



Econ 201: Introduction to Economic Analysis

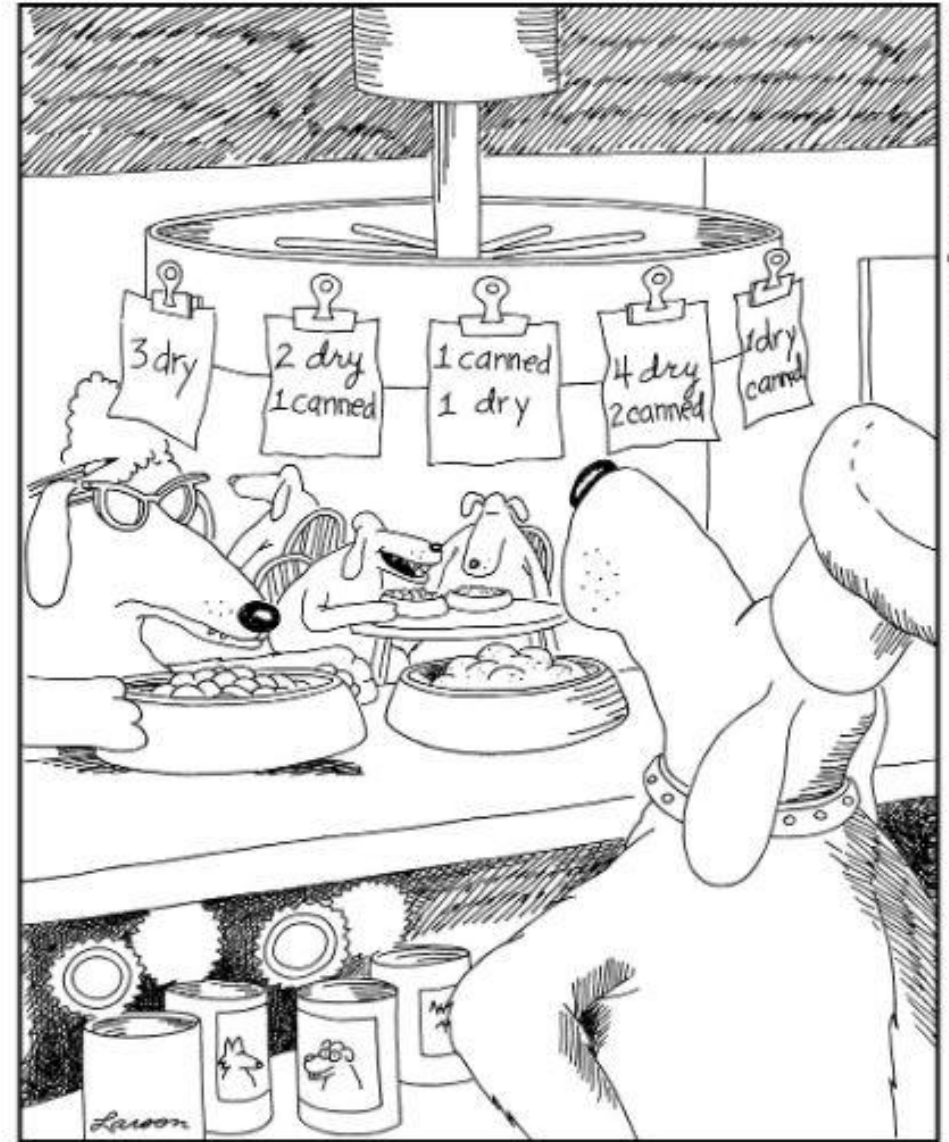
October 2 Lecture: Perfect Competition in the Long Run



