Microeconomic Theory — ECON 323 503
Chapter 8: Competitive firms and markets

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Outline

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2. Profit maximization: how much to produce if at all.
3. Competition in the short run: supply curve is driven by variable costs.
4. Competition in the long run: no fixed costs and firms can enter/exit.

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Example: Chicago commodity exchange

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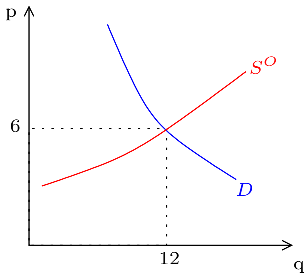
$S^O(p)$ — *Other* firms' supply (add up the supply of other firms).

Residual demand curve



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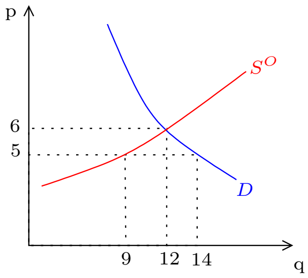

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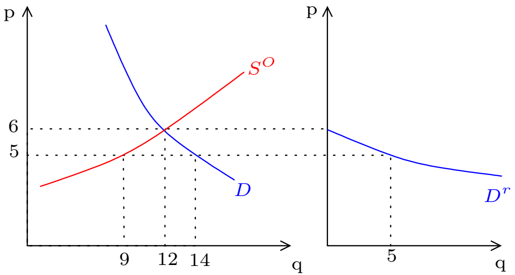

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(Differentiate $D^r(p) = D(p) - S^O(p)$ with respect to p.)

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Residual demand for firm i is over 300 times more elastic than market demand!

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This means that the firm can sell as many units as it wishes to as long as it charges no more than p. If it charges anything more than p, demand for its good drops to zero.

This is intuitive: if other firms sell the same product as you, when you charge more than they do, nobody buys from you.

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2. More importantly: the competitive model is a *benchmark* to compare real world markets to.

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Since C is *economic* cost (including all opportunity costs), π is the *economic* profit.

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When picking q:

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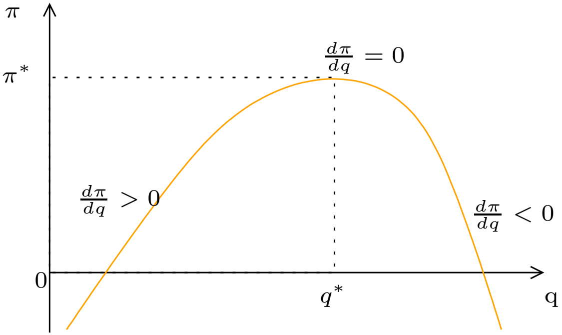
When picking q:

1. Which level q^* yields the highest profit (or minimizes loss when $(\pi(q) < 0)$?
2. Should you just shut down rather than produce q^*?

Picking q^*



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These are all equivalent.

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$\frac{d\pi}{dq}$ is *marginal profit*: the additional profit per unit increase of quantity.

Output rules

Since $\pi(q) = R(q) - C(q)$,

$$\frac{d\pi(q)}{dq} = \frac{dR(q)}{dq} - \frac{dC(q)}{dq} = MR(q) - MC(q).$$

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If $\frac{d\pi(q^*)}{dq} = 0$ then

$$MR(q^*) = MC(q^*).$$

Second order condition

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It is equivalent to $\frac{dMR(q)}{dq} < \frac{dMC(q)}{dq}$: the marginal revenue curve is flatter than the marginal cost curve

Shutdown rules

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Only if doing so reduces your loss.

Example

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\begin{aligned}
&R = \$2,000 \\
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No.

If you shut down, $R = \$0$ and $VC = \$0$ so $\pi = -\$3,000$.

Competition in the short run

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So $MR(q) = p$ for every q.

Finding q^*

To find q^*, equate MR and MC to find optimal quantity:

$$MR(q^*) = MC(q^*)$$

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$$MC(q^*) = p.$$

The second order condition tells us that

$$\frac{dMC}{dq} > 0$$

So, MC is upward sloping.

