

# LECTURE 8: PRICE-TAKING FIRMS

## Today's Topic: Price Rules, OK?

1. **A Competitive Market?** the meaning of competition, a price-taker's revenue.
2. **Profit Maximisation and the Supply Curve:** a simple example, *MC* and supply, shut-down decisions, long-run entry or exit.
3. **Competitive Supply Curves:** market supply with a fixed number of firms, supply with entry or exit, shifts in demand, upwards-sloping long-run supply?

# CONDITIONS FOR COMPETITION

**Today: how price is everything for a price-taking firm in a competitive market; short-run shutdown or permanent exit? how the firm's supply and the market supply curves happen.**

**Three conditions for perfect competition: many buyers and sellers in the market; goods or services offered for sale largely identical; and (dynamically) firms can freely enter or exit the market.**

**Examples.**

# THE COMPETITIVE FIRM'S REVENUE

**A price-taking firm faces a perfectly elastic, horizontal demand curve, at price  $P$ .**

**The firm can sell as much as it wishes at price  $P$  or below, but nothing at higher prices.**

**The firm's Total Revenue,  $TR = P \cdot y$ , at output  $y$ /period.**

**Its *Average Revenue*:  $AR = \frac{TR}{y} = P$**

**Its *Marginal Revenue*:  $MR = \frac{\Delta R}{\Delta y} = P$**

**Remember: the firm cannot affect  $P$  by varying its output  $y$ .**

# EXAMPLE OF PROFIT MAXIMISATION

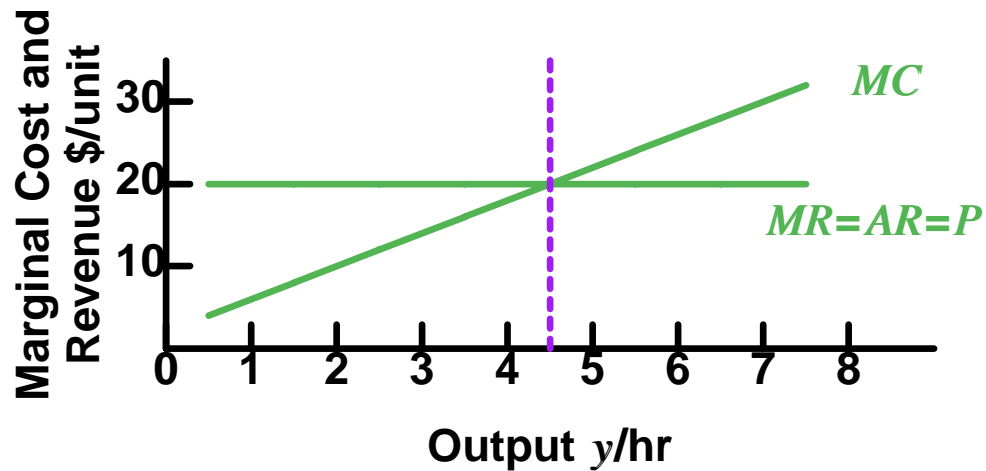
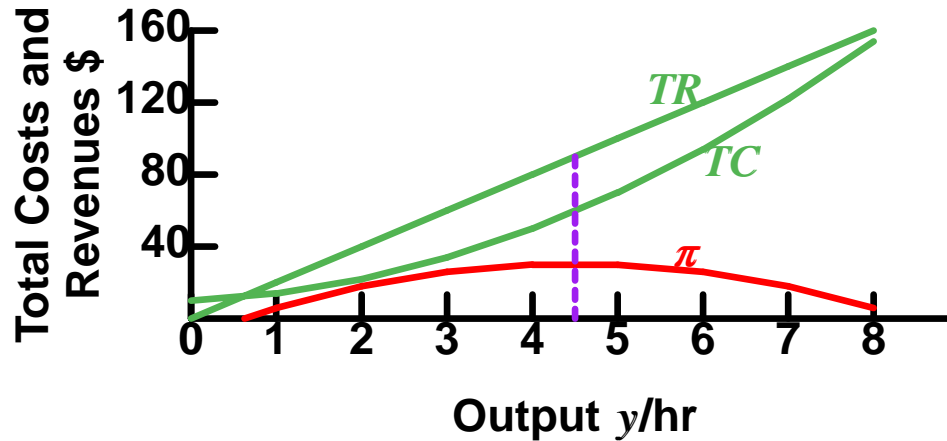
| Output Quantity | Total Revenue | Total Cost | Profit               | Marginal Revenue                 | Marginal Cost                    |
|-----------------|---------------|------------|----------------------|----------------------------------|----------------------------------|
| $y$             | $TR$<br>\$    | $TC$<br>\$ | $\pi$<br>$= TR - TC$ | $MR$<br>$= \Delta TR / \Delta y$ | $MC$<br>$= \Delta TC / \Delta y$ |
| 0               | 0             | 10         | -10                  | 20                               | 4                                |
| 1               | 20            | 14         | 6                    | 20                               | 8                                |
| 2               | 40            | 22         | 18                   | 20                               | 12                               |
| 3               | 60            | 34         | 26                   | 20                               | 16                               |
| 4               | 80            | 50         | 30                   | 20                               | 20                               |
| 5               | 100           | 70         | 30                   | 20                               | 24                               |
| 6               | 120           | 94         | 26                   | 20                               | 28                               |
| 7               | 140           | 122        | 18                   | 20                               | 32                               |
| 8               | 160           | 154        | 6                    | 20                               |                                  |