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Daily dose of The Far Side

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Dog restaurants



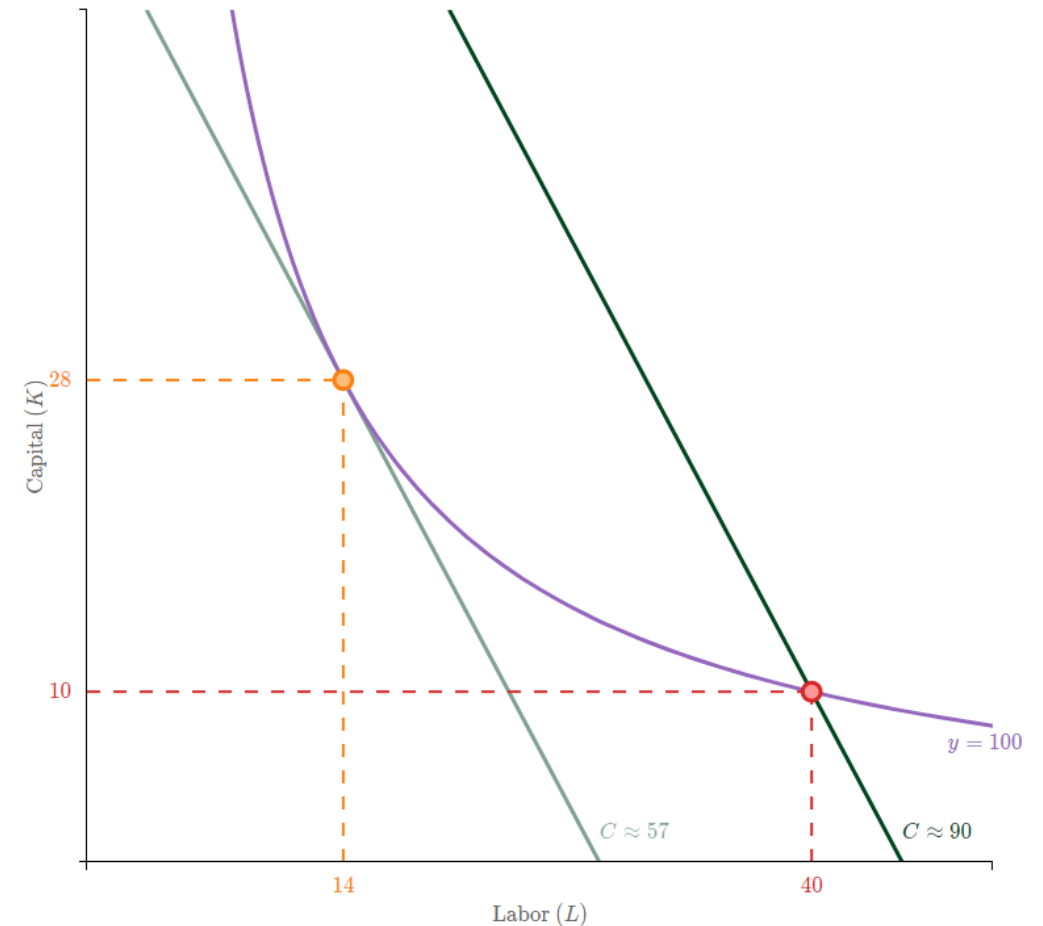
Preview of this class session

- Short run \rightarrow long run
- Two things can change for firms
 - Can adjust fixed inputs
 - Can enter or leave industry
- Firms change capital to lower costs along LRAC curve
- Entry if profit > 0 ; exit if < 0
- Long-run equilibrium: $P = \min \text{LRAC}$
- Industry expansion may increase (or decrease) input prices
 - Long-run supply curve could be horizontal, upward-sloping, or downward-sloping



