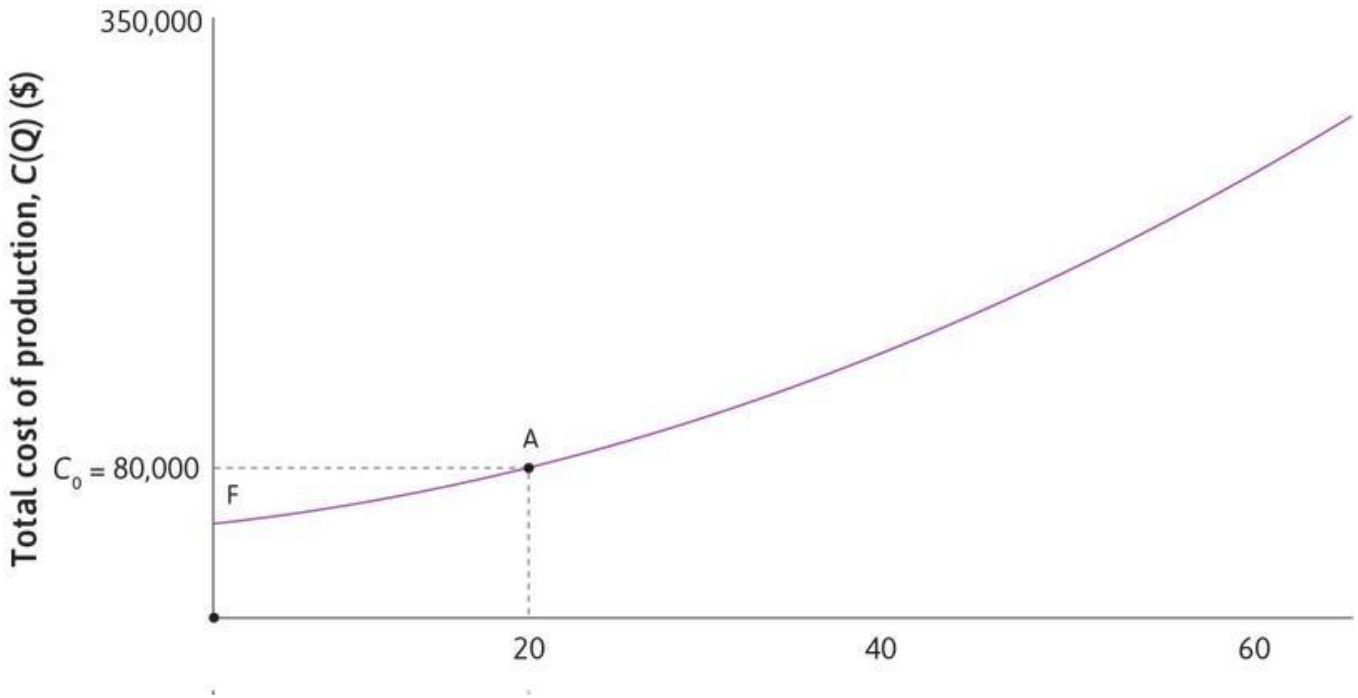
Decreasing returns to scale: if you increase all inputs by a certain proportion, the *output increases by a lesser proportion*.

e.g., if you double the inputs, the *output less than doubles*

©Dr. Kumar Aniket

Cost Function

Cost functions shows how total production cost (*fixed* and *variable*) varies with quantity produced.



©Dr. Kumar Aniket

Cost Function

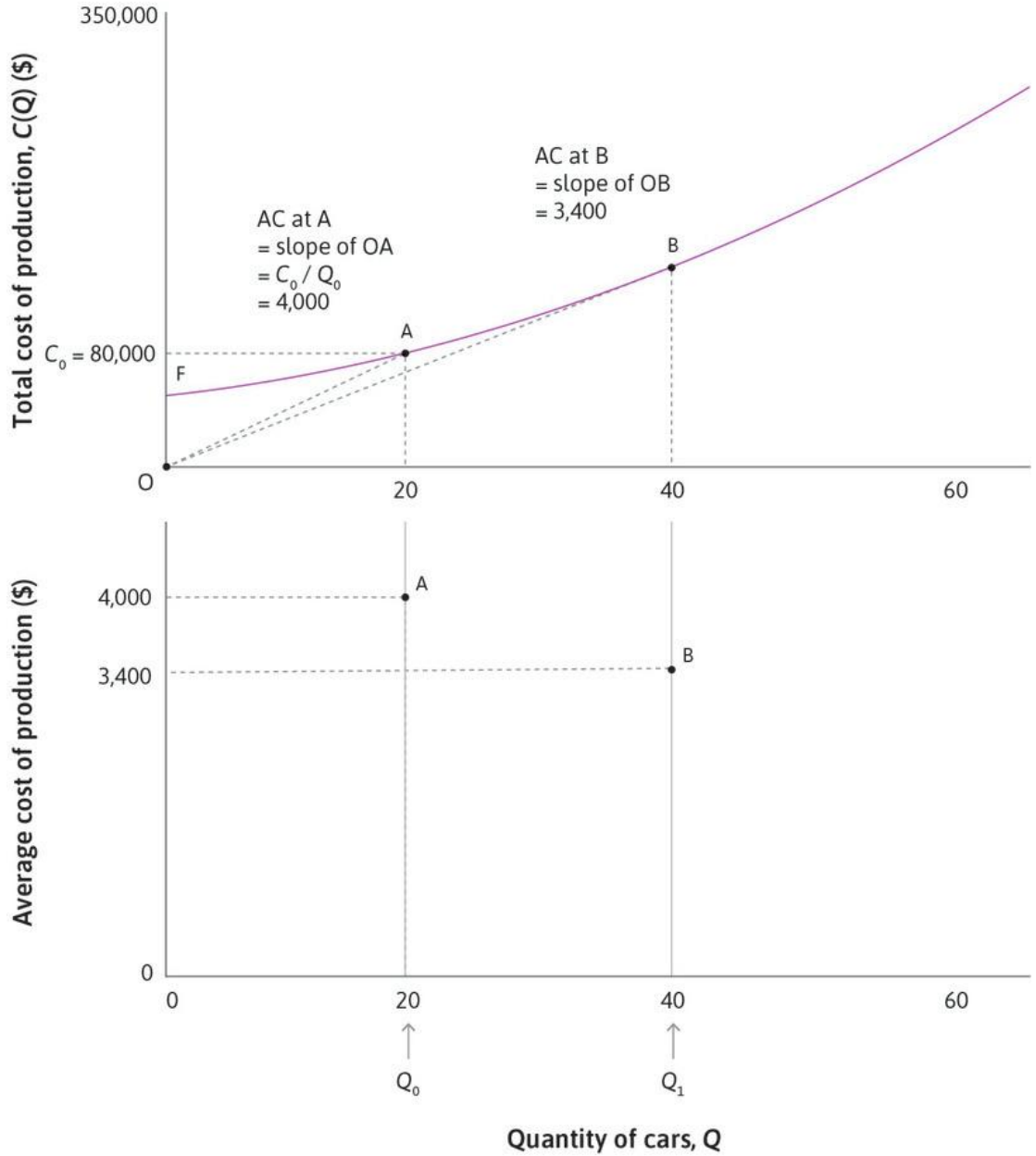
Cost functions show how total production cost varies with quantity produced.

