Perfect competition and pure monopoly

Part I: The perfectly competitive firm

MICRO- AND MACROECONOMICS

Perfect competition –
the competitive firm's supply decision

Part 1

Industries and the number of firms

- An industry is the set of all firms making the same product. The output of an industry is the sum of the outputs of its firms.

- Yet different industries have very different number of firms. Eurostar is the only supplier of train journeys from London to Paris. In contrast, the UK has hundreds of thousands of farms and tens of thousands of grocers.

- Why do some industries have many firms but others only one?

Perfect competition and monopoly

- First it is useful to establish two benchmark cases, extremes between which all other types of market structure must lie. These limiting cases are *perfect competition* and *monopoly*.

- In a **perfectly competitive** market, both buyers and sellers believe that their own actions have no effect on the market price.

- In contrast, a **monopolist**, the only seller or potential seller in the industry, sets the price.

Competitive demand

- We focus on how the number of sellers affects the behaviour of sellers.

- Buyers are in the background. We simply assume that there are many buyers whose individual downward-sloping demand curves can be aggregated into the market demand curve.

- Thus, we assume that the demand side of the market is competitive, but contrast the different cases on the supply side.
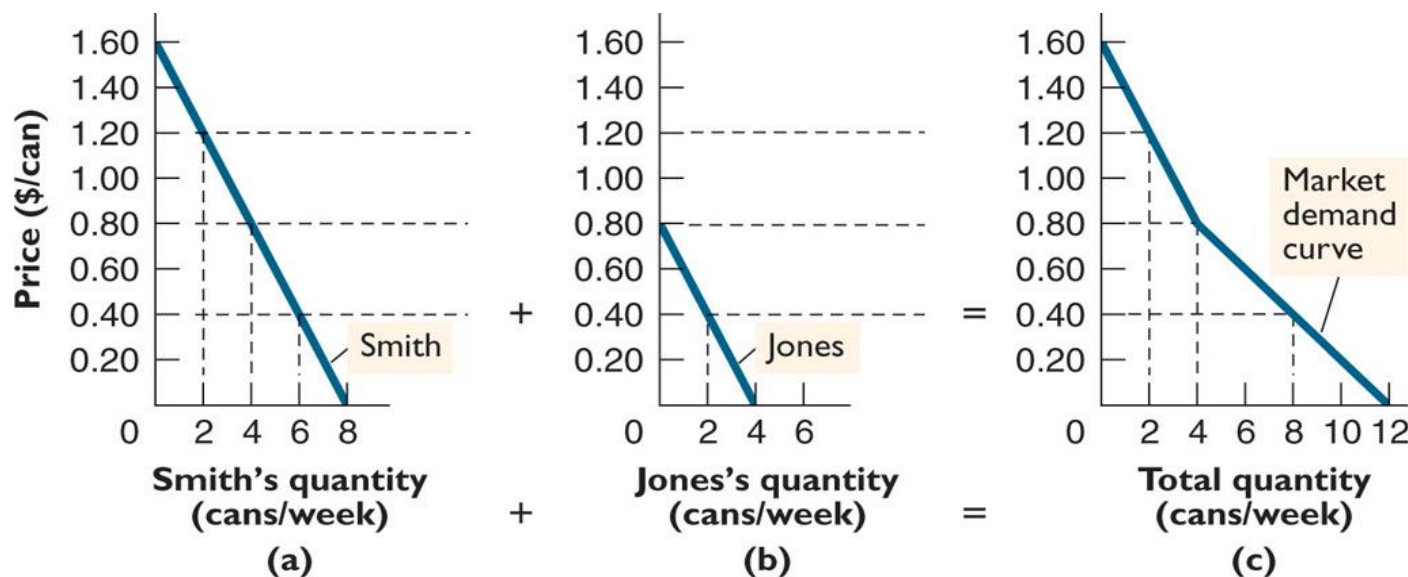
Quantities demanded and supplied and perfect competition

- Perfect competition means that each firm or household, recognizing that its quantities supplied or demanded are trivial relative to the whole market, assumes its actions have no effect on the market price.
- This assumption was also built into our earlier model of consumer choice. Each consumer's budget line took market prices as given, unaffected by the quantities then chosen.
- Changes in market conditions, applying to all firms and consumers, change the equilibrium price and hence individual quantities demanded, but each consumer neglects any feedback from his own actions to market price.

Competition in theory and everyday usage

- This concept of competition, which we now extend to firms and supply, differs from everyday usage. Ford and VW are fighting each other vigorously for the European car market, but an economist would not call them perfectly competitive. Each has such a big share of the market that changes in its quantity supplied affect the market price.

- VW and Ford each take account of this in deciding how much to supply. They are not *price-takers*.

- Only under perfect competition can individuals make decisions that treat the price as independent of their own actions.
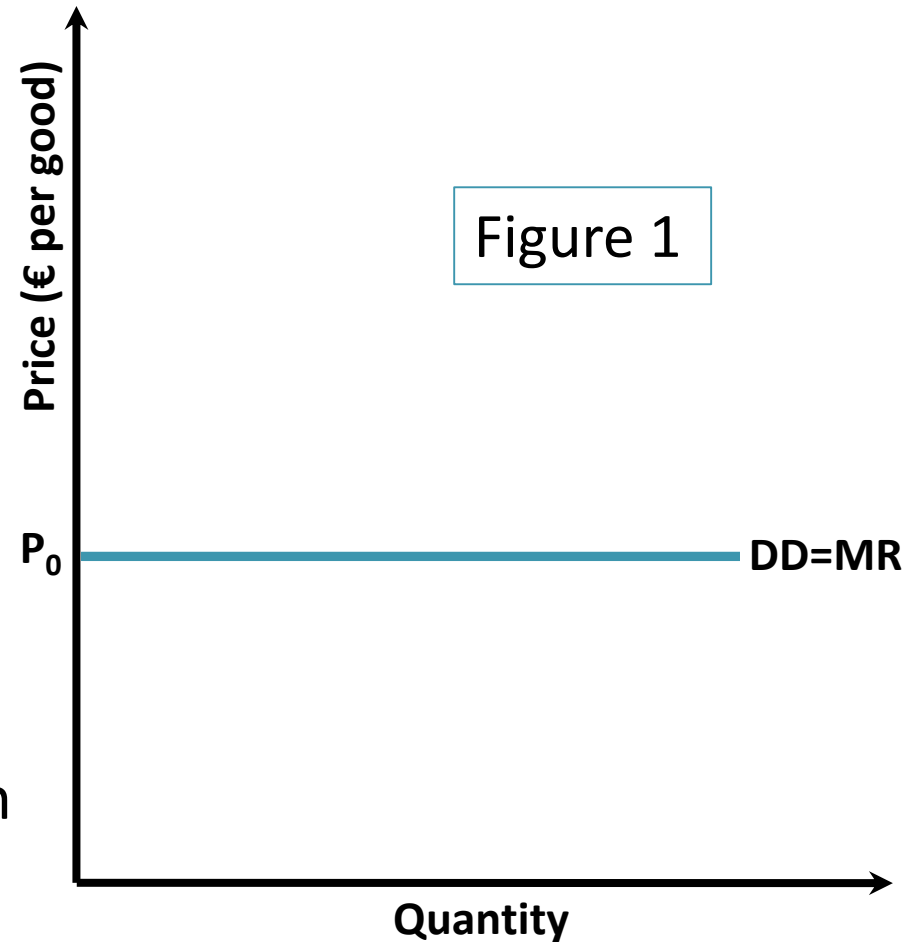
The competitive firm's demand curve

- A competitive firm can sell as much as it wants at the market price P_0.

- Its demand curve *DD* and marginal revenue curve *MR* are horizontal at this price.

