

Lecture 5: Costs and Producing

1. Types of business organizations
 - sole proprietorship: one owner runs everything
 - partnership: multiple owners
 - corporation: shareowners own the business; shares can be bought and sold; shareholders hire a CEO (chief executive officer) to run the corporation
2. Role of profit: we'll assume the objective of any business is to maximize their profits (revenues - costs). So they'll put resources, and make products and services, where they can make the most profit. High profits are a signal that buyers want more of the product or service ("invisible hand" at work), and businesses will be motivated to respond.
3. To start a business, and specifically to get loans from a bank, need a "business plan" which shows what you will produce, who will buy it, how you will produce it, and what your revenues, costs, and profits will look like over several years. A *production function* shows the "inputs", like labor, material, land, that is used to produce the "output".
4. We'll use the restaurants operated by my friend "Mr. Pizza" to illustrate cost concepts. Three general categories of costs.
 - a. *Fixed Costs*: Costs unrelated to how much output (# pizzas) is produced. Often called "overhead" by business people. Examples: rent or mortgage on building, property taxes, electricity (if varies little with output), insurance, and management salaries.

In the *short-run*, when Mr. Pizza has a certain number of stores of a certain square footage, fixed costs are the same if 1 pizza is sold per month or if 1000 are sold.
 - b. *Variable Costs*: Costs which directly increase with increases in output. Examples: food ingredients, pizza boxes, labor of hourly workers.
 - c. *Total Costs*: sum of fixed costs and variable costs
5. Interesting Implication ("when to fold"): Let's say Mr. Pizza is losing money (his revenues from selling pizzas aren't covering his total costs). Will he automatically close his stores?

Answer: He'll only close if revenues are less than variable costs. Why: Because if revenues exceed variable costs, he makes enough to cover variable costs and has some money left over to pay part of fixed costs, which he's committed to paying anyway.

Example: Monthly \$

Fixed costs:	\$10,000
Variable costs:	\$20,000
Total costs:	\$30,000
Revenue:	\$26,000

Mr. Pizza is losing money - that is, profits are negative (revenue of \$26,000 minus total costs of \$30,000 equals profits of -\$4000). If he closes his stores, he still owes \$10,000 per month, until his fixed cost contracts expire. If he continues operating, he pays all variable costs and has \$6000 to apply to fixed costs, so his monthly loss is \$4000. If he closes his stores, Mr. Pizza's monthly loss is \$10,000. It's better to lose \$4000 than to lose \$10,000. When Mr. Pizza's fixed cost contracts are up, he'll close the stores

6. Marginal cost: Marginal cost is the key concept business people use in deciding how much output to produce and sell. Marginal cost is simply the additional cost of producing one more unit of output (in Mr. Pizza's case, the additional cost of producing one more pizza).

The idea is simple. If the price Mr. Pizza receives from selling one more pizza exceeds that pizza's marginal cost, then he'll make a profit on that pizza (profit here would equal the price minus the marginal cost). So he'll produce that pizza.

But, you might ask, won't marginal cost be the same for all units of output (for all Pizzas)? No - marginal cost will initially decline as more units (more pizzas) are produced, then at higher levels of output marginal cost will increase.

Why does marginal cost initially decline as more units (pizzas) are produced? Mr. Pizza is able to use his workers more efficiently (as more pizzas are produced, workers can specialize and get better at one task), and Mr. Pizza is able to buy ingredients in bulk at a cheaper cost per unit.

Then why does marginal cost eventually increase as more units (pizzas) are produced? There are two reasons. First, some variable inputs can become more expensive. For example, as Mr. Pizza tries to hire more hourly labor, he may have to bid people away from other jobs by offering higher wages. Second, his fixed inputs - particularly his space and equipment - begin to affect his efficiency. With more use, his ovens need more frequent repair and maintenance. Also, extra workers begin to get in each other's way as more are hired to make more pizzas.

Or, another example, gift wrapping at a department store. Major variable expense is labor time to wrap the gift. Say it takes an average of 10 minutes to wrap a gift during non-holiday periods. However, around holidays, more customers want gifts wrapped. The store hires more labor, brings in more wrapping paper, but still only has one counter

area for wrapping and one cash register. With more workers and more gifts to wrap, workers wait longer to cut paper, and it takes them longer to wrap since they don't have as much counter space. Also, workers must wait to use the cash register. All this increases the average time to wrap a gift to, say, 20 minutes. So if the workers are paid by their time, notice the cost per wrapped gift has doubled.

7. So, Mr. Pizza's monthly costs might look like the following:

<u># pizzas produced</u>	<u>Fixed cost</u>	<u>Variable cost</u>	<u>Total cost</u>	<u>Marginal cost</u>
500	\$10,000	\$5000	\$15,000	
1000	\$10,000	\$7500	\$17,500	$\frac{\$17,500 - \$15,000}{1000 - 500} = \$5$
1500	\$10,000	\$9000	\$19,000	$\frac{\$19,000 - \$17,500}{1500 - 1000} = \$3$
2000	\$10,000	\$12,000	\$22,000	$\frac{\$22,000 - \$19,000}{2000 - 1500} = \$6$
2500	\$10,000	\$20,000	\$30,000	$\frac{\$30,000 - \$22,000}{2500 - 2000} = \$16$

If the "market price" for pizzas is \$12, then Mr. Pizza would stop at producing and selling 2000 pizzas. He would not produce and sell the next 500 (to 2500) because their marginal cost (\$16) is greater than the price (\$12). It doesn't make sense to make something that costs you \$16 and then sell it for \$12.

But, note, the higher the price, the more pizzas are produced - another illustration of the "supply curve".

You can "check" this by calculating the profits at each alternative production level

<u># pizzas produced</u>	<u>Revenue@ \$12 per pizza</u>	<u>Total cost</u>	<u>Profit</u>
500	500 x \$12 = \$6000	\$15,000	-\$9000
1000	1000 x \$12 = \$12,000	\$17,500	-\$5500
1500	1500 x \$12 = \$18,000	\$19,000	-\$1000
2000	2000 x \$12 = \$24,000	\$22,000	\$2000
2500	2500 x \$12 = \$30,000	\$30,000	\$0

What if the "market" price of pizza is \$5. Mr. Pizza certainly wouldn't produce 2500 or 2000 pizza because their marginal costs are greater than \$5. Would he produce 1500 pizzas, since \$5 is greater than the marginal cost of \$3? Actually, no. In fact, Mr. Pizza would close his stores, because he can't cover his variable costs at any level of production when the price is \$5.

8. If Mr. Pizza's marginal cost is increasing as he produces more pizzas, is there anything he can do?

Yes, he can move to the *long-run*, where he expands the number of stores and/or the size of each store. That is, he changes his fixed inputs and fixed costs.

If this lowers his marginal cost across all production levels, this is called *economies of scale*.

But if this increases his marginal cost across all production levels, this is called *diseconomies of scale*.

Is bigger always better and cheaper per unit of production? Not always. The limiting factors seem to be (1) management and coordination costs, and (2) cost of access for customers.

9. Another note on costs: Owners should not ignore their own costs. Sometimes owners don't include the value of their time as a cost of running their business. So, if instead of operating pizza restaurants, Mr. Pizza's next best job opportunity would be in some kind of sales where he earned \$50,000 annually, he should count this \$50,000 as a cost (an opportunity cost)

10. Another note on the supply curve: some products are "fixed" in supply - no more can be made. Examples: paintings of deceased painters, land at a particular site, stamps from 1940. We'll see the implications of this when we put demand and supply together.