Average cost (AC) is the average cost per unit produced.

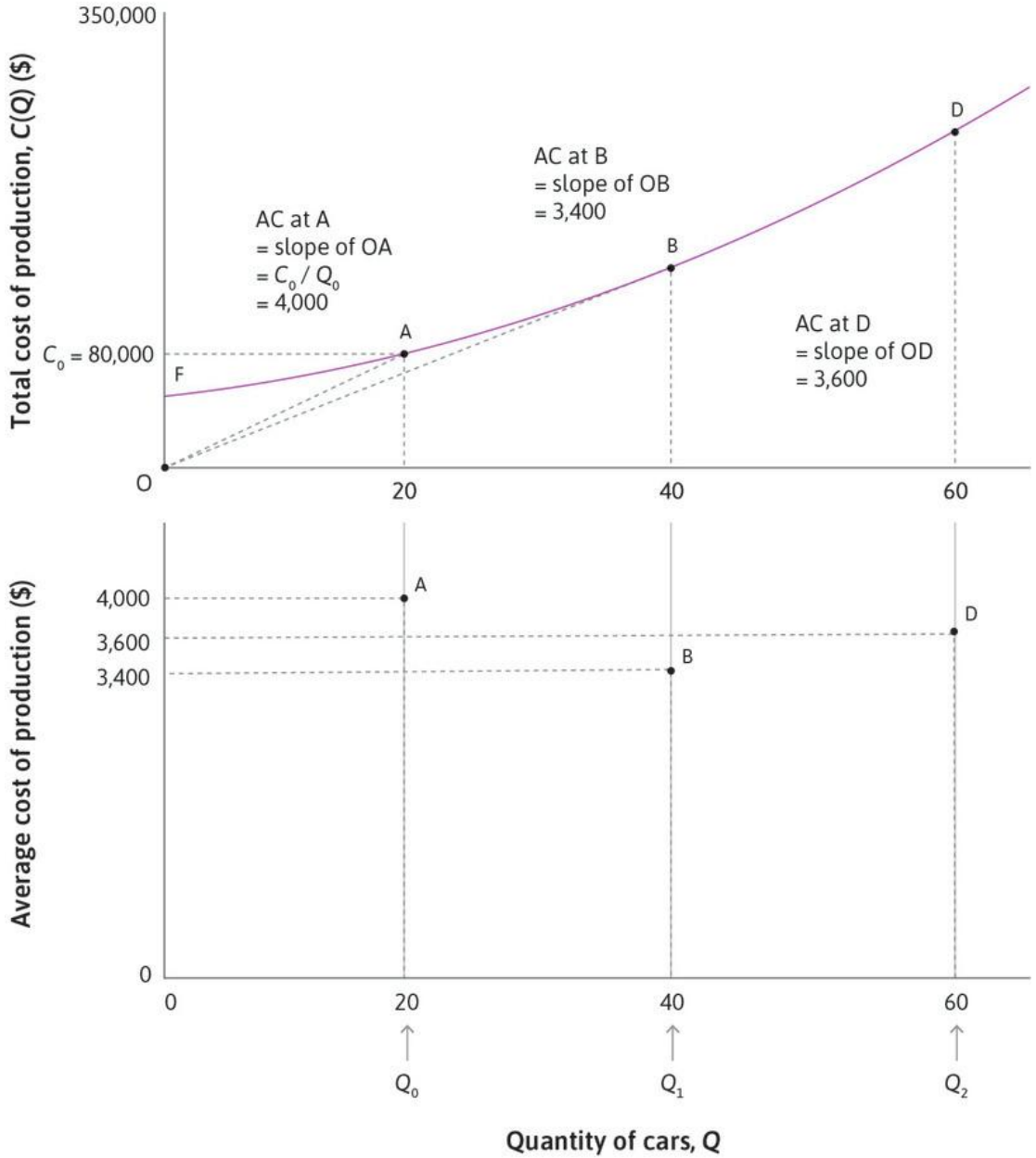
given by slope of the ray from origin to a given point on cost function.

In this example, as quantity produced increases, average costs decrease at first (as fixed costs are divided by large quantities) but increase latter on (e.g. overworked labour, machine breakdown, management costs increase).

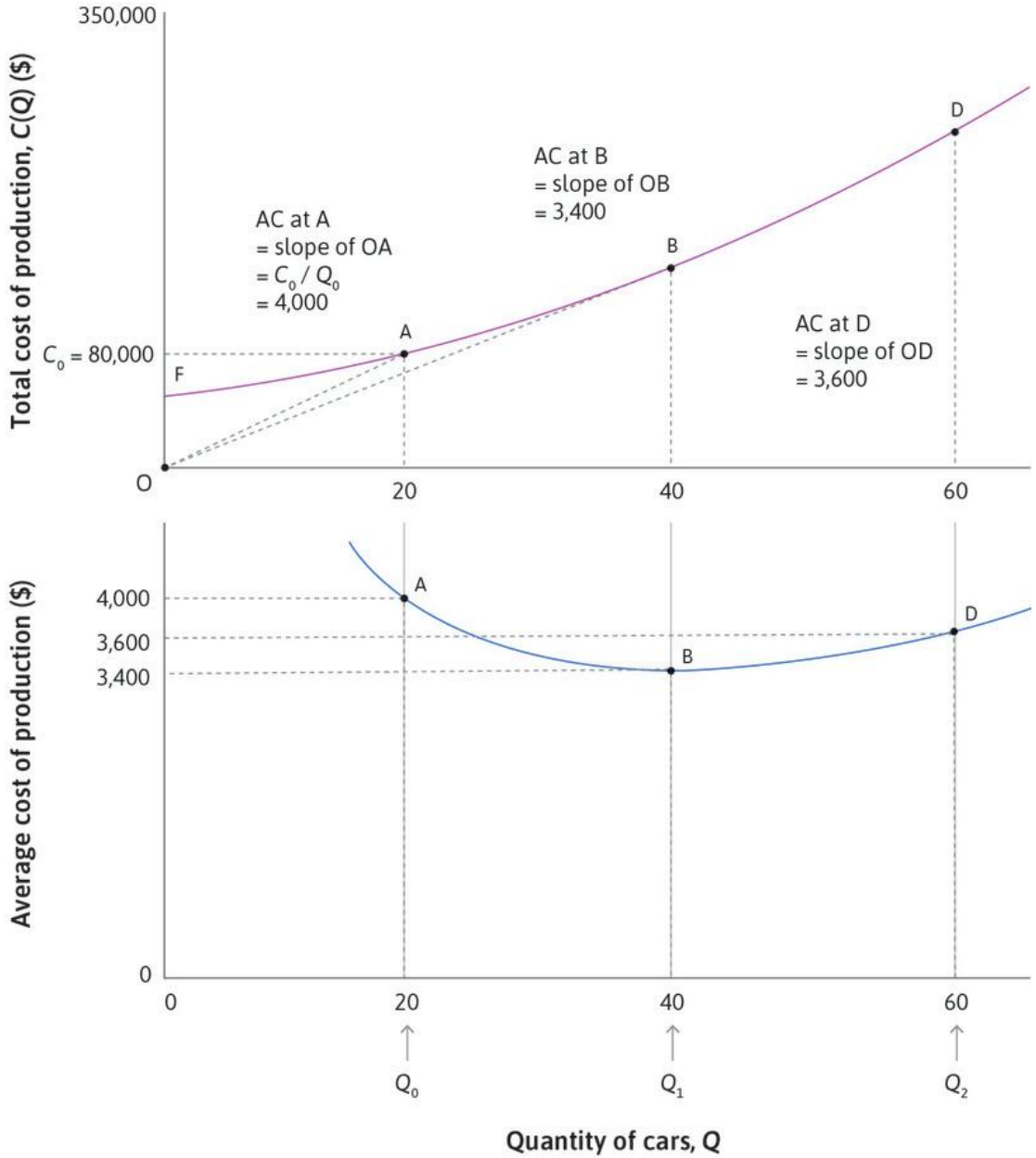
©Dr. Kumar Aniket



©Dr. Kumar Aniket



© Dr. Kumar Aniket



© Dr. Kumar Aniket

Cost Function

Cost functions show how total production cost varies with quantity produced.

