Lecture 5: Consumer Surplus, Production and Supply

If you haven’t registered your clicker and clicker subscription, do so later today. It isn’t too late. For instructions, see the course-website announcements.

Clicker Question
Willingness to Pay (WTP) and Consumer Surplus (CS)

Willingness to Pay is the maximum that a consumer is willing to pay for a good or service.

Example: WTP for Boris Johnson mask

- You are walking along in Kenmore Square after studying economics all night.
- In the window of the BU Bookstore…
- …you see a Boris Johnson mask.
- The mask is scary, really scary, even scarier than Boris himself.
- You think, “I really want that mask. I absolutely must have it.”
You say to yourself….

You think, “I’d be willing to pay up to $60 for that mask.”

Then you notice a price tag on the mask. The price: $12.

So you rush in and buy the mask.

Willingness to pay (WTP) for something is the maximum you would be willing to pay for it.

- If WTP = $60, you would not be willing to pay $61.

- Of course, you are willing to pay $60,…
- …and you would be very happy to pay anything less than $60.

- In particular, you would be delighted to pay only $12.
Describing this situation, economists would say:

- Your *willingness to pay* = $60.
- The *price* = $12.
- Your *consumer surplus* = $48.

**Consumer surplus (CS)** is the monetary value of the benefit remaining to the consumer after the price (an opportunity cost) is paid.

Consumer surplus of a voluntary purchase will not be negative, ...

...because the consumer *would not buy* a good that would give him a negative surplus (unless he is behaving irrationally or has poor information).

Because **CS** determines what a consumer wants to buy at each possible price, it can be used to calculate demand!

- We'll show how later in the course.

\[
CS = WTP - P
\]
The Production Process

- The entire production process is a series of transformations in which inputs generated by the primary factors of production…

- …gradually become the final goods and services used for consumption or as tools for production.

- Inputs at stages of production between primary-factor inputs and the creation of final goods and services are called intermediate inputs.
Primary Factors of Production

- The primary factors of production are resources that generate the initial inputs into the productive process.

- Economists usually assign the primary factors to three categories:
  - labor
  - capital goods
  - land

- The primary factors exist in limited quantities for long periods of time. They aren’t used up during the productive process.

- What inputs are generated by the primary factors?
  - Labor services: Productive work from human beings
• Capital Services: the use of productivity-increasing capital goods (tools)—in the form of *physical capital*,

  *human capital*,

  *social capital*.

• Land or Natural-Resource Services: the use of resources provided by nature.

---

**Availability of Primary Factors**

■ Determined by economic and noneconomic forces.

■ The availability of labor depends on the working-age population, the labor-force participation rate and working hours.

  ■ Both are influenced by wage levels.

  ■ These are difficult issues, studied by demographers (experts in population) and labor economists.

■ The availability of *land* is determined by nature.

  ■ Exception: ....

■ The availability of capital goods is the result of *capital formation* (the creation of tools).
Economic Growth

- Many societies have become accustomed to annual growth in economic output (GDP).

- In societies with low population growth, increases in economic output often imply increases in output per person.

  - Between 1980 and 2015, real income per capita in China increased by more than 25 times, an annual growth rate of almost 10%.
  - 750 million Chinese were lifted out of poverty.
  - During the same period, real income per capita in the United States grew at an annual rate of less than 2%,…
  - …and much of the increase in the US went to people who were relatively wealthy.

Sources of Economic Growth

- Economies grow because of
  - growth in the quantity of primary inputs, and
  - the use of new, more productive technologies.

- Growth in the amount of primary inputs
  - Labor input doesn’t grow much in advanced economies (or it may even shrink).
  - Neither does the amount of land, almost all created by nature.
  - But because of capital formation, the quantities of physical and human capital increase over time.
Capital Formation and Technological Change

Experts estimate that in the last 70 years, 50% - 70% of economic growth comes from capital formation,…

and the rest comes from new technologies (technological change).

But new technology was the key to the Industrial Revolution.

Look at Britain’s takeoff in the 18th century, the start of “capitalism.”

Not much change in the other countries during that period.

Production and Supply

Supply (the quantities that firms want to produce and sell at various prices) is determined by

- the amounts of primary factors and intermediate goods needed to produce desired quantities of output,

- and the opportunity cost of primary factors and intermediate inputs used.
Example: Milk production by Farmer Jones

To produce and sell milk, Farmer Jones uses:

- Services of primary factors: farm land, farmers’ labor, farmers’ skill, dairy cows, barns, milking machinery…
- Intermediate inputs: grain to feed cows, fuel, electricity, etc.

