

Economics 101 – Section 5

Lecture #15 – March 4, 2004

Chapter 7
How firms make decisions
- profit maximization

Overview

- Exam next class – March 9th 11-12:10
- Assignment #6 due today
 - Hand in after class
 - (by Midnight in folder on wall outside my office)
- Extra study session
 - – 8-10PM Thursday
 - 2432 food science
- Today start on problem of the firm
 - Profit maximization

Profit maximization – overview

- What is profit maximization
 - Accounting vs. economic profit
- The firms constraints
- Profit maximizing level of output
- Role of marginal decision making
- Dealing with loss – short-run and long-run actions

Profit maximization

- Question – What is the firms objective?
 - Usually want to make as much profit as possible
- Interpret the firm as a single economic decision maker whose goal is to maximize the owners profit
- What is profit? – Two definitions
 - Accounting profit
 - =Total Revenue – Accounting costs

Profit maximization

- Economic profit
 - = Total Revenue – All costs of production
 - = Total revenue – (explicit costs + implicit costs)
- What is the difference between these two?

Profit maximization

- Accounting profit

Total Revenue from Selling T-shirts		\$300,000
Cost of raw materials	\$ 80,000	
Wages and salaries	150,000	
Electricity and phone	20,000	
Advertising cost	40,000	
Total Explicit Cost		290,000
Accounting Profit		\$ 10,000

Profit maximization

□ Economic Profit

Total Revenue from Selling T-shirts		\$300,000
Cost of raw materials	\$ 80,000	
Wages and salaries	150,000	
Electricity and phone	20,000	
Advertising cost	40,000	
Total Explicit Costs	\$290,000	
Investment income foregone	\$ 6,000	
Rent foregone	4,000	
Salary foregone	40,000	
Total Implicit Costs	\$ 50,000	
Total Costs		\$340,000
Economic Profit		-\$ 40,000

Profit Maximization

- In this class we will be using the concept of economic profit
- The proper measure of profit for understanding and predicting the behavior of firms is economic profit.
- Unlike accounting profit, economic profit recognizes all the opportunity costs of production – both explicit and implicit

Profit Maximization

- A note on firms
 - Firms need not refer to only those organizations which sell goods and services
 - We could also include non-profit organizations as well (UNICEF, NRA, etc.)
 - We would just need to use a broader definition of total revenue to accomplish this
 - i.e. putting value on helping people, improving living conditions, etc.
 - The principles we use here could be applied to pretty much any organization

Profit Maximization

- The firms constraints
 - Recall with the LRATC discussion from last day the graph gave us the lowest average cost possible to produce a given level of output
 - However, the PRATC curve could not tell us anything about how much should be produced
 - How much the firm should produce is going to depend on what will maximize their profit levels, the firm will face constraints which will limit the amount they would like to produce

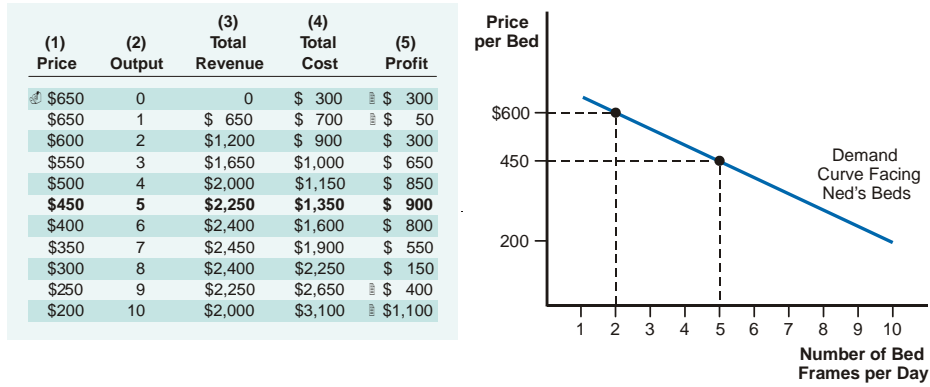
Profit Maximization

- One constraint is the demand curve facing the firm
 - This is the demand curve for the product produced by the firm
 - This demand curve is built upon the consumer theory – do not confuse the demand with supply here
 - The demand curve facing the firm tells use, for different prices, the quantity of output that customers will choose to purchase from that firm.