Average cost (AC) is the average cost per unit produced.

given by slope of the ray from origin to a given point on cost function.

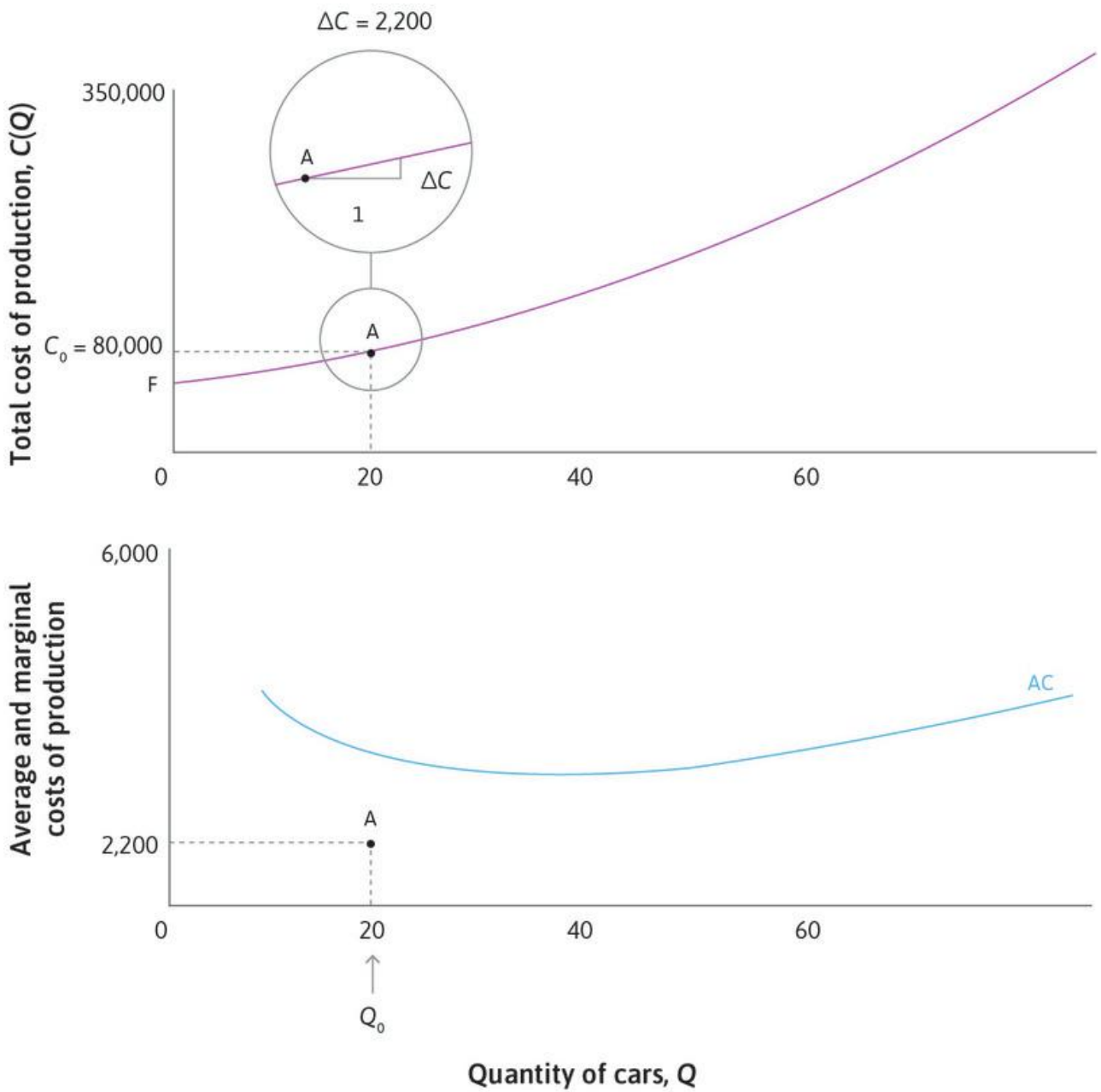
In this example, as quantity produced increases, average costs decrease at first (as fixed costs are divided by large quantities) but increase latter on (e.g. overworked labour, machine breakdown, management costs increase).

Marginal cost (MC): the effect on total cost of producing one additional unit of output.

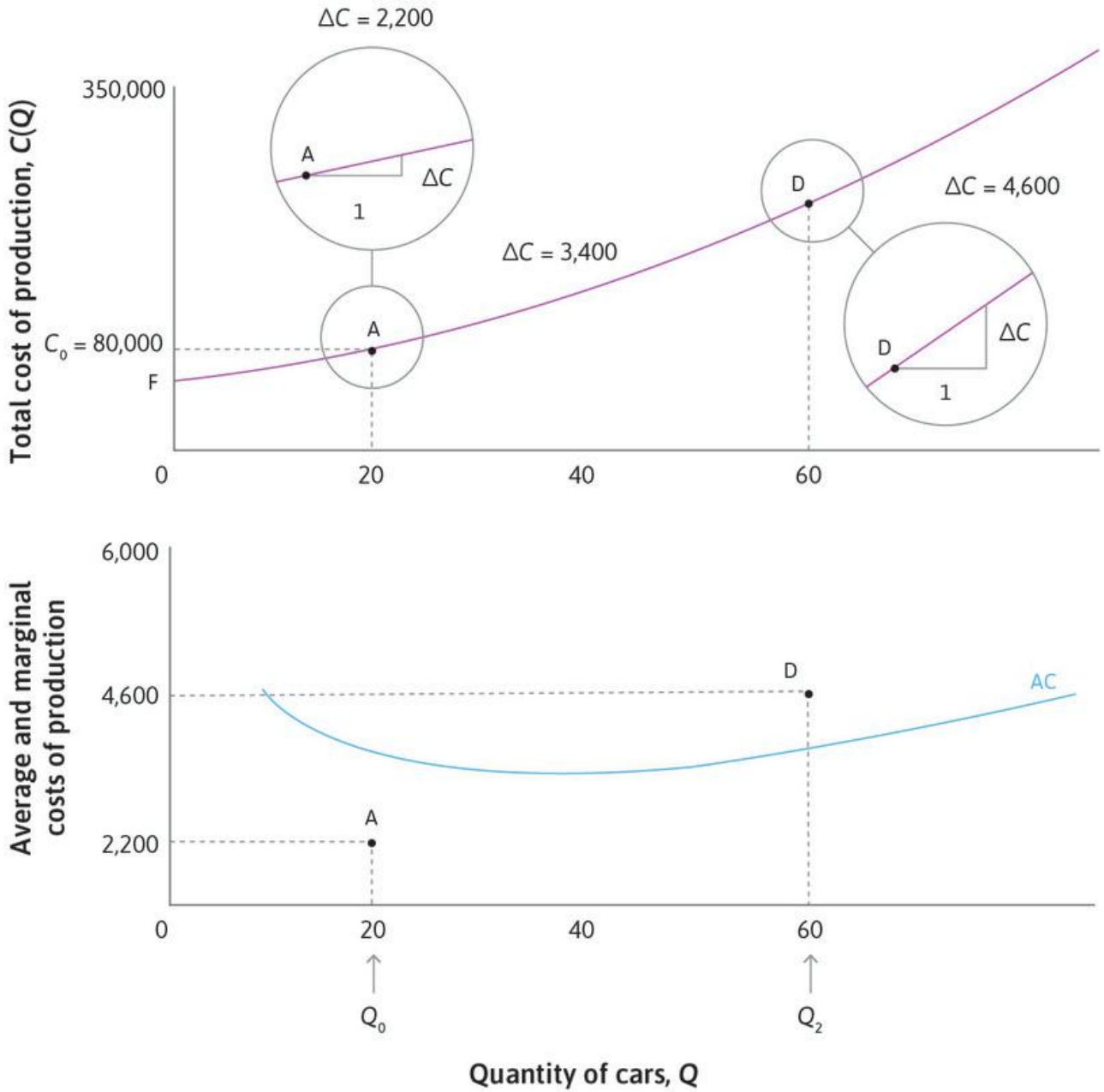
given by slope of the cost function at a given point.

