Econ Dept, UMR

Presents

Perfect Competition--A Model of Markets

Starring

- The Perfectly Competitive Firm
- Profit Maximizing Decisions
  - In the Short Run
  - In the Long Run

Featuring

- An Overview of Market Structures
- The Assumptions of the Perfectly Competitive Model
- The Marginal Cost = Marginal Revenue Rule
- Marginal Cost and Short Run Supply
- Social Surplus

Part II: Profit Maximization in the Short Run

- First, we define some terms
- Second, we explore the MR = MC rule
- Third, we look at the
  - The Break-even point, and
  - The Shut down point

Reminders...

- Firms operate in perfectly competitive output and input markets
- In perfectly competitive industries, prices are determined in the market and firms are price takers
- The demand curve for the firm's product is perceived to be perfectly elastic

Total and Marginal Revenue

- Total revenue is the amount of revenue the firm takes in from the sale of its product.

  TR = price x quantity sold

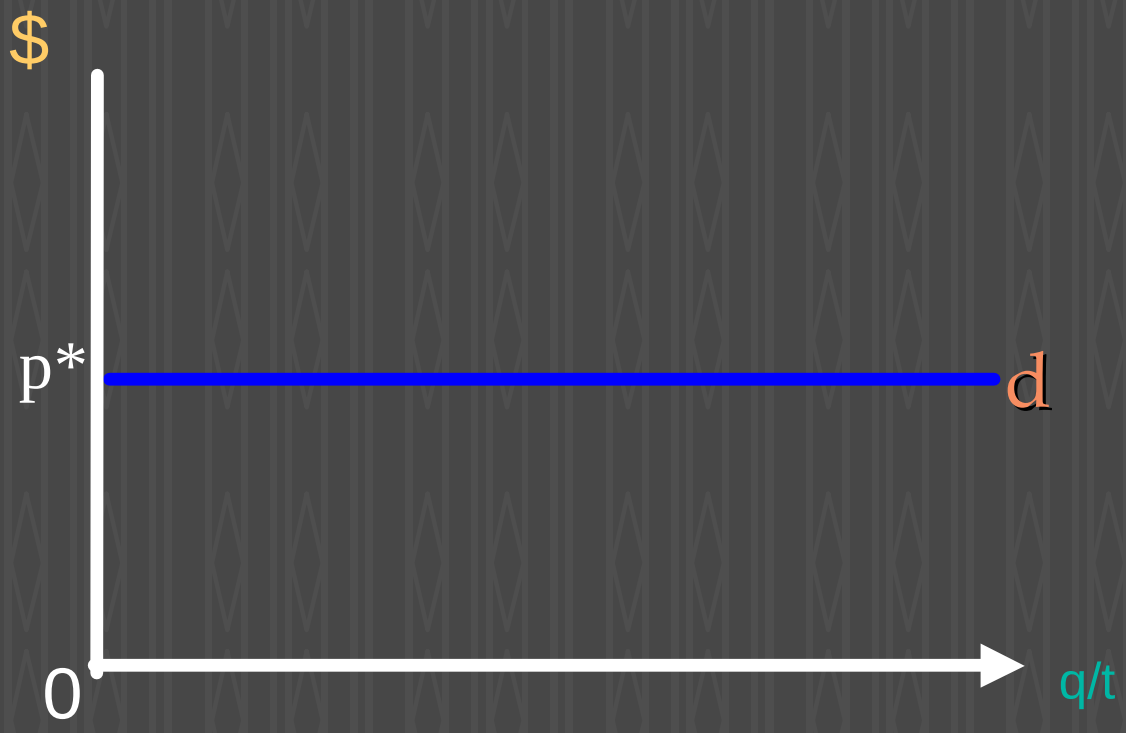
- Marginal revenue is the change in revenue to a firm when it changes output by one unit

  MR =)TR/)q

Marginal Revenue

- Marginal Revenue is the change in revenue from selling one more, or one less unit
- If the firm gets price p* for every unit it sells, **as it does in perfect competition**, then p* is the marginal revenue at all quantities
  - MR = Δ in TR / Δ in Q
- Horizontal Demand Curve means,
  - MR = P

Demand Curve, d, as seen by the price taking firm



Firm's Horizontal Demand Curve

- At P > p*, Sales = 0
- At P < p*, Less Profits then if Sell at p*
- p* found from Market Equilibrium Price

Profit Maximization

- We assume that the firm is profit maximizing
- Profit = Total Revenue - Total Cost
- Total Revenue is P x q
- Profit maximization means cost of producing any output is minimized
  - The input mix is such that $MP_i/P_i = MP_j/P_j$ for all variable inputs i and j used
  - The cost curves drawn are the lowest possible

Consider the following data for a firm

q	TFC	TVC	MC	P=MR	TR	TC	TR-TC
0	$55	$ 0	$--	$ 40			
1	55	45		40			
2	55	65		40			
3	55	70		40			
4	55	80		40			
5	55	95		40			
6	55	120		40			
7	55	155		40			
8	55	200		40			
9	55	255		40			
10	55	320		40			

Can you fill in the missing columns?

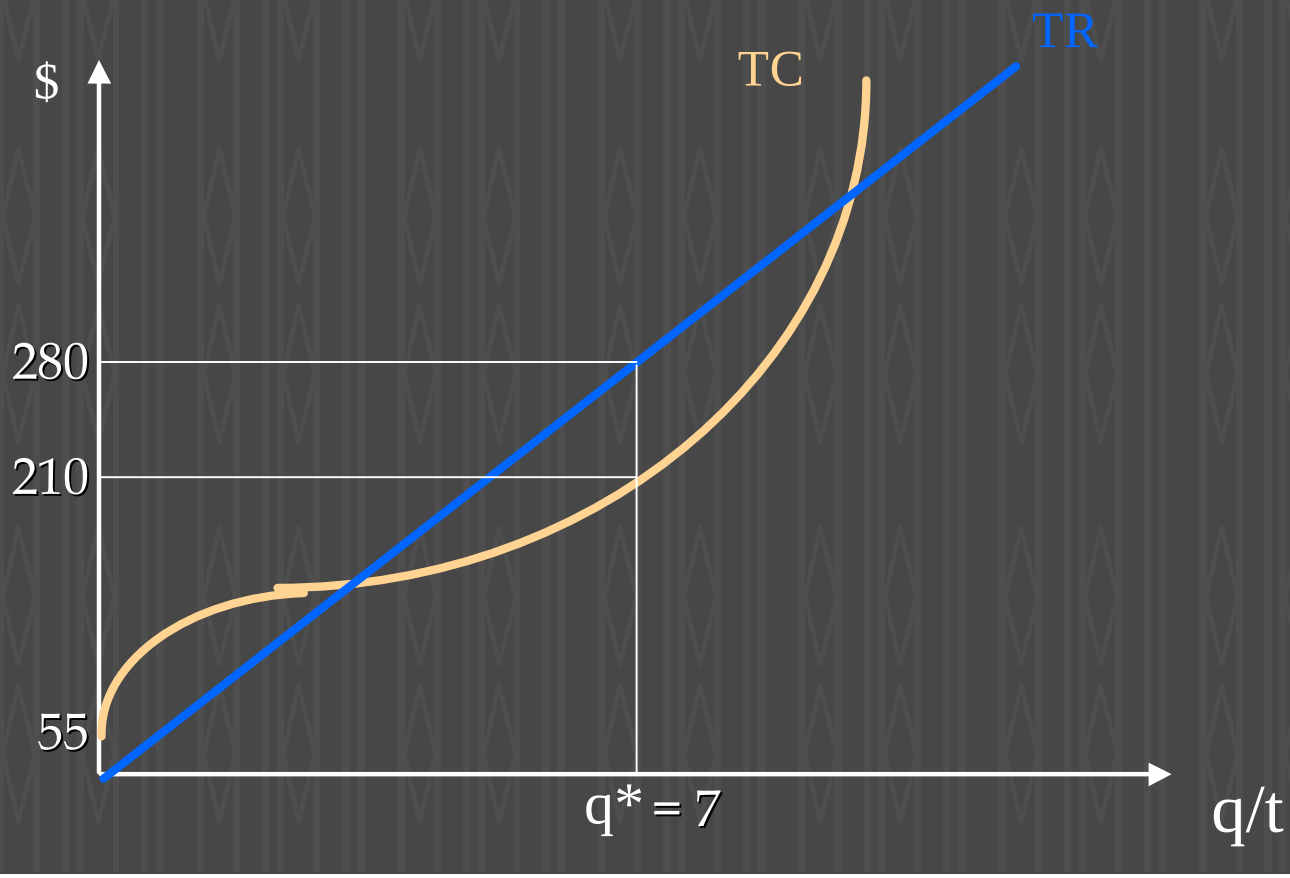
What is the firm's profit maximizing level of output?