(GKSM, Table 14.2, with output price  $P = \$20/\text{unit.}$ )

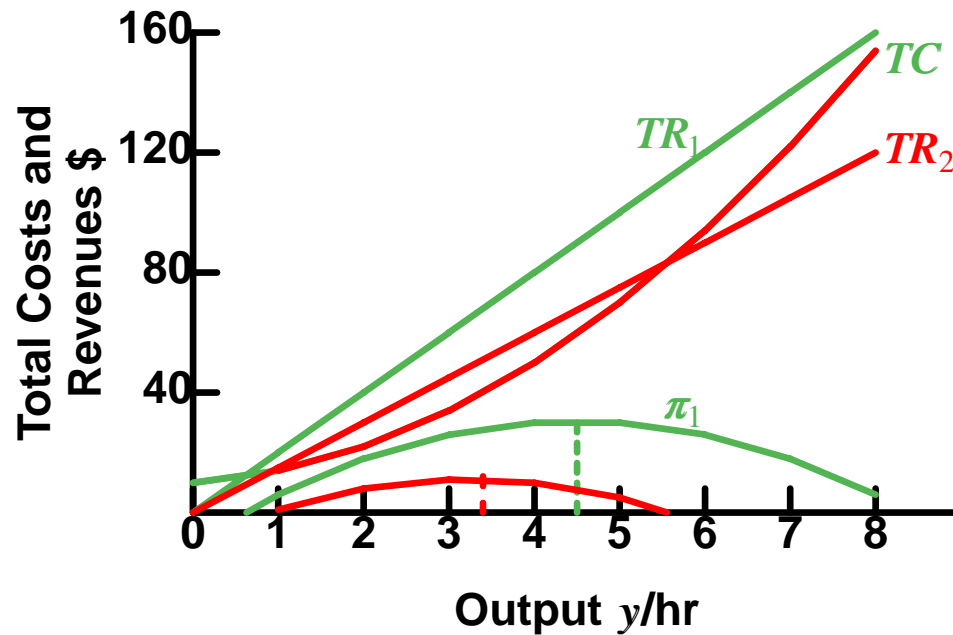
**$TC$  rises disproportionately: Decreasing Returns to Scale DRTS, and hence rising  $MC$ . Why?**