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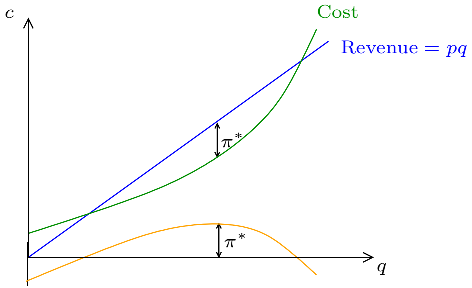

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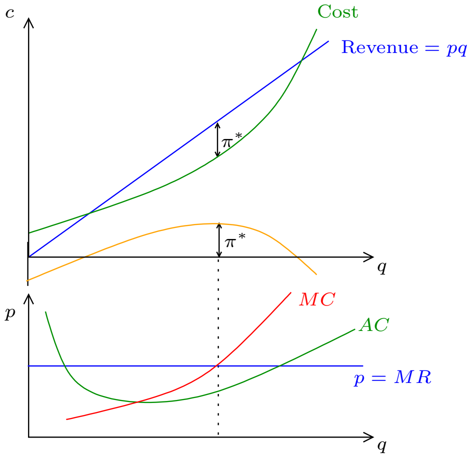

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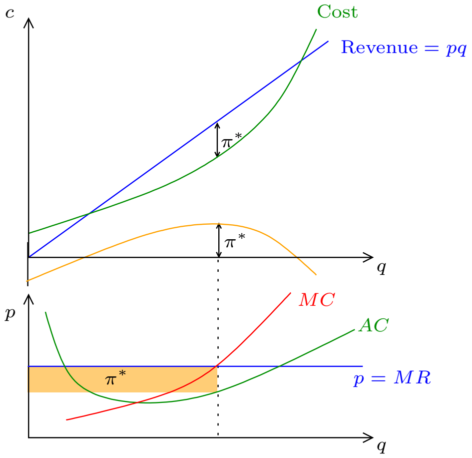

Shut down or not?

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2. minimum AVC $\leq p \leq$ minimum AC: you're running a loss, but reducing it by staying in business.
3. $p >$ minimum AVC: you're losing money by staying in business. Shut down.

Short run supply

Remember, for $p \geq$ minimum AVC,

$$p = MC(q^*).$$

and for $p <$ minimum AVC, output is zero.

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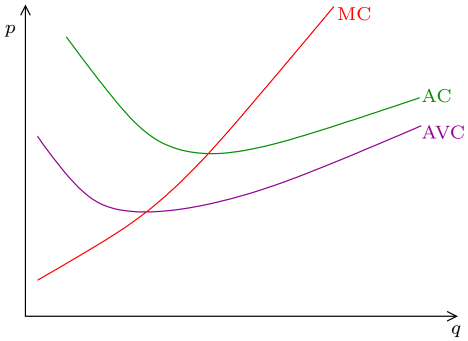
That's your supply curve!

Short run supply curve



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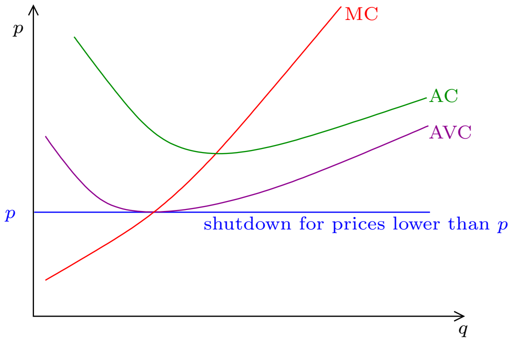

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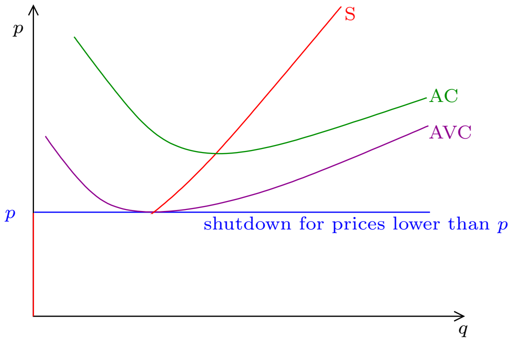

