Econ 200
Module 5
Lecture 12

UNIVERSITY *of* WASHINGTON

Outline

1. Perfectly Competitive Markets
2. Revenue in PC Markets
3. Profit Maximization for PC Firms
4. Showing Profit Graphically

Reading: Ch 13

Market Structures

Market Structures: models of how the firms in a market interact with buyers to sell their output.

In decreasing order of *competitiveness*:

- Perfectly competitive markets
- Monopolistically competitive markets
- Oligopolies, and
- Monopolies.

Each market structure will be applicable to different real-world markets and will give us insight into how firms in certain types of markets behave.

Introduction to Perfectly Competitive Markets

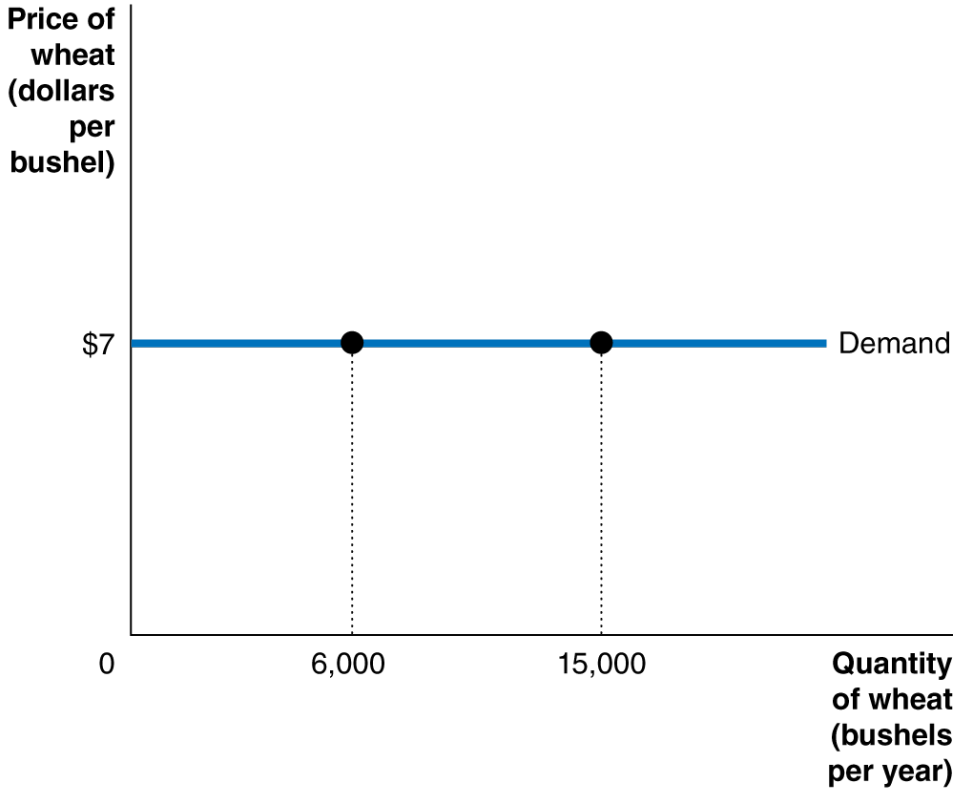
The first market structure we will examine is the **perfectly competitive market**: one in which

- There are many buyers and sellers;
- All firms sell identical products; and
- There are no barriers to new firms entering the market