q	TFC	TVC	MC	P=MR	TR	TC	TR-TC
0	$55	$ 0	$--	$40	$--	$ 55	$ -55
1	55	45	45	40	40	100	-60
2	55	65	20	40	80	120	-40
3	55	70	5	40	120	125	- 5
4	55	80	10	40	160	135	25
5	55	95	15	40	200	150	30
6	55	120	25	40	240	175	65
7	55	155	35	40	280	210	70
8	55	200	45	40	320	255	65
9	55	255	55	40	360	310	50
10	55	320	65	40	400	375	25

Profit Maximizing

- Since the perfectly competitive firm cannot choose the price, the only choice left for the firm is to choose how much to produce.
- The firm will choose the quantity where TR-TC is the largest, in other words - where the difference between the TR and TC curves is the biggest

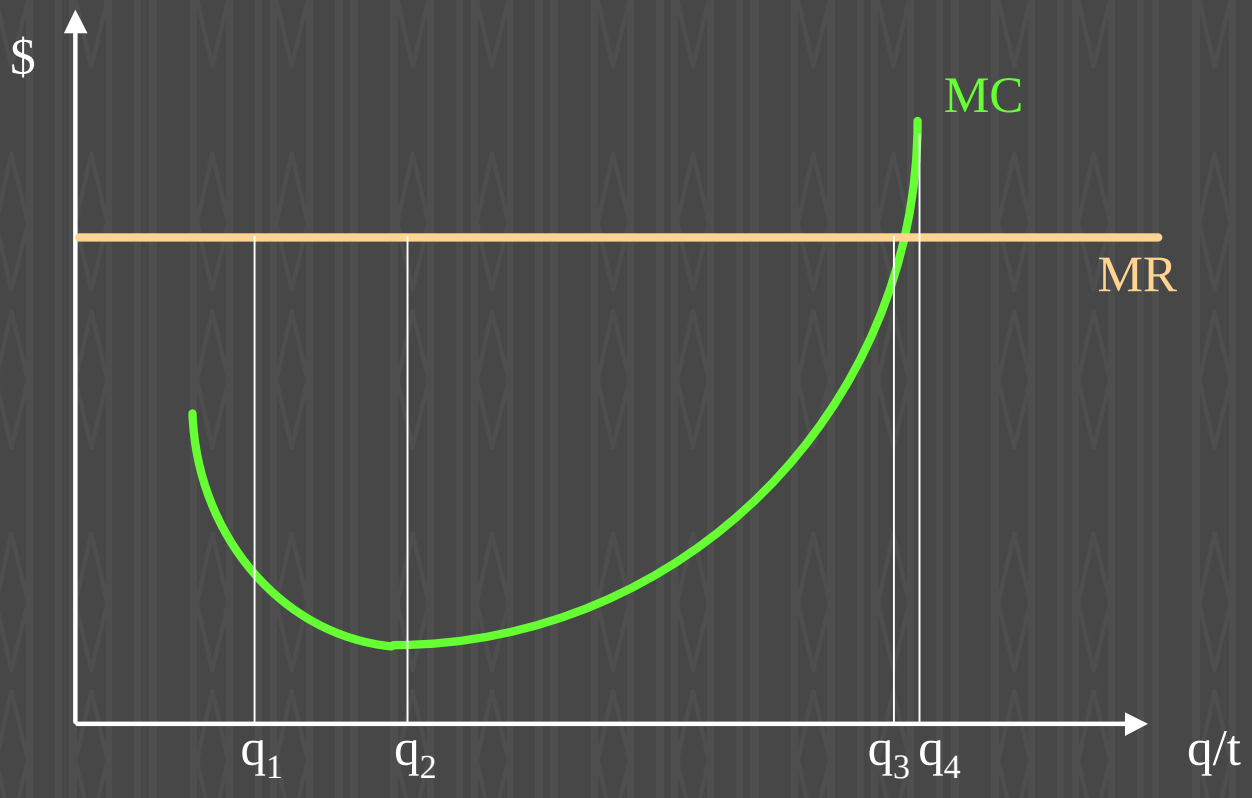
Profit Maximized when TR and TC are furthest apart



Profit Maximizing

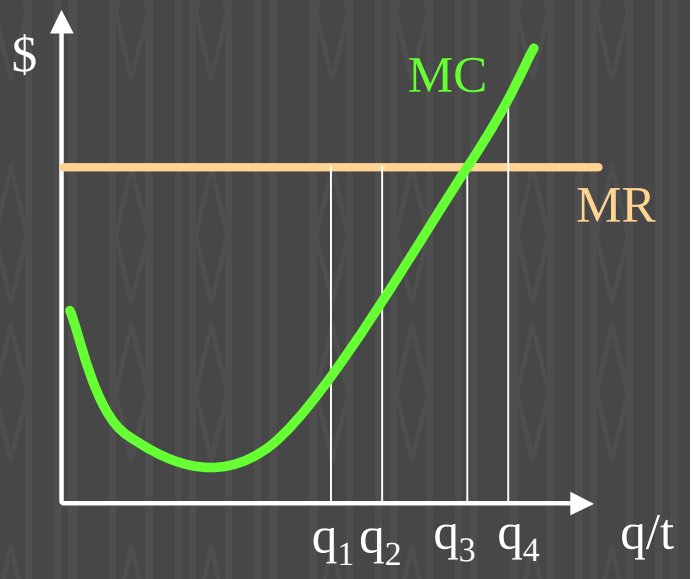
- Note that the slope of the TR and TC curves are the same at this quantity
- This means the the derivative of TR is the same as the derivative of TC at q*
- There is a way we can find q* without calculus, though
- We will need to graph the MR and MC curves

Profit Max without Calculus



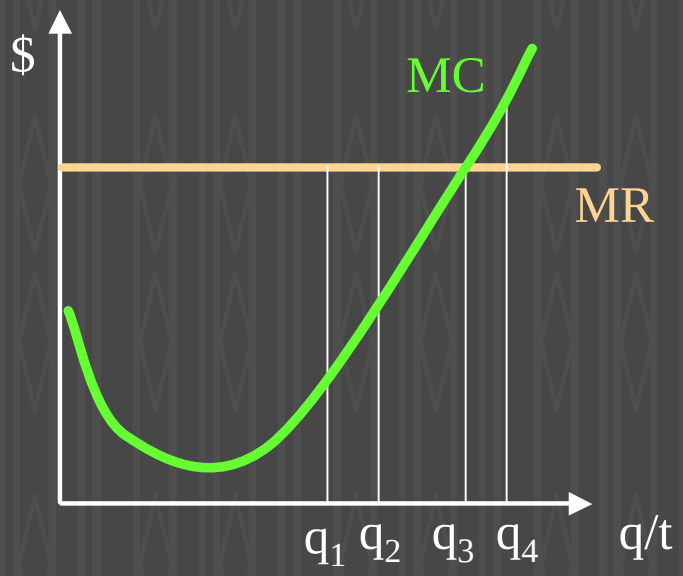
Profit Maximizing

- Consider the quantity q_1
- At q_1 MR>MC. This means that the additional revenue from selling one more is greater than the cost of making one more.
- This means the firm will make more profit by making one more, so they will
- The same is true at q_2