Figure 1

Price (€ per good)

P_0 ─────────────── DD=MR

Quantity
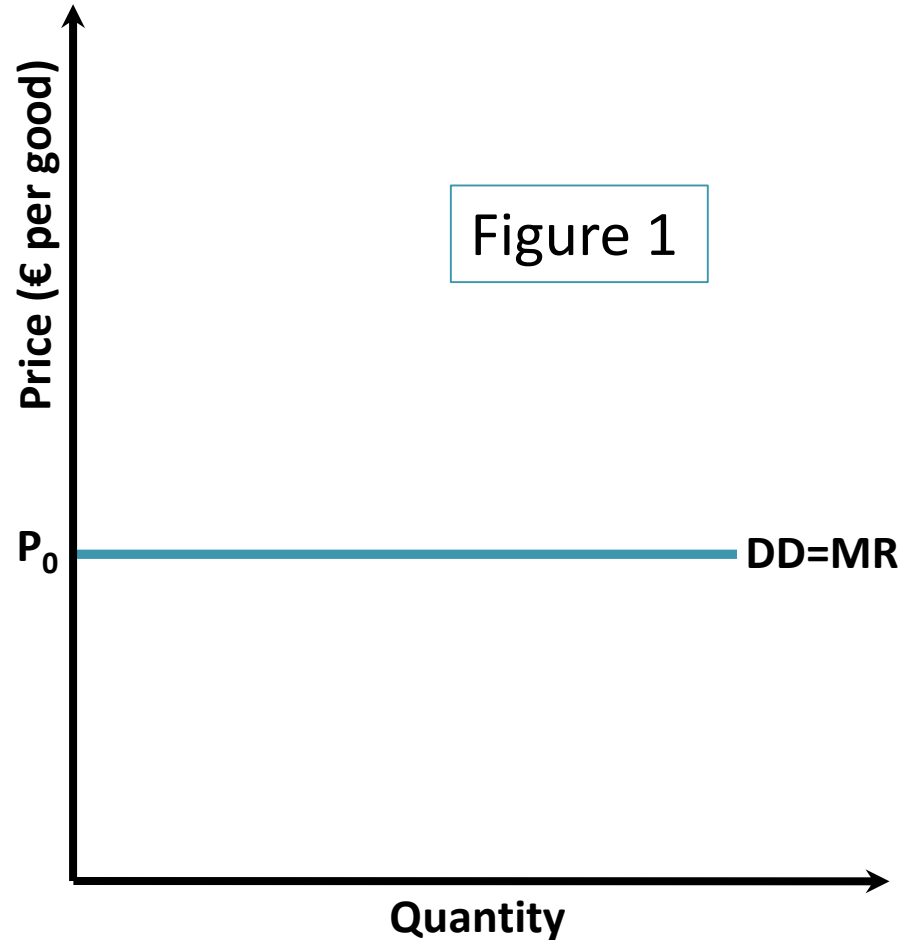
Horizontal demand curve

- If an individual's action does not affect the price, a perfectly competitive industry must have many buyers and many sellers.

- Each firm in a perfectly competitive industry faces a horizontal demand curve as in figure 1.

- However much the firm sells, it gets the market price. If it charges a price above P_0 it will not sell any output: buyers will go to other firms whose product is just as good. Since the firm can sell as much as it wants at P_0, it will not charge less than P_0. The individual firm's demand curve is *DD*.

Figure 1

Price (€ per good)

P_0 ────────────────── **DD=MR**

Quantity

Features of perfectly competitive firms

- A horizontal demand curve is the key feature of a perfectly competitive firm. To be a plausible description of the demand curve facing the firm, the industry must have four attributes.

- First, there must be many firms, each one *trivial* (= tiny) relative to the entire industry.

- Second, the product must be standardized.
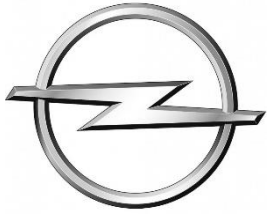
Homogeneous and heterogeneous products

- Even if the car industry had many firms it would not be a perfectly competitive industry.

- A Ford Mondeo is not a perfect substitute for an Opel Vectra. The more imperfect they are as substitutes, the more it makes sense to view Ford as the sole supplier of Mondeos and Opel (GM) as the sole supplier of Vectras.

- Each producer then ceases to be trivial relative to the relevant market, and cannot act as a price-taker. In a perfectly competitive industry, all firms must be making the same product, *for which they all charge the same price*.

Perfect and imperfect information

- Even if all firms in an industry made *homogeneous* (=identical) goods, each firm may have some discretion over the price it charges if buyers have imperfect information about the quality or characteristics of products.

- To rule this out in a competitive industry, we must assume that buyers have almost *perfect information* about the products being sold. They know the products of different firms in a competitive industry really are identical.

Free entry

- Why don't all the firms in a PC industry do what OPEC did in 1973-74, collectively restricting supply, to increase the price of their output by moving the industry up its market demand curve?

- The fourth crucial characteristic of a perfectly competitive industry is *free entry and exit*. Even if existing firms could organize themselves to restrict total supply and drive up the market price, the consequent rise in profits would simply attract new firms into the industry, thereby increasing total supply again and driving the price back down.
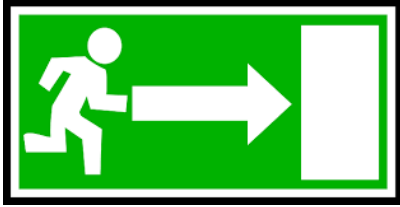
Free exit

- Conversely, as we shall shortly see, when firms in a competitive industry are losing money, some firms will close down and, by reducing the number of firms remaining in the industry, reduce the total supply and drive the price up, thereby allowing the remaining firms to survive.

To sum up, each firm in a competitive industry faces a horizontal demand curve at the going market price. To be a plausible description of the demand conditions facing a firm, the industry must have:

1. many firms, each trivial relative to the industry;

2. a homogeneous product, so that buyers would switch between firms if their prices differed;

3. perfect customer information about product quality, so that buyers know that the products of different firms really are the same; and

4. free entry and exit, to remove any incentive for existing firms to collude.

The firm's supply decision

- Earlier, we developed a general theory of supply.

- The firm uses the marginal condition (MC = MR) to find the best positive output; then it uses the average condition to check if the price for which this output is sold covers average cost.
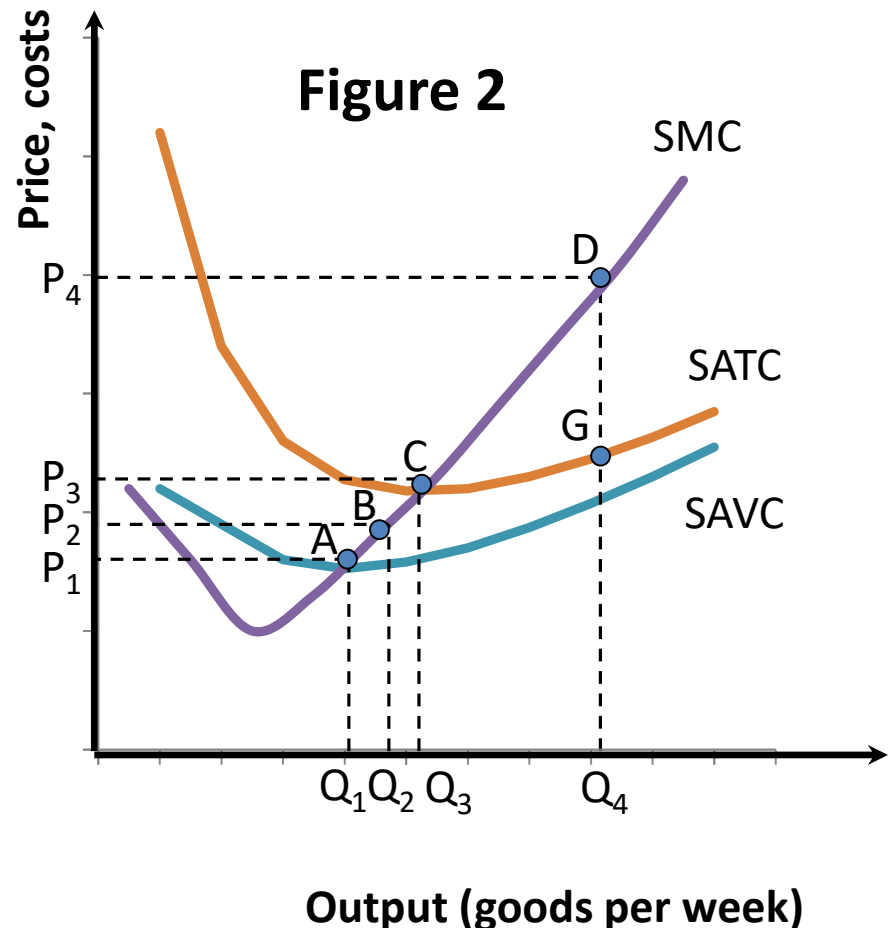
The special case of perfectly competitive firms

- This general theory must hold for the special case of perfectly competitive firms.