In this example, marginal costs increases as quantity produced increases.

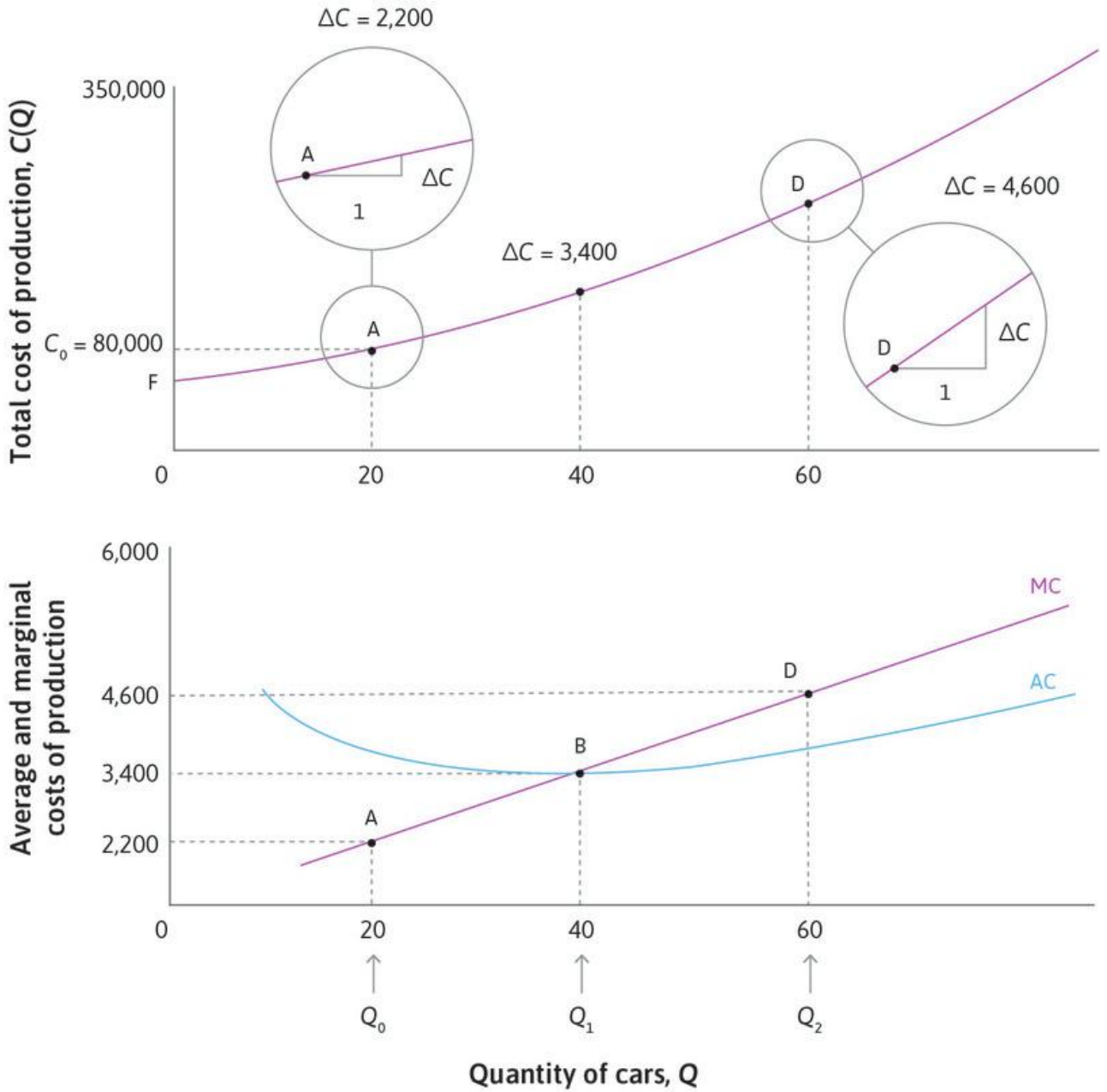
©Dr. Kumar Aniket



©Dr. Kumar Aniket

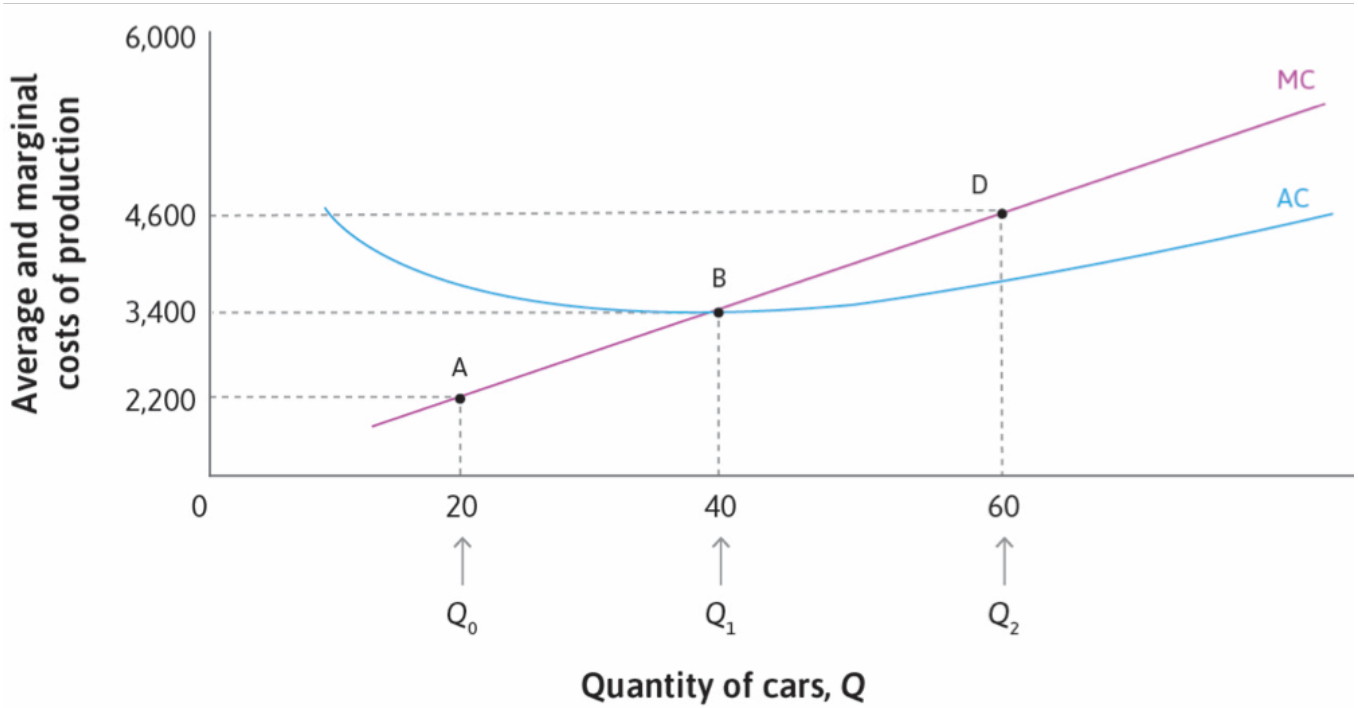


©Dr. Kumar Aniket



©Dr. Kumar Aniket

Relationship between MC and AC



Marginal cost pulls average cost towards itself

If MC < AC	*If MC > AC*
then AC is decreasing in Q	*then AC is increasing in Q*

©Dr. Kumar Aniket

Profit Function

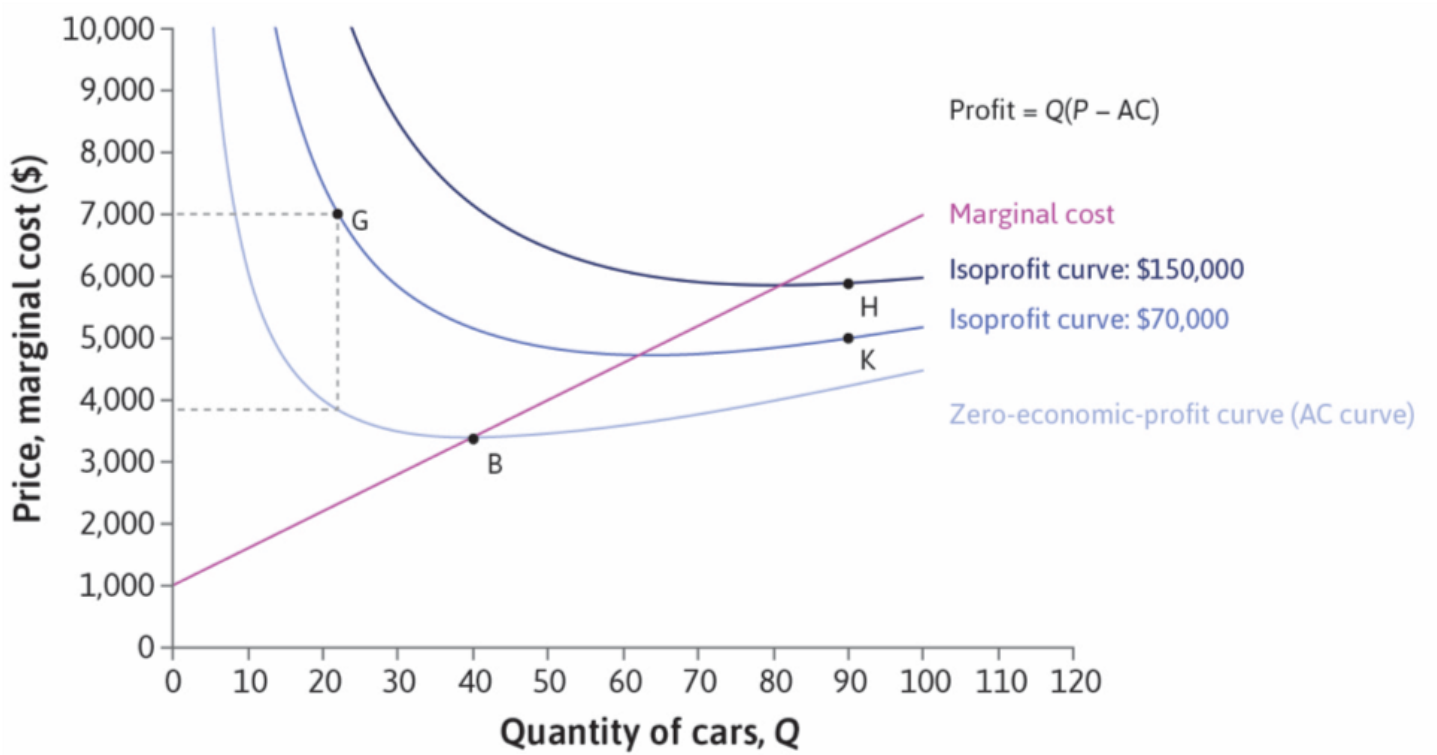
$$\begin{aligned}\text{Economic Profits} &= \textit{Total revenue} - \textit{Total costs} \\ &= \textit{Total revenue}\,(Q) - \textit{Total costs}\,(Q)\end{aligned}$$

Total Revenue	*Total Costs*	
	Fixed costs	*Variable costs*
Price $\times$ Quantity	Cost of capital (investment)	Wages and cost of material

©Dr. Kumar Aniket

Iso-profit Curves

Iso-profit curves show *price-quantity combinations* that gives the producer a constant profit level.



Cost & revenue functions influences shape of iso-profit curves.

©Dr. Kumar Aniket

Iso-profit Curves

Economic Profit is total Revenue ($Q \times P$) minus total Cost (C)

$$\begin{aligned}\text{Economic Profit} &= QP - C \\ &= Q\left(P - \frac{C}{Q}\right) \\ &= Q\,(P - AC)\end{aligned}$$

Iso-Profit Lines: Drawing a line for profit constant at \$70000.

$$\begin{aligned}Q(P - AC) &= \$70000 \\ P &= AC + \frac{\$70000}{Q}\end{aligned}$$

