Lecture 2/12

Reminders: PS 2 due 2/23, posted this afternoon, names assigned randomly
Midterm 1 2/26

Today:
Long-run expansion path graphically
Short-run firm supply
→ profit max rule $P=MC$
→ shut down rule
Short-run competitive equilibrium

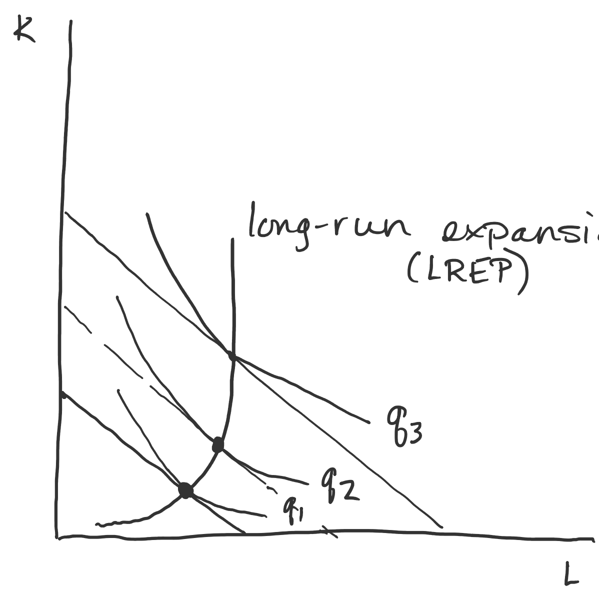
A question to consider:
Suppose my production function is $f(L,K,M)$
and K is fixed in the SR but L and M are variable
How would I find the short-run cost curve?

$$\Phi(L,M,\lambda) = wL + pM + r\bar{K} + \lambda(q - f(L,\bar{K},M))$$

the long-run cost curve?

$$\Phi(L,M,K,\lambda) = wL + pM + rK + \lambda(q - f(L,K,M))$$

$$\frac{w}{MP_L} = \frac{p}{MP_M} = \frac{r}{MP_K}$$



long-run expansion path (LREP) - cost-minimizing input combinations for various levels of output