Changes in factor prices

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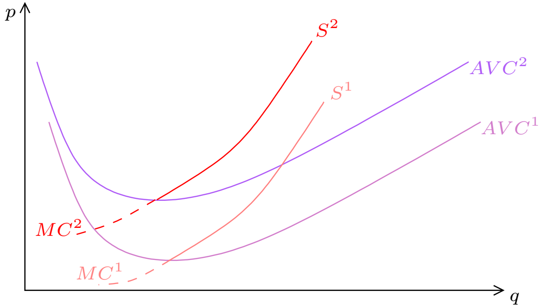
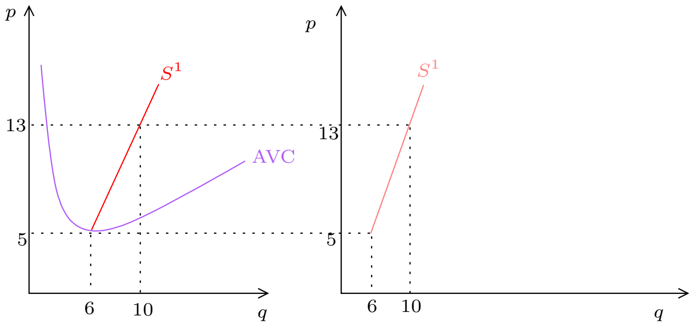


Short run market supply



If there's only one firm, its supply is the market supply.

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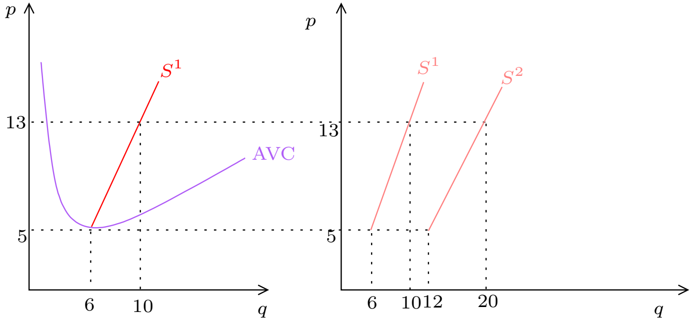

If there are two, add them up.

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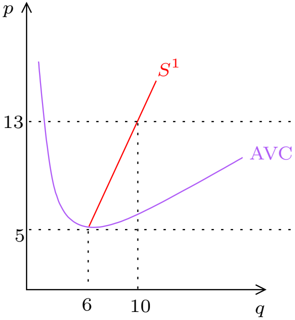
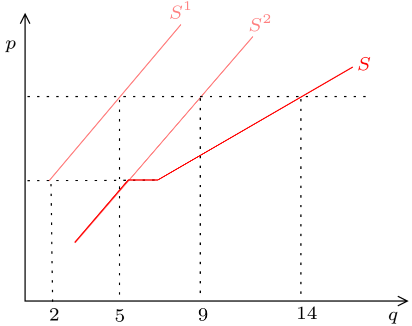


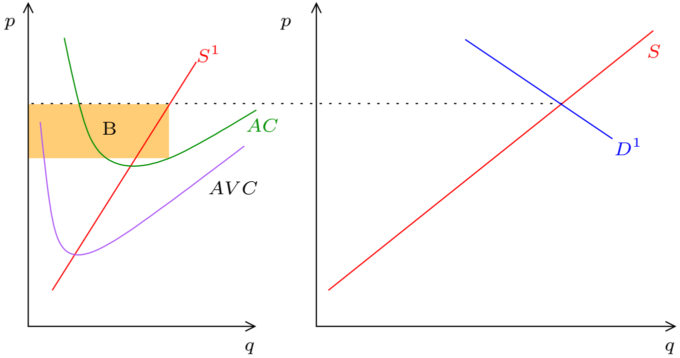
And so on.

What if the firms aren't identical



You can still add supply curves horizontally.

Short run competitive equilibrium



Firms are making a profit (B).