Adjustment of fixed input: capital vs. labor

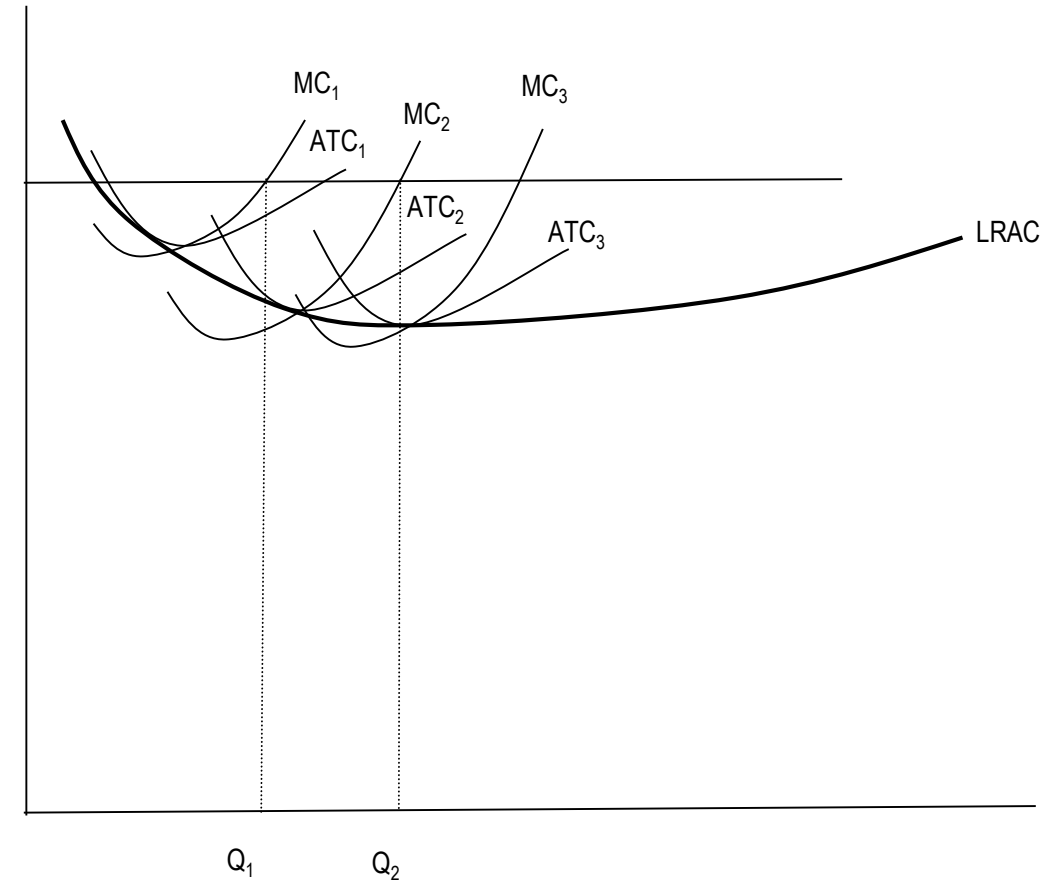
- Recall that firm chooses input mix in long run that **minimizes cost** of producing chosen Q
- Suppose that in the short-run, it's at the lower point and wants to use more capital
 - This means expanding its capacity and substituting capital for labor
- Less labor used if output is fixed, but output usually goes up as well
- High isoquant may have more or less capital





Adjustment of fixed input: long-run cost

- Firm starts with low capital
 - Produces Q_1 where $P_1 = MC_1$ makes profit because $P_1 > ATC_1$
 - Can reduce ATC and make more profit by expanding capital
- At medium capital (ATC_2) firm produces Q_2 and makes larger profit if price stays at P_1
- But each firm would expand capital and **increase production toward minimum of LRAC**
- As firms expand, MC shifts out and industry supply increases: price falls





