

Lecture 16: Profit Maximization and Long-Run Competition



Clicker Question

For an airline, output is the number of passengers carried....

Cost, Revenue and Profits

- Total Cost (**TC**):

$$TC = FC + VC$$

- Average Cost (**AC**): $AC = TC / Q$

- Sometimes called Average Total Cost (**ATC**)

- Profits: $\pi = \text{Total Revenue} - \text{Total Cost}$

$$= (P \times Q) - TC$$

$$= (P \times Q) - AC \times Q$$

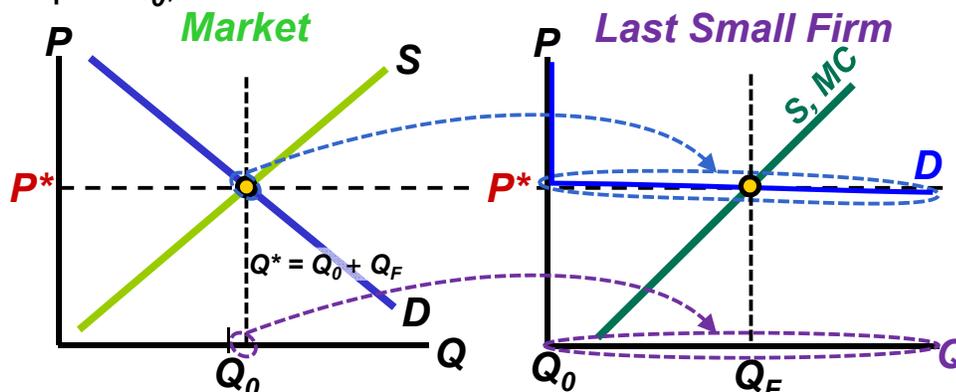
$$= (P - AC) Q$$

- Producer surplus is the same as profits before fixed costs are deducted.

$$\begin{aligned} \pi &= \underbrace{(P \times Q) - VC}_{PS} - FC \\ &= PS - FC \end{aligned}$$

A Small Firm in a Competitive Market

- The equilibrium price P^* is determined by the entire market.
- If all of the other firms charge P^* and produce total output Q_0 , then ...



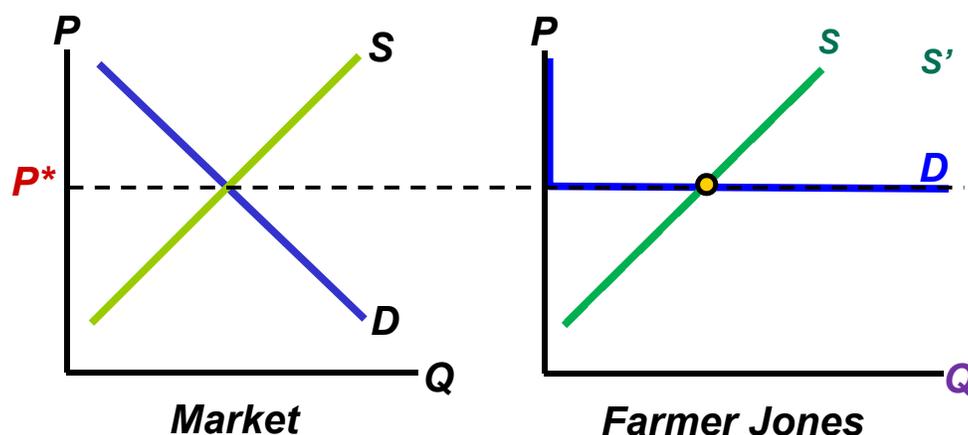
- for the last small firm, the remaining demand near the market price seems very large and very elastic.
- The last firm's supply determines its own equilibrium quantity: it will also charge the market price (and be a price-taker).

Supply Shifts in a Competitive Market

- Suppose Farmer Jones discovers that hip-hop music increases his hens' output of eggs.
- Then his supply curve would shift to the right.