©Dr. Kumar Aniket

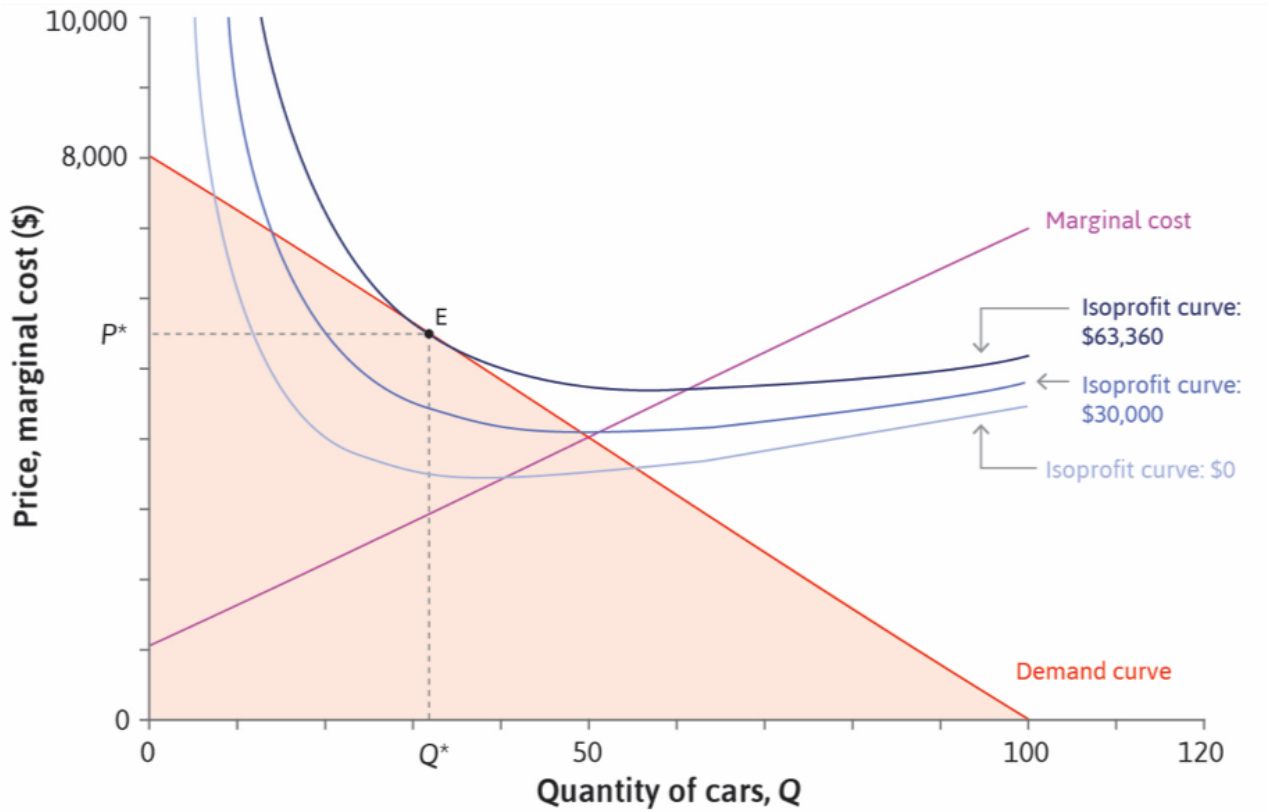
Demand curve

firm's feasible area

Iso-profit curves

firms profit increases with iso-profit curves

Firm maximises by choosing the highest feasible indifference curve



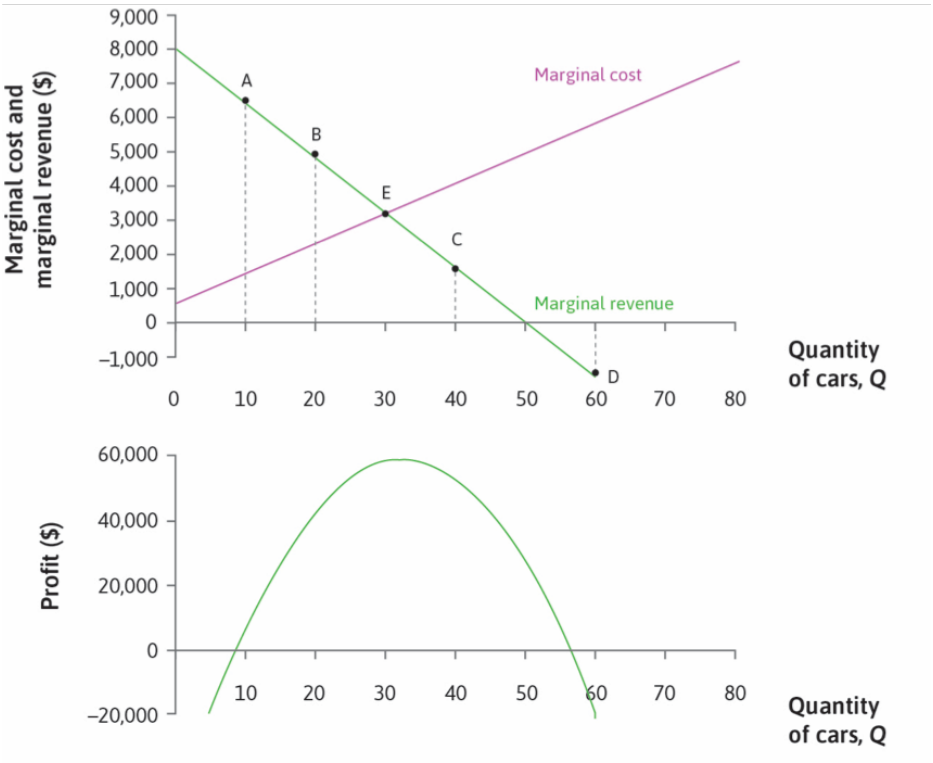
©Dr. Kumar Aniket

Profit maximisation from another perspective

Marginal revenue (MR) is the increase in revenue from selling an additional unit

Marginal cost (MC) is the cost of producing an additional unit.