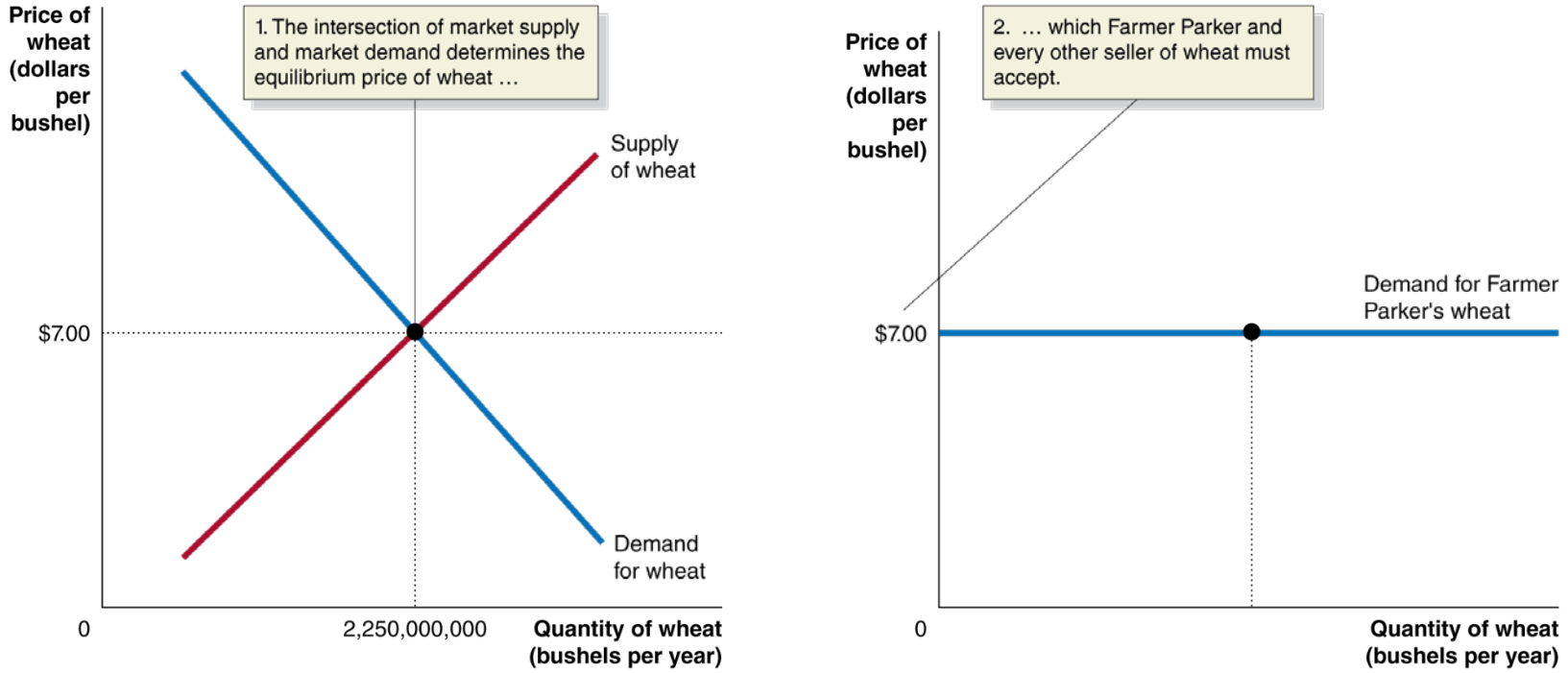
The first and second conditions imply that perfectly competitive firms are **price-takers**: they are unable to affect the market price.

The Demand Curve for a Perfectly Competitive Firm

By definition, a perfectly competitive firm is too small to affect the market price no matter what quantity is sold.



How Is the Firm's Demand Curve Determined?



There are thousands of individual wheat farmers.

Their collective supply, combined with market demand for wheat, determines the market price.

The individual farmer takes this market price as his or her demand curve.

Firm Revenue in PC Markets

For Perfectly competitive firms:

Price = Average Revenue = Marginal Revenue

Average revenue: Total revenue divided by the quantity of the product sold.

Marginal revenue: the change in total revenue from selling one more unit of a product.

→ *Total Revenue = Price X Quantity*

Revenue for a Perfectly Competitive Firm

Number of Bushels (*Q*)	Market Price (per bushel) (*P*)	Total Revenue (*TR*)	Average Revenue (*AR*)	Marginal Revenue (*MR*)
0	$7	$0	-	-
1	7	7	$7	$7
2	7	14	7	7
3	7	21	7	7
4	7	28	7	7
5	7	35	7	7
6	7	42	7	7
7	7	49	7	7
8	7	56	7	7
9	7	63	7	7
10	7	70	7	7

For a firm in a perfectly competitive market, price is equal to both average revenue and marginal revenue.

Profit Maximization: the Goal of the Firm

We assume that decisions made by the firm are made solely to maximize firm profit.

For all firms:

Profit = Total Revenue – Total Cost

Firms choose output Q that maximizes this quantity.

Profit Maximization for Farmer Parker

Quantity (bushels) (*Q*)	Total Revenue (*TR*)	Total Cost (TC)	Profit (TR – TC)
0	$0.00	$10.00	-$10.00
1	7.00	14.00	-7.00
2	14.00	16.50	-2.50
3	21.00	18.50	2.50
4	28.00	21.00	7.00
5	35.00	24.50	10.50
6	42.00	29.00	13.00
7	49.00	35.50	13.50
8	56.00	44.50	11.50
9	63.00	56.50	6.50
10	70.00	72.00	-2.00