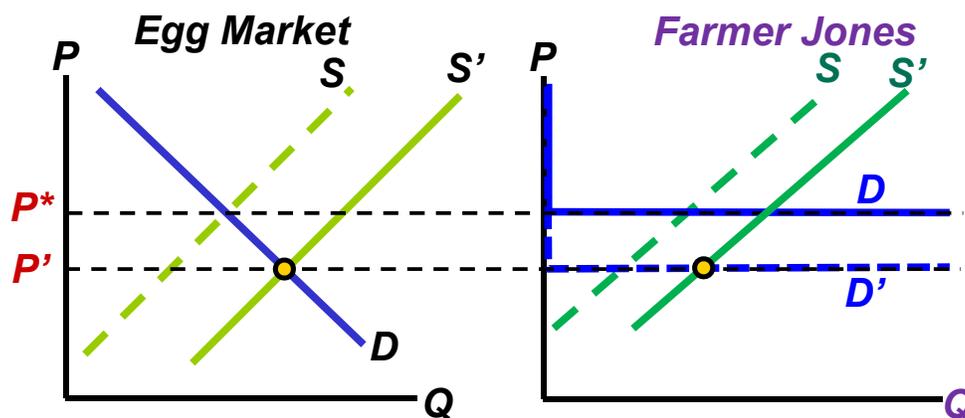
- But his price (the market price) wouldn't change. Why not?

- How does the shift of his supply curve affect Farmer Jones?



- Farmer Jones' supply shifts to the right, but his equilibrium price remains the same.
 - Doesn't the market supply shift?
 - Would Farmer Jones sell more or less?

- NOW suppose that all farmers find out that hip-hop music increases their hens' output of eggs.
- All the farmers blast hip-hop at their chickens.
- And the chicken's start laying eggs like crazy.



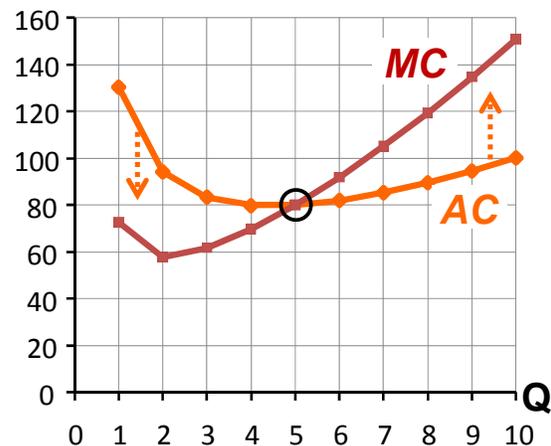
- Hip-hop causes the supply curves of Farmer Jones **and the other farmers** to shift to the right,...
- ...which causes market supply to shift.
- The new market-equilibrium price would fall to P' , so Farmer Jones' demand shifts down.
- Farmer Jones' supply has shifted to the right, but he must sell at a lower price.

Clicker Question

Farmer Jane runs a dairy farm that produces milk. If she discovers....

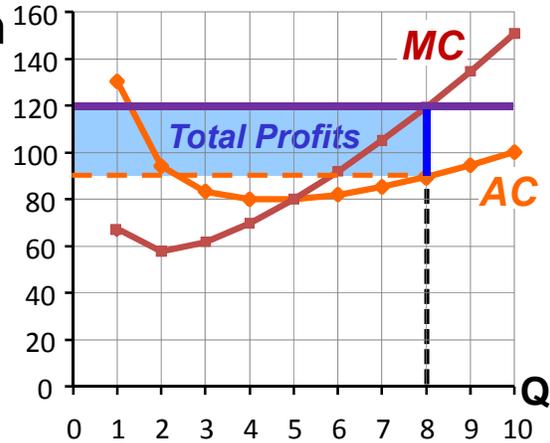
Marginal and Average Costs

- **MC** is the cost of producing a given unit.
- **AC** is the *average cost* of producing *all* the units up to the given unit.
- **MC** rises eventually – Why?
- If $FC > 0$, **AC** starts high,
 - but it falls as fixed cost is divided over more output,...
 - and rises again as **MC** becomes more important.
- If **MC** crosses **AC**, it must cross at the bottom of the **AC** curve.
 - If **MC** is under **AC**, then **MC** is pulling the average down.
 - But if **MC** is above **AC**, then **MC** is pulling the average up.