- *The special feature of perfect competition is the relationship between marginal revenue and price.*

- A competitive firm faces a horizontal demand curve. Making and selling extra output does *not* bid down the price for which existing output is sold. The extra revenue from selling an extra unit is simply the price received.

- A perfectly competitive firm's marginal revenue **is** its output price,

$$MR = P \qquad \text{(Eq. 1)}$$

– The perfectly competitive firm produces at that level of output at which price is equal to marginal cost, provided it makes more profit by producing some output than none at all.

– The firm's short-run supply curve is the SMC curve above the point A, the shutdown point below which the firm cannot cover average variable costs SAVC in the short run.
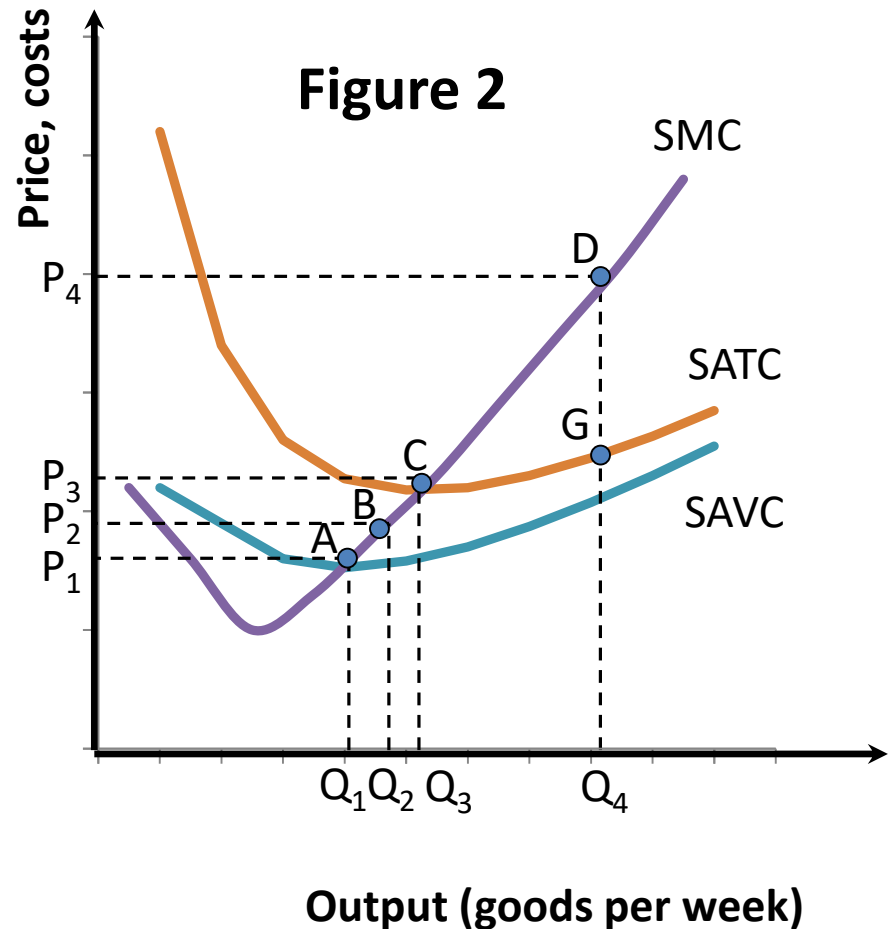
The firm's short-run output decision

Figure 2

Price, costs

SMC

SATC

SAVC

P_4 · · · · · · · · · · · · · D

P_3 · · · C

P_2 · · B

P_1 · A

Q_1 Q_2 Q_3 Q_4

Output (goods per week)

A firm's short run supply curve

- Figure 2 shows again the short-run cost curves – marginal cost *SMC*, average total cost *SATC*, and average variable cost *SAVC* – from our earlier lecture. Any firm chooses the output at which marginal cost equals marginal revenue.

- Equation (1) means that a perfectly competitive firm chooses the output at which:

$$SMC = MR = P \quad (Eq. 2)$$

- Suppose the firm faces a horizontal demand curve at the price P_4 in figure 2. From equation (2) the firm chooses the output Q_4 to reach point **D**, at which price equals marginal cost.

Figure 2

Price, costs

Output (goods per week)

SMC

SATC

SAVC

D

G

C

B

A

P_4

P_3

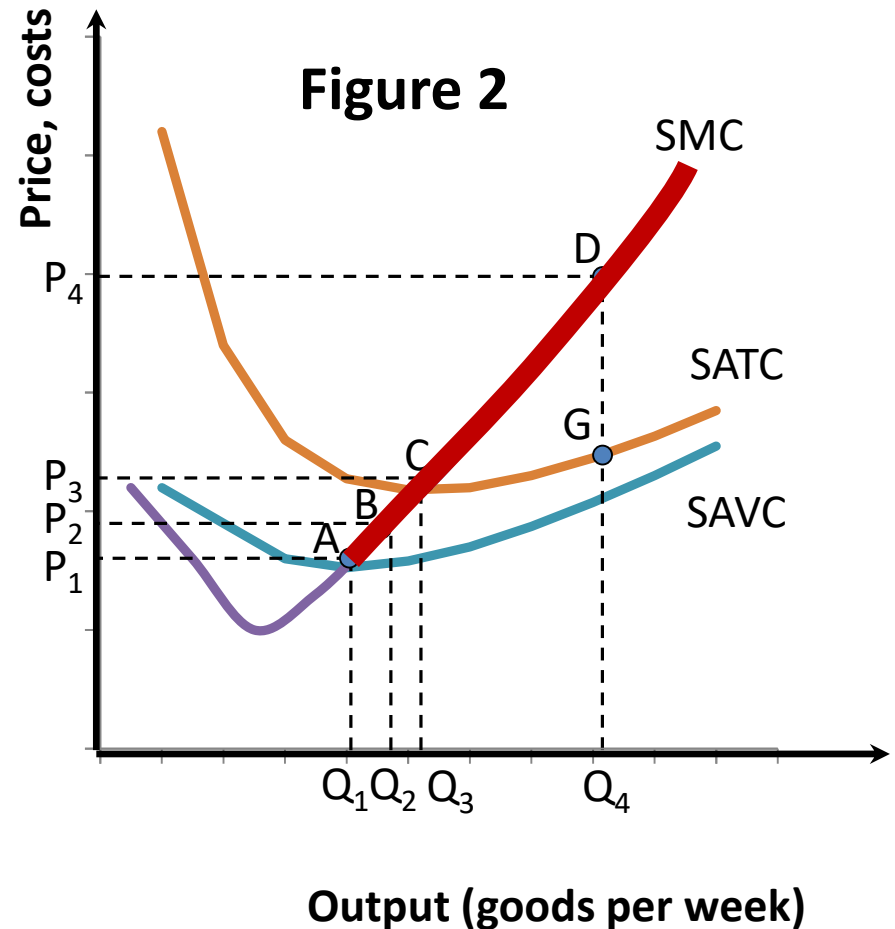P_2

P_1

Q_1 Q_2 Q_3 Q_4

Shutdown condition

- Next, the firm checks whether it would rather shut down in the short run.

- It will shut down if the price P_4 fails to cover short-run variable costs at this output. In figure 2 P_4 exceeds *SAVC* at the output Q_4.