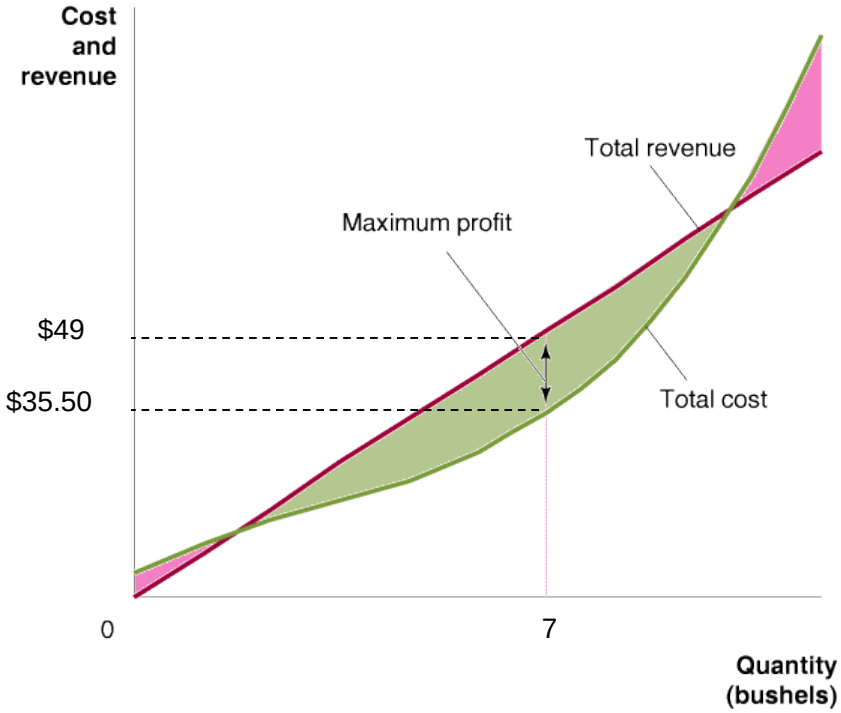
Suppose costs are as in the table.

We can calculate profit; profit is maximized at a quantity of 7 bushels. This is the *profit-maximizing level of output.*

Showing Revenue, Cost, and Profit

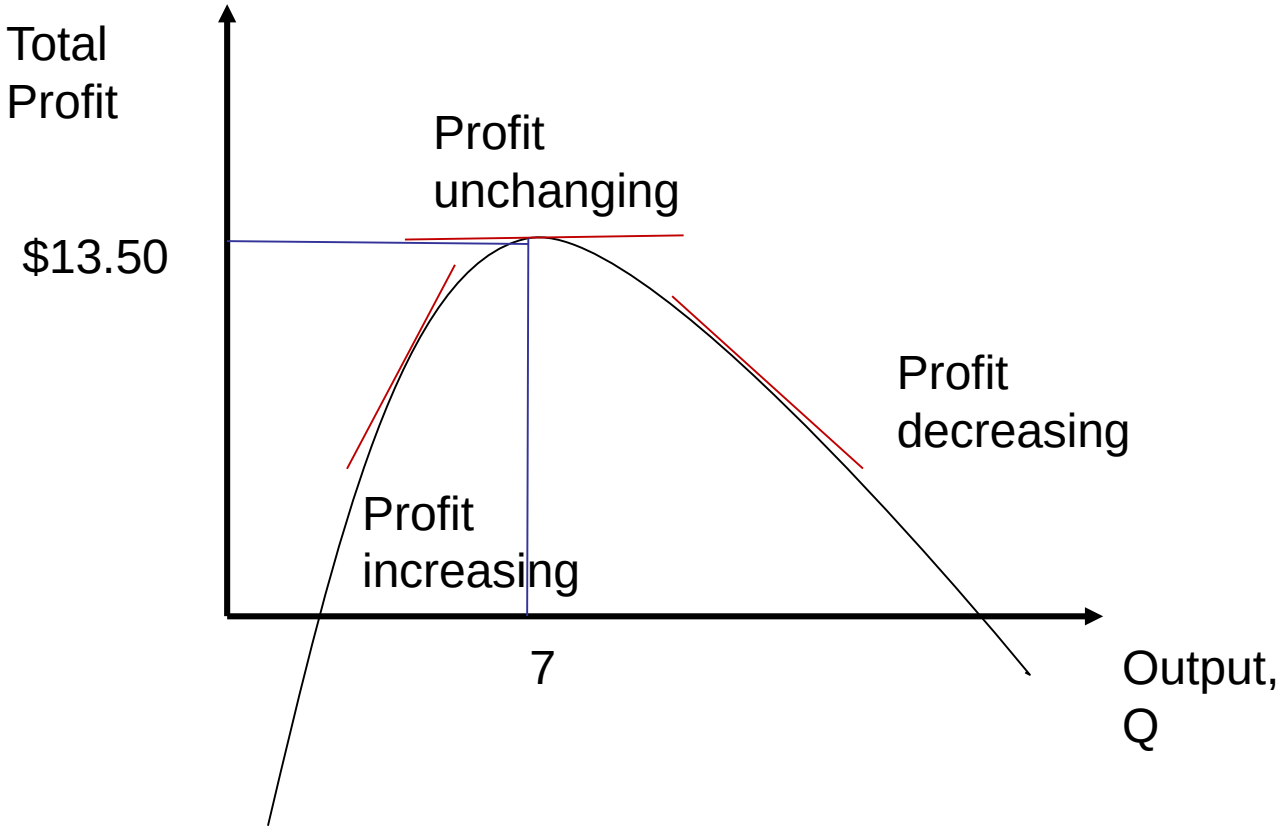
Profit = TR – TC

At the profit-maximizing level of output, the vertical distance between TR and TC is maximized.