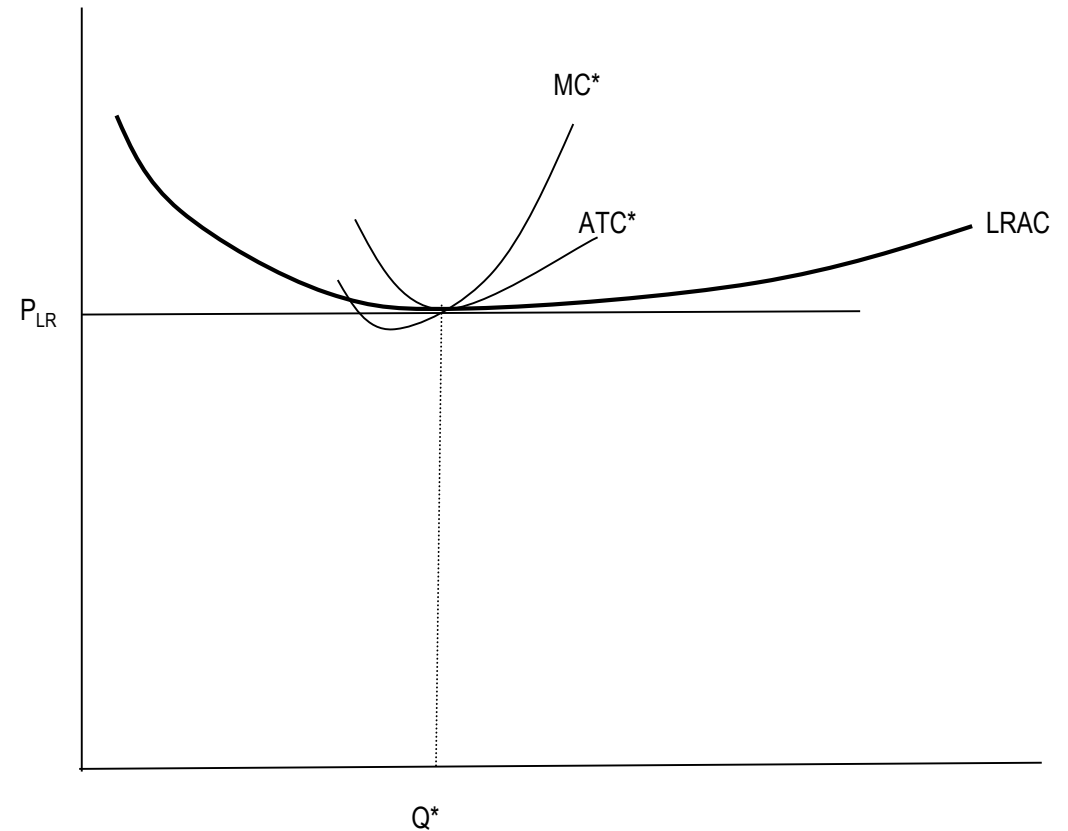
Entry and exit

- Price $>$ ATC means firms make **economic profit**
 - Higher than “normal profit” of other industries
 - Normal profit in other industries is part of economic opportunity cost
- New firms **enter with positive profit**, shift industry supply curve to the right, lower price
- Negative economic profit means firms **exit** industry in long run, shift supply curve left and raise price
- As long as $P > \min \text{LRAC}$, firms can adjust K in a way to make positive profit \rightarrow entry \rightarrow price falls
- If $P < \min \text{LRAC}$, firms exit and price rises
- **Long-run equilibrium**: Price = $\min \text{LRAC}$



Long-run equilibrium of competitive industry

- **Price = min LRAC**
- Firms produce at **efficient scale**
 - Price = MC = ATC = LRAC
 - Changes in capital have made costs of production (ATC) as low as possible
- Firms make **zero economic profit**
 - No incentive to enter or exit
- Supply = demand → surplus is maximized
- Competitive equilibrium is fully efficient: “**Invisible hand**”





Economic profit vs. economic rent

- Suppose that farmer Jane owns a farm with most productive soil
 - Her costs are lower than other farmers, but she sells at the same price
 - She earns a higher return on her farm than others (who earn “normal” profit or zero economic profit)
 - Isn’t this positive economic profit?
- No. We call this **economic rent**.
 - She could rent out the valuable land, so there is an opportunity cost that matches the excess returns that she earns by using it
 - When this component of economic cost is taken into account, her economic profit is zero



