Thursday, Oct 28, Lecture 15
Income and Substitution Effects, Profits and Costs

Income and Substitution Effects

The Income and Substitution Effects of a Price Change on Demand

- When the price of a good changes, consumers experience two effects.

- ***Substitution Effect:*** The good whose price has changed may now seem like a better (or worse) good to buy in comparison with other goods.

  This changes the quantity demanded.

- ***Income Effect:*** The price change may make the consumer feel richer (or poorer) than before.

  This also changes the quantity demanded.

- **Example:** You were planning to buy an ***iPhone***. But you see that the price of the iPhone has risen by 30 percent. You say to yourself:

  - ***"What a rip-off! I can get something better for the same amount money."*** That's the ***substitution effect***. You would rather spend your money on a OnePlus 9 Pro (an Android phone).

  or maybe you say

  - ***"I can't afford that."*** That's the ***income effect***. You will make-do with a less expensive device.

The Direction of the Income and Substitution Effects

- When you are ***buying*** and consuming a ***normal good*** the substitution and income effects work in the same direction.
- **Example:** You eat lots of expensive fish.
  - If the price of fish increases, you want to buy ***less fish*** and more of other food with protein (substitution effect).
  - But you also feel poorer, so you want to buy ***less fish*** for that reason as well (income effect).
  - The two effects work in the same direction.

- When you are ***buying*** and consuming an ***inferior good***, the income and substitution effects work in opposite directions.
- **Example:** ***Potatoes*** **(cheap, inferior)**
  - When the price of potatoes goes up, you want to buy ***less potatoes*** and more meat *(substitution effect)*.
  - But you also feel poorer, so now you cannot afford meat **(expensive, normal)**, and you buy ***more potatoes*** and less meat *(income effect)*.
  - In the real world, when the price of the inferior good is rising, the substitution effect is always stronger than the income effect.
  - But in rare cases, when the price of the inferior good is falling, the income effect can be stronger than the substitution effect: e.g. wheat & rice in China. Such goods are called Giffen goods.

Clicker Survey

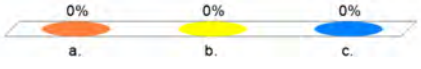
Imagine that you are working **15 hours** per week at a bookstore to help pay your BU tuition and fees. And suppose your boss raises your wage from ***$12*** to ***$24*** per hour. Would you…

a. work more hours?

b. work the same number of hours?

c. work fewer hours?

[All answers will be marked as correct.]



- When you are selling and consuming a normal good the two effects work in opposite directions.

- **Example:** Selling leisure
  - **Leisure** is a normal good—you want and can afford more leisure when you are richer.
  - ***Work*** is ***leisure time*** sold to someone else.
  - You are working* part-time in a supermarket in order to pay for fancy clothes.

    **selling your leisure time*

  - But if you were richer, you would want to keep more leisure time for yourself and work fewer hours.

- One day, the manager tells you: “My friend, you are a good worker, so I’m going to double your wage.”

[The price of leisure (taking time off) is now higher. Why?]

- You would like to consume less leisure (work more hours),…
- …because you can substitute more fancy clothes for each hour of leisure sacrificed.

Substitution Effect

- But you would also like to consume more leisure (work fewer hours),…
- …because you are richer than before and can afford to consume more leisure time yourself.

Income Effect

- When you consume a normal good that you are selling (leisure),…
- …the substitution and income effects work in opposite directions,…
- …and the income effect may be stronger than the substitution effect.

Income Taxes and Work Hours

- Do people want to work more when income-tax rates are reduced? What do you think?
  - If income-tax rates fall, your take-home pay from work rises.
  - This is effectively an increase in your wage rate.
- The substitution effect would make people want to work more (substitute goods for leisure).
- But the income effect would induce people to work less (they are richer and can afford more leisure).
- Data suggest that the two effects for male workers are of equal size, so that men work the same amount when income-tax rates increase.

Profits and Costs

Profit Maximization

- ***Revenue (R)***: Income of a firm from sales and other sources (before costs are deducted).
- ***Profit (π):*** Benefits received by a firm's owners after all costs are paid. ***Profit = Revenue – Cost***
- In most economic models, we assume that the firm's goal is to ***maximize profit***.
- In the model, firm owners are rational and self-interested.