- The firm supplies Q_4 and makes profits. Point **D** lies above point **G**, the short-run average total cost (including overheads) of producing Q_4.
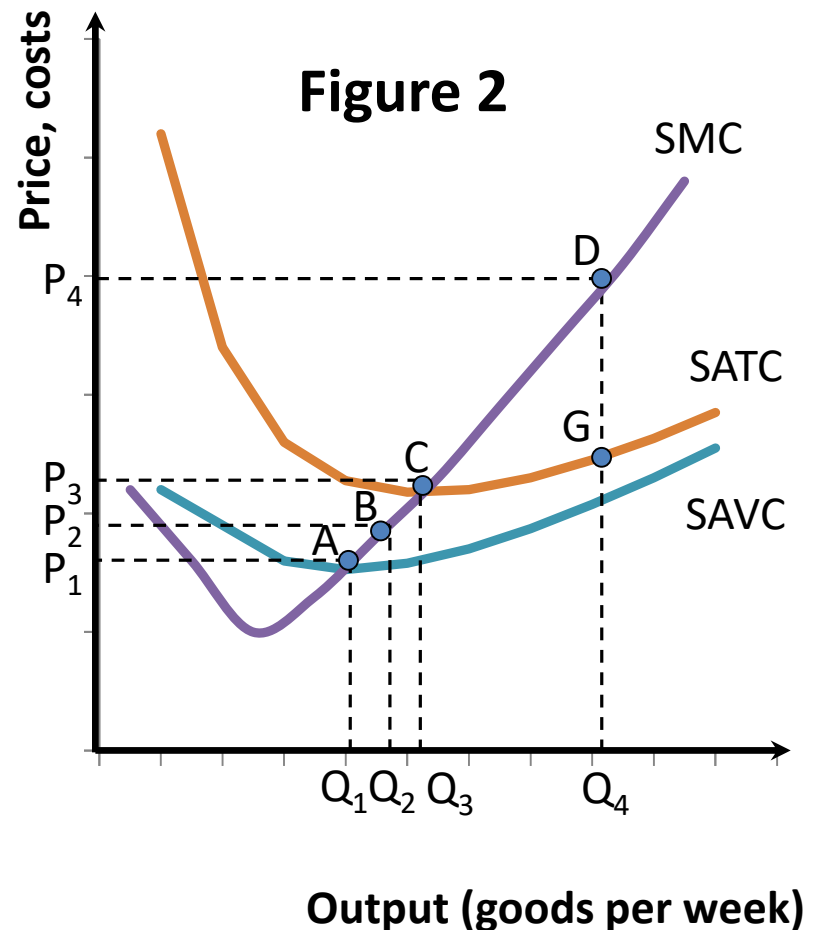

Figure 2
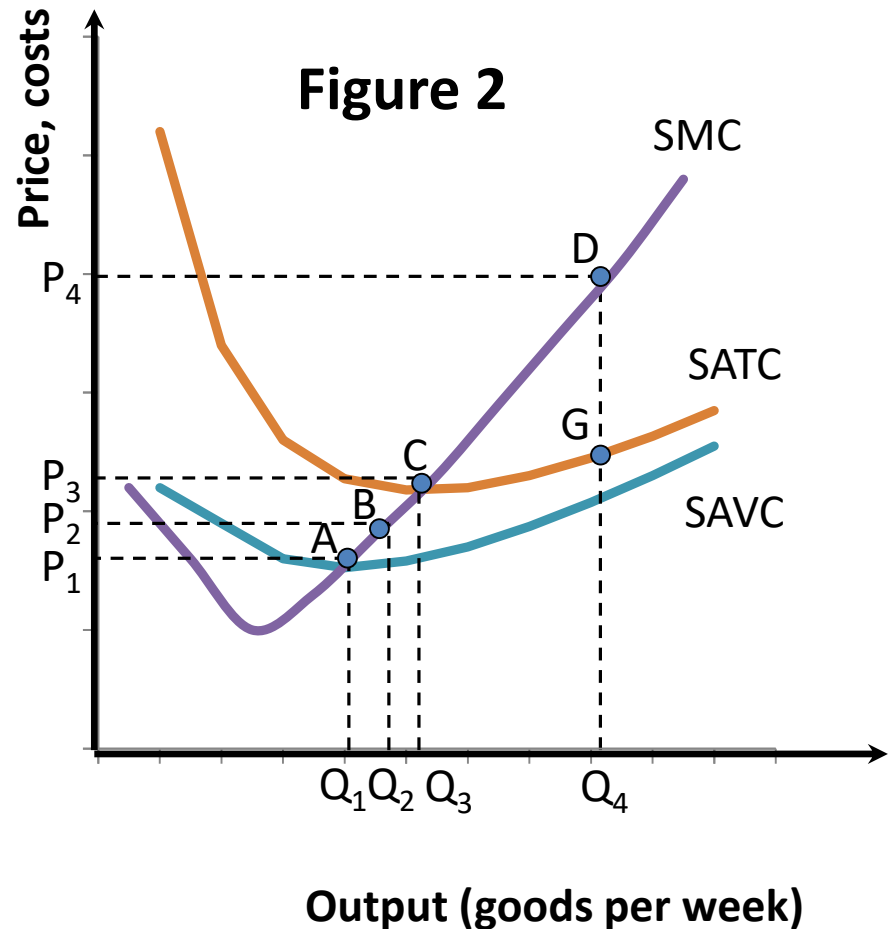
- In the short run, the firm supplies positive output for any price above P_1. At a price P_2, the firm makes Q_2, the output at which price equals marginal cost (although $\pi < 0$).

- Any price below P_1 is below the minimum point on the *SAVC* curve. The firm cannot find an output at which price covers *SAVC*.

- The **short-run supply curve** is the *SMC* curve above point **A**, at which the *SMC* curve crosses the lowest point on the *SAVC* curve.
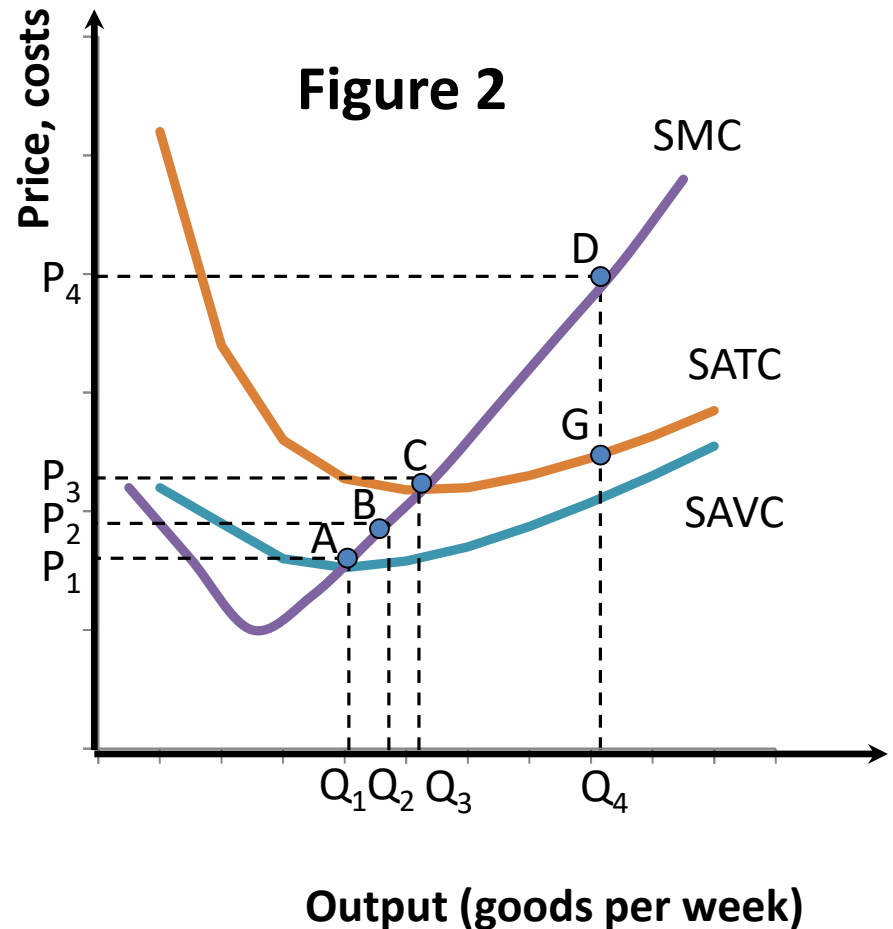
The short-run supply curve

Price, costs

Figure 2

SMC

P_4 ---- D

SATC

G

P_3 ---- C

P_2 ---- B

P_1 ---- A

SAVC

Q_1 Q_2 Q_3 Q_4

Output (goods per week)

Short-run losses and profits

- Between points **A** and **C** the firm is making short-run losses, but recouping some of its overheads.