(a) Total revenue, total cost, and profit

Finding Maximum Profit



Profit Maximization: the Goal of the Firm

For all firms, choose Q such that:

$$\frac{\Delta profit}{\Delta Q} = \frac{\Delta total\ revenue}{\Delta Q} - \frac{\Delta total\ cost}{\Delta Q} = 0$$

Then,

$$\frac{\Delta total\ revenue}{\Delta Q} = \frac{\Delta total\ cost}{\Delta Q}$$

Or…

MR = MC

Profit Maximization for Farmer Parker: MR=MC

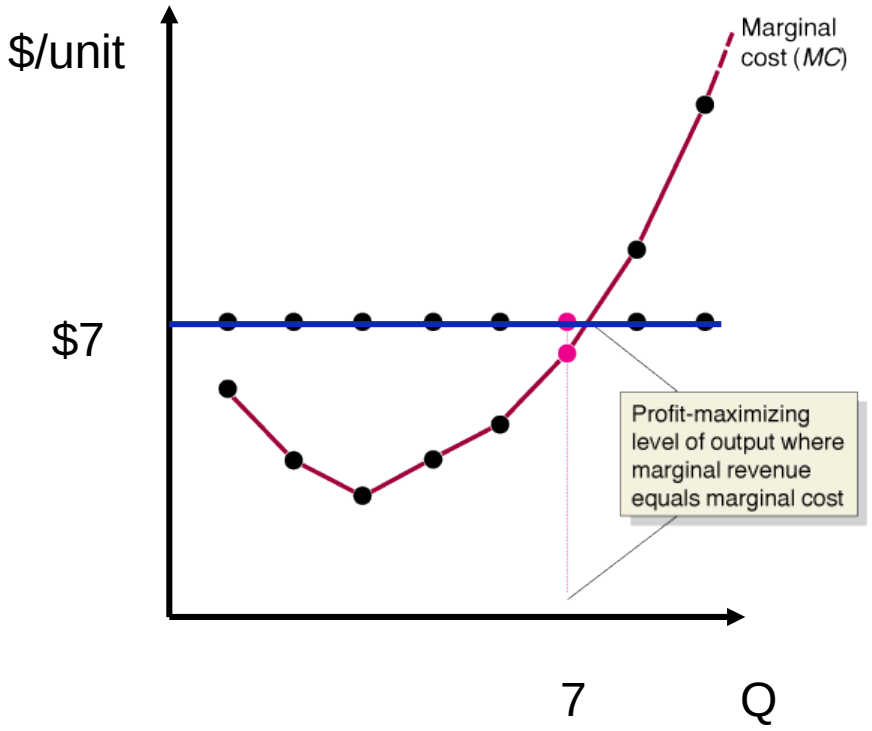
Quantity (bushels) (*Q*)	Total Revenue (*TR*)	Total Cost (TC)	Profit (TR – TC)	Marginal Revenue (*MR*)	Marginal Cost (MC)
0	$0.00	$10.00	-$10.00	-	-
1	7.00	14.00	-7.00	$7.00	$4.00
2	14.00	16.50	-2.50	7.00	2.50
3	21.00	18.50	2.50	7.00	2.00
4	28.00	21.00	7.00	7.00	2.50
5	35.00	24.50	10.50	7.00	3.50
6	42.00	29.00	13.00	7.00	4.50
7	49.00	35.50	13.50	7.00	6.50
8	56.00	44.50	11.50	7.00	9.00
9	63.00	56.50	6.50	7.00	12.00
10	70.00	72.00	-2.00	7.00	15.50

Profit is maximized by producing as long as MR>MC; or until MR=MC, if that is possible.

Showing Marginal Revenue and Marginal Cost

The firm maximizes profit by choosing the level of output where MR is equal to MC

(or just less, if equal is not possible).



Rules for Profit Maximization

The rules we have just developed are:

1. The profit-maximizing level of output is where the difference between total revenue and total cost is greatest.
2. The profit-maximizing level of output is also where MR = MC.