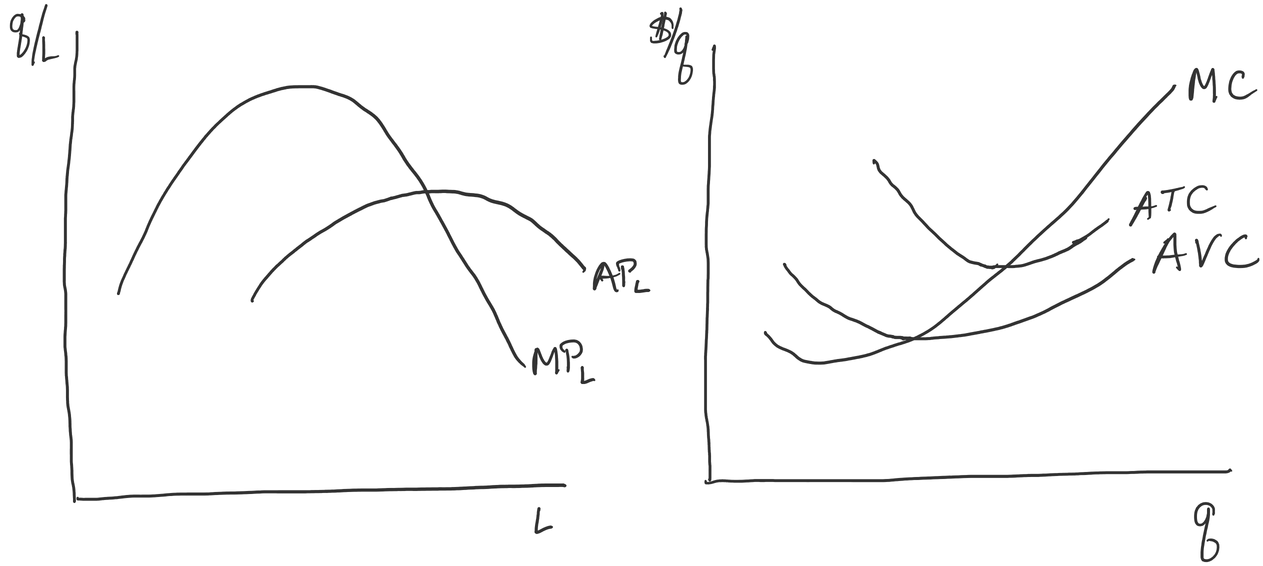
Ex. $f(L,K) = L^{1/3}K^{1/3}$

$$\frac{w}{r} = \frac{\frac{1}{3}L^{-2/3}K^{1/3}}{\frac{1}{3}L^{1/3}K^{-2/3}} = \frac{K}{L}$$

$$K = \frac{w}{r}L$$

$$-\frac{w}{r} = -\frac{MP_L}{MP_K}$$ ← LREP is the collection of all pts where this is true

Remind ourselves what we know about SR



How much should I produce? goal: $\max_q \pi$ profit

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

revenue - cost

$$\max_q \pi(q) = R(q) - C(q)$$

$$\frac{dR}{dq} - \frac{dC}{dq} = 0$$ 1st order condition

2nd order condition $$\frac{d^2R}{dq^2} - \frac{d^2C}{dq^2} < 0$$

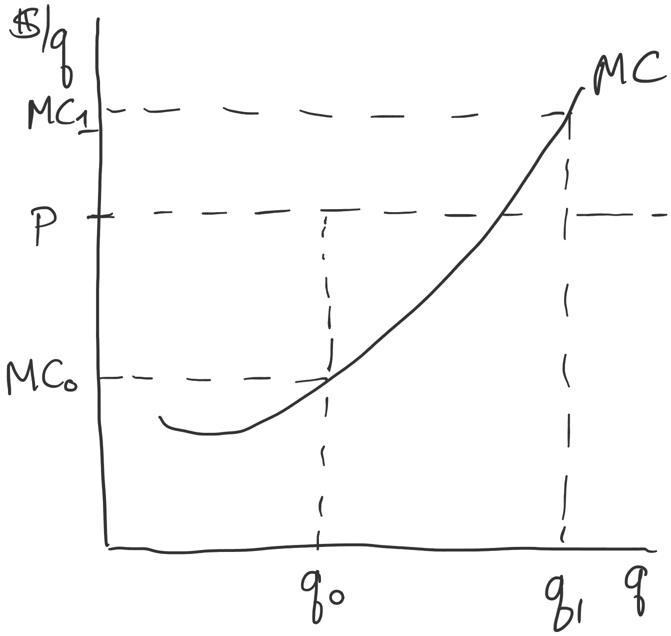
$MR = MC \Leftarrow \pi$-max condition (general)

Perfectly competitive mkt $\Rightarrow$ all agents take price as given $R(q) = p \cdot q \Rightarrow \frac{dR}{dq} = MR = p$

for competitive firms π-max requires $p = MC$

2nd order condition $-\frac{d^2C}{dq^2} < 0 \Rightarrow \frac{d^2C}{dq^2} > 0$

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



suppose I'm producing q_0
if I sell a little more, I collect p in extra revenue and spend MC_0 in extra cost $\Rightarrow \pi$ increased

if I producing q_1 and sell 1 fewer unit, I lose p in revenue but save MC_1 in cost $\Rightarrow \pi$ increased