- At any price above P_3, at which the *SMC* curve crosses the lowest point on the *SATC* curve, the firm is making short-run profits.

- At the price P_4 the profit per unit output (average profit) is the distance **DG**, price minus average total costs per unit.

Figure 2

SMC

SATC

SAVC

P_4

P_3
P_2
P_1

A B C G D

Price, costs

$Q_1 Q_2 \ Q_3$ Q_4
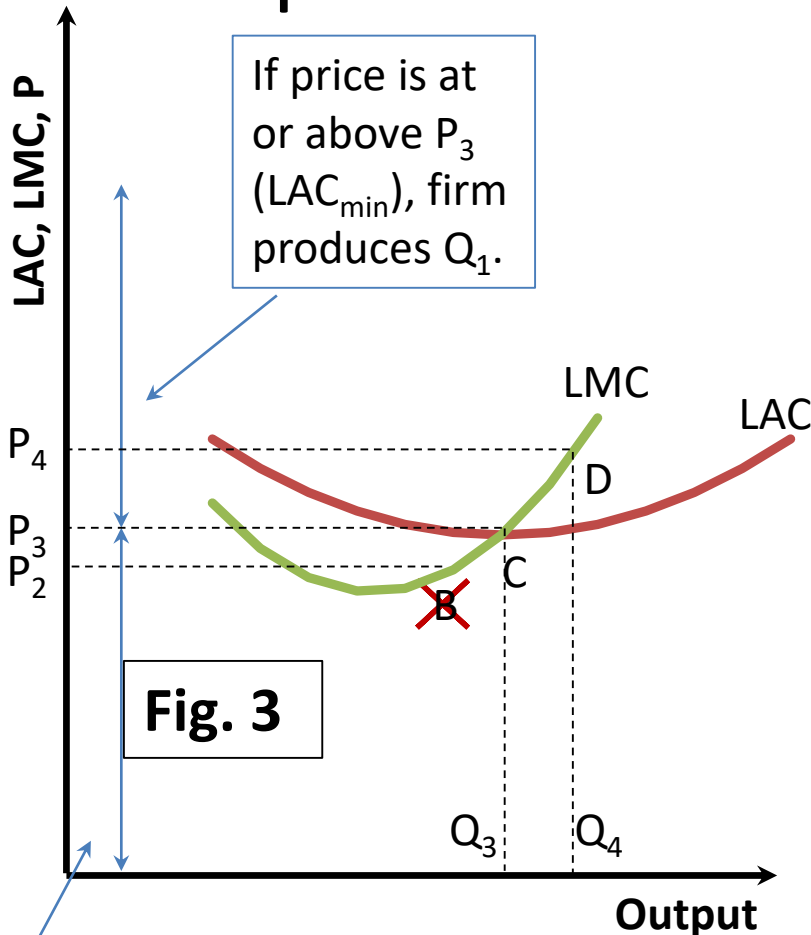
Output (goods per week)

- Remember that these are economic or supernormal profits after allowing for the economic costs, including the opportunity costs of the owners' financial capital and work effort, summarized in the *SAVC* and *SATC* curves.

- The price P_1 is the **shutdown price**, below which the firm cuts its losses by making no output.

Economic costs and shutdown price

Figure 2

The firm's long-run output decision

If price is at or above P_3 (LAC_{min}), firm produces Q_1.

LMC

LAC

P_4

D

P_3

P_2

C

X

Fig. 3

Q_3 Q_4

Output

LAC, LMC, P

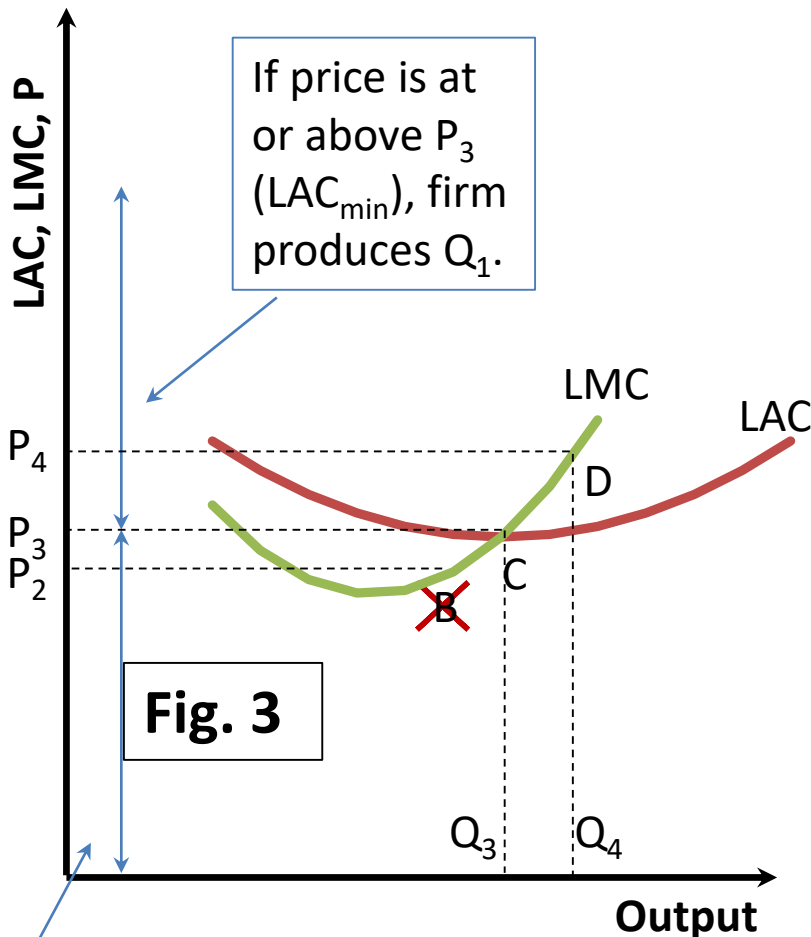If price is less than P_3 (LAC_{min}), firm goes out of business

- The perfectly competitive firm produces at the level of output at which P is equal to marginal cost, provided it makes more profit by producing some output than none at all.

- At any price above P_3 the firm makes profits because price is above long-run average cost (*LAC*). At any price below P_3, such as P_2, the firm makes losses because price is below long-run average cost. It therefore will not produce any output at prices below P_3. The long-run supply curve is the *LMC* curve above point **C**.