However *neither of these rules require the assumption of perfect competition; they are true for every firm!*

For PC firms, P = MR; this implies:

3. The profit-maximizing level of output is also where P = MC.

A Useful Formula for Profit

We know profit equals total revenue minus total cost; and total revenue is price times quantity. So write:

$$\text{Profit} = (P \times Q) - TC$$

Dividing both sides by Q, we obtain:

$$\frac{\text{Profit}}{Q} = \frac{(P \times Q)}{Q} - \frac{TC}{Q}$$

A Useful Formula for Profit

$$\frac{\text{Profit}}{Q} = \frac{(P \times Q)}{Q} - \frac{TC}{Q}$$

Or:

$$\frac{\text{Profit}}{Q} = P - ATC$$

Then:

$$\text{Profit} = (P - ATC) \times Q$$

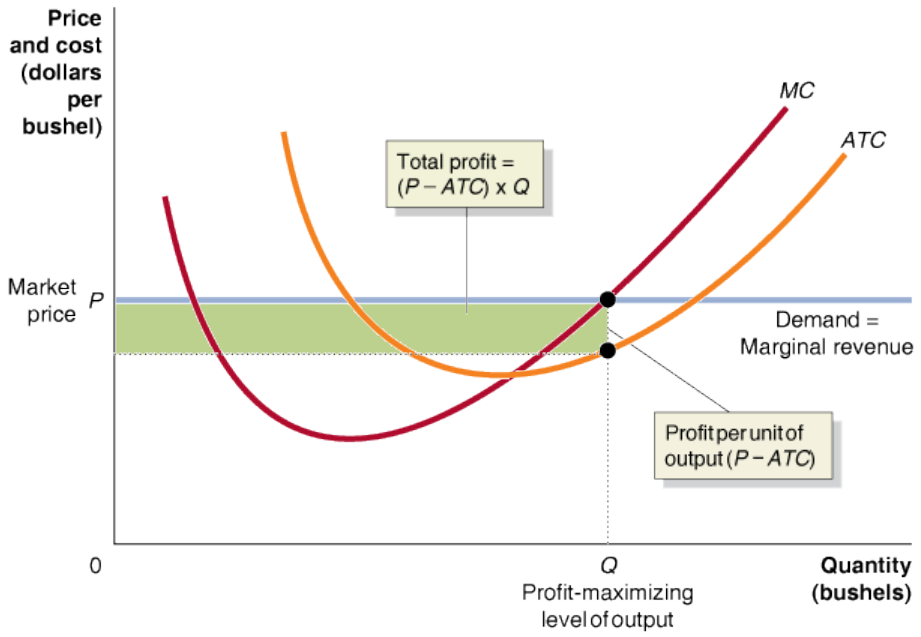
The right hand side is the area of a rectangle with height *(P – ATC)* and length *Q*. We can use this to illustrate profit on a graph.

Showing the Maximum Profit on a Graph

Firm chooses Q where MR=MC

P-ATC = Profit/unit of output

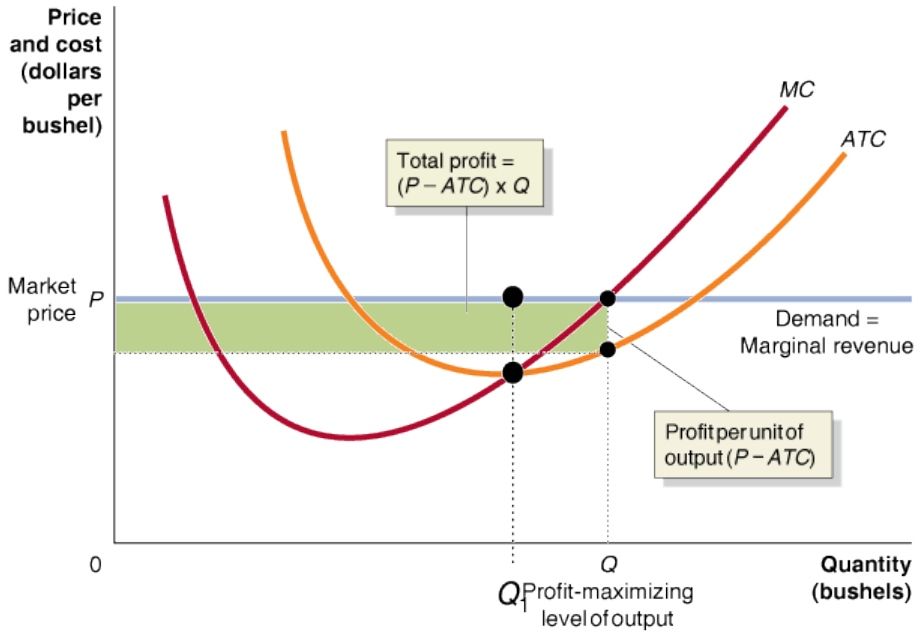
Profit =Profit/unit of output X the amount of output