Firm maximises profit by choosing MR=MC

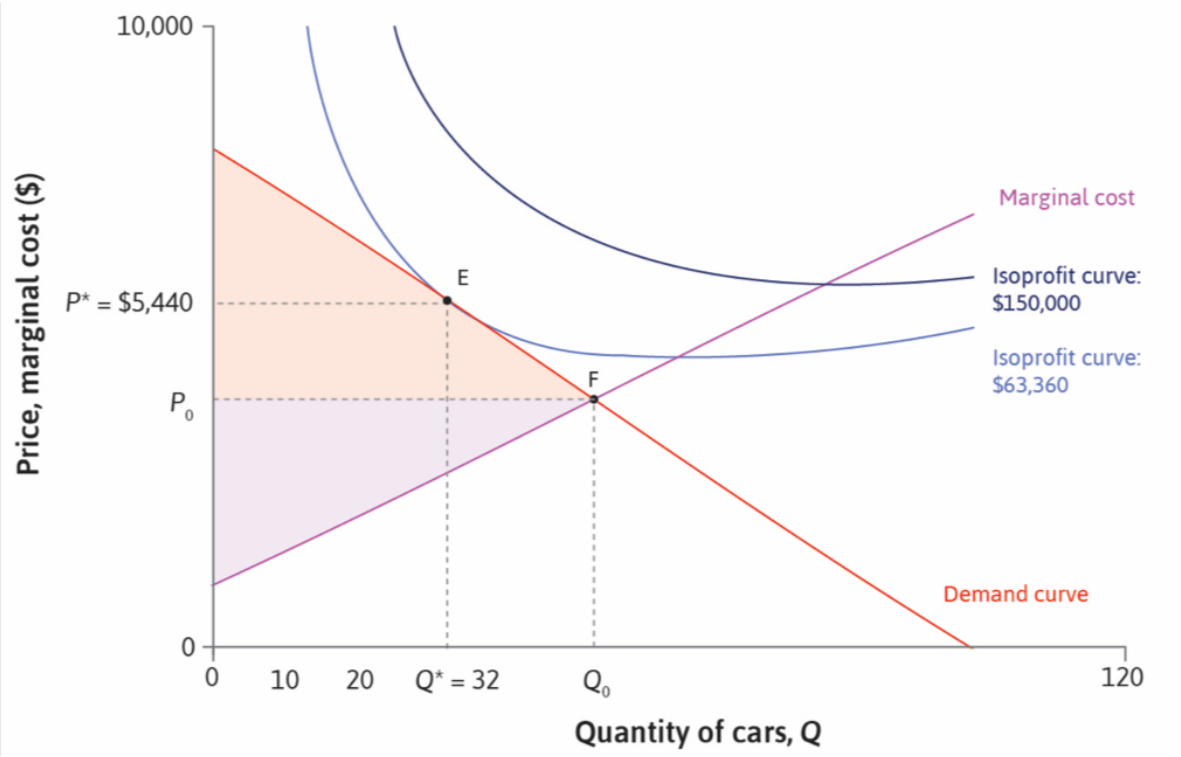


©Dr. Kumar Aniket

Consumer surplus (CS): the total difference between willingness-to-pay and purchase price

Producer surplus (PS): the total difference between revenue and marginal cost

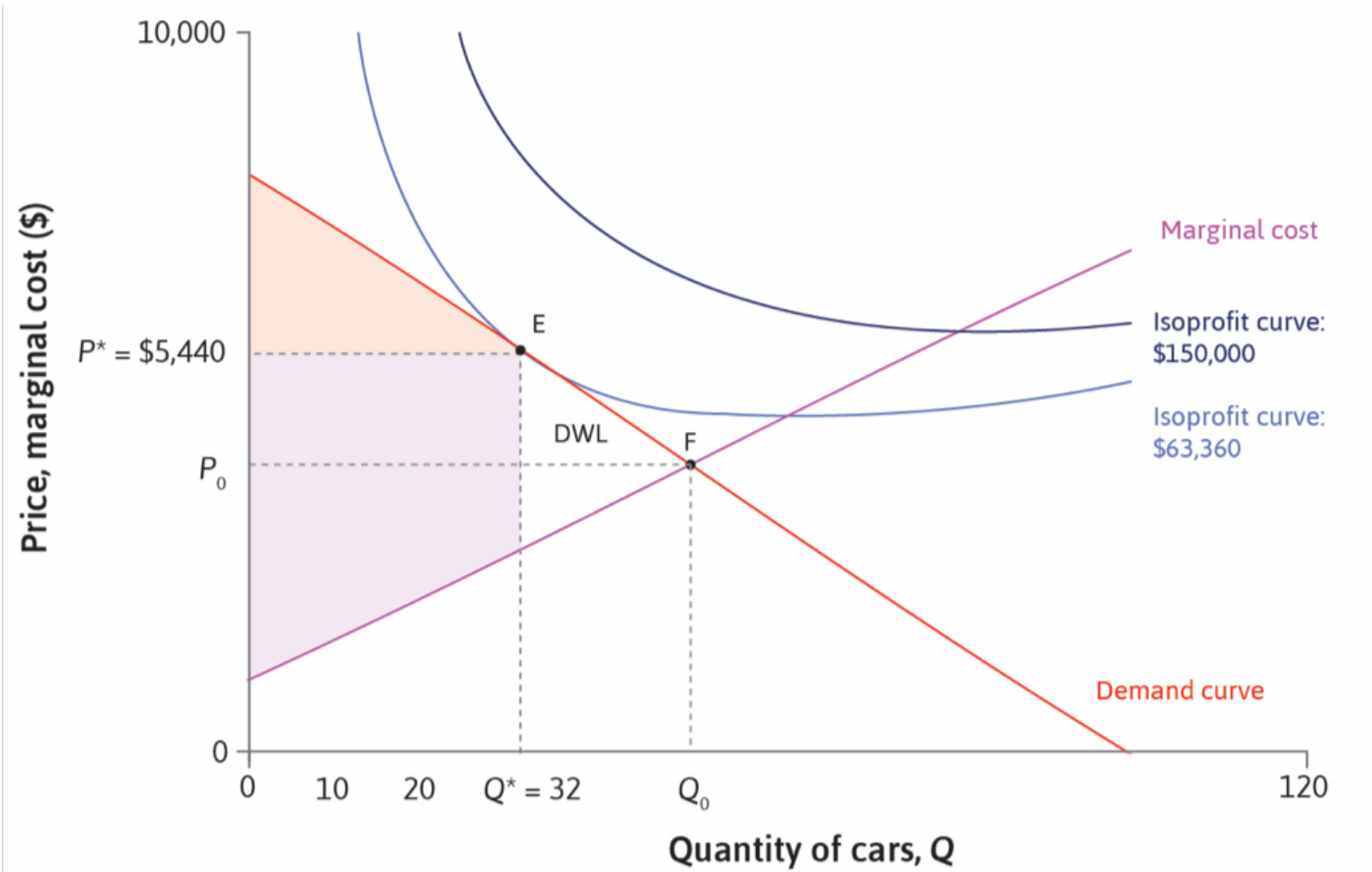
$$\begin{aligned} \textit{Total surplus} &= \textit{Consumer surplus} + \textit{Producer surplus} \\ &= \textit{Total gains from trade} \end{aligned}$$



©Dr. Kumar Aniket

Deadweight loss is difference between current surplus (E) and the surplus in a *Pareto efficient allocation* (F)