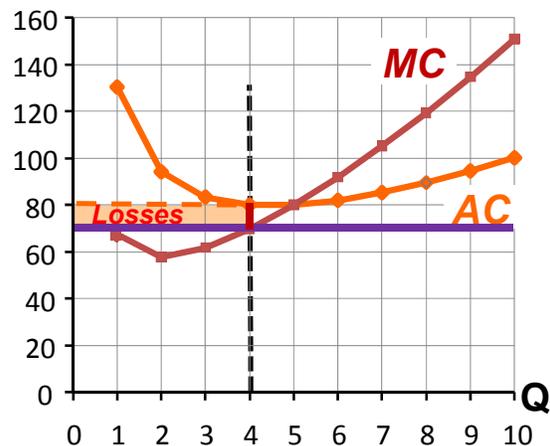
Using AC to Measure Profits

- If $P = 120$ then, if the firm produces, profits are maximized when the firm produces **8** units. Why?
- If **8** units are produced, $AC = 90$,...
- so average profits per unit are **30**.
- Total profits are _____.



Using AC to Measure Losses

- If $P = 70$ then, if the firm produces, profits are maximized when the firm produces **4** units. Why?
- If **4** units are produced, $AC = 80$,...
- so on average the firm loses **10** per unit (even though profits are maximized).
- Total losses are _____.
- The firm cannot be profitable at this price, and it should shut down.

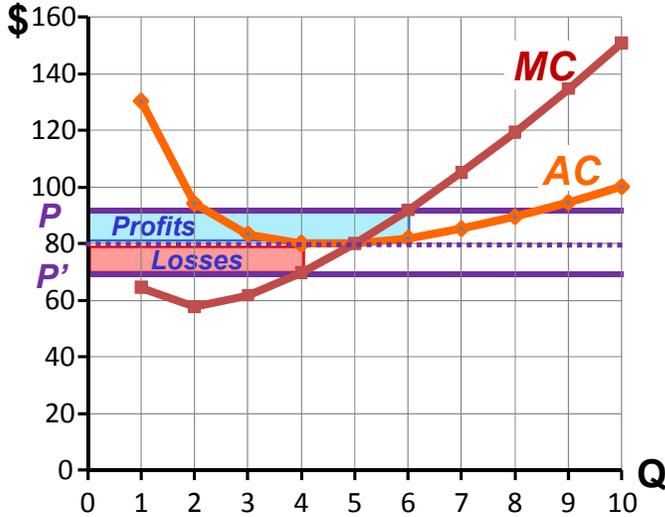


The Shut-Down Condition

- If a firm is producing at the profit-maximizing level of output,
- yet still cannot earn a positive profit,...
- then it should be shut down.
- This happens when price is less than the lowest possible average cost. Why?
- So, if $P < \min AC$, the firm should stop producing.

