Lecture 15: Income and Substitution Effects on Demand and Producer Cost

Session ID: DDEE

Clicker Question
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) 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 40 percent. You say to yourself:

- *“What a rip-off. I can get something just as good for less money.”* That’s the **substitution effect.** You would rather spend your money on a Samsung Galaxy S5 (but not the trashy S6 or S7).
- *“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** a *normal good*, the income and substitution effects work in the same direction.

  - **Example:** *Juice*. If the price of juice increases, you want to buy **less juice** and more of other things (substitution effect).
  - But you also feel poorer, so you want to buy **less juice** for that reason as well (income effect).

- When you are **buying** an *inferior good*, the income and substitution effects work in opposite directions.

  - **Example:** *Potatoes*. 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, and you buy even **more potatoes** and less meat (*income effect*).
  - When the income effect is stronger than the substitution effect the good is called a *Giffen good*,…
  - …but there are no known Giffen goods in the real world.
Selling a Normal Good

- **Work** is *leisure time* sold to someone else.

- Your situation:
  - 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.

- **Note:** *Leisure is a normal good—you want and can afford more leisure when you are richer.*
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 is now higher. Why?*

- You would like to work more hours, (substitute fancy clothes for leisure).
- But you would also like to work fewer hours, because you are richer than before and can afford more leisure time for yourself.

When you are selling a normal good (leisure), the two effects work in opposite directions,…

…and the income effect may be stronger than the substitution effect.

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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 make people want to work less (they are richer and can afford more leisure).
So which is stronger: the substitution effect (work more) or the income effect (work less)?

The data suggest that for men, the two effects are about equal.

It isn’t true that men will work more if income taxes are reduced.

But for women, the substitution effect is stronger than the income effect,…

Women do tend to work more when tax rates fall.
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, the firm’s goal is to maximize profit.

Firm owners are self-interested.

“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
Economic Profit vs. Accounting Profit

The concept of profits used in this course (sometimes called economic profit)…

…should be distinguished from the concept used by accountants (often called accounting profit).

Almost all published data on profits describe accounting profits, but here we always use economic profits.

Profit (as defined by economists):

\- Revenue – All Costs [including owners’ opportunity costs of operating the firm]

Accounting Profit:

\- Revenue – Explicit Costs
  [as measured by actual expenditures, which specifically excludes owners’ opportunity costs]

Accountants must use only those quantities that can be observed and verified by outsiders.
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 chair is likely to be different from the **MC** of producing the 226th chair.

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 or shut down?
  - What if **P = $4**?
  - Would you produce 5?
  - Would the **MC** curve determine supply (as before)?

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.
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 fixed costs were absent.

- In what follows, we will allow for the possibility of fixed costs.

What costs must the publisher of the CFO book incur 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.
Variable Cost

- The cost incurred as output increases is called *variable cost (VC)*.

- The variable cost of a printed textbook include:
  - 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.

What is the Total Cost for producing 7 units?

*Total Cost = Fixed Cost + Variable Cost*

\[ TC = FC + VC \]
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:** Nick buys a book for $150, but then he decides that it isn’t worth reading. He cannot return it.
  - He says: “I could sell it to a friend for $40, but I’d lose $110 on the sale.”
  - In fact, he’d earn a profit of $40 on the sale.

- 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 undertaking the activity.

When Fixed Costs are Sunk

- Sometimes firms pay (or are obligated to pay) fixed costs for a future period.

- **Example:** A grocery store has paid rent on its premises for 6 months in advance.

- **Example:** A shoe factory has purchased and paid for shoe-making equipment that will last 5 years.

- **Example:** A university has given a young professor a three-year contract.
  - *(They are obligated to continue paying her for three years.)*
After fixed costs are paid (or obligated), they become sunk costs...

...so, for decision-making purposes, *the firm should not treat payments already made as opportunity costs.*

Most fixed costs are periodic (e.g. electric bills).

- They may have the status as 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.*
Clicker Question

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