

# Economics 101 – Section 5

Lecture #16 – March 11, 2004

Chapter 7  
How firms make decisions  
- profit maximization

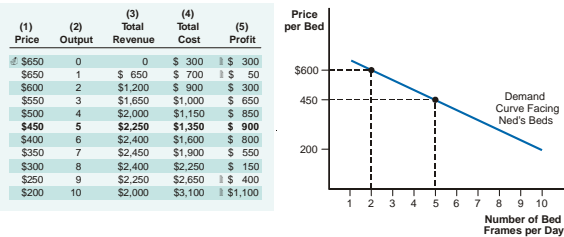
## Lecture overview

- Recap of profit maximization from last day
  - The firms constraints
  - Profit maximizing level of output
  - Marginal decision making
  - Graphical Analysis
- What happens when you are losing \$ - should you shut the firm down or not?
  - When to shut down and when not to
- Goals of the firm versus those of the workers
  - Principal-Agent problem

## Profit Maximization

- The demand curve facing the firm shows us the maximum price the firm can charge to sell any given amount of output.

Figure 1 The Demand Curve Facing the Firm



## Profit Maximization

- Total revenue
  - - is the total inflow of receipts from selling a given amount of output
  - This is computed as the quantity sold multiplied by the accompanying price on the demand curve

## Profit Maximization

- The cost constraint
  - For each level of production the firm must determine the cheapest method to produce that quantity – i.e. determine the least cost method
  - At any level of output the firm may produce at it must incur the cost associated with “least cost method”
  - This is largely determined by the firms production technology
    - How many inputs are used to produce any given level of output

## The profit-maximizing level of output

- We can use 2 methods to determine what is the profit maximizing level of output
  - 1) the total revenue and total cost approach
  - 2) The marginal revenue and marginal cost approach
- Both methods will give exactly the same result

## The profit-maximizing level of output

(1) Price	(2) Output	(3) Total Revenue	(4) Total Cost	(5) Profit
\$650	0	0	\$ 300	\$ 300
\$650	1	\$ 650	\$ 700	\$ 50
\$600	2	\$1,200	\$ 900	\$ 300
\$550	3	\$1,650	\$1,000	\$ 650
\$500	4	\$2,000	\$1,150	\$ 850
<b>\$450</b>	<b>5</b>	<b>\$2,250</b>	<b>\$1,350</b>	<b>\$ 900</b>
\$400	6	\$2,400	\$1,600	\$ 800
\$350	7	\$2,450	\$1,900	\$ 550
\$300	8	\$2,400	\$2,250	\$ 150
\$250	9	\$2,250	\$2,650	\$ 400
\$200	10	\$2,000	\$3,100	\$1,100

## The profit-maximizing level of output

- The marginal revenue and marginal cost approach
  - This method may seem less intuitive but gives much more insight into the firms and managers decision making process
  - In other economics courses this is the primary method used since it is much more insightful in understanding behavior

## The profit-maximizing level of output

- Marginal revenue (MR)
  - Is the change in total revenue (TR) from producing on more unit of output (Q).

$$MR = \frac{\Delta TR}{\Delta Q}$$

## The profit-maximizing level of output

- Recall the definition of marginal cost from previous lectures
- Marginal cost
  - Is the increase in total cost from producing one more unit of output

$$MC = \frac{\Delta TC}{\Delta Q}$$

Output	Total Revenue	Marginal Revenue	Total Cost	Marginal Cost	Profit
0	0		\$ 300		-\$ 300
1	\$ 650	\$650	\$ 700	\$400	-\$ 50
2	\$1,200	\$450	\$ 900	\$300	\$ 300
3	\$1,600	\$350	\$1,000	\$150	\$ 650
4	\$2,000	\$250	\$1,150	\$300	\$ 850
5	<b>\$2,250</b>	\$150	<b>\$1,360</b>	\$250	<b>\$ 900</b>
6	\$2,400	\$ 50	\$1,600	\$300	\$ 800
7	\$2,450	-\$ 50	\$1,900	\$350	\$ 550
8	\$2,400	-\$150	\$2,250	\$400	\$ 150
9	\$2,250	-\$250	\$2,650	\$450	-\$ 400
10	\$2,000		\$3,100		-\$1,100

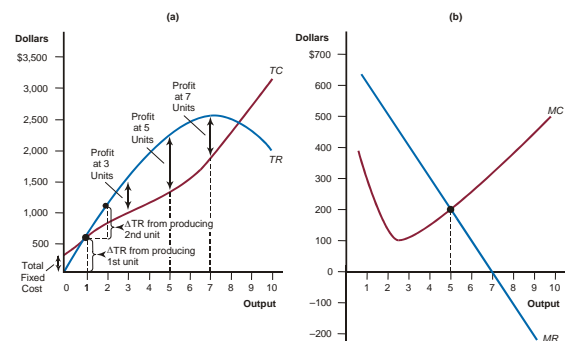
## The profit-maximizing level of output