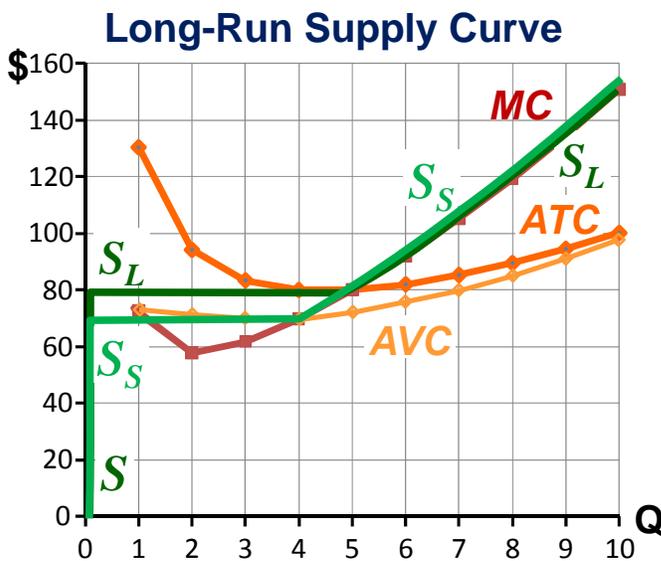
- But *in the short run*, fixed costs *that are already paid* should **not** be treated as a costs in making the shut-down decision.
 - Why not?
 - Because they are **sunk costs** (not avoidable).
 - So maybe the firm can stay open for a while.
 - Often, in the short run, only variable costs are avoidable, so we should use **AVC** (*average variable cost*) as the value of **AC**.
 - In the long run, all costs are avoidable, so we should use **ATC** (*average total cost*) as the value of **AC**.

Marginal and Average Costs



- This firm should not be in business if the market price is below _____.
- Price P is above the minimum AC , so the firm can produce profitably.
- But if the firm produces at a price P' less than the minimum AC , it would have to produce at a loss.

The Firm's Long-Run Supply Curve



- In the long run, AC is the same as ATC .
- Can you tell how much the firm will want to sell if the price is
 - \$120 per unit?
 - \$81?
 - \$60?
 - \$40?
- If $P < \min ATC$, then net profits must be negative at any output level, and the firm will shut down.
- See the supply curve.
- In the short run, AC is often the same as AVC instead of ATC .
 - The short-run MC could be higher, but we ignore that possibility.

Clicker Question

In the short run, the rising part of the **MC** curve is often the same as the supply curve...

Do real-world firms maximize profits?

- In the competitive model, **maximizing profits** also maximizes **social surplus**.
- But firms have some of the same problems maximizing profits that consumers have maximizing utility.
 - The maximization problem is very difficult.
 - ◆ Firms may not know their own marginal costs.
 - ◆ They may not be acquainted with all feasible production methods.
 - The psychology of entrepreneurs may create problems.
 - ◆ Entrepreneurs tend to be biased by optimism.
 - ◆ Or they may suffer from hubris (overconfidence).

- The owners of firms face problems that individuals do not.
 - Controlling their employees
 - ◆ How to get workers to work hard?
 - ◆ How to get managers to pursue the interests of the owner (instead of their own)?
 - Fear of risk
 - ◆ Maximizing profits may be risky,...
 - ◆ so managers may choose very safe bets that are less profitable .
 - ◆ Very safe business ventures are often not in the social interest, because new technologies and economic growth require a reasonable amount of risk.
- Is profit maximization is a good approximation of what real firms do in a free market?

The Search for Profits

- In the competitive model, firms maximize profits.
- Moreover, a large number of (greedy) entrepreneurs are searching for profitable business opportunities.
- If the market price of a good and its production costs can generate economic profits,...
- ...these entrepreneurs will start new firms and enter the industry.