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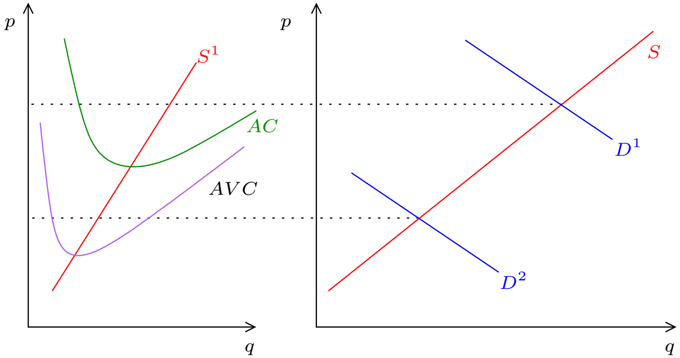
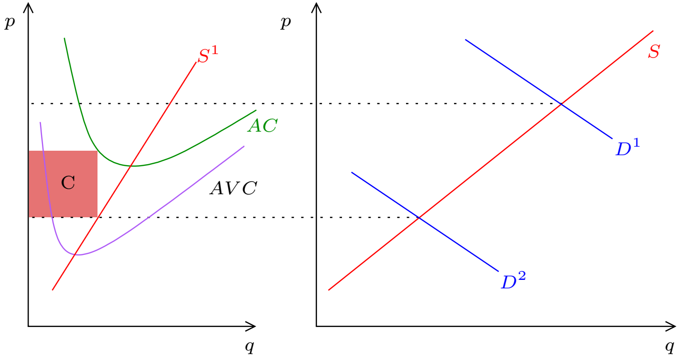


Equilibrium price shifts if demand changes.

Short run competitive equilibrium



Firms are making a loss (C) but covering variable costs.

Competition in the long run

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Shut down in case of loss.

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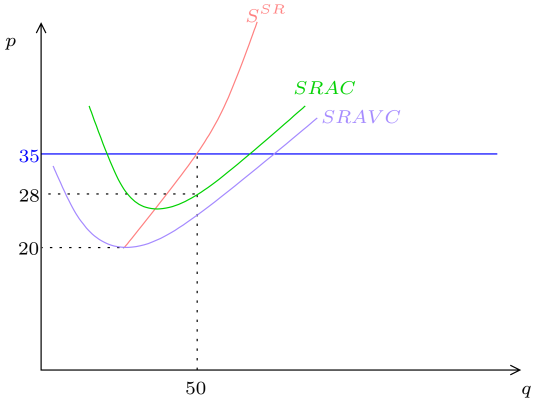
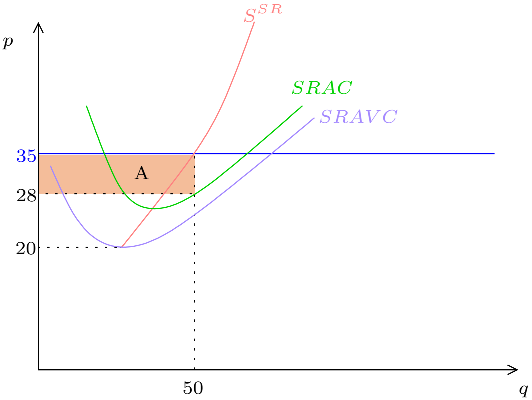
Again, in the long run, the firm can have the right inputs.

An example



Stuck with small a plant: at $p = \$35$, produce 50 units.

An example



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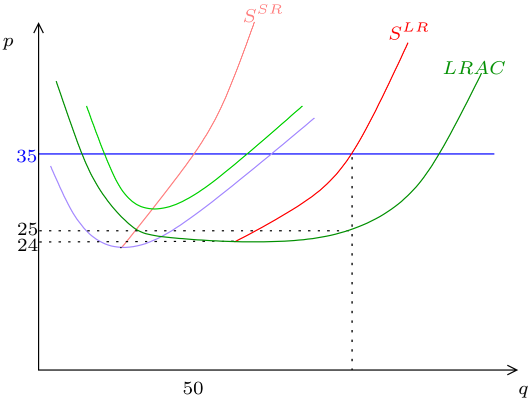
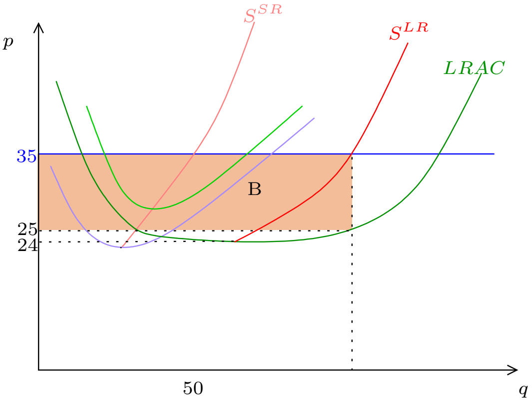


With optimal plant size: at $p = \$35$, produce 100 units.