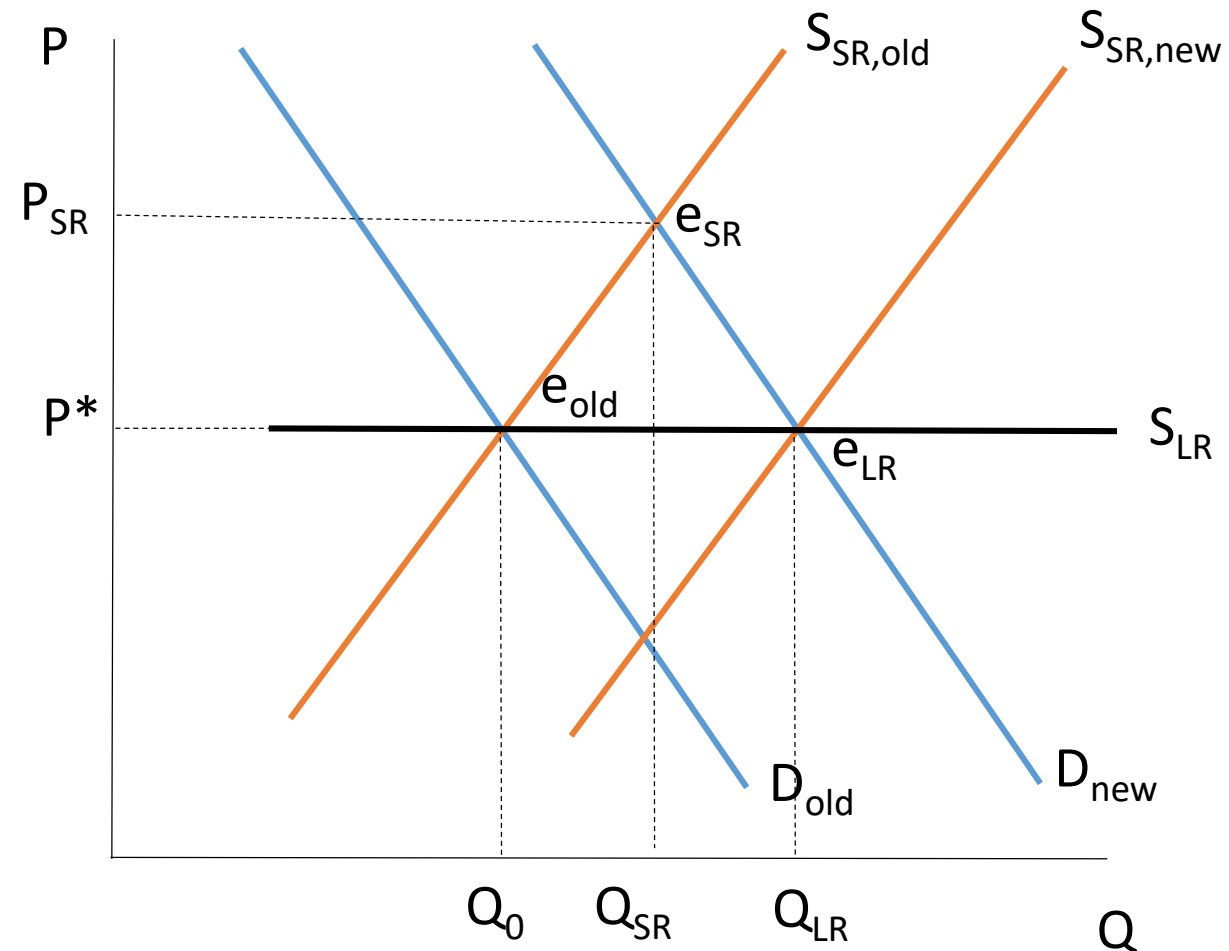
Demand expansion in long run

- What happens in long run if **demand in competitive industry grows**?
- Start at long-run equilibrium with firms at min LRAC, zero profit
- Initial price increase → positive profit → new entry → short-run supply curve shifts right
- Will price go back to min LRAC?
 - Yes, unless the expansion raises the prices of some inputs
 - If industry is small relative to its input markets, then these prices are not affected and industry price returns to original min LRAC level
 - Profits return to zero



Long-run supply curve (constant costs)