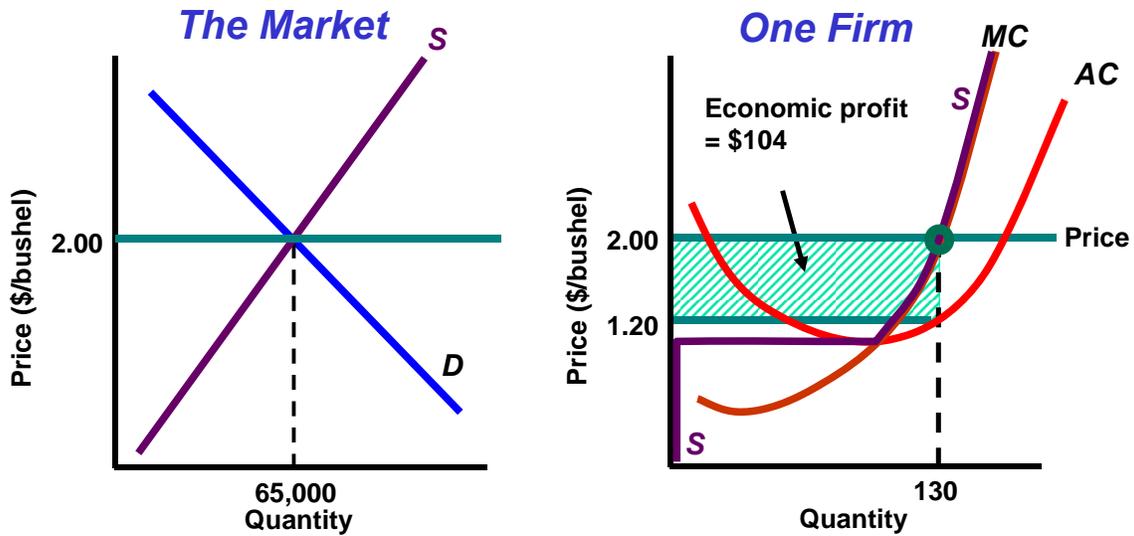
- But if the market price is too low, firms will face losses...
- ...and some will close down.

Entry and Exit in the Long Run

- When an entrepreneur considers starting a firm, she has ***no sunk costs***. [*Why not?*]
 - (Therefore, ***ATC*** should be used as ***AC***.)
- So she enters only if long-run economic profits can be found.
- Firms will continue to enter as long as these profits are available.
- But as they enter,
 - the market supply shifts out,
 - the market price falls,
 - and further entry becomes less profitable.

- Entry stops when new firms would no longer be able to obtain economic profits.
- At that point, the ***economic profits*** of existing firms are zero.
- To illustrate this process, we use a fictional example of the market for corn.