**What is the profit-maximising level of output?**

# PROFIT-MAXIMISING GRAPHS



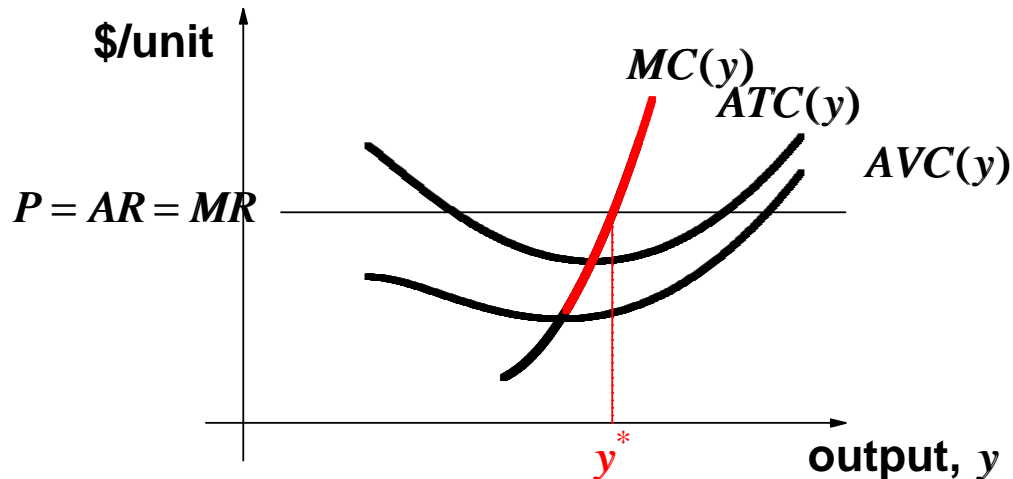
# EFFECTS OF A PRICE FALL



Two effects of a price fall: lower maximum profit  $\pi^*$ , and lower  $\pi$ -maximising output  $y^*$ .

But the  $\pi$ -maximising output  $y^*$  is more easily seen on the *MC-MR* plot.

# MC CURVE AND SUPPLY

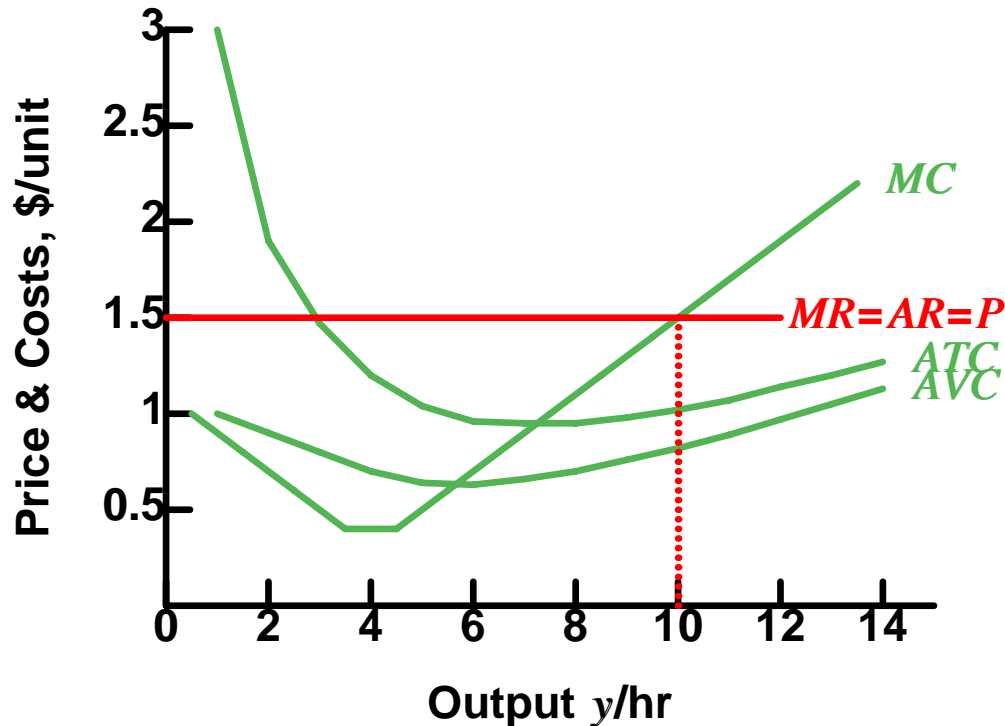


**Profit-maximising output  $y^*$  when  $MC(y^*) = MR$ .**

**For a price-taking firm,  $MR = AR = \text{price } P$ , so as  $P$  varies, read off the optimum  $y^*$  from the level of output where the horizontal demand curve (price  $P$ ) cuts the upwards-sloping  $MC$  curve.**