24

A firm's long-run supply curve

LAC, LMC, P (vertical axis)

LMC

LAC

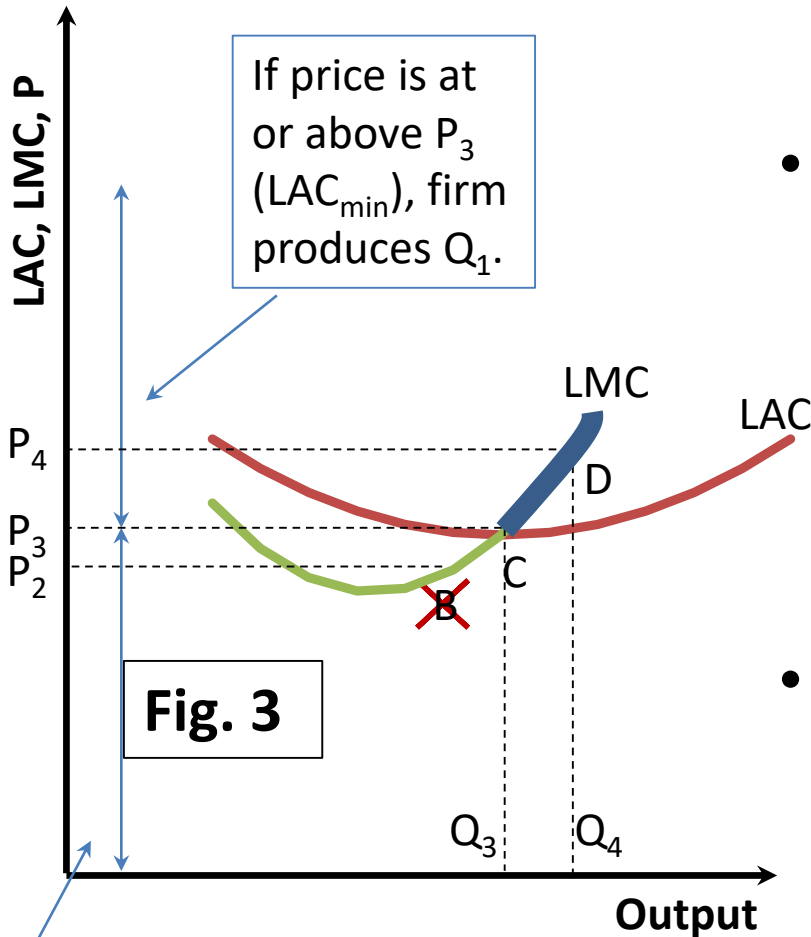**Fig. 3**

Output (horizontal axis)
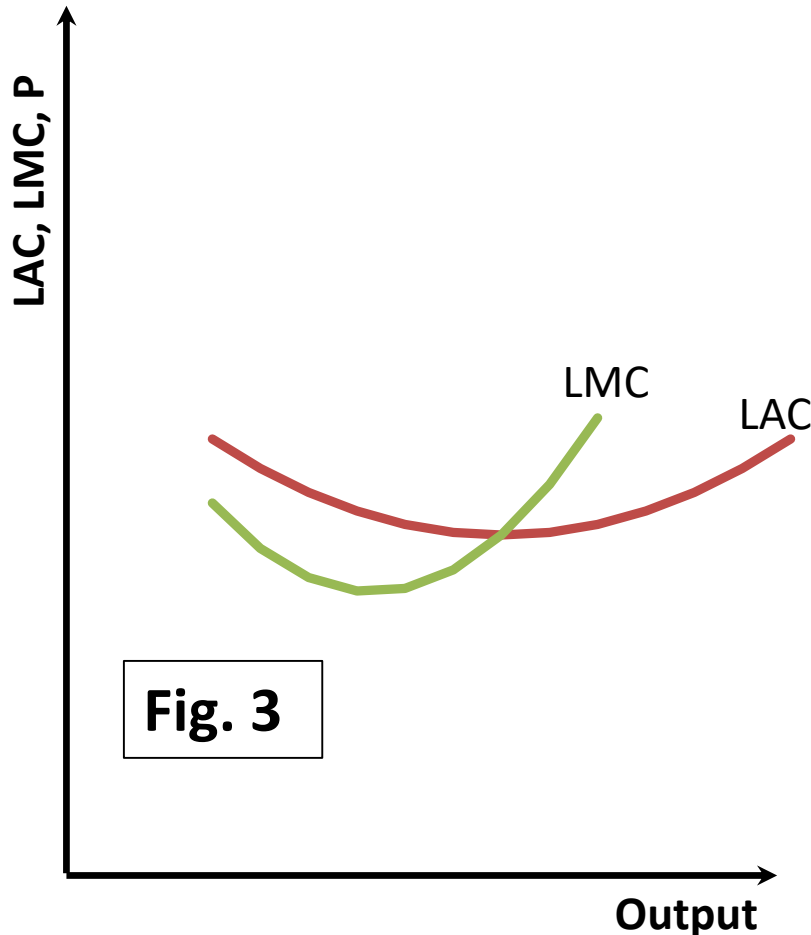
- Figure 3 shows the firm's average and marginal costs in the long run.

- The long-run marginal cost curve LMC is flatter than the short-run marginal cost curve SMC since the firm can adjust all inputs in the long run.

Exit condition in the long run

If price is at or above P_3 (LAC_{min}), firm produces Q_1.

LMC

LAC

P_4

P_3
P_2

D

C

B

Fig. 3

Q_3 Q_4

Output

LAC, LMC, P

If price is less than P_3 (LAC_{min}), firm goes out of business

- Facing a price P_4, the firm chooses the long-run output Q_4 at point **D**, then checks if it is better to shut down than to produce this output.

- In the long run, shutting down means leaving the industry altogether. The firm exits the industry if price fails to cover long-run average cost LAC at the best positive output. At the price P_2 the best positive output is at point **B** in figure 3, but the firm makes a loss and should exit the industry in the long run.

A firm's long-run supply

If price is at or above P_3 (LAC$_{min}$), firm produces Q_1.

Fig. 3

If price is less than P_3 (LAC$_{min}$), firm goes out of business

- A firm's **long-run supply curve**, relating output supplied to price in the long run, is that part of its *LMC* curve above its *LAC* curve.

- At any price below P_3 the firm exits the industry. At the price P_3 the firm produces Q_3 and just breaks even after paying all its economic costs. It makes only normal profits.

- When economic profits are zero the firm makes **normal profits**. Its accounting profits just cover the opportunity cost of the owner's money and time.

Entry or exit price
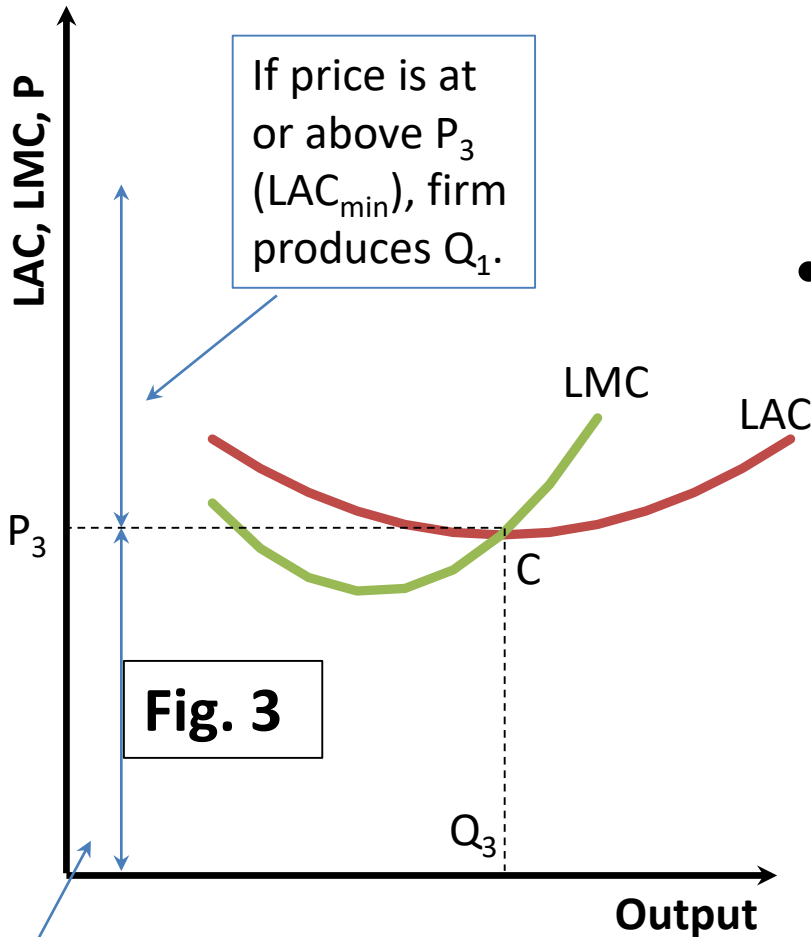
If price is at or above P_3 (LAC_{min}), firm produces Q_1.

Fig. 3

If price is less than P_3 (LAC_{min}), firm goes out of business

- The price P_3 corresponding to the lowest point on the *LAC* curve is the *entry or exit price*.