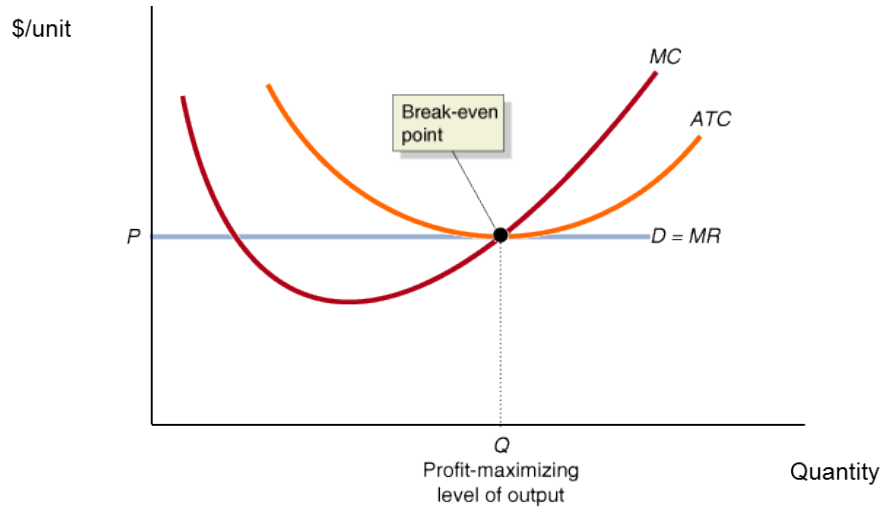
Incorrect Level of Output

Why not produce Q_1, where *profit per unit* is maximized?

MR>MC at Q_1; you could still get additional profit for producing above Q_1.



A Firm Breaking Even – When Maximum Profit is No Profit



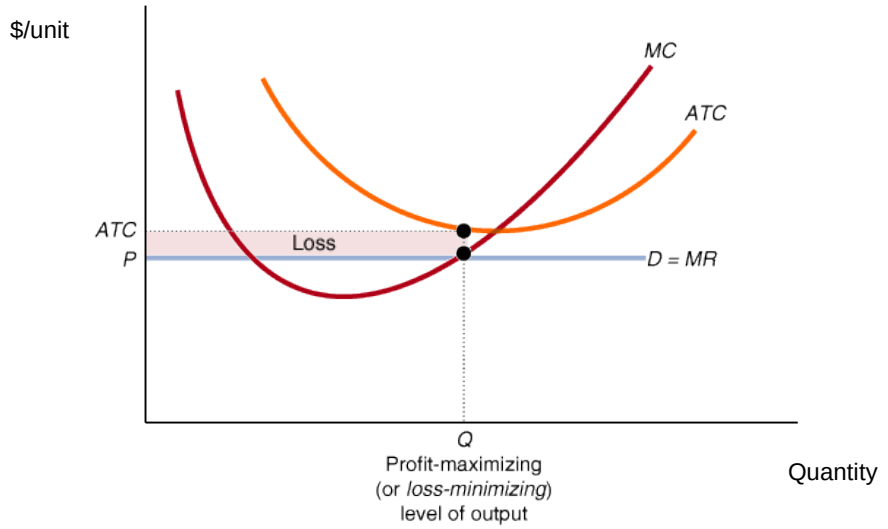
Here, the best this firm can do is to *break even*, obtaining no profit but incurring no loss.

The *MC=MR* rule still leads us to this optimal level of production.

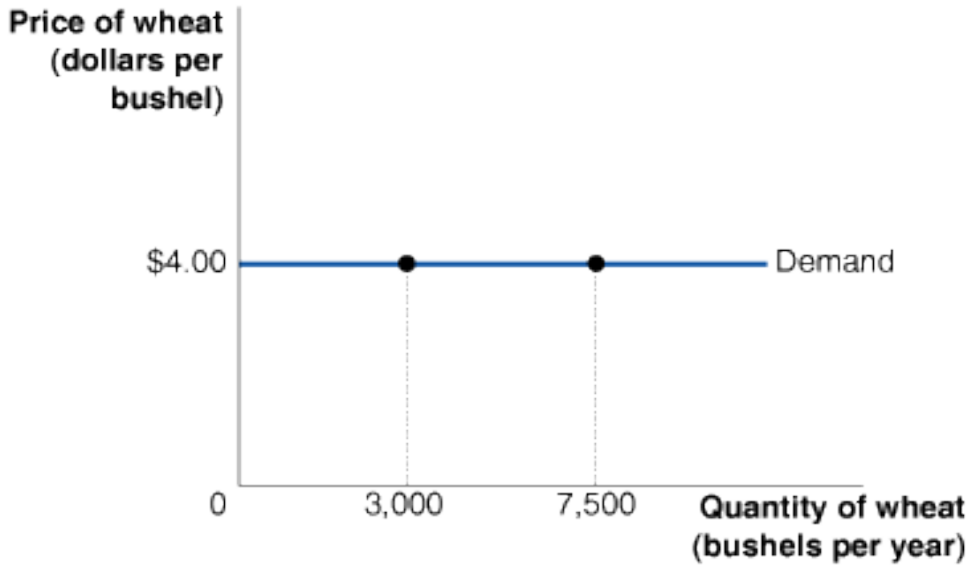
A Firm Experiencing a Loss

Not only can this firm not make a profit, price is always *lower* than average total cost, so it *must* make a loss.