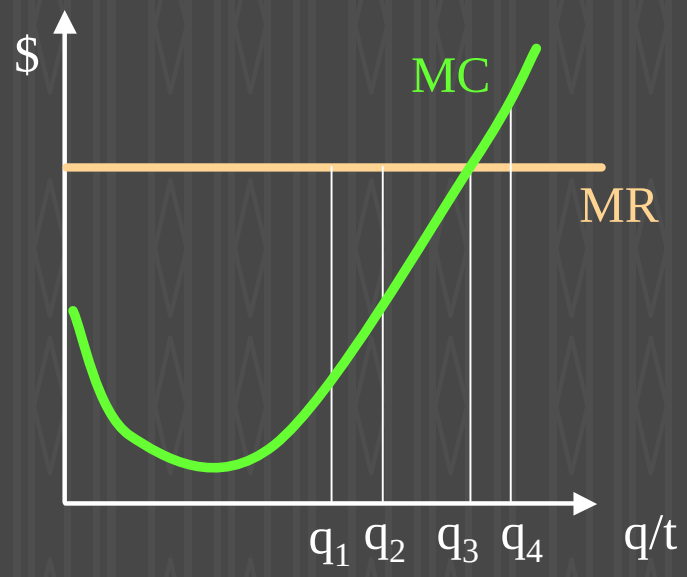
Profit Maximizing

- At q_3, MR=MC. This means that the firm will get exactly as much money from selling one more as it cost them to make one more
- So the firm has no interest in making one more



Profit Maximizing

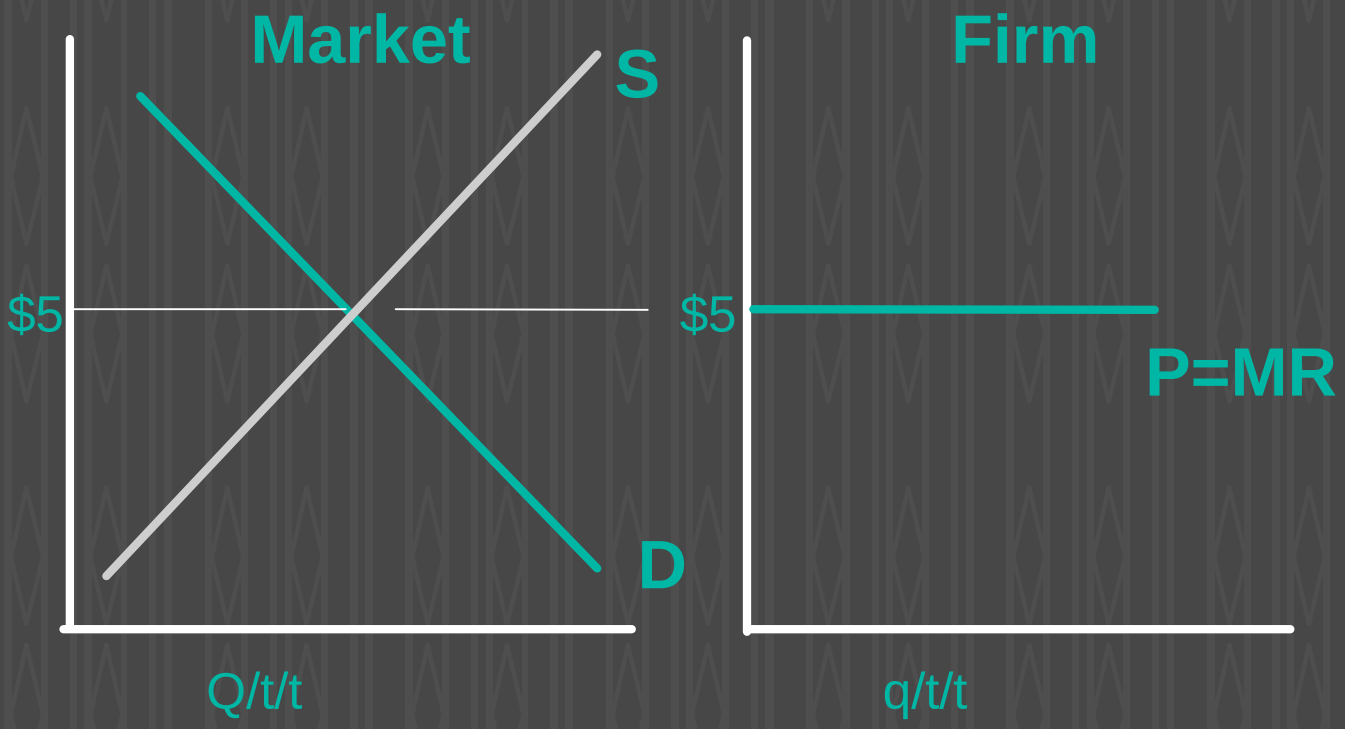
- And at q_4, MR<MC. This means that it costs more to make one more than it will bring in when it is sold
- This means the firm will lose money
- So the firm would want to decrease production to bring MC down



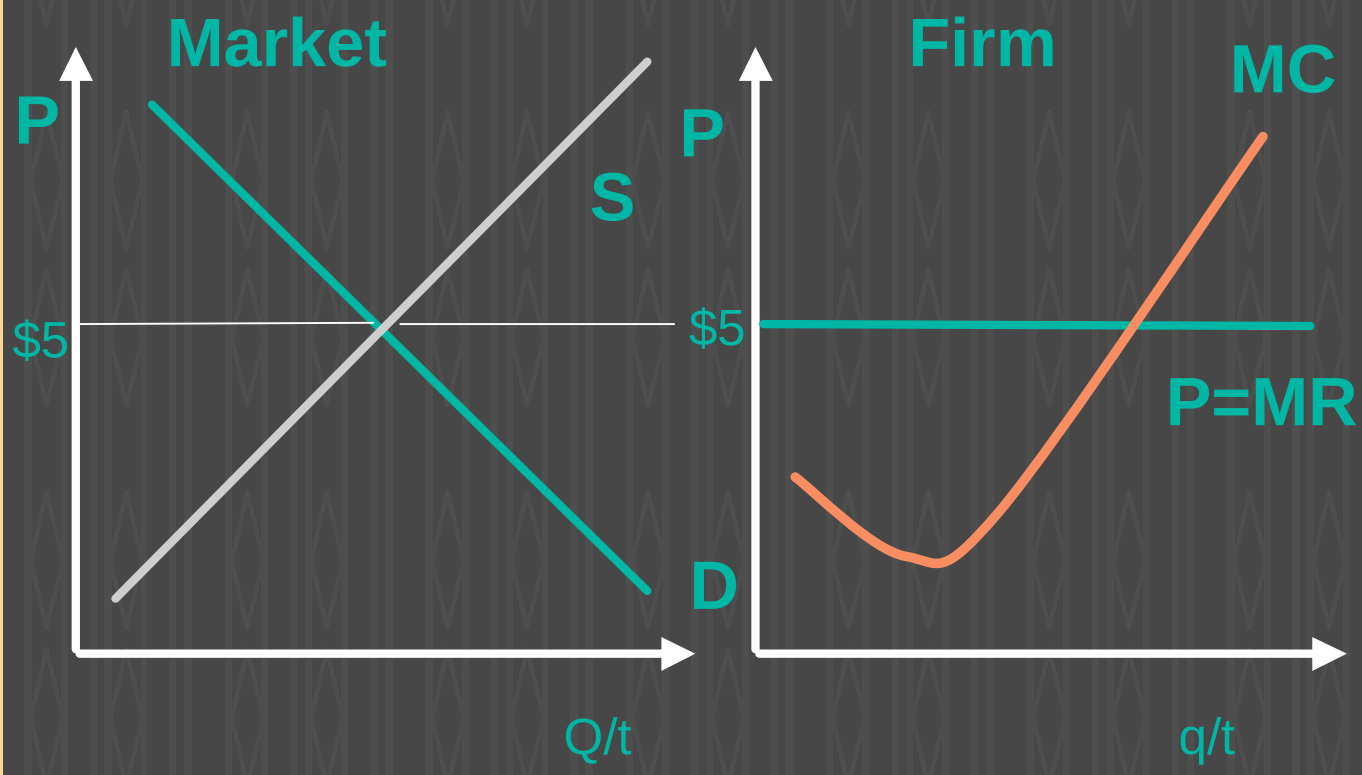
The Golden Rule

- A profit maximizing firm will always produce where MC=MR
- In the case of Perfect Competition, we know MR=P, so we could also say that a profit maximizing firm produces where P=MC

