

# Perfect competition – the competitive firm's supply decision

Microeconomics

# 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 200 000 farms and 30 000 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

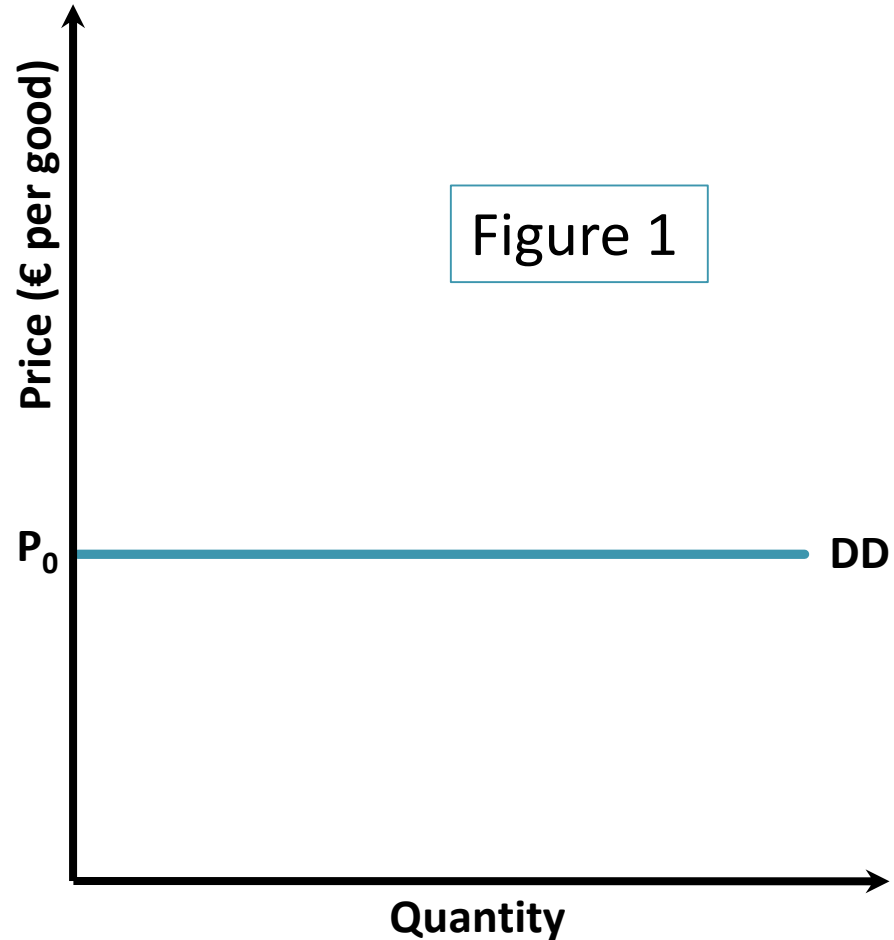
- Perfect competition means that each firm or household, recognizing that its quantities supplied or demanded are trivial relative to the whole market, assumes its actions have no effect on the market price.
- This assumption was also built into our earlier model of consumer choice. Each consumer's budget 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  $DD$  is horizontal at this price.



# 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  $DD$ .



# 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* 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* or 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 the 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.

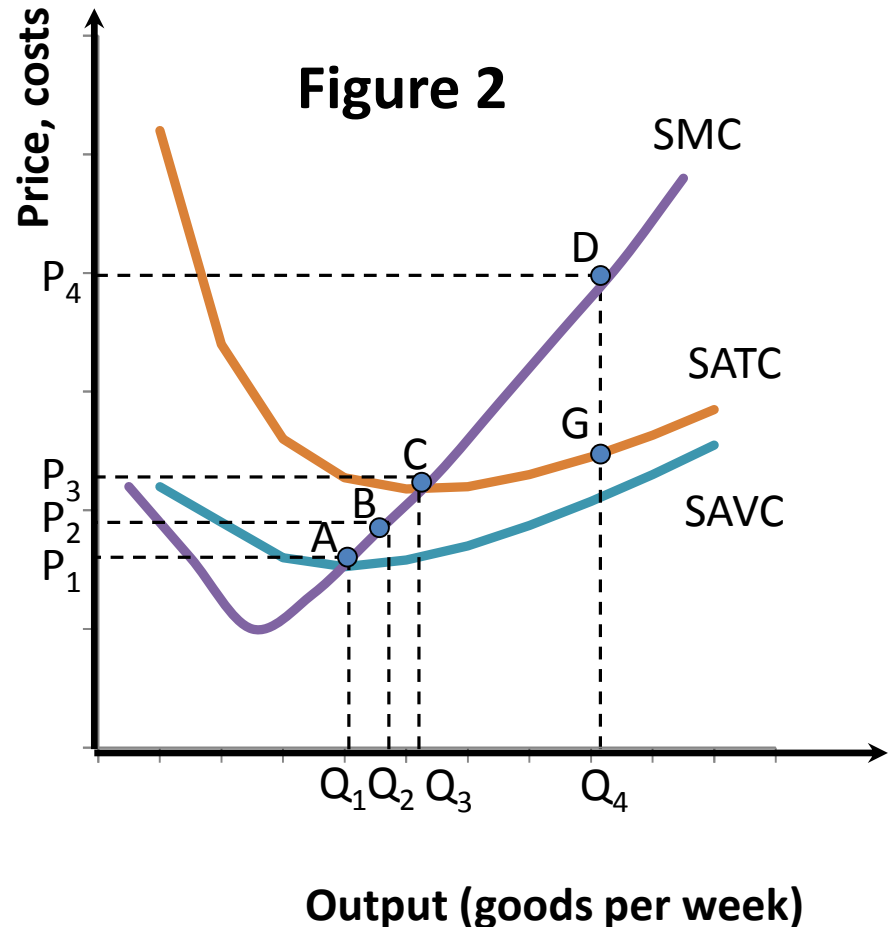
# The special case of perfectly competitive firms

- 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,  $MR = P$  (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



# 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

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

- 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.