- Most economists agree with the first great economist:

> *"It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest."* --- *Adam Smith, 1776*

- Economists tend to think that it's best if owners follow their narrow self-interest, maximize profits...
- …and let markets work,…
- …while government policy makers set the rules of the marketplace to protect social welfare.

Economic Profit vs. Accounting Profit

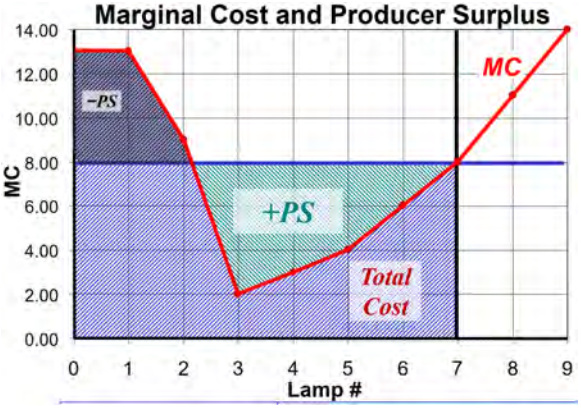
- Profit (as defined by economists):
  - ***Revenue – All Costs*** [including owners' opportunity costs of operating the firm]
- Accounting Profit:
  - ***Revenue – Explicit Costs***
    [as measured by monetary expenditures, which excludes owners' opportunity costs]
  - Accountants must use only those quantities that can be observed and verified by outsiders.
- Almost all published profit data use accounting profits. *But we use economic profits, because economic profits are more important for decision-making.*

Fixed Costs and Marginal Cost

- The ***fixed cost (FC)*** is the cost that must be paid to allow any production to take place. It does not depend on the quantity produced.
- A ***marginal cost (MC)*** is an opportunity cost of producing a particular unit.
  - ***MC*** is normally different for each unit produced.
  - **Example:** The ***MC*** of producing the 89th engine is likely to be different from the ***MC*** of producing the 226th engine.

U-Shaped Marginal Cost and Producer Surplus

- Suppose ***FC = 0*** for lamp production. If the ***MC*** curve is U-shaped, a firm may have to accept negative surplus before it can create positive surplus.



- Suppose ***P = $8***.
- How many lamps would you produce?
- What is your total cost?
- Your ***PS***?
- Your net ***PS***?
- Would you produce ***7*** or shut down?
- What if ***P = $4***?
- Would you produce **5** lamps?
- Would the ***MC*** curve determine supply (as before)?

Fixed Costs

- Fixed costs are costs that must be paid to allow any production to take place.
- They do not rise with the level of output.
- In the previous analysis, we assumed **that there were no fixed costs**.
- In what follows, we will allow for the possibility of fixed costs.

- What costs must the publisher of a printed textbook pay before they produce copy #1?
  - The book must be written,
  - graphics designed,
  - the material checked,
  - edited,
  - typeset,
  - marketed.
- These pre-production costs are an example of ***fixed costs***.
- If they are paid, the book can be printed.
- Same idea if they put it on the internet.

- Other examples of fixed costs:
  - the cost of lighting & heating in a factory
  - the cost of obtaining a liquor license for a restaurant
  - a travel agent's cost of renting offices
  - the research costs of a pharmaceutical company producing a drug
- Fixed costs can be one-time costs or repeated in each production period.
- Within a production period, fixed costs do not vary with changes in the quantity produced.

Clicker Question

For an airline, output is the number of passengers carried. Which of the following is a fixed cost of ***one airline flight from Boston to Los Angeles?***