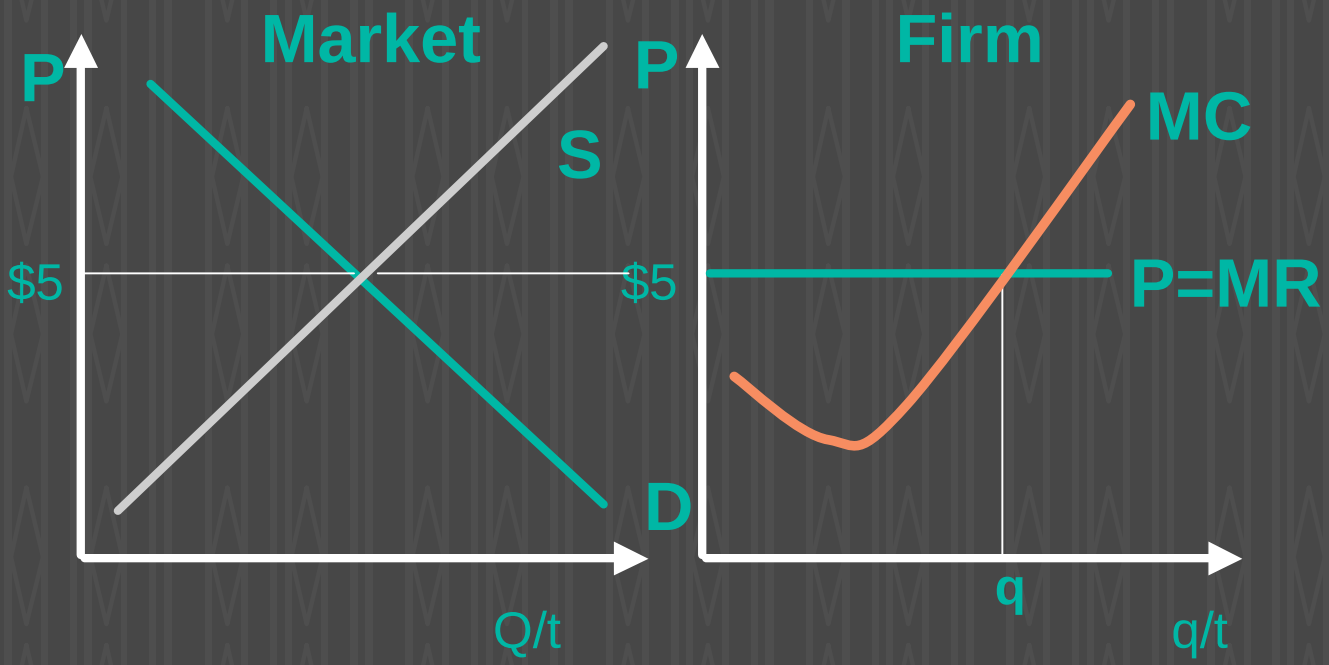
In a perfectly competitive market, the firm's demand curve is the firm's marginal revenue curve.



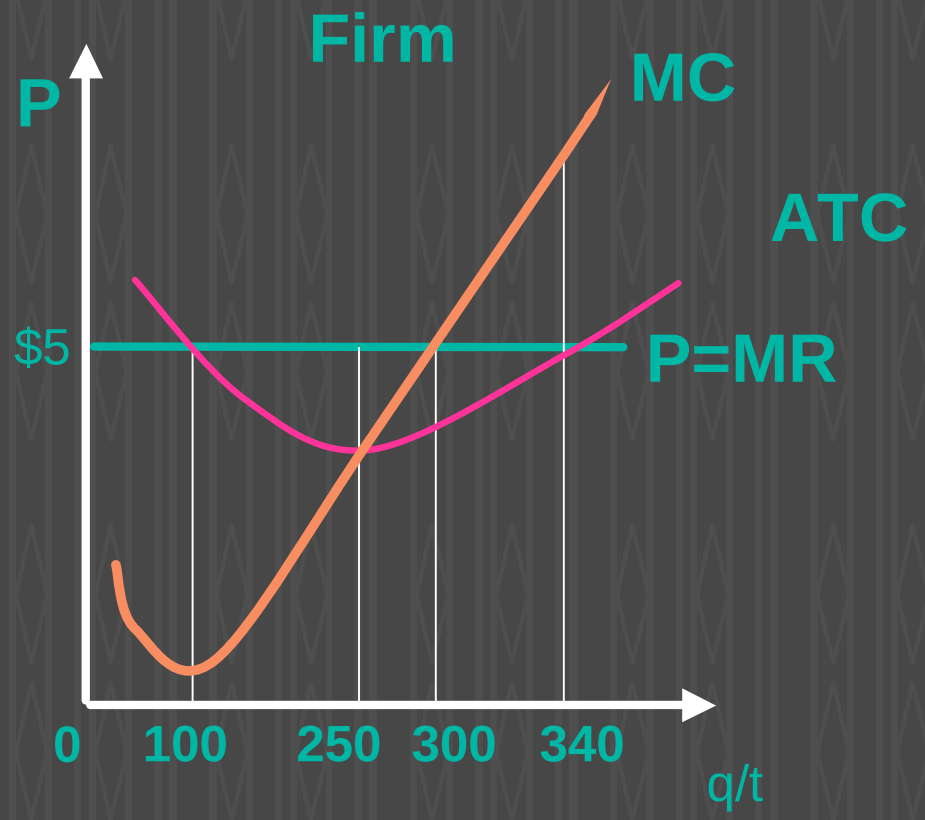
Comparing Marginal Cost and Marginal Revenue to Maximize Profit



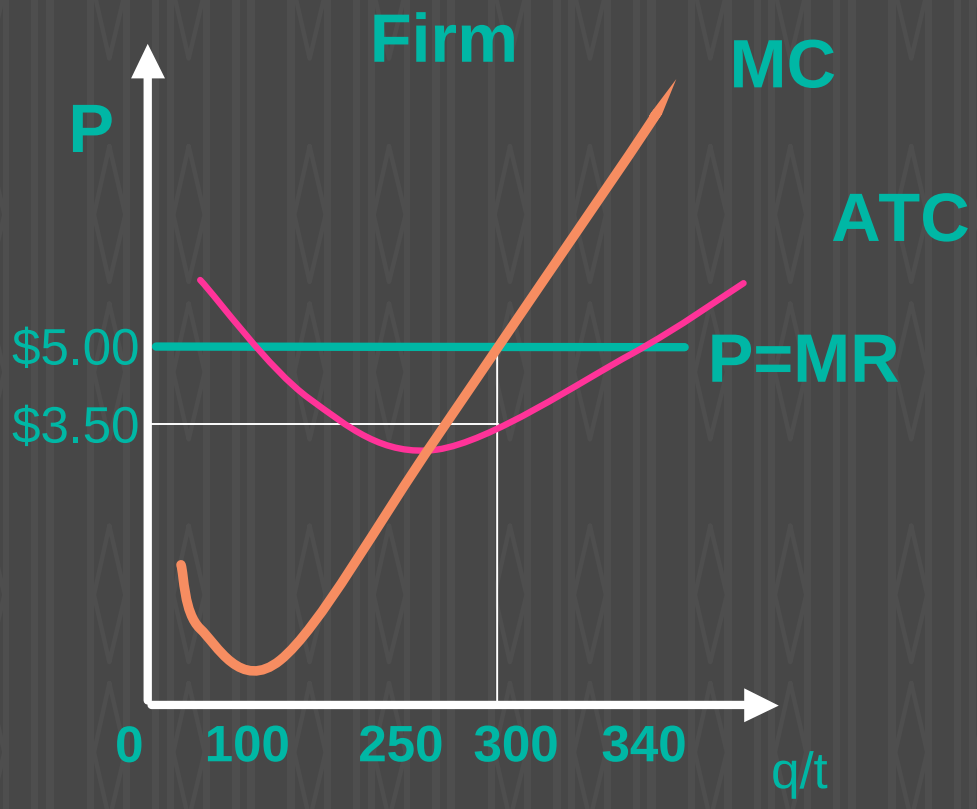
The firm maximizes profits by producing where MR = MC.