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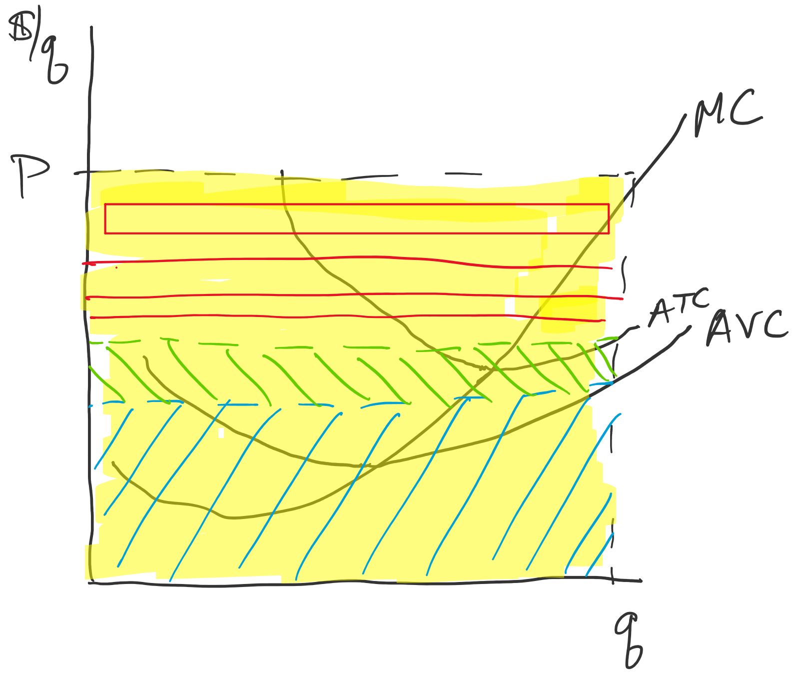
Measure profit graphically