- When a firm faces a downward sloping demand curve there will be two forces acting on revenue
  - 1) revenue gain – from selling additional output at the new price
  - 2) revenue loss – from selling all the previous units out output at a lower price
    - Example – going from 2 to 5 bed frames – selling 3 more frames but the instead of getting \$600 for the first two, you now only get \$450

## The profit-maximizing level of output

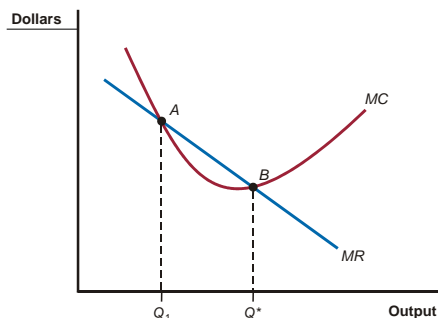
- Using MC and MR to maximize profits
  - An increase in output will always raise profits as long as  $MR > MC$
  - An increase in output will always decrease profit when  $MR < MC$
  - Following from above, profit will be maximized where MR is as close to MC as possible

Figure 2 Profit Maximization



## New Material

- Profit maximizing using marginal cost and marginal revenue revisited
  - The profit maximizing level of output is always found where MC intersects MR from below

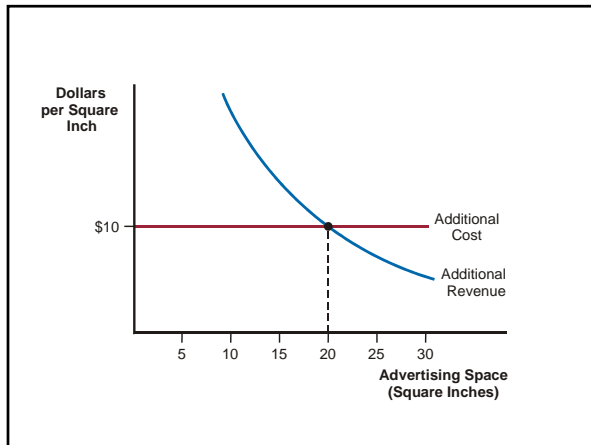


## Profit Maximization

- Why is our marginal approach to maximizing profit reasonable?
- This idea of having marginal cost and marginal revenue as close as possible to marginal cost means the amount of money coming in (MR) for each additional unit of output is just equal to the amount of money going out (MC) to pay for the additional output

## Profit Maximization

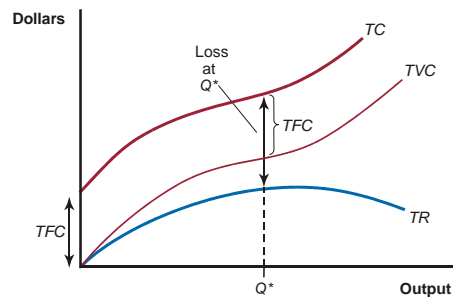
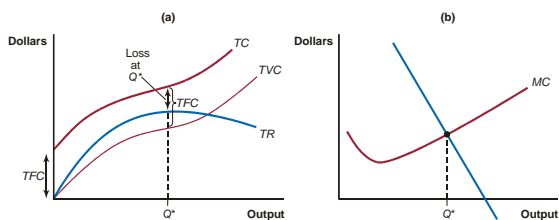
- The text refers to this as the “marginal approach to profit”
- This notion can be applied to other ideas as well
  - Example with advertising



## When to shut down

- What happens if you are losing money in the short run?
  - Should you always shut down?
    - Answer depends on how much you are losing.
- The shut down rule in the short run (SR) is to stop production if it cannot cover its variable costs
  - If it can cover all its variable costs but not all the fixed costs, then it should still keep producing in the SR

Figure 5 Loss Minimization



## When to shut down in the SR

- If we are already at the output level where  $Q^*$  is the point where  $MR=MC$  then:
  - If  $TR > TVC$  at  $Q^*$ , the firm should keep producing
  - If  $TR < TVC$  at  $Q^*$ , then the firm should shut down
  - If  $TR = TVC$  at  $Q^*$ , then the firm does not care if it shuts down or not

## What happens in the LR?

- In the LR all inputs are variable so the firm would shut down or exit the industry if there is any loss at all
  - No matter how small the loss is, in the LR the firm should exit

## The principal-agent problem

- Do the firms manager(s) and the workers have the same objectives?
  - Usually not!
  - Firms want to make profits and earn \$ for the shareholders
  - Workers usually want to maximize their benefit from working (i.e. their wage less the time and effort required to get that wage)

## The principal-agent problem

- The difference between the firm managers goals and those of the workers or employees creates what is called a **principal-agent problem**