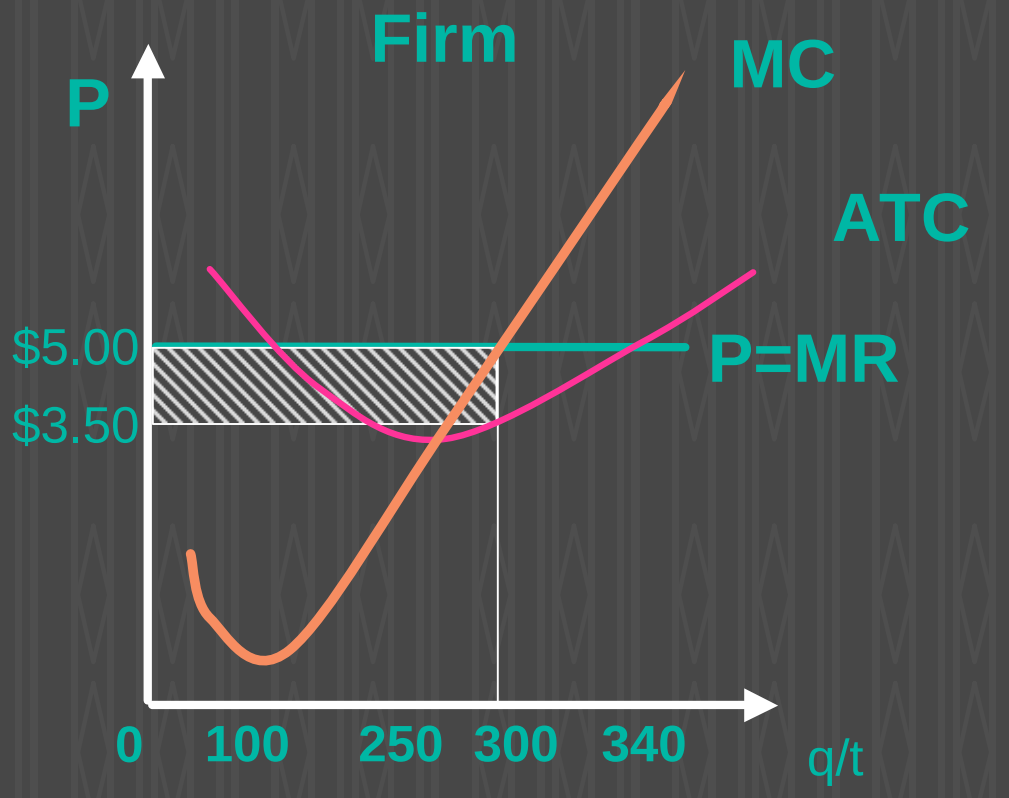
Why is q=300 the profit-maximizing level of output for the firm?



What will be the firm's profit level at the profit-maximizing level of output?



The firm's profit at q=300 is $1.50 per unit, or $450.



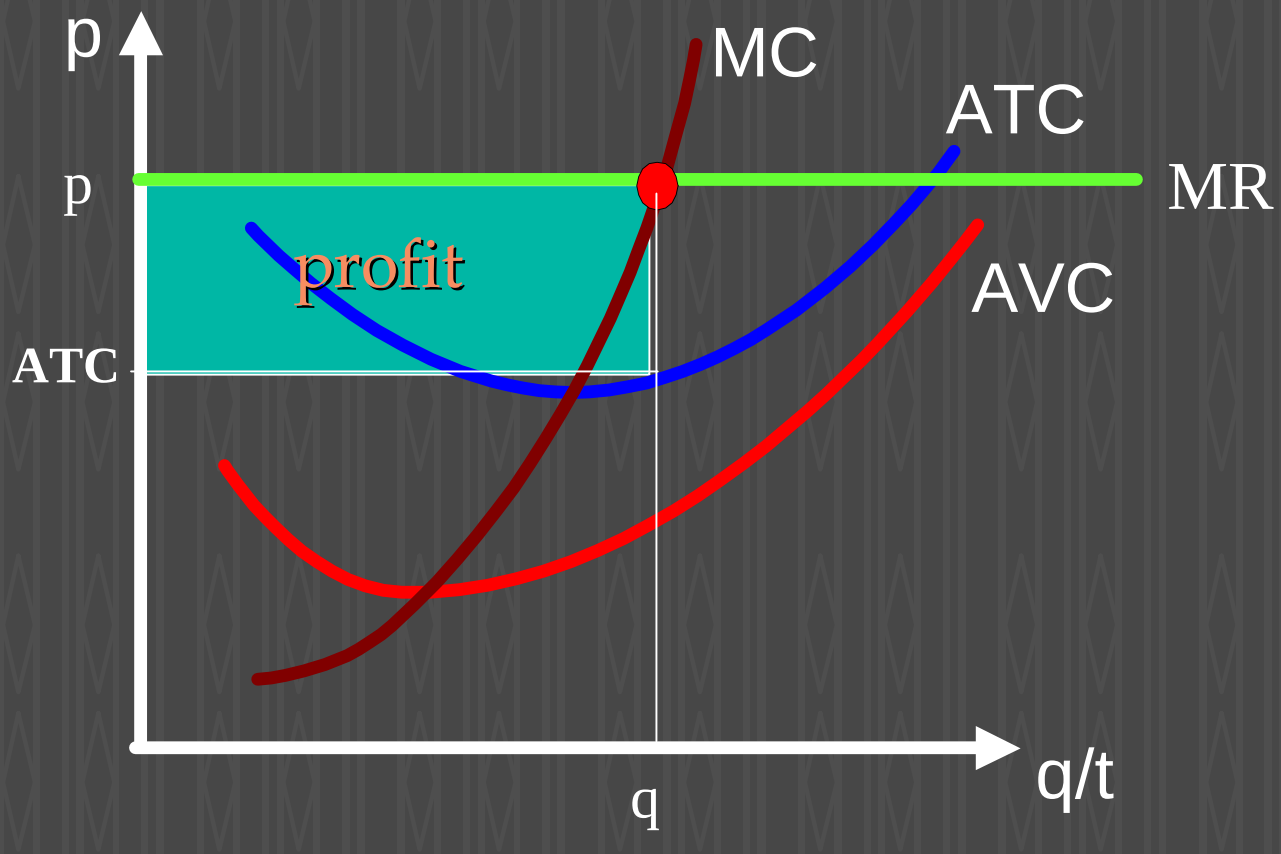
Firm's Supply Curve

- In other words, given a price, the firm looks to the MC curve and produces that quantity
- This is a supply curve--the relationship between quantity supplied and price
- The Perfectly Competitive firm's MC curve is its Supply Curve
  - Later, we qualify this to say the MC curve above the AVC curve

