

Ch. 8

Costs and the Supply of Goods

Organization of the business firm

What do firms do?

1. they purchase productive resources from households and other firms
2. then they transform those resources into different commodities
3. and finally they sell those commodities or services back to consumers

Incentives, Cooperation, and the nature of the firm

The owners of the firm are the residual claimants – they receive what is left of the profits (the residual) after all the contractual costs have been paid

In a market economy (like the U.S.), property rights play an important role in to producers of goods. Because those producers are the residual claimants of the profit, those producers have strong incentives to keep cost as low as they can. (After all, if the costs are lower then the producer can keep more profit.)

Some problems that occur in businesses

Shirking – Have you ever been at work and felt like the other employees have not been doing as much as they can? When people do not perform up to their abilities it is called shirking. Shirking lowers the amount of output that could be produced. (The highest level of output that could be produced can only be produced when everyone is working to the best of their ability. If anyone does not work to the best of their ability, then output is not being produced at its highest level. It's like the production possibilities curve (remember that?) where resources are being used inefficiently. Only the resources here are people's labor.)

Principal-agent problem – This problem arises because the buyer of goods (the buyer) does not have full information about the circumstances that the seller (the agent) faces. As an example, if you were to go buy a car, you can do research on the type of car you are looking to buy, you can do research on

the dealer you are looking to buy from (is this dealer honest?), you can even test drive that car. But do you know everything about the car? You probably don't know if it can handle doing 90 miles per hour on I-10 and I-95 as you head for Daytona Beach. The engine could blow on you. However, the dealer may know of the past problems of this car once you drive over 55 miles per hour and "neglect" to tell you.

The three types of firms (these are just definitions)

1. Proprietorship – a business firm owned by an individual who possesses the ownership rights to the firm's profits and is personally liable for the firm's debts. My dad owns his own business. He can keep all of the profits but he must pay all of the debts.
2. Partnership – a business firm owned by two or more individuals who possess the ownership rights to a firm's profits and are personally liable for the firm's debts. The same story as proprietorship only now my dad and my mom own the business.
3. Corporation – a business firm owned by shareholders who possess ownership rights to the profits but are not personally responsible for the debts of the firm. The key difference is that the shareholders are not personally responsible for the debts of the firm, meaning that if Philip-Morris owes 8 billion dollars, the creditors cannot come to your home and seize your personal assets if you own stock in Philip-Morris.

Economic and Accounting Profits

There is a difference between economic and accounting profits. An accounting profit is the profit most people usually think of when they think of profit. It is Total Revenue (sales in most cases) minus costs (explicit). These are the profits listed on company reports, etc. Economic profits also take into account some implicit costs. Implicit costs are usually defined as opportunity costs which we all know and love as the value of the next best alternative foregone. Thus, economic profits are considered to be the total revenue (still usually sales) minus both the explicit (how much the product cost that was bought from the supplier, the electric bill, wages, etc.) and implicit (opportunity) costs. Let's use the example from the book.

Terry is the owner of the local grocery store. Terry works full-time as the manager, chief cashier, and janitor. Terry's total sales were \$85,000 last year. His explicit costs were \$50,000. His accounting profit was $\$85,000 - \$50,000 = \$35,000$. However, there are three implicit costs that the economic profit takes into account. The first is the interest that Terry could earn if he did not have money tied up in the equipment in the store, which amounts to \$3,000 in foregone interest. The second is the money he could make from renting his storefront out each month for \$500. This second opportunity cost amounts to \$6000. Finally, if Terry did not work full at his own grocery store he could work as manager of the local Publix which would pay him \$28,000 a year. Now, what is Terry's economic profit? It is his total revenue (\$85,000) minus his total costs (both explicit and implicit costs). His explicit costs are \$50,000 and his implicit costs for the year are \$37,000 (\$3000 in interest plus \$6000 in rent money plus \$28,000 from his next best job, which is managing Publix). His economic profit then is $\$85,000 - \$50,000 - \$37,000 = -\$2,000$. Thus Terry is making an accounting profit, but is not making an economic profit.

Short run and long run

We discussed the short run and the long run a little bit at the beginning of the semester. It is essentially the same for a firm as it was for consumers. Remember that consumers could not vary their demand as much in the short run as they could in the long run because they did not have enough time to research other options. In the long run consumers could vary their demand because they had the necessary time to seek out alternatives. The same logic applies to the production side of the long run and the short run. The producers must use some of their inputs in the short run because they do not have enough time to change them or perhaps they have a contract that runs for another six months and they cannot alter the contract. These are called fixed inputs. Whatever the reason, firms have some fixed inputs in the short run (we usually call this the plant size – it is not easy to go from one production plant to another one overnight). In the long run, however, all inputs to the production process can be changed.