**$\therefore \pi$ -maximising output  $y^*$  when  $P = MC(y^*)$  for a price-taking firm.**

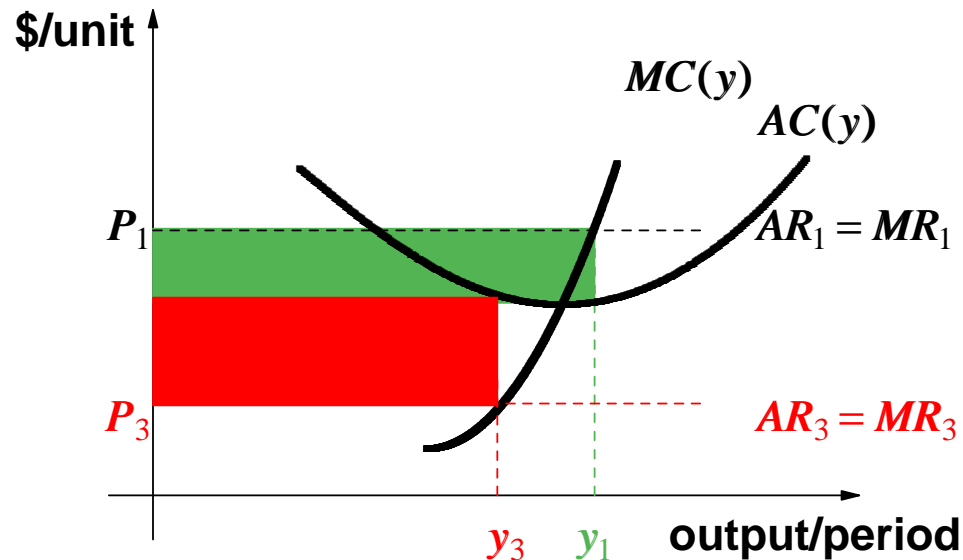
# BOB'S BAGELS



The competitive firm's supply curve is its  $MC$  curve. At price  $P = \$1.50$ , optimum output  $y^* = 10$  units/hr, and profit  $\pi = y^* \cdot (AR - ATC) = 10(1.5 - 1) = \$5/\text{hr}$ .



# ECONOMIC PROFITS: +VE & -VE



**Green rectangle = positive profit =  $y_1 \cdot (AR_1 - AC_1)$**

**Red rectangle = negative profit:  $P_3 = AR_3 < AC_3$ .**

## SHUTDOWN IN THE SHORT RUN

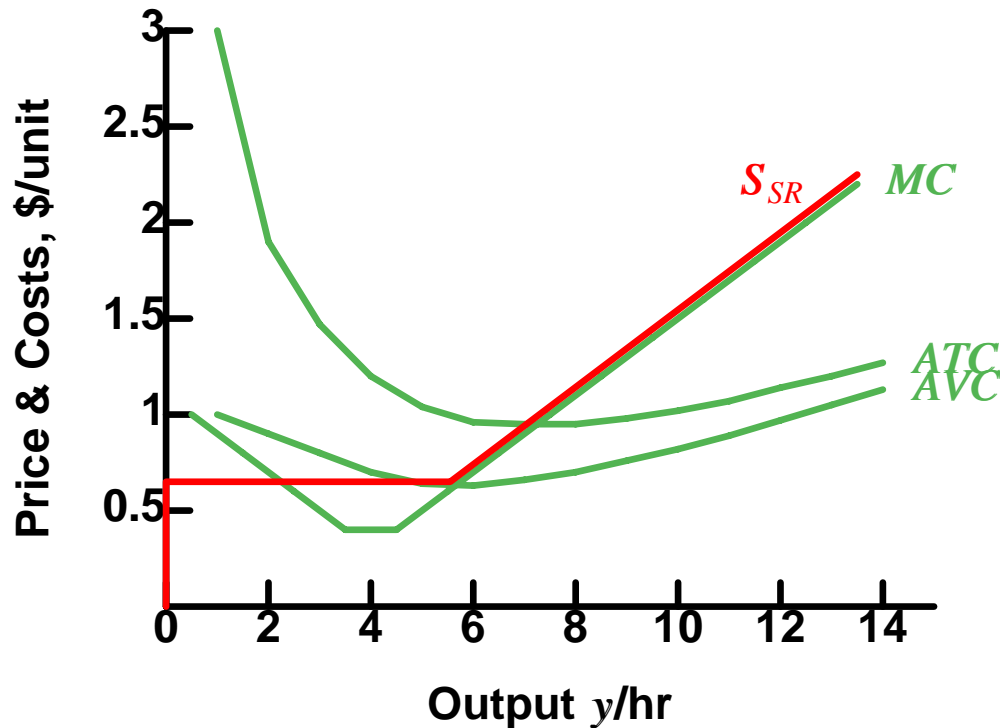
The firm will make a loss (a negative profit) when the Average Revenue ( $= P$ ) is less than  $ATC$ .