An example



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Another difference: prices of inputs respond to increased market output.

Role of entry/exit

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- Enter if $\pi > 0$.

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Remember: this is economic profit. The cost is *all* economic cost, including opportunity cost.

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If the last firm that enters makes no profit, no more firms enter.

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Once there is no more loss, no more firms exit.

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3. Limited resources for inputs: wireless spectrum for mobile phones.

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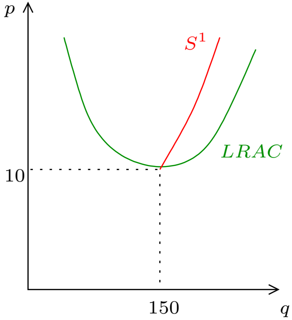
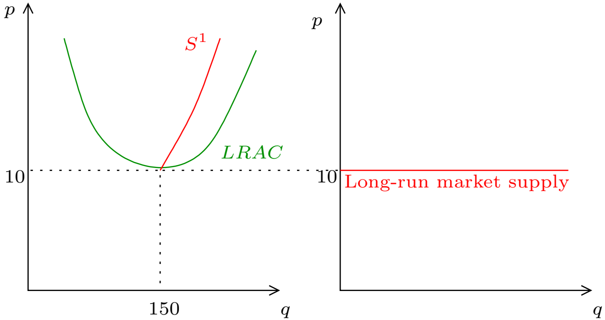
then market supply is a horizontal line at minimum average cost.

Long-run market supply with free entry



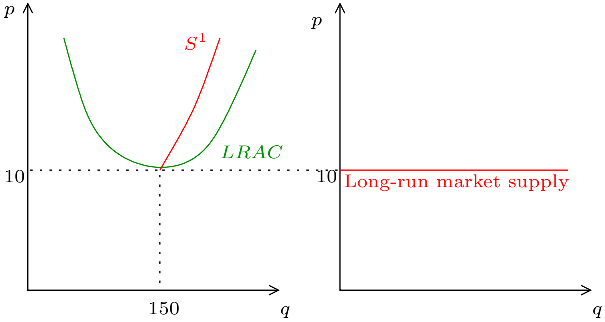
S^1 is the supply curve of a single firm. Obviously market supply is zero below \$10.

Long-run market supply with free entry



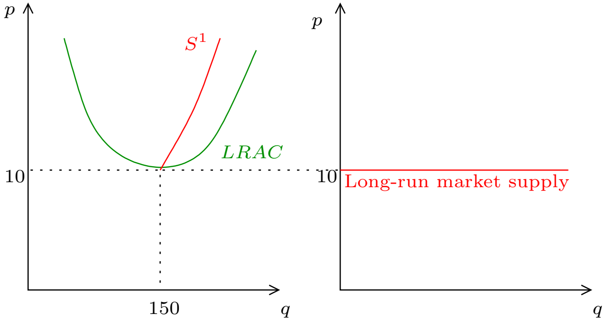
If $p > \$10$ then $\pi > 0$.

Long-run market supply with free entry



If $p > \$10$ then $\pi > 0$. Firms enter until $p = \$10$.

Long-run market supply with free entry



If $p > \$10$ then $\pi > 0$. Firms enter until $p = \$10$.
At $p = \$10$, $Q = n \times 150$ for any number of firms n.