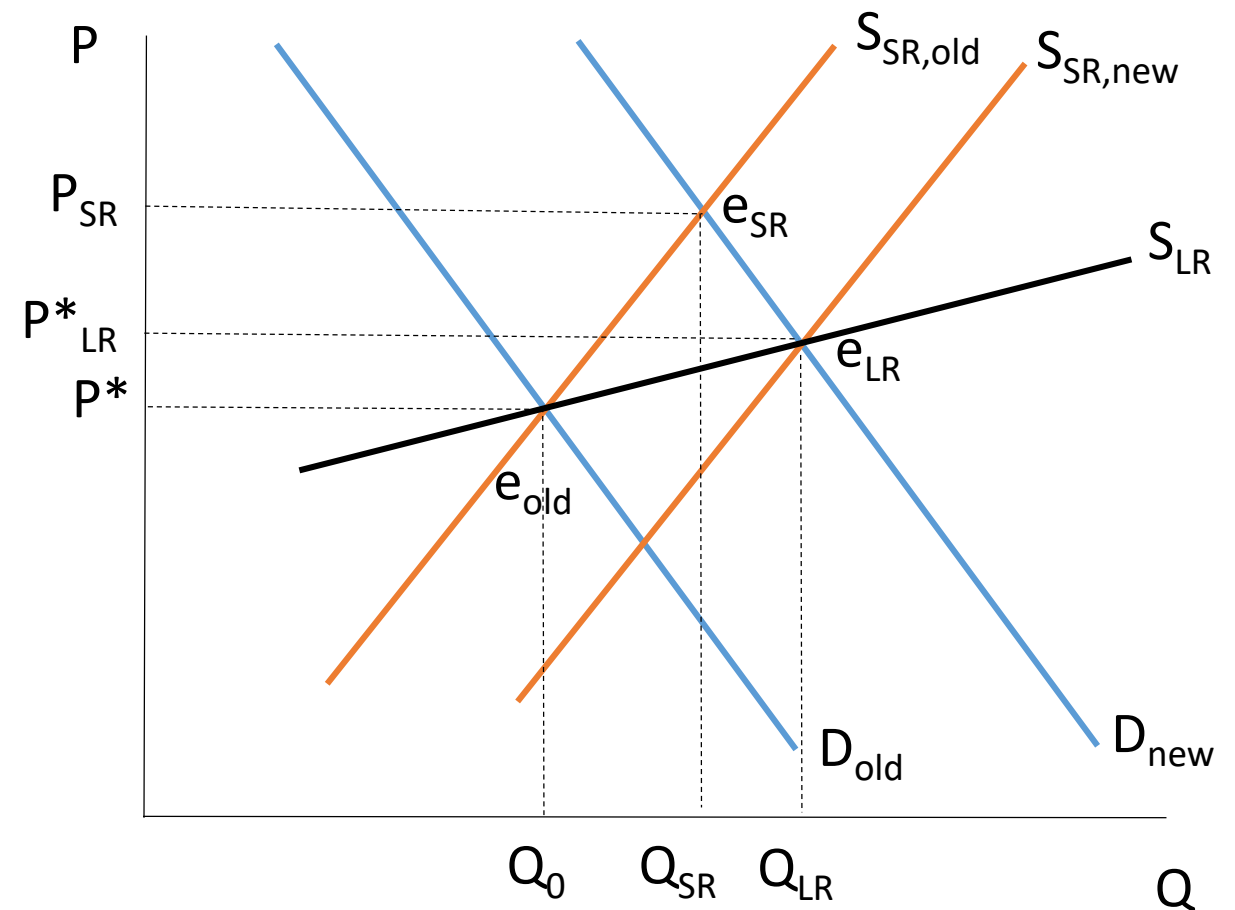
- At initial equilibrium, e_{old} , price P^* is at min of LRAC
- Demand shifts from D_{old} to D_{new}
- Short-run equilibrium to e_{SR}
- Price is $P_{SR} > \min LRAC$
- Profit $> 0 \rightarrow$ entry \rightarrow short-run S curve shifts out until profit back to zero, when P is back to $P^* = \min LRAC$ at e_{LR}
- Long-run effect is increase in Q with no change in P : **horizontal long-run supply curve**





Long-run supply curve (increasing costs)

- What if industry expansion raised prices of inputs?
 - LRAC curves of firms would shift up
 - Price would not return *all the way* back down to initial level
- Long-run supply curve slopes upward, but is still more elastic than in short run



Review

- In long run, competitive firms adjust fixed inputs to reach the minimum point of the LRAC curve
- Entry or exit occurs if economic profit is positive or negative, shifting short-run supply so that price \rightarrow min LRAC
- If input prices are not affected by industry expansion, then long-run supply is horizontal (**constant-cost industry**)





Daily diversion

How many minutes in a 12-hour cycle does my clock show the correct time both right-side-up and upside-down?





What comes next?

- Last session before first midterm exam
 - Watch Web site for Jeff's review session and the assistants' work session hours
- After exam, we study imperfect competition starting with pure monopoly model on Wednesday
- Case study for Wednesday: New York City ice trust
- No problem set for next week