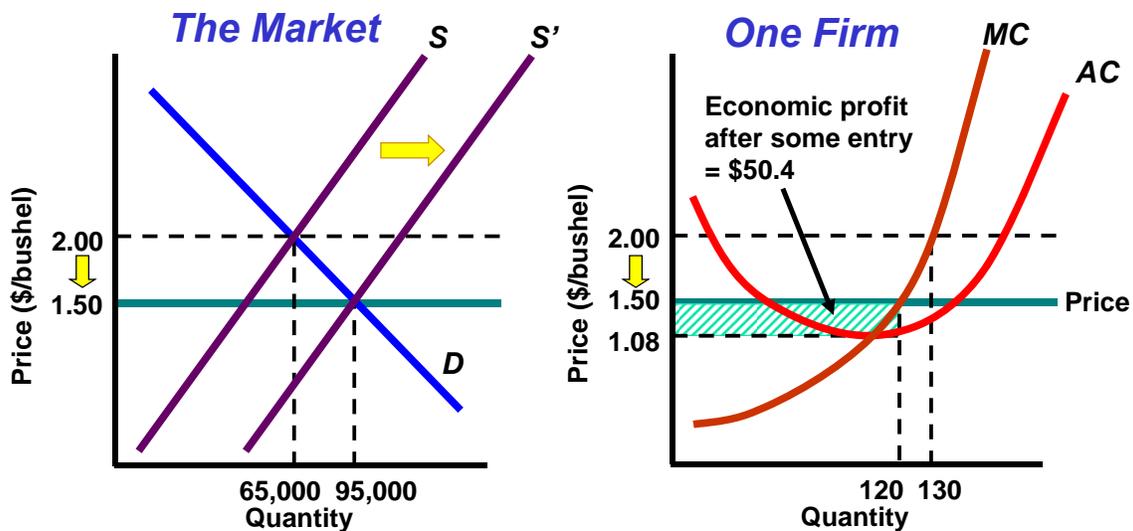
Economic Profit in the Corn Market



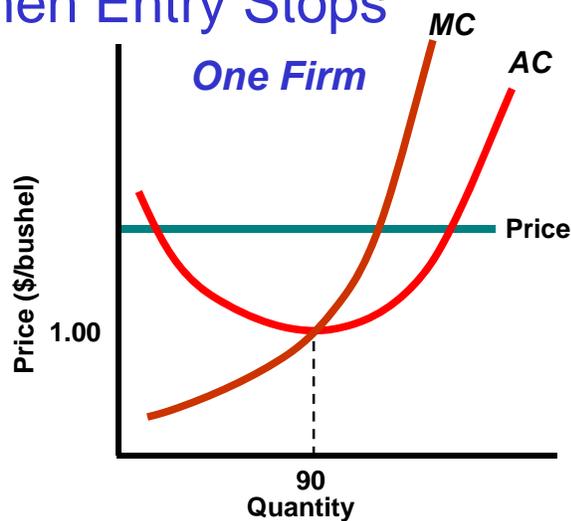
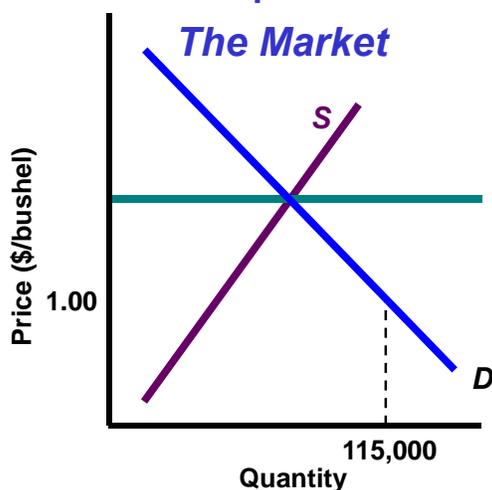
- At $P = \$2.00$, $Q = 130$ and $AC = \$1.20$, which is greater than the minimum AC .

The Effect of Entry on Price and Economic Profit

- However, economic profits will attract new firms, and **entry** will reduce both prices and profits.



Equilibrium when Entry Stops



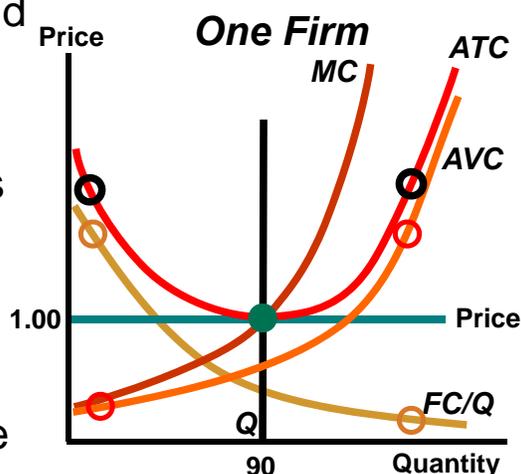
- Entry of firms continues until all firms earn zero long-run economic profits.
- At this point, there are more firms, and each firm is producing at lower cost.

- In the long run, **AC** is **ATC** and $ATC = AVC + FC/Q$

- **FC/Q** is large when firms are small (low output), but **AVC** is small.

- **AVC** is large when firms are large, but **FC/Q** is small.

- At either extreme, **ATC** will be large.