# 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  $Q_4$ .

# The short-run supply curve

- 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.
- 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.

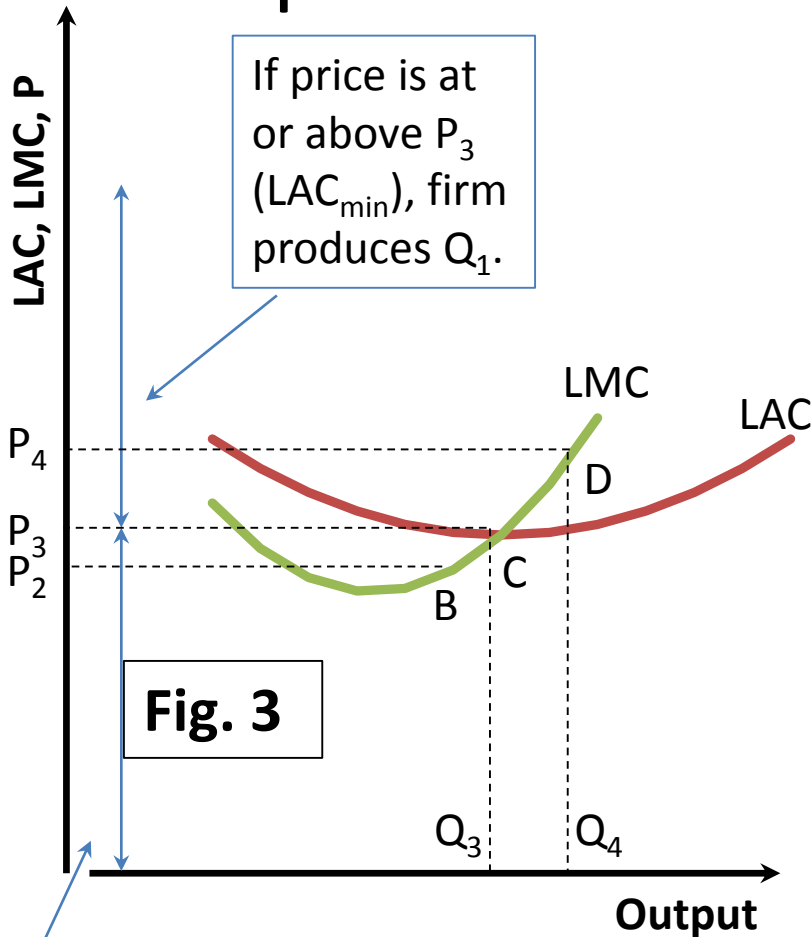
# Short-run losses and profits

- 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 is the distance **DG**, price minus average total costs per unit.

# Economic costs and shutdown price

- 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.

# The firm's long-run output decision



- 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**.

# A firm's long-run supply curve

- 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

- 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

- 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

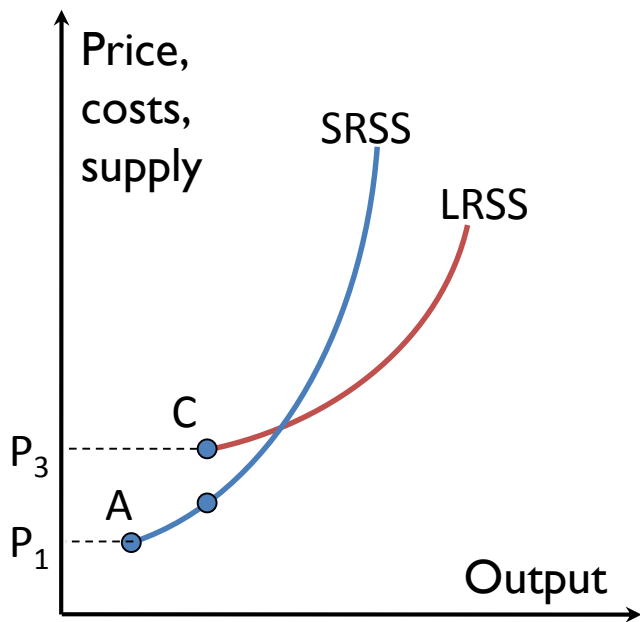
- The price  $P_3$  corresponding to the lowest point on the  $LAC$  curve is the *entry or exit price*.
- At this price firms make only normal profits. There are no incentives to enter or leave the industry. The resources tied up in the firm are earning just as much as their opportunity costs, what they could earn elsewhere.

# Entry and exit

- **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.

# The decision facing an entrant

- 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.



## 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

- 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.
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Table 1

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

# 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. Table 1 sets out this principle.