- At this price firms make only normal profits. There are no incentives to enter or leave the industry. The resources tied up in the firm are earning just as much as their opportunity costs, what they could earn elsewhere.
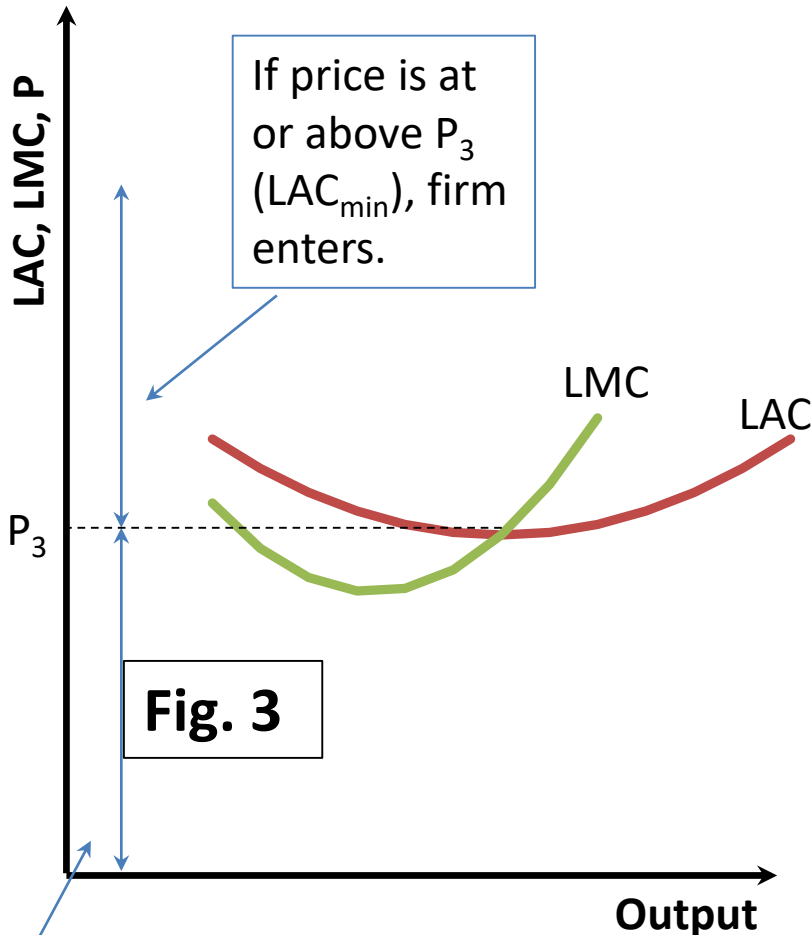
28

Entry and exit

If price is at or above P_3 (LAC_{min}), firm produces Q_1.

LMC

LAC

P_3

Fig. 3

If price is less than P_3 (LAC_{min}), firm goes out of business

Output

LAC, LMC, P
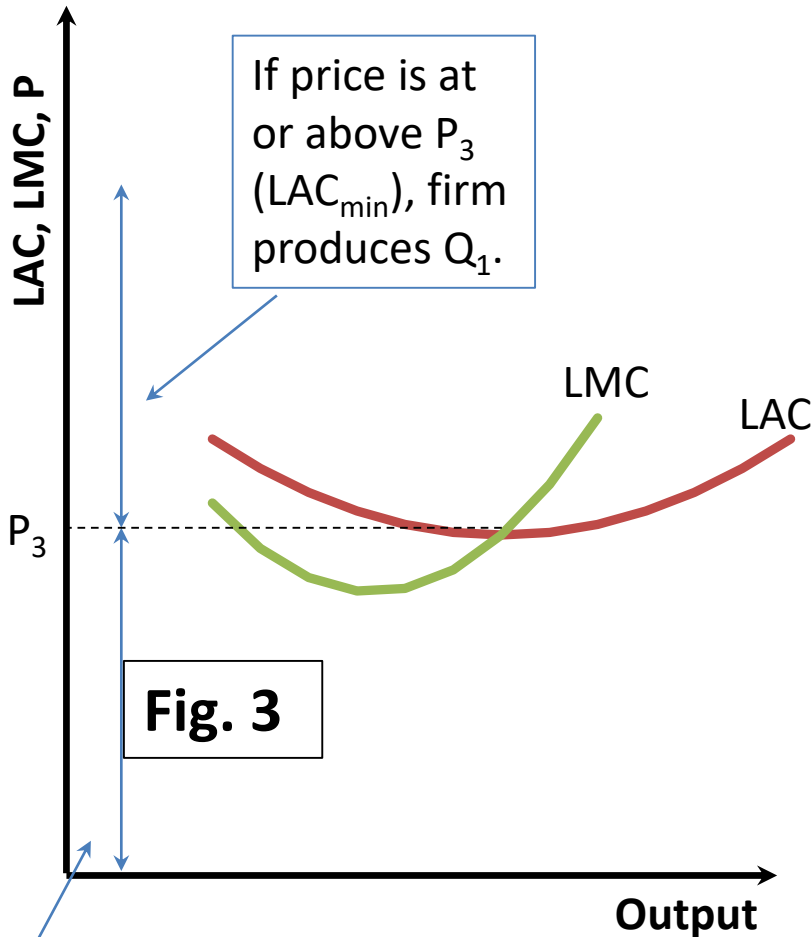
- **Entry** is when new firms join the industry.
- **Exit** is when existing firms leave.
- Any price below P_3 induces a firm to exit the industry in the long run.
- P_3 is the minimum price required to keep the firm in the industry.

29

The decision facing an entrant

If price is at or above P$_3$ (LAC$_{min}$), firm enters.

LMC

LAC

P$_3$

Fig. 3

Output

If price is less than P$_3$ (LAC$_{min}$), firm does not enter.

- We can also interpret figure 3 as the decision facing a potential entrant to the industry.

- The cost curves now describe the post-entry costs. P_3 is the price at which entry becomes attractive.

- Any price above P_3 yields supernormal profits and encourages entry of new firms.

Supply decisions of a competitive firm (figure 4)
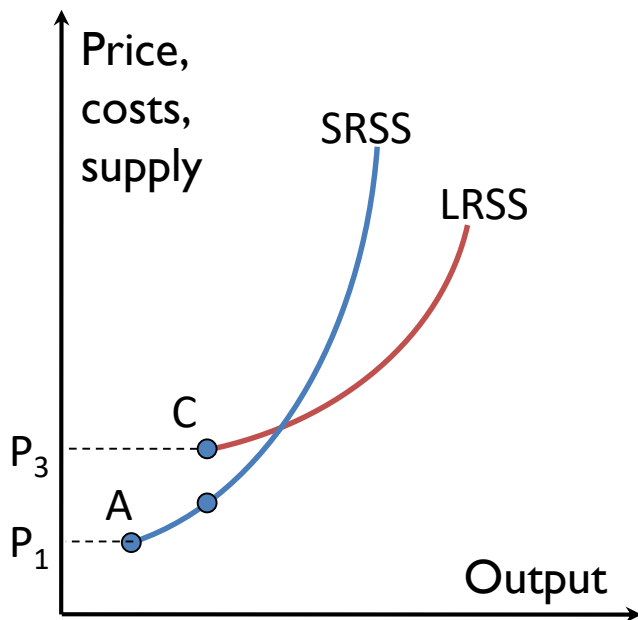
- Figure 4 summarizes the preceding discussion.

- For each level of fixed factors there is a different *SMC* curve and short-run supply curve *SRSS*.

- The long-run supply curve *LRSS* is flatter than *SRSS* because extra factor flexibility in the long run makes the *LMC* curve flatter than the *SMC* curve.