The firm is still profit maximizing at MC=MR!



Refer to the figure below. What is this graph trying to explain?



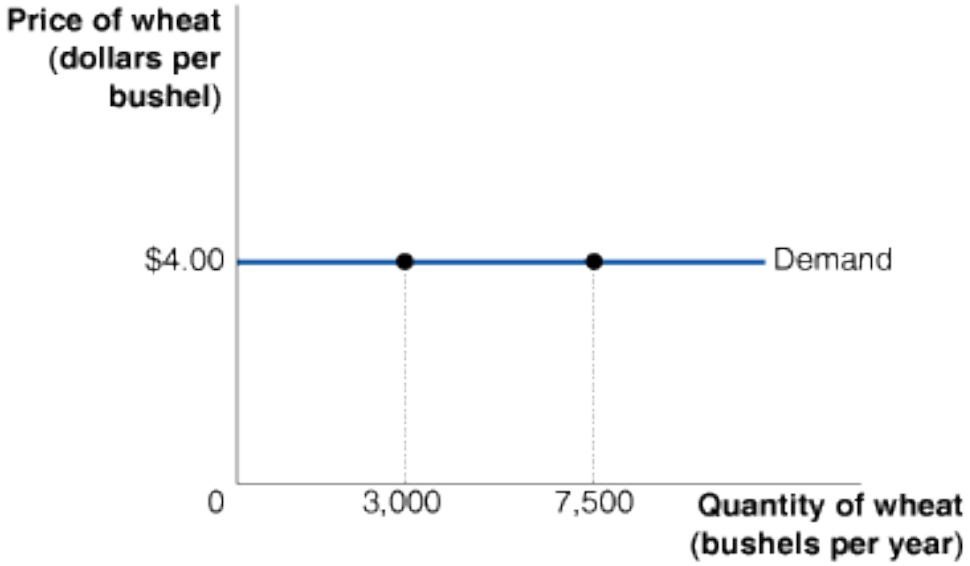
a. The decision of a producer to charge $4.00 for 3,000 bushels or for 7,500 bushels.

b. Uncertainty about producing 3,000 or 7,500 bushels given the market price of $4.00.

c. How market demand and the firm's demand curve are one and the same in a perfectly competitive market.

d. The ability of the perfectly competitive firm to sell any amount of output as long as it accepts the market price of $4.00.

Refer to the figure below. What is this graph trying to explain?



d. The ability of the perfectly competitive firm to sell any amount of output as long as it accepts the market price of $4.00.

Fill in the table for a price taking firm in a competitive market. How does the marginal revenue of the 5th good sold compare to the price?

Quantity	**Price** ($)	**Total revenue** ($)	**Average revenue** ($)	**Marginal revenue** ($)
1	95			
2				
3				
4				
5				

Fill in the table for a price taking firm in a competitive market. How does the marginal revenue of the 5th good sold compare to the price?

Quantity	Price ($)	Total revenue ($)	Average revenue ($)	Marginal revenue ($)
1	95	95	95	95
2	95	190	95	95
3	95	285	95	95
4	95	380	95	95
5	95	475	95	95

They are equal at every level of output in a perfectly competitive market.