The cost curves

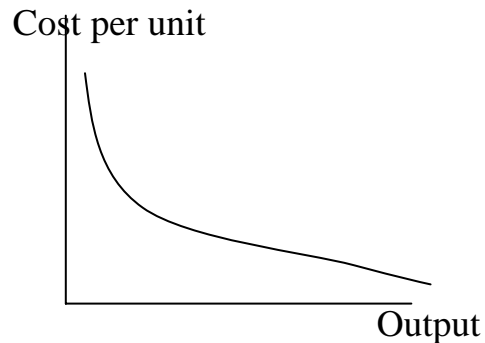
First I will define the curves and then I will show graphs. Don't get lost on these.

Term	Symbol	Equation	Definition
Fixed Cost	FC		Cost that is independent of the output level
Variable cost	VC		Cost that varies with the output level
Total fixed cost	TFC		Cost of the fixed inputs
Total variable cost	TVC		Cost of the variable inputs
Total cost	TC	$TC = TFC + TVC$	Cost of all inputs
Marginal cost	MC	$MC = \Delta TC \div \Delta Q$	The change in total cost required to produce one more unit of output
Average fixed cost	AFC	$AFC = TFC \div Q$	TFC divided by the number of units produced
Average variable cost	AVC	$AVC = TVC \div Q$	TVC divided by the number of units produced
Average total cost	ATC	$ATC = AFC + AVC$	AFC plus AVC

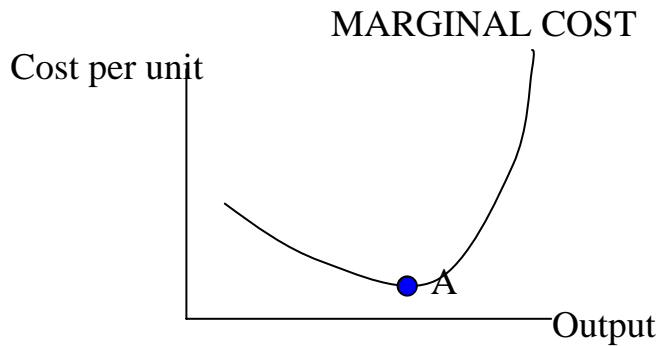
These definitions are intuitive for the most part. There are two types of costs, fixed and variable. The total cost is just these two costs added together. Average costs are average costs per unit produced. So if you produce 10 baseball bats and your TFC is \$100 then your AFC is \$10 per baseball bat. Likewise, if your TVC is \$200 then your AVC is \$20 per baseball bat. Your ATC then is just \$30. More on this later.

Now for some graphs. Most of the graphs that you will deal with should look like this (at least for the second test). I will show each graph and then give a brief explanation of why it is shaped like this.

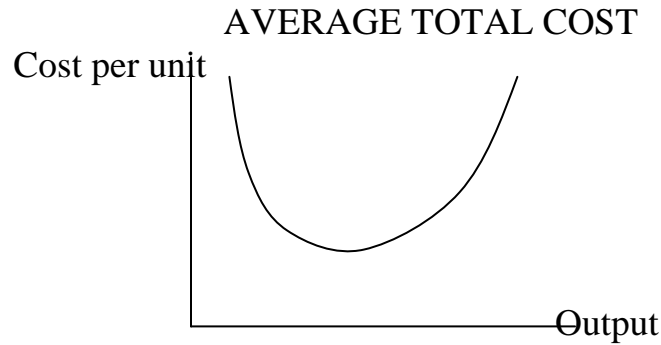
AVERAGE FIXED COST



Think about average fixed cost (AFC) this way. You sign a lease for one year. It is for \$1000 a month. The more roommates that you add the less you have to pay each month. The landlord cannot charge you any more for rent because you signed the lease. The cost is fixed at \$1000 per month. If 2 people live there it is \$500 per person. If 10 people live there it is \$100 per person. If 100 people live there it is \$10 per person. You get the picture? The more people you add, the less the AFC per person is. The same occurs with a firm that produces output. The more output they produce the lower their AFC will be.



At some point in time, the marginal cost of producing another output begins to increase. On this graph it is point A. If we produce another unit of output our marginal cost begins to increase.



The ATC curve will be U-shaped. At the beginning of the curve, ATC is high because of high AFC (look back at the graph of AFC). As more output is produced the ATC falls until it hits some minimum point. Then it begins to rise. Why? Is it because of AFC? No. AFC is always going down as long as output is increasing. It is beginning to turn upward because of higher MC (look back at the marginal cost graph).