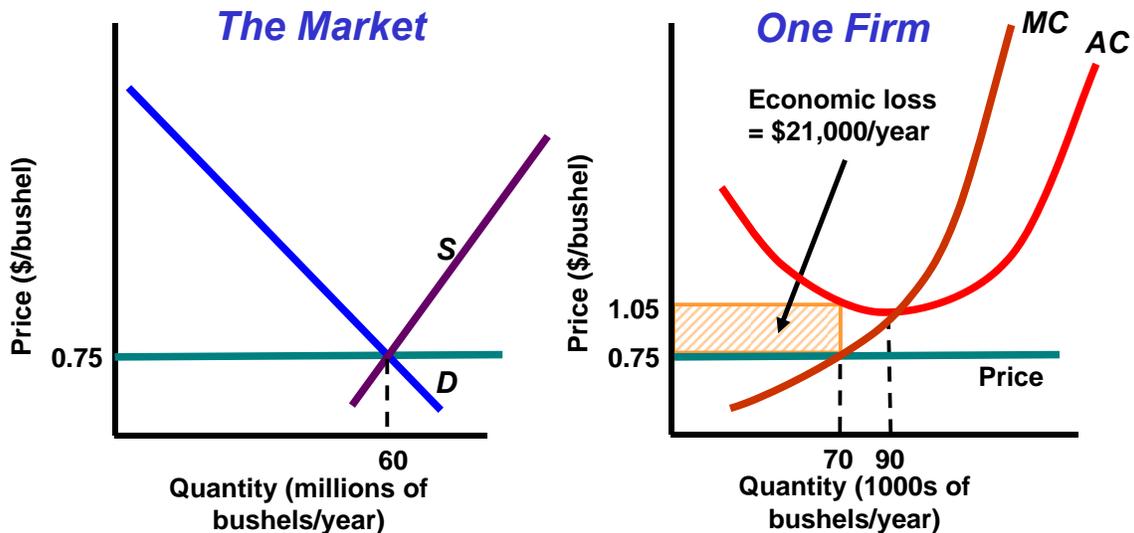


- If we start with a small number of firms, entry leads to a result between these two extremes and **minimizes** $ATC = AVC + FC/Q$...

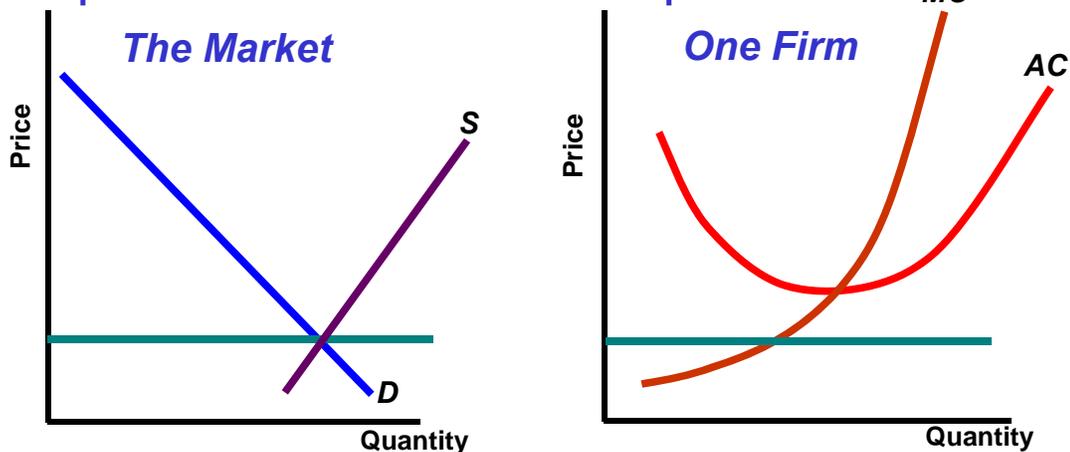
- meaning that competition trades off the **number of firms** and the **size of each firm** in a **perfectly efficient** way.

Economic Losses in the Corn Market

A market price below the minimum AC will result in economic losses.



Equilibrium when Exit Stops



- In the presence of long-run losses,
- firms will exit from the industry, and the market price will increase.
- Exit will stop when losses disappear, and economic profits reach zero.
- Again production will occur at minimum **AC**.

Imperfect Competition

- In the long run, perfect competition balances the number and size of firms perfectly.
- But imperfect competition does not.
- Later in the course, we show that some kinds of imperfect competition yield too many small firms.
- But perfect competition cannot create the iPhone.

Clicker Question

Which of the following is true about perfectly competitive firms in the long run?

End of File