Profit

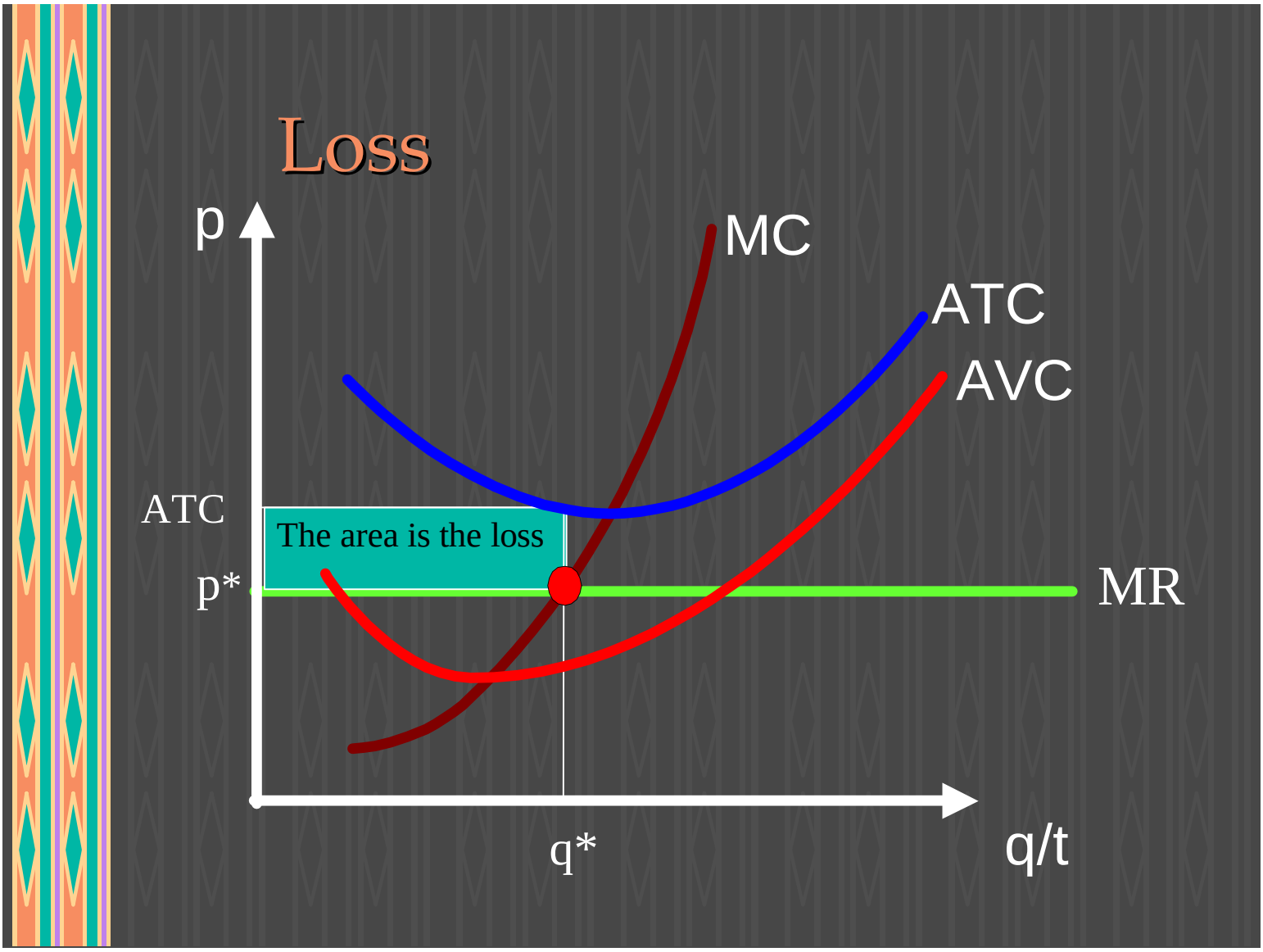
- We can also determine exactly how much profit the firm is making.
- We know profit = total revenue - total cost
- Since ATC=TC/q, we know ATC x q = Total Cost
- We also know that total revenue = price times quantity
- So Profit=(pxq)-(ATCxq)=(p-ATC)xq, or graphically...

Profit =(p-ATC) x q



Loss

- Note that as long as p>ATC at q*, there will be a profit.
- But it may be possible that no matter how much is produced, the firm will still lose money
- In this case the q* is the quantity where the firm loses the least amount of money
- For example...


Loss
p
MC
ATC
AVC
ATC
The area is the loss
p*
MR
q*
q/t

The decision of whether to stay open

- Just because a firm is losing money in the short run doesn't mean it should close its doors. Often we hear of major firms like IBM posting a loss, but they stay open
- When does a firm shut down?

The decision of whether to stay open

- If P*<ATC, then the firm is losing money, BUT
- If P*>AVC, they are getting enough revenue to pay all of the variable cost
  - TR = P x q > TVC = AVC x q
- The excess pays down some of the fixed cost. If they shut down, they will have to pay all of the fixed cost with no revenue. So they are better off staying open and being able to pay some of the fixed costs than shutting down and not being able to pay ALL of the fixed cost

The Shut Down Point

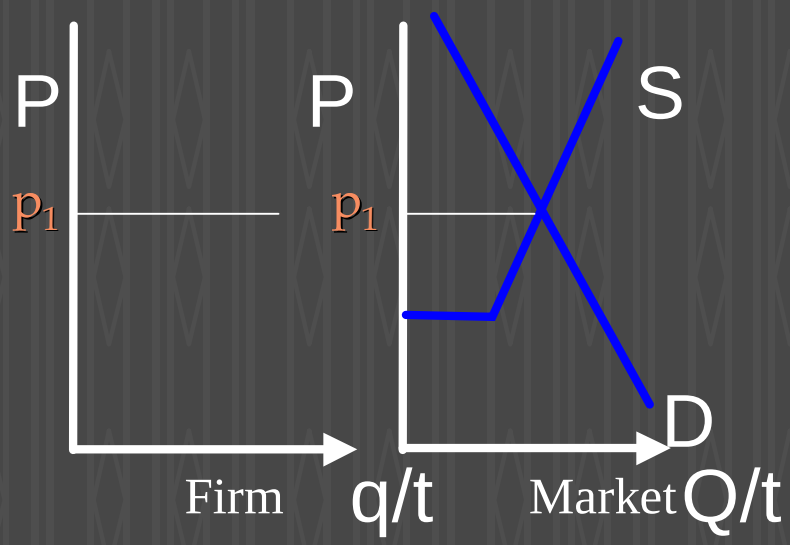
- Shut-down Point: P = min AVC
  - Firm is indifferent between staying in business and going out of business.
- Firm Supply Curve
  - MC curve at or above the Shut-down Point

Let's Review Profit Maximizing in the Short Run

- In the short run, the firm takes the market price, given by the intersection of the market supply and demand curves.
- The firm then produces where MC=MR and takes a profit or loss as long as P>AVC

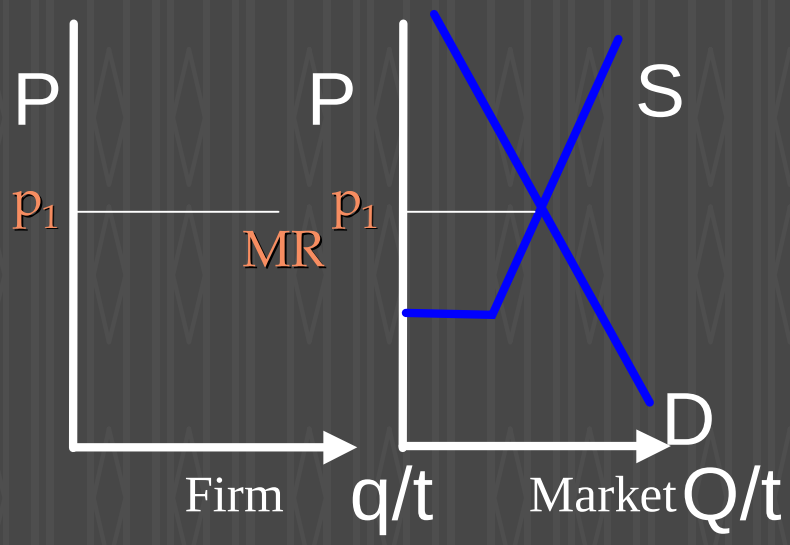
Profit Maximization in the Short Run

- The firm takes the market price p_1 as given
- Notice the use of "q" for the firm's output, and "Q" for the market