Law of Diminishing Returns

The law of diminishing returns represents the fact that at some point in time you will begin to increase output at a decreasing rate. This means that you can add variable inputs to the production process but that these inputs increase output at smaller and smaller amounts. Since they increase output at smaller and smaller amounts their impact on total output is diminishing. Use the example in the book again. If you are a farmer and you have one acre of land that you plant wheat on you want to make sure that the wheat is going to grow. So you use fertilizer on the wheat. Fertilizer is a variable input, the land you grow the wheat on and the number of wheat seeds is fixed. As you apply more and more fertilizer to the land and the seeds the fertilizer has less of an impact. Think about what would happen if you dumped 100 pounds of fertilizer on a single plant. Would all of that fertilizer effect the plant? No, just some of it would. At some point in time the fertilizer is going to begin to have a diminishing effect on the growth of the plant (you could probably argue that at some point you would kill the plant). Again the best way to show this is with a table.

LAW OF DIMINISHING RETURNS

The first two columns are given results. We find Marginal Product by seeing how much total product has increased by an increase in one unit of the variable input. We find average product by dividing the total product by the number of variable units used.

Units of variable input	Total Product	Marginal Product	Average Product
0	0	Not applicable	Not applicable
1	8	8	8.0
2	20	12	10.0
3	34	14	11.3
4	46	12	11.5
5	56	10	11.2
6	64	8	10.7
7	70	6	10.0
8	74	4	9.3
9	75	1	8.3
10	73	-2	7.3

Diminishing returns has set in with the 3rd unit of labor. The marginal product of the 3rd unit of labor is 14 whereas the marginal product of the 4th unit of labor is 12. Output has gone up from 34 (3rd unit of labor) to 46 (4th unit of labor) but now it is increasing at a decreasing rate.

Diminishing returns and cost curves

Once a firm is faced with diminishing returns, larger and larger additional units of the variable input are required to expand output by one unit. This causes MC to rise. As MC rises, it will eventually exceed ATC. When MC is greater than ATC, the additional units cost more than the average, and ATC must increase.

Output and costs in the long-run

The short-run effects refer to a time period in which some input into the production process is fixed. In the long-run, all inputs can be changed. Generally, plant size is considered to be fixed in the long run. What is the significance of the long-run? When posed with a problem in the long-run, firms decide how much output they are willing to produce. They use predictions and forecasts to make these decisions. They will choose fixed input levels that minimize the specific quantity of product that they will produce. As a reminder, once these fixed input levels are chosen the firms will remain on the short-run ATC curve until they can change their fixed input levels. So if their predictions are not correct, they may be operating at a point that is not the most efficient for the output level they are producing.

Economies and diseconomies of scale

Do larger firms have lower unit costs than comparable smaller firms? Economic theory suggests that they do. This principle is called economies of scale. Note that economies of scale is present whenever the long-run ATC (LRATC) is falling. A direct opposite of economies of scale is diseconomies of scale. Diseconomies of scale occur when LRATC is increasing. A third principle is constant returns to scale. Constant returns to scale occurs when LRATC is a straight line. The important points to remember from this section are:

1. larger firms are more efficient when economies of scale are present
2. all size firms are efficient constant returns to scale is present
3. smaller firms are more efficient when diseconomies of scale are present

Why do cost curves shift?

1. the price of resources change
 - a. if the price of resources increases the cost curves will shift upward
 - b. if the price of resources decreases the cost curves will shift downward
2. taxes (we all know that taxes are bad and would cause the curves to shift upward)
 - a. if the tax were a one-time annual tax, it would become part of fixed cost and shift the ATC curve and AFC curve upward, but it would not affect the AVC
 - b. if the tax were levied on each individual unit of good sold, it would shift the AVC and the ATC upward, but would not affect the AFC

3. regulations
 - a. the same story for taxes applies to regulations; sometimes AFC increases, sometimes AVC increases but ATC always increases
- 4 technology
 - a. technological improvements shift the cost curves down; the better the technology the more cheaply firms can produce goods

Sunk costs

Sunk costs are costs that have already been incurred because of past decisions. When past decisions cannot be reversed, these costs become irrelevant to the current decision at hand.

Story: A girlfriend of mine bought me about \$400 worth of clothes for Christmas. I then left for Connecticut. While I was gone she decided she did not like me anymore. The \$400 that she spent on me played no role in her decision to dump me. She realized that it was a sunk cost that could not be recovered (unless she came over to my house and stole the clothes back).

Story: I left to go home for a couple of days at the beginning of spring break. I chose to take I-10 east. I left at 1 in the afternoon. If any of you chose to take that route at that time, you know that I spent about an hour in traffic due to construction. Because there were no exits to leave the highway at any point during the traffic jam, and because I could not cross the median with my car, the time spent in the traffic jam was a sunk cost. It was a cost that I incurred based on my decision to take I-10 at 1 in the afternoon on the Friday at the beginning of spring break. Since I could not reverse this decision (I could not turn around and take highway 90 for example), the only thing that I could do was suck it up and take the loss of an hour of my time.