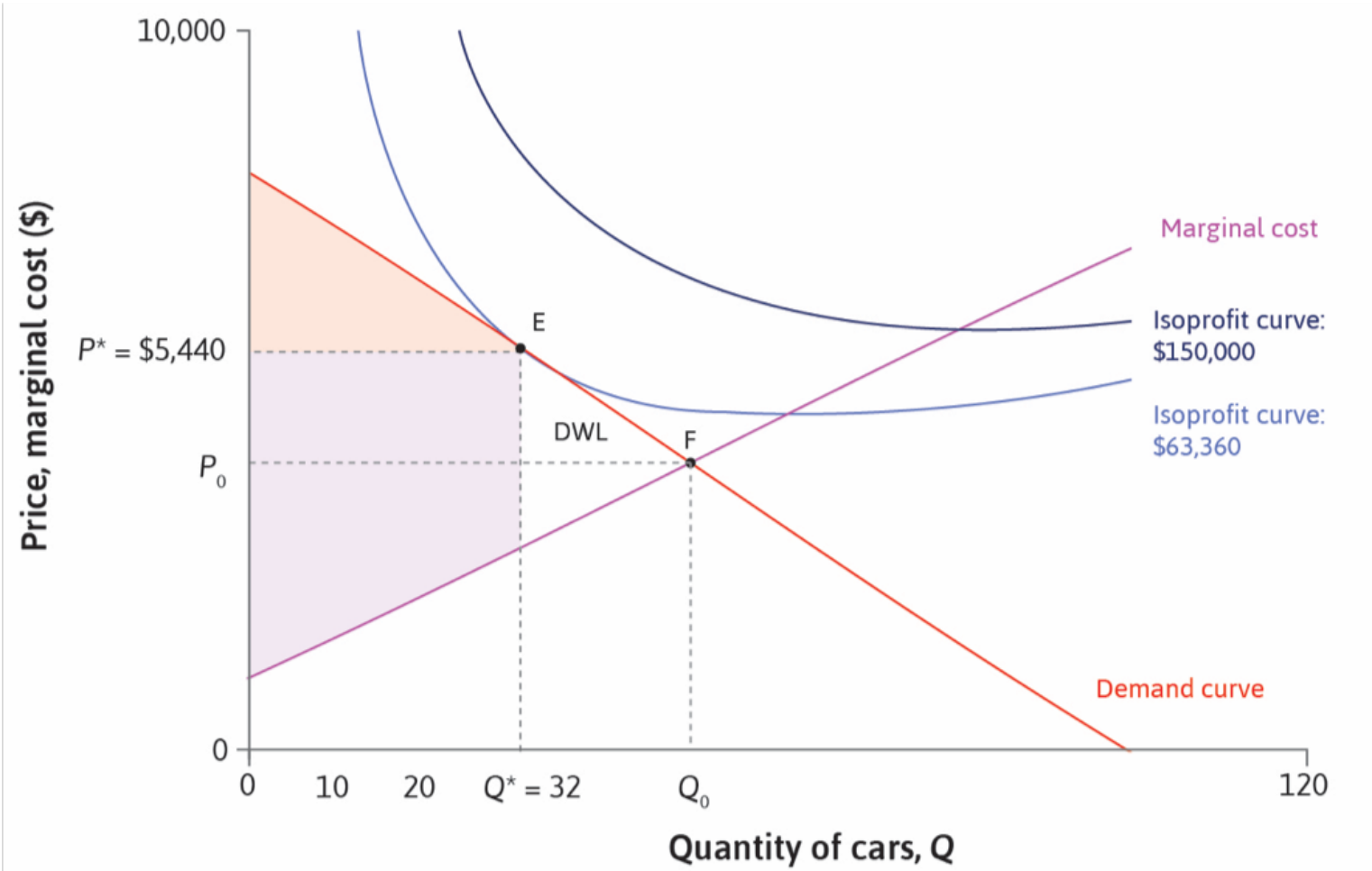
Pareto efficient allocation is where demand meets the marginal cost



©Dr. Kumar Aniket

F is where society's surplus is maximised (*perfect competition*)

E is where the firm's profits are maximised (*monopoly*)



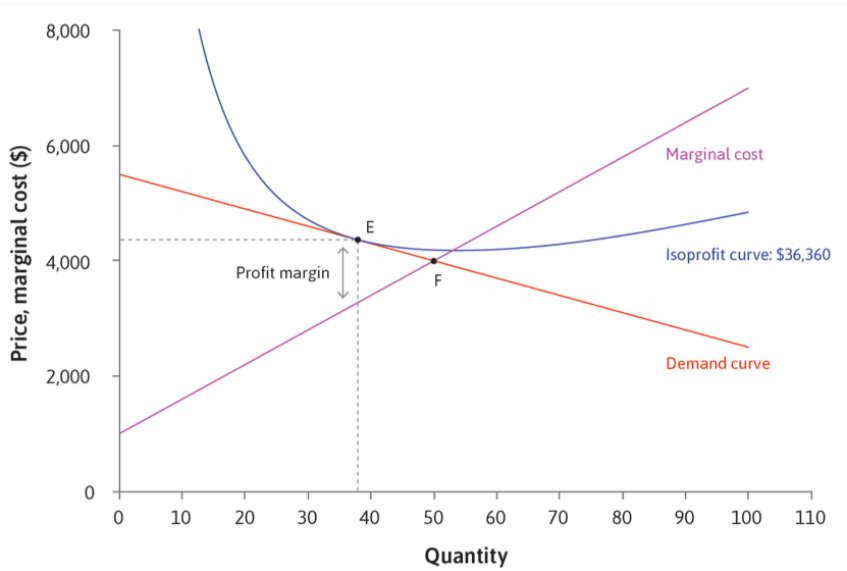
©Dr. Kumar Aniket

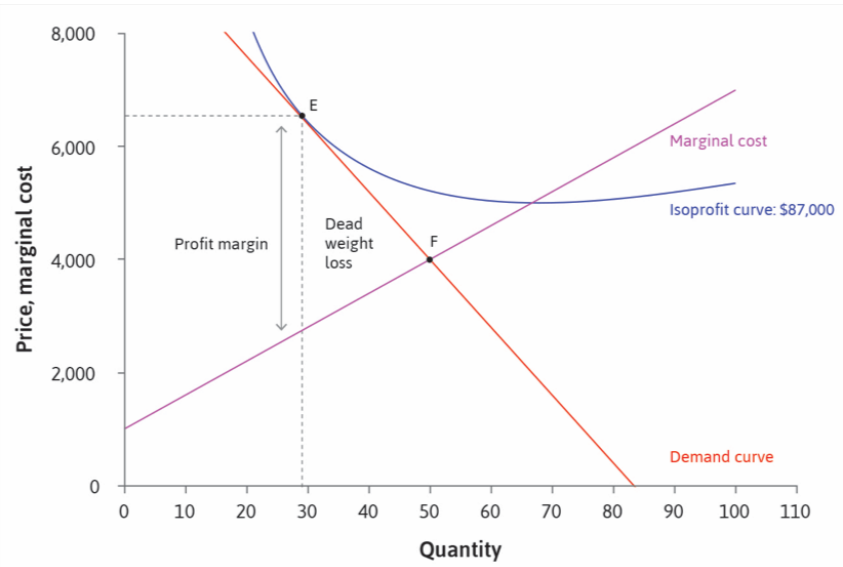
Elasticity and Deadweight loss

The *flatter* (more *elastic*) the *demand curve*,

the lower *firm's profit in monopoly* and

lower the *dead-weight loss*.





©Dr. Kumar Aniket

Market Power: Specialised Products

Example of market power: A firm selling specialised products.

They face *little competition* and hence have *inelastic demand*.

They can *set price above marginal cost* without losing customers, thus *earning monopoly rents*.

Deadweight loss results from the *inelasticity* of demand

©Dr. Kumar Aniket

Market Power: Innovator

Example of market power: A firm selling innovative products.

Innovation: Technological innovation can allow firms to differentiate their products from competitors' e.g. hybrid cars

Firms that invent a *completely new product* may prevent competition altogether through patents or copyright laws, e.g. iphone in 2007

Advertising: Firms can attract consumers away from competing products and create brand loyalty.

Both of these tactics can shift the firm's demand curve.

©Dr. Kumar Aniket

Market Power: Natural Monopolies

Example of market power: A natural monopoly

A *natural monopoly* arises when one firm can produce at lower average costs than two or more firms e.g. utilities like electricity, water.

Instead of encouraging competition, policymakers may put price controls or make these firms publicly owned or publicly regulated, e.g., railways.

©Dr. Kumar Aniket

Summary

Model of a *firm with market power*

Price and *production* decisions depend on a firm's *demand curve* and *cost function*.

Firms produce an output that *maximises their profits* and where *marginal revenue equals marginal cost*.

Surplus measures the *gains from trade*

Total surplus = Producer surplus + Consumer surplus

Price elasticity of demand affects surplus and profits

Deadweight loss occurs when allocation is not Pareto efficient and measures the loss of surplus lost from society due to market power

©Dr. Kumar Aniket