Price, costs, supply

SRSS

LRSS

C

P_3

A

P_1

Output
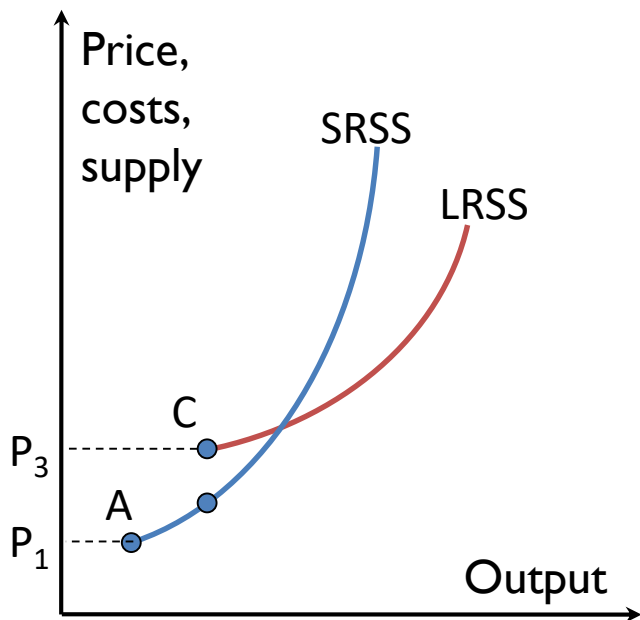
Short-run and long-run supply curves of the competitive firm (figure 4)

Taken from the two previous figures, the short-run supply curve *SRSS* is the firm's *SMC* curve above **A** and the long-run supply curve *LRSS* is the firm's *LMC* curve above **C**. P_1 is the shutdown price in the short run and P_3 the entry and exit price in the long run. If the firm happens to begin with the stock of fixed factors it would choose at the lowest point on its *LAC* curve, then **C** will actually lie on the *SRSS* curve.
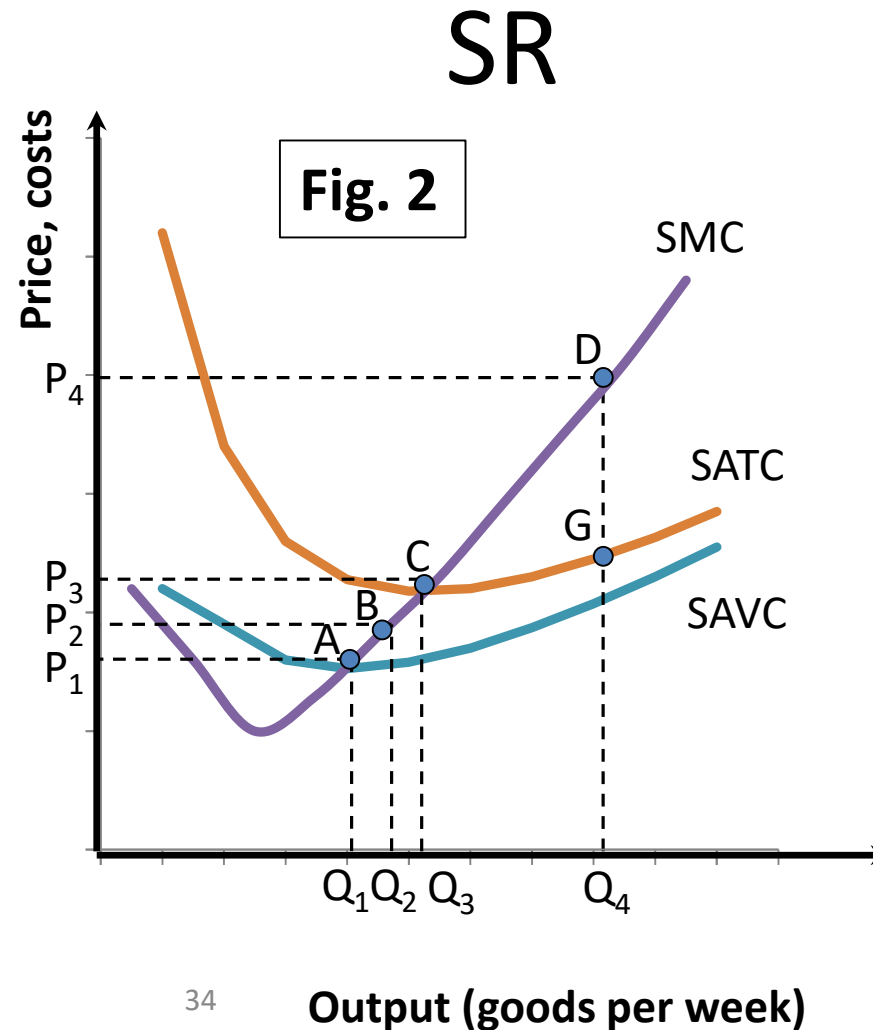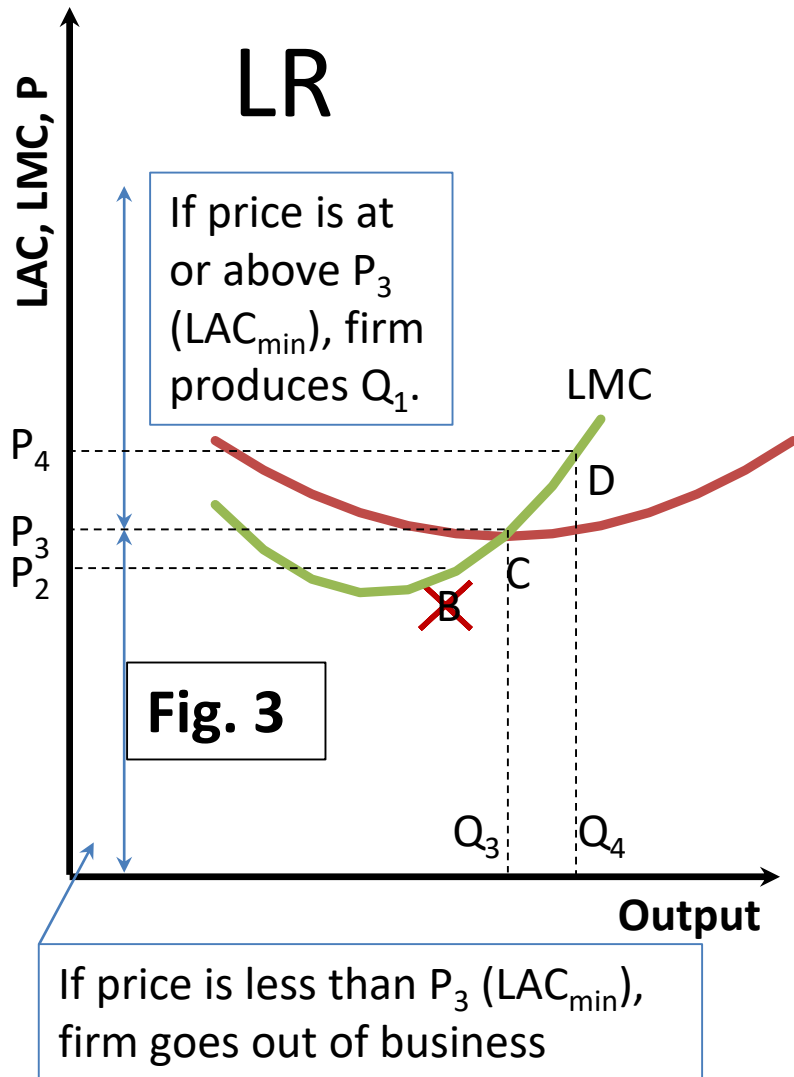
Supply decisions of a competitive firm

- The *SRSS* curve starts from a lower shutdown price because, in the short run, a firm will produce if it can cover average variable costs.

- In the long run all costs are variable and must be covered if the firm is to stay in the industry.

- In either case, a competitive firm's supply curve is the part of its marginal cost curve above the point at which it is better to make no output at all. The table below sets out this principle.

Marginal condition	Average condition	
	Short run	Long run
Produce output Where P = MC	If P < SAVC shut down temporarily	If P < LAC exit industry

Marginal condition	Average condition	
	Short run	Long run
Produce output Where P = MC	If P < SAVC shut down temporarily	If P < LAC exit industry

LR

Fig. 3

If price is at or above P_3 (LAC_{min}), firm produces Q_1.

If price is less than P_3 (LAC_{min}), firm goes out of business

SR

Fig. 2

34