But it might still operate in the short run, so long as it can cover its  $VC$ : In the short run the firm's  $VC$  are avoidable (if the firm shuts down).

So long as  $P = AR > AVC$ , the firm will operate in the short run: price (i.e.  $AR$ ) is sufficient to cover Variable Costs, even if it does not also cover Fixed Costs.

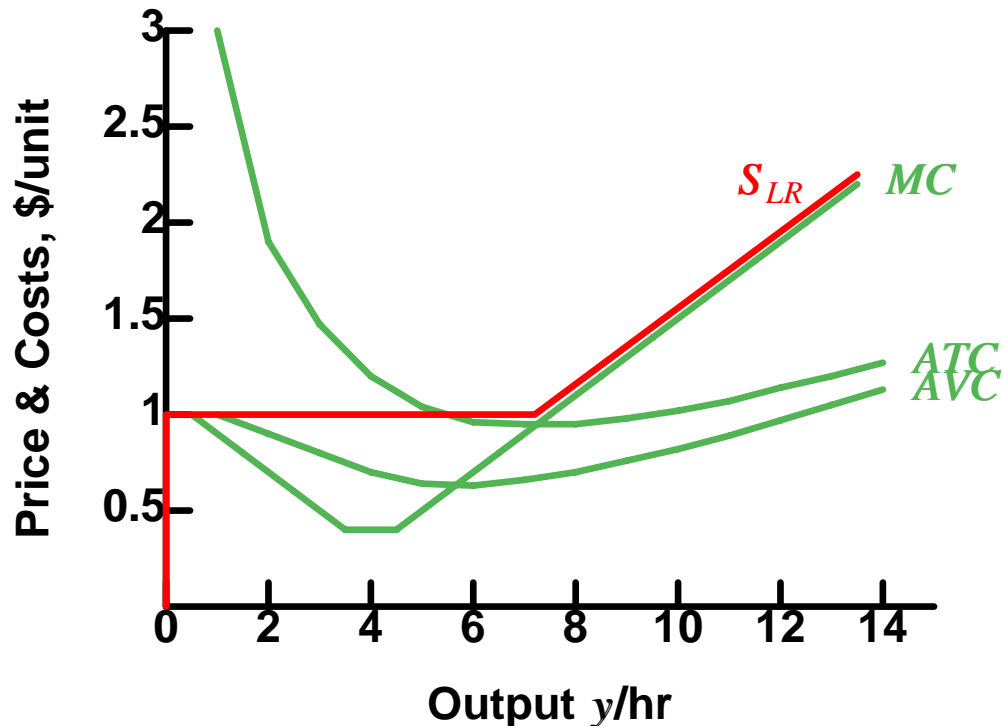
How long can it supply while  $AVC < P = AR < ATC$ ? Depends.

# SHORT-RUN SUPPLY CURVE



The competitive firm's (Bob's Bagels) short-run supply curve is its  $MC$  curve above  $AVC$ .