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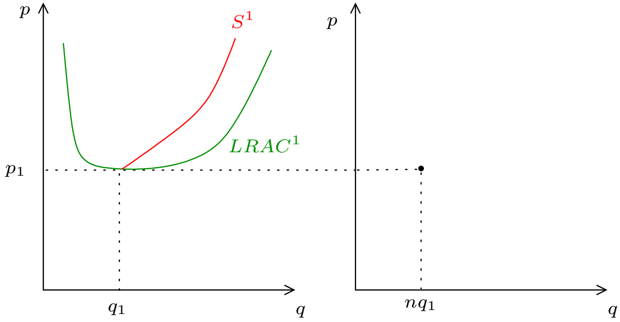
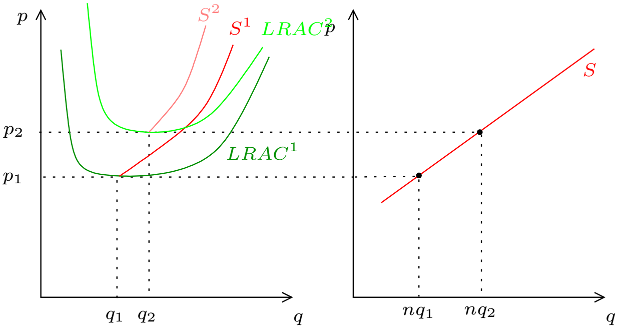
3. Input prices vary with market output:
   3.1 price rises with output: market supply slopes upwards.
   3.2 price drops with output:market supply slopes downwards.

Long-run market supply in an increasing-cost market



At price p_1, each firm produces q_1. If there are n firms, market supply is $Q_1 = nq_1$.

Long-run market supply in an increasing-cost market



At $Q_2 = nq_2 > Q_1$, the input is more expensive. So the cost curves all shift up and S slopes upwards.

Long-run supply curve with trade

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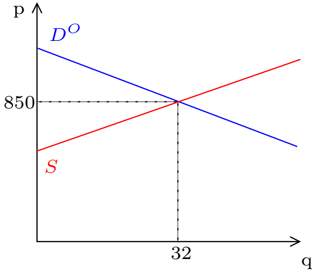
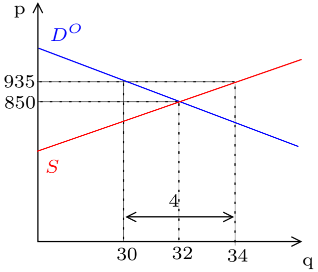
From the perspective of consumers in that country, the supply of the good is S^r.

Residual supply



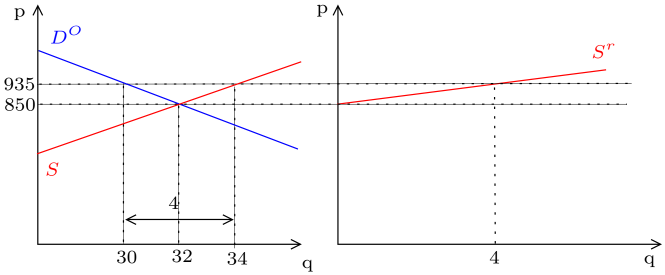
When $p = \$850$, the rest of the world consumes the entire world supply. This leaves a supply of 0 for the country.

Residual supply



At $p = \$935$, the rest of the world demands 30 units and the world supply is 30 units, leaving a supply of 4 for the country.

Residual supply



Doing this for all prices above \$850 gives us S^r.
It's a lot flatter than S.

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Consumers in this country face an upward sloping supply curve.

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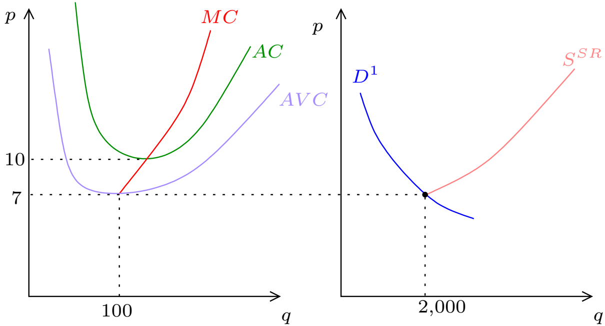
S^{SR} most likely slopes upwards.

Short-run and long-run competitive equilibrium



Minimum $AVC = \$7$, 20 firms in short run, each with the right number of level of fixed input for the long run.

