

Microeconomics, Module 5: "Behavior of Firms"

Illustrative Test Questions

(The attached PDF file has better formatting.)

Question 5.1: Variable and Sunk Costs

After spending \$45 on a novel, you discover that you dislike it and will never read it. Your options are to keep the book or sell it for \$10 to a used book store. You should

- A. Keep the book because it cost more than \$10.
- B. Keep the book because its \$45 cost exceeds the benefit of selling it.
- C. Sell the book because its \$45 cost exceeds the benefit of selling it.
- D. Sell the book because the \$45 you spent are sunk, and the marginal revenue of \$10 exceeds the marginal cost of zero.
- E. Sell the book, even though its cost exceeds the sale price, to avoid reading it.

Answer 5.1: D

This question is trivial, but people make these mistakes continually. People view the cost of discarding something as its purchase price; the actual cost is the resale price. We cover this at length in the corporate finance course (exactly the same perspective).

Question 5.2: Sewer System

A town has spent \$20 million to build a new sewer system. An additional \$5 million is needed to complete the project, but because of budget cuts the town is considering abandoning the project. When should the town not complete the sewer system?

- A. If the benefits of completing the sewer system are less than \$5 million.
- B. If the benefits of completing the sewer system are less than \$15 million.
- C. If the benefits of completing the sewer system are less than \$25 million.
- D. The town should complete the sewer system to avoid wasting the money already spent.
- E. Should not complete the sewer system unless private investors put up the money.

Answer 5.2: A

Brealey and Myers express the concept as *only future cash flows are relevant*. Past cash flows that cannot be recouped are sunk costs and are irrelevant. This is covered in more depth in the corporate finance course.

Question 5.3: Off-Shore Oil Rig

An oil company has spent \$20 million on an off-shore oil rig, which can be completed for an additional \$6 million. A new study shows that the oil produced by the off-shore rig will bring in only \$10 million in additional revenue. The company should

- A. Complete the oil rig because the marginal cost outweighs the marginal benefit.
- B. Complete the oil rig because the marginal benefit exceeds the marginal cost.
- C. Accept the \$10 million loss and not complete the oil rig.
- D. Not complete the oil rig because the marginal benefit is smaller than the marginal cost.
- E. Not complete the oil rig because the ultimate benefit is less than the ultimate cost.

Answer 5.3: B

Question 5.4: Slope of Marginal Cost Curve

As more output is produced, a firm's marginal cost tends to

- A. Increase
- B. Decrease
- C. Remain constant
- D. Change unpredictably
- E. First increase and then decrease

Answer 5.4: A

Question: Sometimes I read that marginal costs tend to increase and sometimes I read that marginal costs tend to first decrease and then increase. What is correct?

Answer: The answer depends on how initial (start-up) costs are treated.

- If start-up costs are treated as the marginal cost for the first item, marginal costs tend to first decrease and then increase.
- If start-up costs are treated as fixed costs, marginal costs tend to increase.

We treat some start-up costs as fixed costs and some start-up costs as the marginal cost of the first item. Suppose a firm wants to write auto insurance in California. It may treat the cost of an office in California as a fixed cost but the cost of its first underwriter in California as the marginal cost of the first policy.

Question: If marginal costs tend to increase, why are most industries constant cost industries?

Answer: Marginal costs tend to increase in the short run; in the long-run, they depend on the type of industry. Suppose a firm produces automobiles. If demand is unexpectedly high and it wishes to produce more autos, it works its factory at more than capacity, pays its workers overtime wages, and suffers bottlenecks in production, all of which raise short run marginal costs. If the high demand continues, it builds another factory and hires more workers, bringing marginal cost back to the original level.

Question 5.5: Increasing Marginal Cost

If marginal cost rises *sharply* when demand increases, then probably

- A. The firm is in the short run.
- B. The firm is in the long run.
- C. The industry is competitive.
- D. The industry is monopolistic.
- E. The firm is in a cartel.

Answer 5.5: A

For an increasing cost industry, marginal cost may rise in the long-run, but the rise would be gradual; rarely do marginal costs rise sharply in the long-run.

Question 5.6: Marginal Revenue and Marginal Cost

If marginal revenue exceeds marginal cost, then

- A. The firm is earning a positive level of profit.
- B. The firm is earning a negative level of profit.
- C. The firm should shut down.
- D. The firm's profit will increase if the firm increases its output.
- E. The firm's profit will increase if the firm decreases its output.

Answer 5.6: D

Landsburg defines marginal cost and revenue as the additional cost and revenue from the last item produced and sold. If the production function is continuous, we could define it as the additional cost and revenue from the next item produced. If the next item increases revenue more than cost, the firm raises profits by producing at least one more item.