Find the profit maximizing quantity below

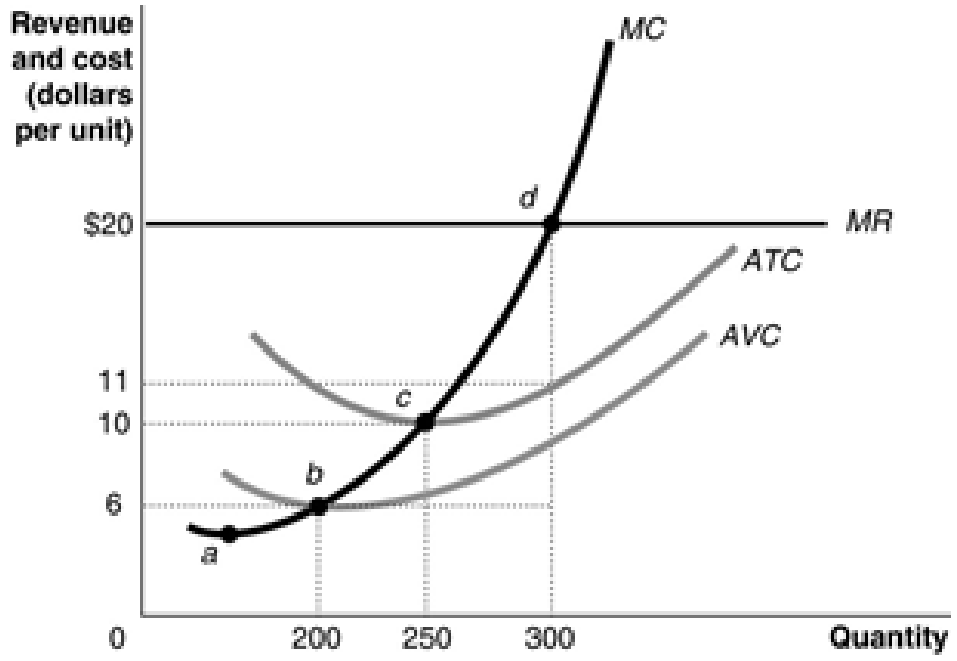
Quantity of plantains (bunches)	**Total revenue** (CFA Francs)	**Total cost** (CFA Francs)	**Profit** (CFA Francs)	**Marginal revenue** (CFA Francs)	**Marginal cost** (CFA Francs)	**Marginal profit** (CFA Francs)
0	0	700		-	-	-
1	800	1,200		800	500	
2	1,600	1,800		800	600	
3	2,400	2,600		800	800	
4	3,200	3,600		800	1,000	
5	4,000	4,800	-	800	1,200	

Find the profit maximizing quantity below

Quantity of plantains (bunches)	**Total revenue** (CFA Francs)	**Total cost** (CFA Francs)	**Profit** (CFA Francs)	**Marginal revenue** (CFA Francs)	**Marginal cost** (CFA Francs)	**Marginal profit** (CFA Francs)
0	0	700	-700	-	-	-
1	800	1,200	-400	800	500	300
2	1,600	1,800	-200	800	600	200
3	**2,400**	**2,600**	**-200**	**800**	**800**	**0**
4	3,200	3,600	-400	800	1,000	-200
5	4,000	4,800	-800	800	1,200	-400

- Even though profit is maximized, it is negative.
  - (But still better than zero output- why?)
- If P < ATC, then profits will be negative.
- Why not choose Q=2?

Calculate firm profits when firm costs and marginal revenue are as shown.



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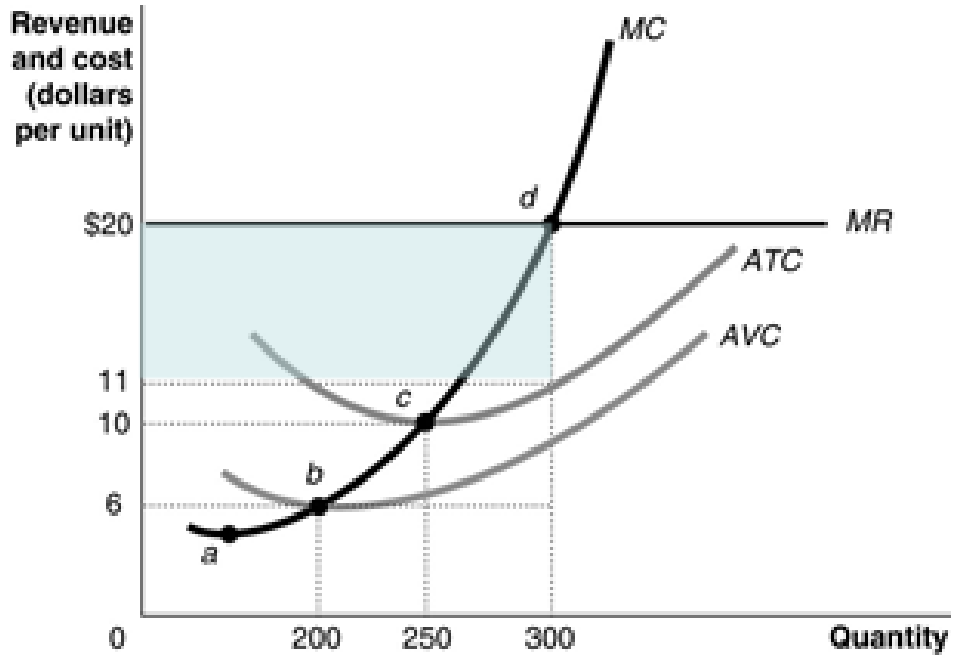

Profit = (P-ATC)*q = ($20-$11)*300=$2700