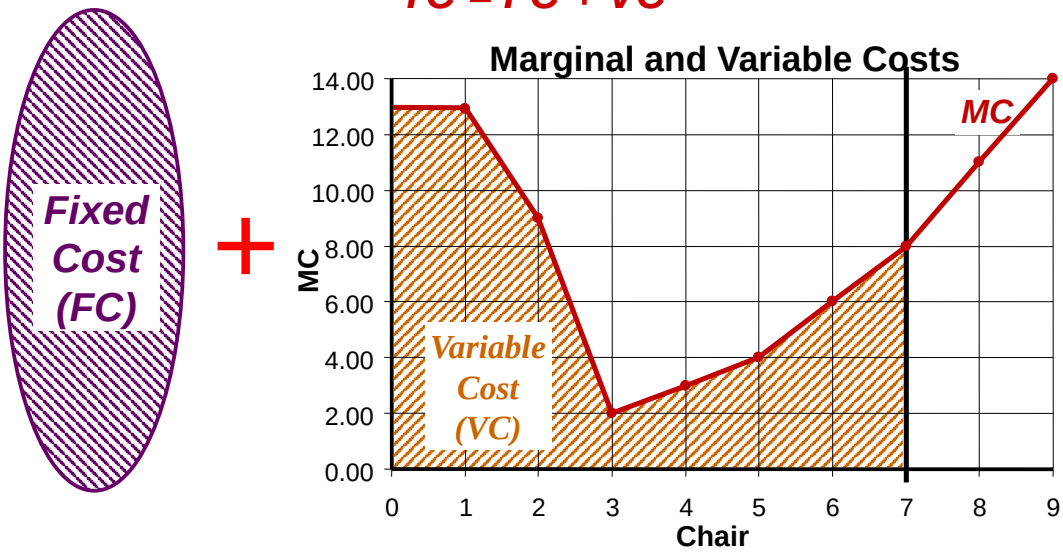
a. the pilot's salary
b. the wages of the ground crew
c. the cost of inspecting the engines
d. ALL of the above

Variable Cost

- ***Variable cost (VC)*** is the portion of production costs that varies with the amount of output.
- ***VC*** doesn't include the fixed cost.
- The variable cost of a printed textbook includes:
  - the cost the of paper in the books,
  - the cost of printing,
  - but ***NOT*** the cost of writing or editing.
- Total variable cost can be calculated as the sum of the marginal costs of the units produced.

- ***Total Cost = Fixed Cost + Variable Cost***

TC = FC + VC



- If the fixed cost is 20, what is the Total Cost of producing 7 units?

Profit, Producer Surplus and Cost

- ***Profit = Revenue − Total Cost***

$$\pi = R - TC$$
$$= R - FC - VC$$

- ***Producer Surplus = Revenue − Variable Cost***

$$PS = R - VC$$

- ***Profit = Producer Surplus − Fixed Cost***

$$\pi = PS - FC$$

Short Run vs. Long Run

- Firms may be unable to change the quantities of some inputs during the current time period.
  - The size of the store.
  - The number of checkout lanes.
- The period of time in which those input quantities cannot be changed is called the ***short run***.
- After enough time passes, those quantities can be changed.

Sunk Costs

- A cost is useful for making decisions only if the cost can be avoided.
- **Example:** Michael buys a book for $150, but then he decides that it isn't worth reading. He can't return it.
  - He says: "I could sell it to a friend for $40, but I'd lose $110 on the sale." ***Wrong!!***
  - In fact, he'd earn a profit of $40 on the sale. ***Why?***
- Costs that cannot be avoided are called ***sunk costs***.
- ***Sunk costs*** should not be included in the opportunity cost of an activity…
- …because sunk costs do not represent sacrifices caused by performing the activity.

- For decision-making purposes, *a firm should treat payments already made (or obligated) as sunk costs,…*
- *… and not as opportunity costs.*
- Most fixed costs are periodic (e.g. electricity bills).
  - They may be already paid (or sunk) temporarily,…
  - but when the cost must be paid again, it has become avoidable (no longer sunk),…
  - and it should be treated as an opportunity cost.

- **Example:** You examine your accounts after the electricity bill has been paid.…
  - You decided to keep your business open ***in the short run***, …
  - because without deducting the already-paid (sunk) electricity bill, the firm is operating at a profit.
  - But when the next electricity bill arrives,…
  - …you decide to close down ***before you have to pay it.***
  - When you include the cost of ***future*** electricity bills, you see that your firm is not profitable ***in the long run***.

Clicker Question

Suppose the ***MC*** of **unit 1** is ***12***, of **unit 2** is ***8*** and of **unit 3** is ***20***, then the ***VC*** of 3 units would be _____ .

a. 60
b. 40
c. 20
d. −8

End of Lecture 15