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

Profit Maximization

- In summation:
 - Firms face constraints that limit its ability to earn profit
 - The demand curve constrains how much can be changed for a certain level of output
 - The cost of production is constrained by the firms technology which is used to determine the firms “least cost method” of production

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

- The total revenue and total cost approach
 - This method is the easiest to understand
 - Under this approach the firm calculates:
 - Profit = $TR - TC$ for each level of output
 - The firm then selects the level of output with the highest amount of profit
 - This is what is done in the last column of fig#1

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
\$450	5	\$2,250	\$1,350	\$ 900
\$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

- Note: Notice that maximizing profit is not the same as maximizing revenue

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	\$550	\$ 900	\$200	\$ 300
3	\$1,650	\$450	\$1,000	\$100	\$ 650
4	\$2,000	\$350	\$1,150	\$150	\$ 850
5	\$2,250	\$250	\$1,350	\$200	\$ 900
6	\$2,400	\$150	\$1,600	\$250	\$ 800
7	\$2,450	\$ 50	\$1,900	\$300	\$ 550
8	\$2,400	-\$ 50	\$2,250	\$350	\$ 150
9	\$2,250	-\$150	\$2,650	\$400	-\$ 400
10	\$2,000	-\$250	\$3,100	\$450	-\$1,100

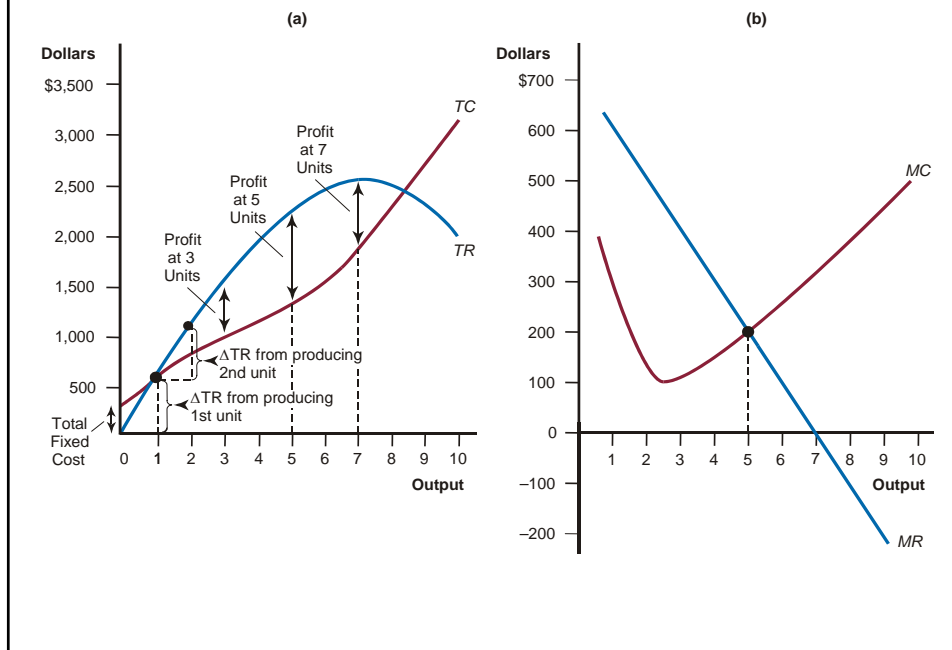
The profit-maximizing level of output

- 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



How to find the profit maximizing level using graphs

- Using the TR and TC approach
 - To maximize profit the firm should produce the quantity of output where the vertical distance between the TR and TC curves is greatest and the TR curve lies above the TC curve
- Using the MR and MC approach
 - The firm should produce at a level closest to where $MR=MC$