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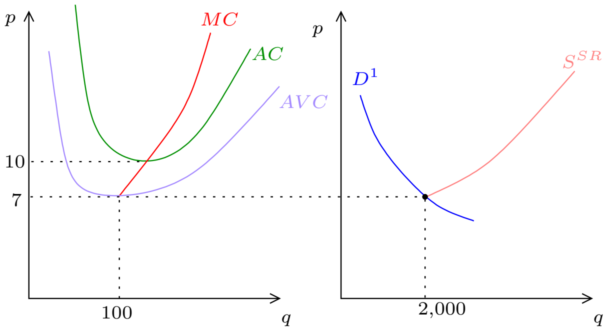

Minimum $AVC = \$7$, 20 firms in short run, each with the right number of level of fixed input for the long run. When demand is low, firms stay in business but sell goods at a loss ($p = \$7$).

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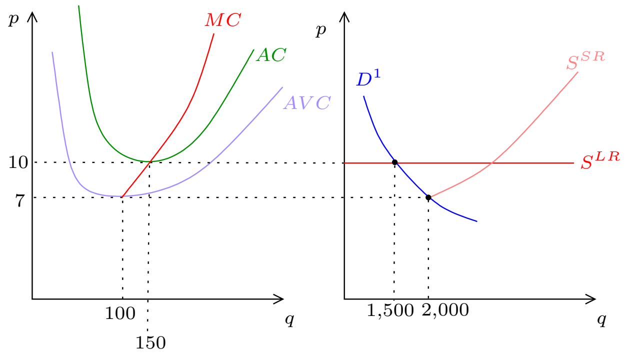

Minimum $AC = \$10$ so firms start going out of business in long run and equilibrium quantity drops.

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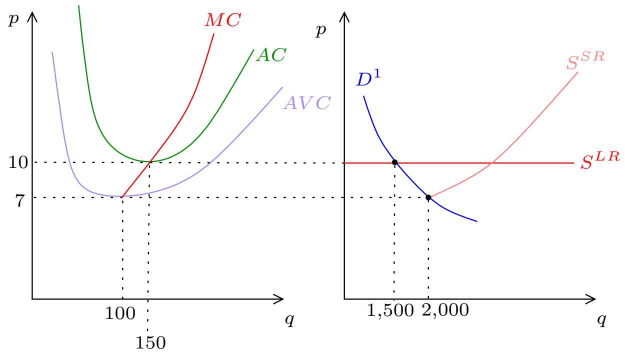

Minimum $AC = \$10$ so firms start going out of business in long run and equilibrium quantity drops. So long-run price is higher than short-run price.

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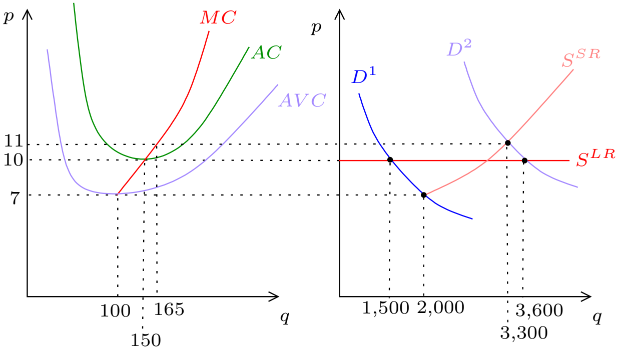

Relationship is reversed for high demand. Equilibrium price is higher in short run than in long run.

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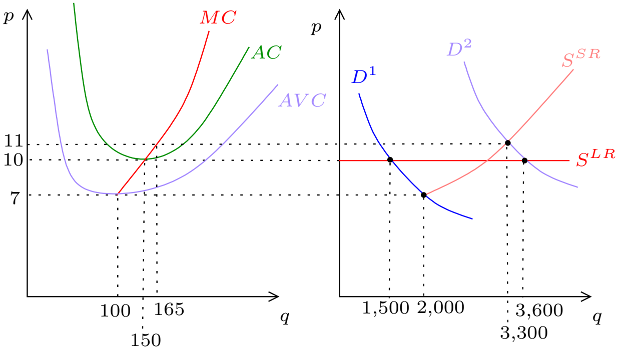

Relationship is reversed for high demand. Equilibrium price is higher in short run than in long run. Firms enter in the long run because short term price is high.