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.]*

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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.

  *

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

* selling your leisure time
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.

- 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.

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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** ($\pi$): Benefits received by a firm’s owners after all costs are paid.  \[ \text{Profit} = \text{Revenue} - \text{Cost} \]

- 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.

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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

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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 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.

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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.

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**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_.

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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