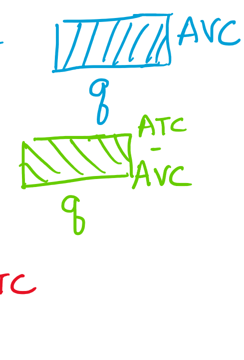


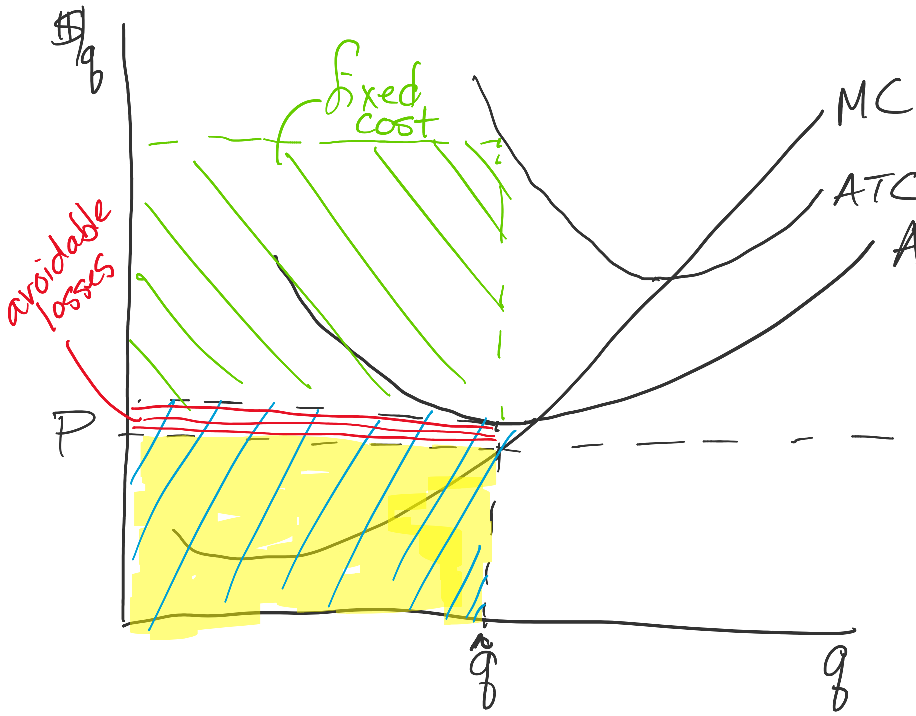
Revenue

Variable cost

Fixed cost

Profit



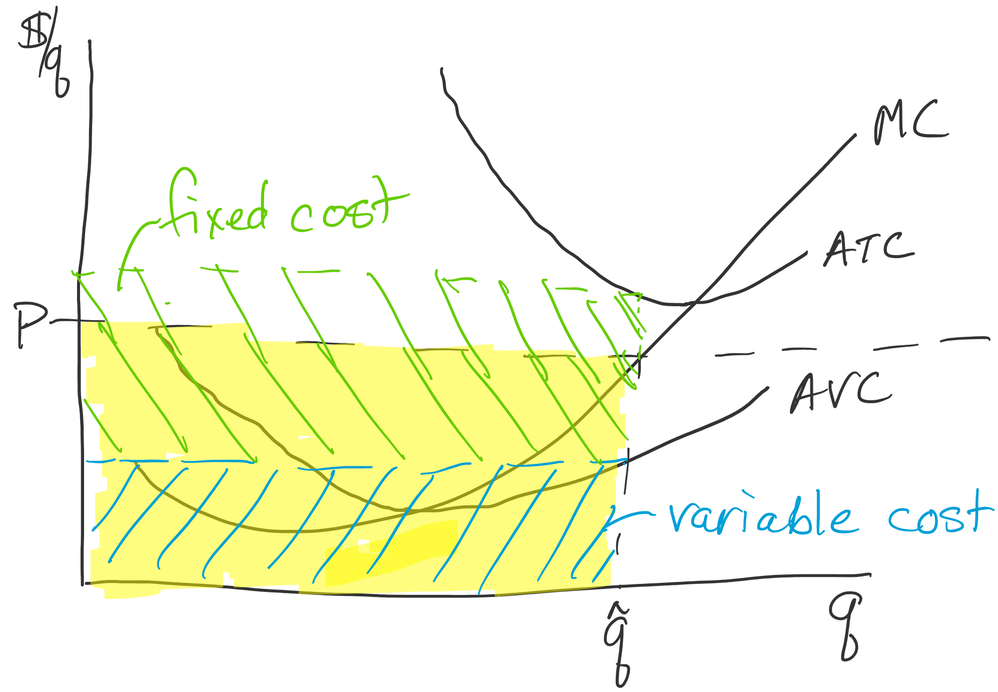


π-max rule tells me to produce at $\hat{q}$

Revenue

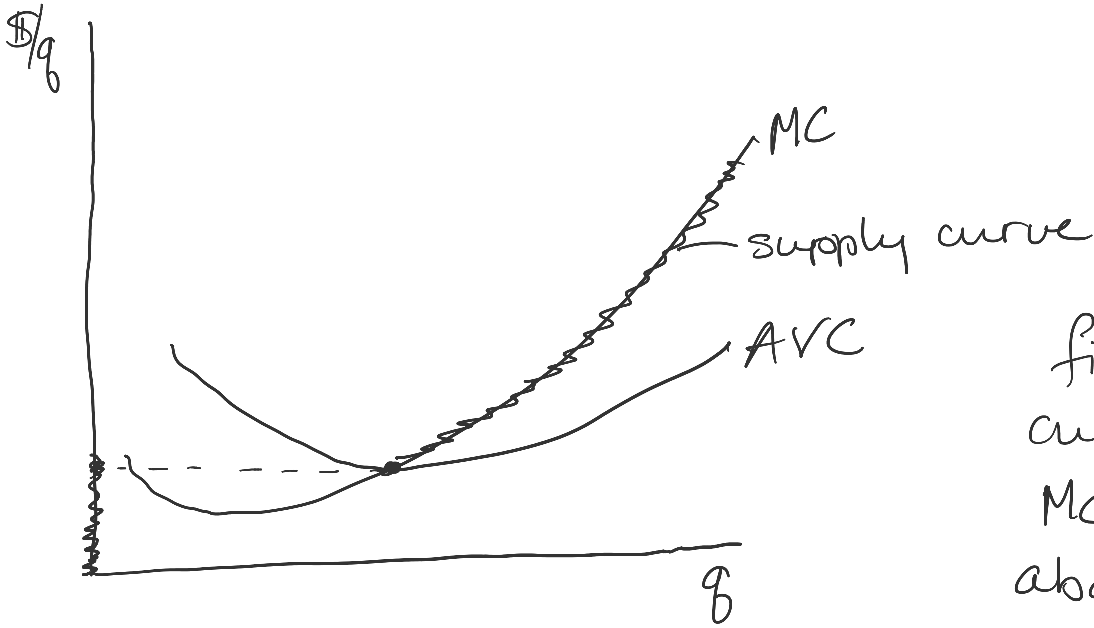
Variable cost

Shut down!



produce in the SR and exit or lower fixed cost by changing K

Put this together to find firm's SR supply curve



firm's supply curve is its MC curve above AVC