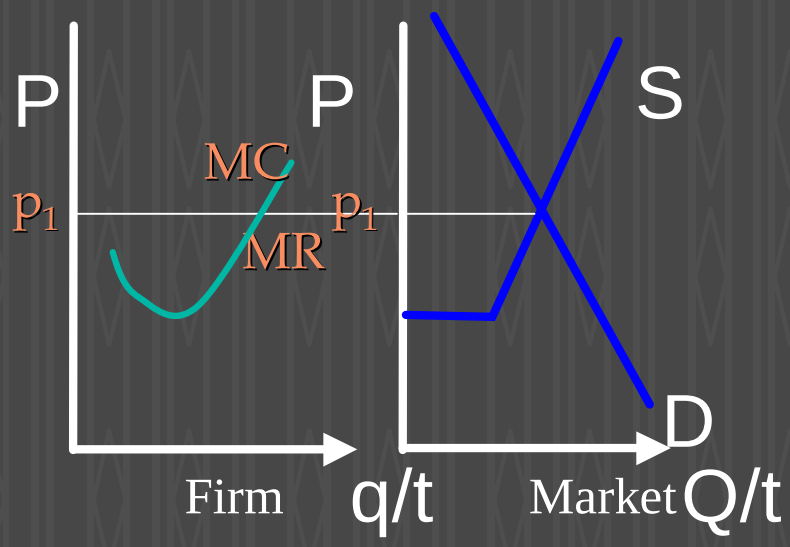
Profit Maximization in the Short Run

- p_1 is the firm's marginal revenue, MR



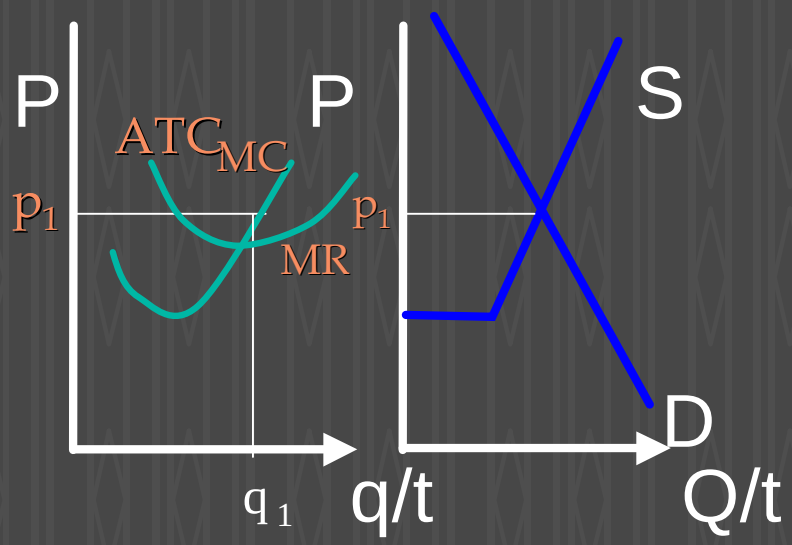
Profit Maximization in the Short Run

- MR is compared with the firm's Marginal Cost, MC



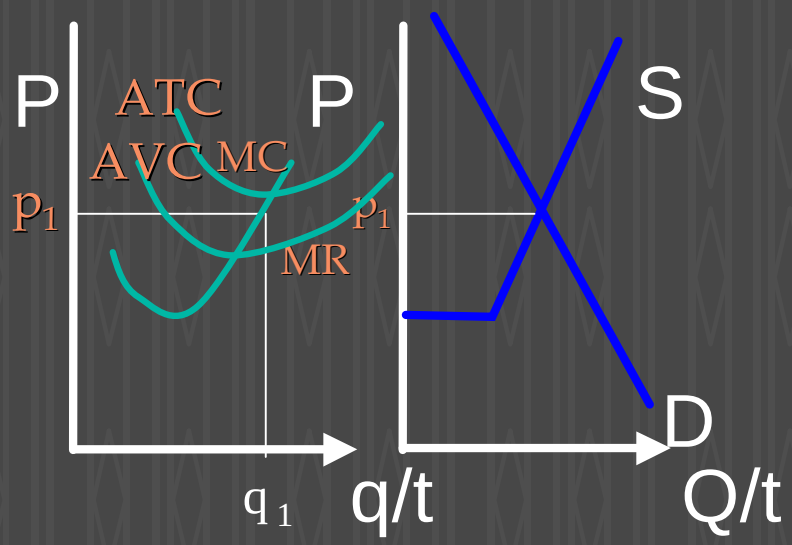
Profit Maximization in the Short Run

- MR=MC locates the profit maximizing output, q_1 if
- p_1 $ATC



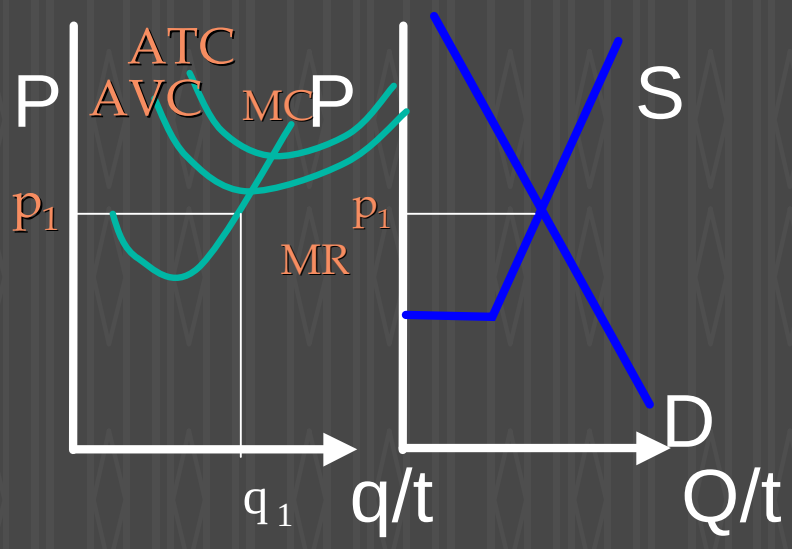
Profit Maximization in the Short Run

- or, MR=MC locates the loss minimizing output, q_1 , if
- ATC # p_1 # AVC

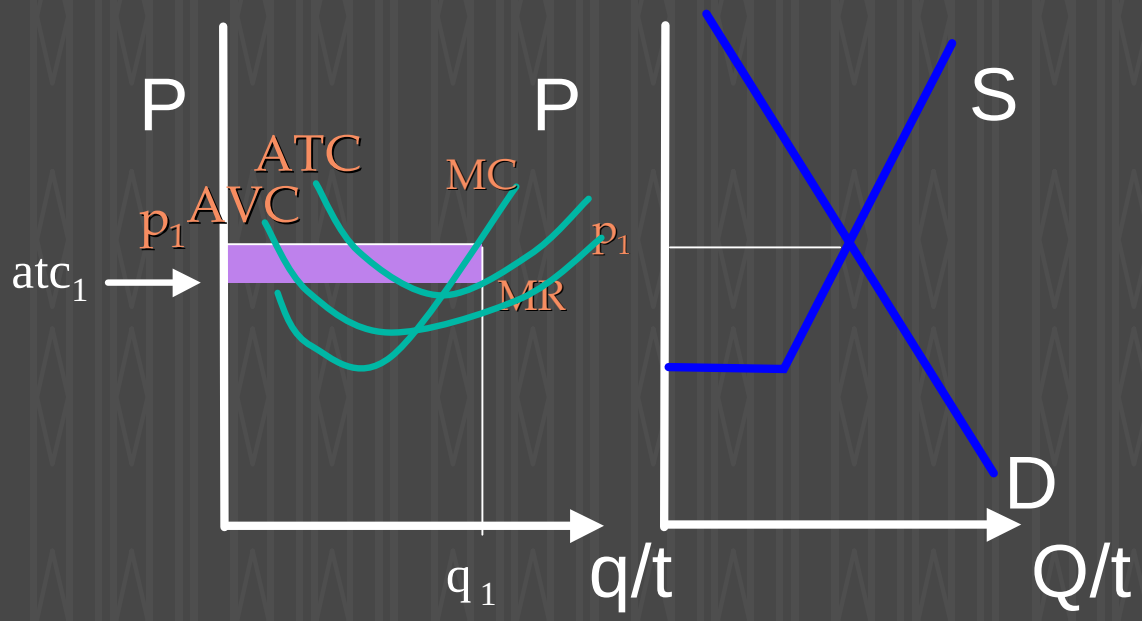


Profit Maximization in the Short Run