# LONG-RUN SUPPLY CURVE



The competitive firm's (Bob's Bagels) long-run supply curve is its  $MC$  curve above  $ATC$ .

## LONG-RUN ENTRY OR EXIT

In the longer run,  $FC$  may be partly avoidable, and exit will occur if the firm incurs a long-run loss:  
**Profit = Total Revenue – Total Costs < 0.**

**Average Profit =  $AR - ATC$**

**∴ *Exit* when Average Profit < 0, when  $AR = P < ATC$ .**

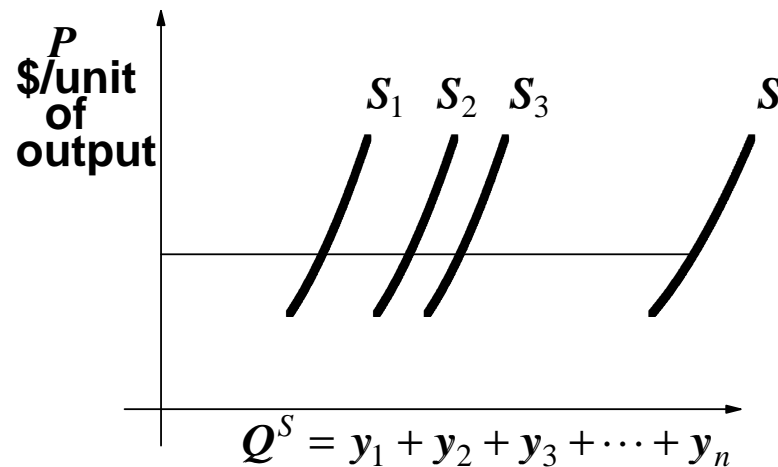
**A firm will not enter a market (industry) unless it expects a positive profit:**

**∴ *Entry* when  $AR = P > ATC$ .**

**Recall:  $TC$  includes the opportunity cost of capital used.**

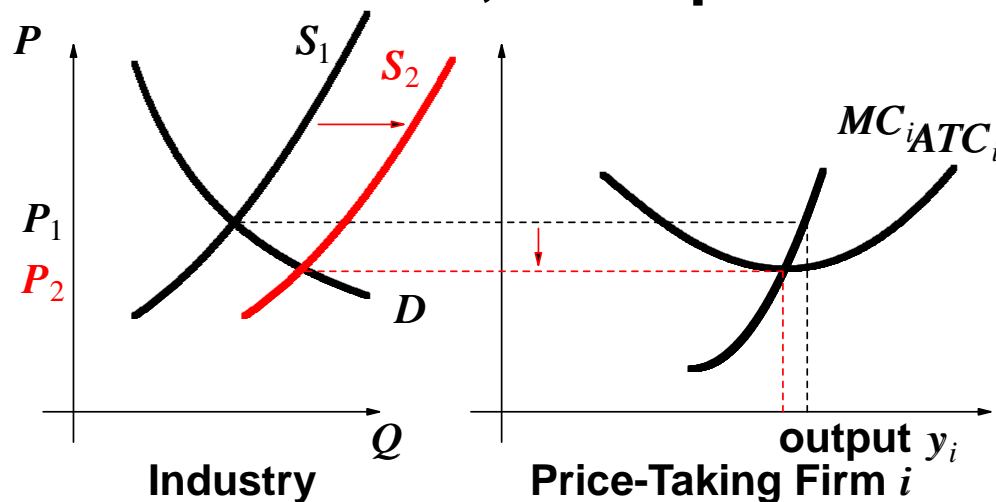
# SUPPLY WITH NO ENTRY OR EXIT

The *Industry Supply Curve S* is the horizontal sum of the supply curves  $S_1, S_2, S_3, \dots, S_n$  of the  $n$  individual price-taking firms:



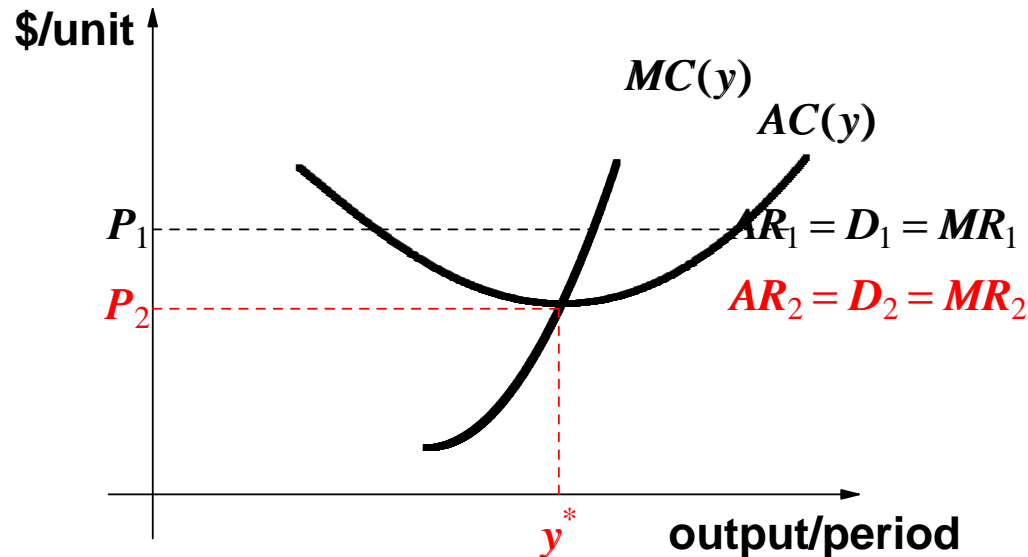
# SUPPLY WITH ENTRY AND EXIT

Firms enter (if  $\pi > 0$ ) or exit ( $\pi < 0$ ). Entry shifts industry supply to the right, exit to the left. As the industry supply shifts, so does the industry price  $P$ : entry pushes  $P$  down, exit up.



Positive profit ( $AR = P_1 > ATC$ ) induces entry. Equilibrium price  $P$  falls as supply shift right. The marginal firm's profit falls to zero:  $P_2 = MC = AC$

# THE MARGINAL PRICE-TAKING FIRM



The *marginal firm*: the first to exit if long-run price  $P$  falls below  $P_2$  (zero-profit). For this firm, new entrants have competed away any positive economic profits.



## THE MARGINAL FIRM

Four things characterise this firm at equilibrium:

1. the firm is **price-taking**:  $AR = MR = P_2$
2. the firm is **profit-maximising**:  $MR = P_2 = MC(y^*)$
3. the firm makes **zero profit**:  $AR = P_2 = ATC(y^*)$
4.  $y^*$  is the **Efficient Scale of production**:  
 $MC(y^*) = \min ATC(y^*)$

$$\therefore AR = MR = P_2 = MC = ATC \text{ at } y^*$$

Firms with lower costs will still have positive profits at  $P_2$  and will operate above their Efficient Scales of Production.

## **A SHIFT IN DEMAND OVER TIME**

**From LR equilibrium, a shift in demand raises price (up the SR supply curve), which creates positive profits in the industry and larger quantity supplied.**

**New firms enter, which shifts the SR supply to the right.**

**New equilibrium: price falls to minimum AC on the LR supply curve.**

## **DOES LONG-RUN SUPPLY SLOPE UP?**

**Yes: even in the long run some input factors might be limited in supply (examples? land, rare mineral inputs, environmental amenity and absorption ability) so prices rise with increased demand (and so the firm's production costs). (This is industry DRTS.)**

**Firms' costs vary: lower-cost firms might have limited capacity to supply, and the marginal firm is one with higher costs, making zero long-run profit at a market price which provides the lower-cost firms with positive profits.**

## SUMMARY

- 1. Firms decide at the margin: their outputs, whether to shut down temporarily, or whether to exit or enter.**
- 2. For competitive price-taking firms, Average Revenue = Marginal Revenue = Price.**
- 3. For competitive price-taking firms, their supply curve is their Marginal Cost curve above their Average Total Cost curve (or for short periods, above their Average Variable Cost curve).**
- 4. Industry (or market) supply curves are horizontal (CRTS) or rising (DRTS).**