The quantity of milk that Farmer Jones wants to sell at each price (his supply) is determined by:

- the quantity of inputs he needs to produce different amounts of milk,
- and the (opportunity) cost of those inputs.

The Supply Schedule

The supply schedule specifies how much a firm wants to sell at various given prices.

Example: Farmer Jones’ supply of milk

<table>
<thead>
<tr>
<th>Price ($)</th>
<th>Quantity (Qts/mo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>10</td>
</tr>
<tr>
<td>0.40</td>
<td>20</td>
</tr>
<tr>
<td>0.60</td>
<td>40</td>
</tr>
<tr>
<td>0.80</td>
<td>60</td>
</tr>
<tr>
<td>1.00</td>
<td>80</td>
</tr>
<tr>
<td>1.20</td>
<td>120</td>
</tr>
</tbody>
</table>
How is the supply curve constructed?

Farmer Jones’ Supply curve is **upward** Sloping:

- At a low price, he will want to sell only a small quantity of milk.
- But if he is offered a higher price, he will want to sell more milk.

Why??
Why does Farmer Jones’ supply curve slope upward?

- Why is Farmer Jones willing to supply more milk at higher prices?

- If he can earn a profit from producing milk, why doesn’t he produce the same amount at all reasonable prices?

**Answer:** Because higher prices justify using more expensive inputs to increase production.

*Fictional Example:*

- At $.20 per quart of milk, Farmer Jones would tell his cows to find their own food.
- At $.40 per quart of milk, he would buy food for them.
- At $.80 per quart of milk, Farmer Jones would hire farm workers to ...
- At $1.20 per quart, he would ...

- At high prices, his extra effort would yield more milk, so a greater quantity would be supplied.

- Farmer Jones will produce an additional unit whenever the price he gets for that unit is greater than its opportunity cost.
Market Demand

- **Market demand** indicates the total quantity of a good demanded by *all buyers* in the market at any given price.

**Example:** Suppose there are 30 buyers in the market:
- 10 who are just like Emily
- and 20 who are just like Sophie.
- What is their market demand?

<table>
<thead>
<tr>
<th>Price</th>
<th>Emily Quantities</th>
<th>Sophie Quantities</th>
<th>Market Demand for Emily and Sophie</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>120</td>
<td>100</td>
<td>10 x 120 + 20 x 100 = 3200</td>
</tr>
<tr>
<td>0.40</td>
<td>80</td>
<td>60</td>
<td>800 + 1200 = 2000</td>
</tr>
<tr>
<td>0.60</td>
<td>60</td>
<td>20</td>
<td>??</td>
</tr>
<tr>
<td>0.80</td>
<td>40</td>
<td>10</td>
<td>??</td>
</tr>
<tr>
<td>1.00</td>
<td>20</td>
<td>0</td>
<td>200 + 0 = 200</td>
</tr>
<tr>
<td>1.20</td>
<td>10</td>
<td>0</td>
<td>100 + 0 = 100</td>
</tr>
</tbody>
</table>

Market Demand Curve

- Market demand is graphed the same way as individual demand.

- **Price**, the independent variable, remains on the vertical axis.

- Individual quantities demanded at each price are added horizontally to find the *quantity demanded* by the entire market.
Market Supply

- The *market supply* is the total quantity offered by all sellers at various prices.

**Example:** Suppose there are 30 farmers in the market who are just like *Farmer Jones*. What is the market supply?

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity</th>
<th>Market Supply for 30 Farmer Jones’</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>10</td>
<td>30 * 10 = 300</td>
</tr>
<tr>
<td>0.40</td>
<td>20</td>
<td>30 * 20 = 600</td>
</tr>
<tr>
<td>0.60</td>
<td>40</td>
<td>??</td>
</tr>
<tr>
<td>0.80</td>
<td>60</td>
<td>30 * 60 = 1800</td>
</tr>
<tr>
<td>1.00</td>
<td>80</td>
<td>30 * 80 = 2400</td>
</tr>
<tr>
<td>1.20</td>
<td>120</td>
<td>30 *120=3600</td>
</tr>
</tbody>
</table>

- The market supply curve is constructed the same way as the market demand curve is.

**Clicker Question**
End of File