Question: Why isn't Choice A also correct? If marginal revenue is decreasing and marginal cost is increasing, and marginal revenue is still greater than marginal cost, the firm must be making a profit.

Answer: The profit includes the fixed costs, what are large for many firms. Fixed costs may be so large that even when marginal revenue equals marginal cost, the firm is still producing at a loss.

Question 5.7: Effects on Marginal Cost

Which of the following is most likely to increase a firm's marginal cost?

- A. An increase in the wage rate.
- B. The adoption of new cost-effective technology.
- C. A fall in the demand for the firm's product.
- D. An increase in the cost of an operating permit required by the local government.
- E. An increase in the fixed expense leverage ratio.

Answer 5.7: A

Choices D and E are fixed costs; they do not affect marginal costs. For Choice E, if the firm raises the fixed expense leverage ratio, it reduces the variable expense leverage ratio.

Choice B reduces marginal cost, though it may increase fixed costs.

Question: In a competitive market, firms operate at minimum average cost. (This is covered in Module 8.) If demand falls, the firms will operate at some other point, and average cost will rise; won't that increase marginal cost?

Answer: Suppose fixed costs are \$400, and the marginal cost for the Q^{th} unit is $2Q$. The total cost for Q units is $400 + Q^2$, and the average cost is $400/Q + Q$. The average cost is minimized when $-400/Q^2 + 1 = 0 \Rightarrow Q = 20$. At this point, marginal cost is $2 \times 20 = 40$.

If demand falls and the firm produces only 19, the marginal cost is $2 \times 19 = 38$ but the average cost is $400/19 + 19 = \$40.05$. (The mathematics is covered in Module 8.)

Question 5.8: Demand, Marginal Cost, and Marginal Revenue

Suppose some of a firm's competitors go out of business, causing the demand for the firm's product to increase. The firm reacts by increasing its production because

- A. Its marginal cost has increased.
- B. Its marginal cost has decreased.

- C. Its marginal revenue has increased.
- D. Its marginal revenue has decreased.
- E. The firm will not increase production.

Answer 5.8: C

Question: Why does failure of a competitor cause marginal revenue to increase? The problem says that the quantity demanded increases; it doesn't say the price increases.

Answer: The problem says that demand increases, not quantity demanded. This means that for the same quantity, consumers are willing to pay a higher price.

Question 5.9: Fixed Costs

Assuming it does not shut down, an increase in the firm's fixed costs will

- A. Force the firm to increase the price it charges for its product.
- B. Cause the firm to decrease the quantity it produces.
- C. Increase the firm's marginal cost.
- D. Be paid for out of the firm's profit.
- E. Cause more firms to enter the industry.

Answer 5.9: D

A fixed cost is paid out of profits; it does not affect the production decisions of the firm.

Question: Landsburg thinks that firms don't raise prices when their costs rise. But we see firms raising prices all the time; what does he mean?

Answer: On the contrary; when firms compete, they may operate for months or years at high losses to avoid raising prices. For example, U.S. airlines have lost billions of dollars year after year, yet many of them are still pricing below cost.

Question: Aren't those airlines losing money because of high variable costs, like high oil costs, not because of fixed costs?

Answer: The airlines losing money are those who have high costs for maintaining and servicing old aircraft. A contract obligating a firm to keep certain workers and pay them certain wages is a fixed cost.

Question 5.10: Marginal Cost Decrease

If the demand curve for a firm's product is downward sloping, a decrease in the firm's marginal cost would cause the firm to

- A. Produce more output and charge a higher price for its product.
- B. Produce more output and charge a lower price for its product.
- C. Produce less output and charge a higher price for its product.
- D. Produce less output and charge a lower price for its product.
- E. Produce less output but not change its price.

Answer 5.10: B

The firm's marginal cost curve is its supply curve. The intersection of the upward sloping supply curve with

the downward sloping demand curve is the equilibrium price and quantity. If the entire supply curve shift down, the point of intersection occurs at higher quantity and a lower price.

Question: What happens if the demand curve is not downward sloping?

Answer: The new intersection occurs at a higher quantity but the same price.

Question: What if the supply curve is not upward sloping? What if the supply curve is flat?

Answer: The new intersection occurs at a higher quantity and a lower price.

Question 5.11: Production and Pricing Decisions

Which of the following will *not* affect a firm's production and pricing decisions?

- A. An increase in the price of the directors' and officers' insurance policy required by government regulations.
- B. An increase in the price of the skilled labor it hires.
- C. An increase in the price charged by its competitors.
- D. An increase in the price of the raw materials it uses in its production.
- E. The development of a lower priced competing product.