- or, Shut Down if P < AVC

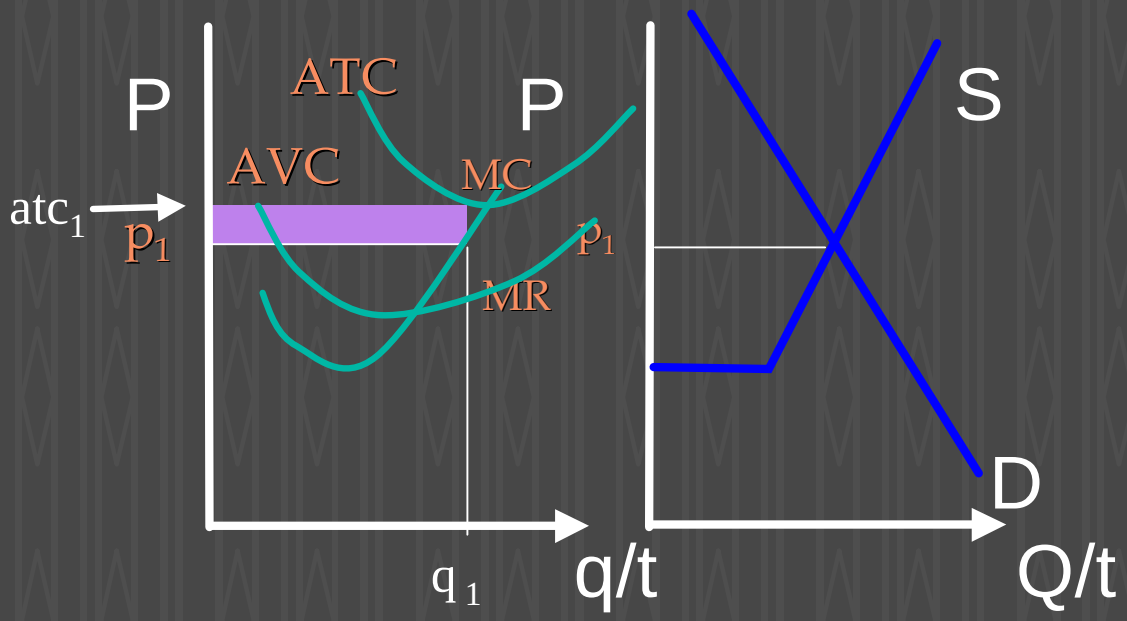


Profit or Loss?



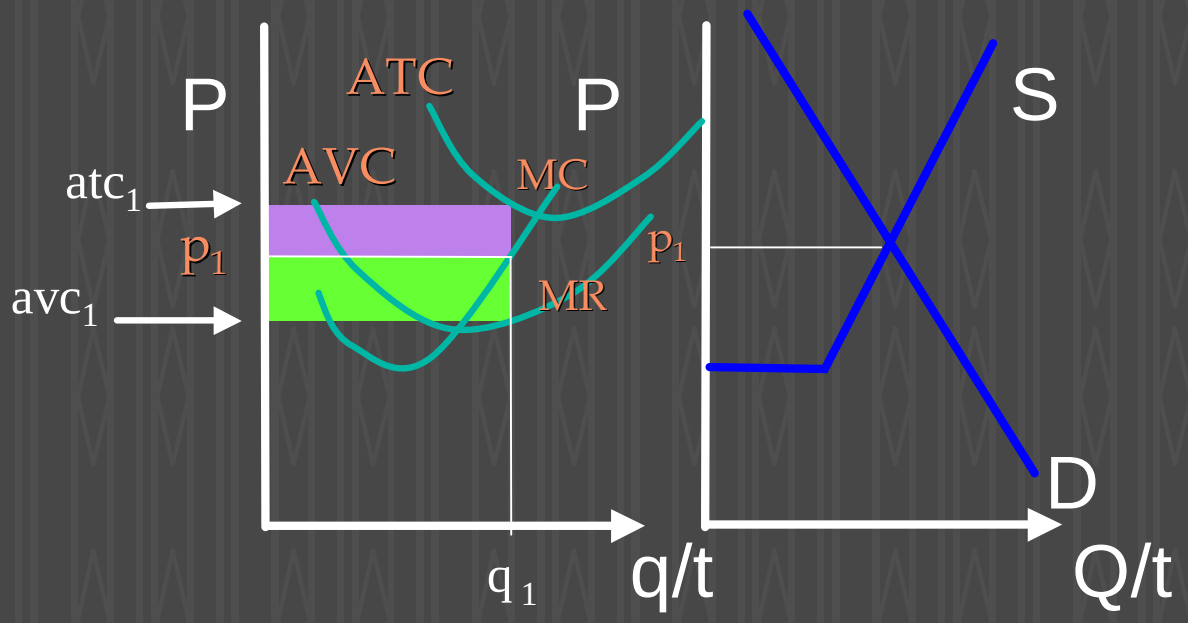
- Profit! $(p_1 - atc_1)*q_1$ =

Profit or Loss?



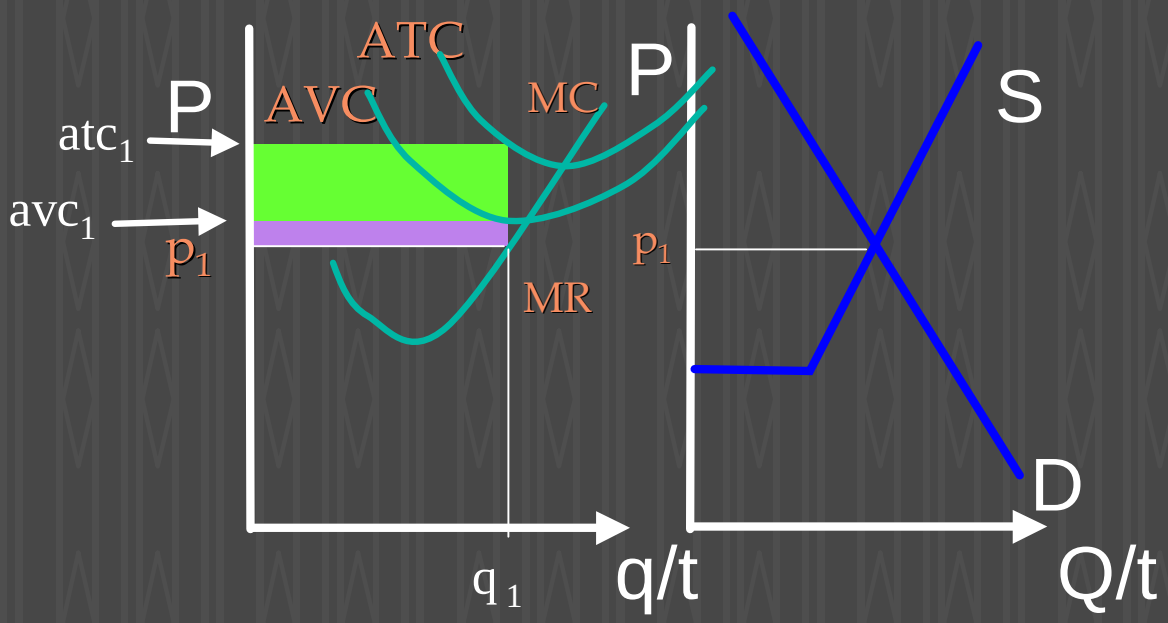
- Loss! $(atc_1 - p_1)*q_1$ =

Shut Down or Operate?



- Operate! Your loss, $(atc_1 - p_1)*q_1$= is less than loss by shutting down, FC
- FC = $(atc_1 - avc_1)*q_1$ =

Shut Down or Operate?



- Shut down! Your loss by shutting down, FC = $(atc_1 - avc_1)*q_1$ = [green rectangle] is less than by operating at q_1 $(atc_1 - p_1)*q_1$ = [green rectangle]

The End

Go ahead to Part III: Long Run Profit Maximization