Answer 5.11: A

Items B and D are variable costs; they are marginal costs that affect pricing decisions.

Item E: If a lower priced competing product is developed, the market price of the good will decline. The firm must lower its price or shut down.

Question: Why will the market price decline?

Answer: The competing product reduces the market demand for the product in question; the intersection of the supply and demand curves shifts to a lower quantity and a lower price.

Item C: If the price charged by competitors increases, the demand for the firm's own product increases. It raises the quantity supplied until its marginal cost rises along its supply curve and equals the new price.

Question: You say the firm raises quantity until the new supply and demand curves intersect. But doesn't this eliminate its profits? Wouldn't the firm prefer to continue producing at the lower quantity where its marginal cost is lower and still make profits?

Answer: The intersection of the supply and demand curves is the point of maximum profit, not the point of zero profit. As we will see in Module 8, the point of maximum profit is also the point of zero economic profit *in the long-run*. In the short run, the point of maximum profit may have negative, zero, or positive profits.

Question 5.12: Price and Quantity

Which of the following could cause the firm to increase both the quantity it produces and the price it charges?

- A. An increase in the price of the insurance policy required by government regulations.
- B. An increase in the price of the skilled labor it hires.
- C. An increase in the price charged by its competitors.
- D. An increase in the price of the raw materials it uses in its production.
- E. An increase in the number of its competitors.

Answer 5.12: C

We assume the demand curve is not vertical. A vertical demand curve means that consumers will pay any price for the good; this never happens.

Item A: An increase in a fixed cost causes no change in quantity or price.

Items B and D: An increase in variable costs (marginal cost) causes an increase in price and a decrease in quantity, assuming the demand curve is downward sloping.

Item E: An increase in the number of competitors decreases the quantity demanded from each firm, causing a decrease in the equilibrium quantity and a decrease in price.

Question: If firms were producing before at minimum average cost, they are now producing at a higher average cost; why should price decline?

Answer: The average cost is higher at the smaller quantity, but the marginal cost is lower.

Question: If all firms produce at a lower quantity and a lower price, they all lose money. The firms are not dumb; won't they all choose to charge the higher price that avoids losing money?

Answer: Unless firms collude, they can't agree on a common price. Collusion is difficult, and it is nearly impossible in most industries in the U.S. (It exists in certain professions, such as medicine, but not in most industries.) When firms cannot collude, each firm has an incentive to lower prices to increase market share. Cartels are unstable and break down easily. We review this subject in later modules.

Question 5.13: Shut Down

A firm shuts down (in the short run) when, for any quantity, total revenue is less than

- A. Total costs
- B. Total variable costs
- C. Average variable costs
- D. Marginal cost
- E. Fixed costs

Answer 5.13: B

Suppose fixed costs are \$10 million and variable costs are \$20 million.

- If revenue > \$30 million, the firm operates at a profit.
- If \$20 million < revenue < \$30 million, the firm operates at a loss.
- If revenue < \$20 million, the firm shuts down (in the short run).

Question: If total revenue is \$25 million, the firm's profit is \$25 million – \$10 million – \$20 million = –\$5 million; why does the firm continue to operate?

Answer: If the firm shuts down, its profit is –\$10 million (fixed costs).

Question 5.14: Costs

All but which of the following are true regarding costs?

- A. The objective of a firm is to maximize profits (in this microeconomics course).

- B. Increasing marginal costs mean that additional units are more expensive than previous ones.
- C. The marginal cost is the *slope* of the total cost curve.
- D. The marginal cost is the *slope* of the variable cost curve.
- E. All of A, B, C, and D are true.

Answer 5.14: E

Question: Do firms always work to maximize profits?

Answer: Shareholders seeks to maximize profits but managers may have other goals, such as reducing risk to avoid bankruptcy the loss of their jobs. Both the corporate finance course and a later module in this course examine the ways shareholders seeks to change the incentives to managers to make them maximize profits.

Question 5.15: Marginal Costs

All but which of the following are true regarding marginal costs?

- A. With increasing marginal costs, the slope of the total cost curve is *increasing*.
- B. At equilibrium, marginal revenue *equals* marginal cost.
- C. A firm continues to produce as long as marginal cost *exceeds* marginal revenue.
- D. *Sunk* costs are irrelevant to future decision making.
- E. All of A, B, C, and D are true.

Answer 5.15: C

Item A: The marginal cost is the slope of the total cost curve.

Item C: A firm continues to produce as long as marginal cost *is less than* marginal revenue.