Demand and Supply: Part II
As you may recall, there are a number of things that can have an effect on demand and supply curves. What are some of them?
Some of the following could have an effect on demand and/or supply

- Changes in Price
- Changes in Income
- Changes in Consumer Tastes or Preferences
- Changes in Govt. Policies (e.g., tax increases or tax cuts)
- Changes in the cost of inputs (costs of labor, e.g.)
- Changes in Technology
- Changes in the number of consumers or suppliers
- Future expectations
- And several other things
Most notably, two other things that can have an effect on demand and supply curves are the prices of substitute goods and complementary goods.
What is a substitute good?
A substitute good is a product that satisfies the same basic want as another product. Tea and coffee, margarine and butter, ground beef and steak, Pepsi and Coke are some examples of substitute goods.
How does the substitution effect work?

Suppose the price of Coca-Cola rises from $P_1$ to $P_2$ because one of the inputs rises in price. This would cause people to consume less coke, quantity decreases from $Q_1$ to $Q_2$. For the substitute good Pepsi the demand curve shifts out for all price levels, from D to D', leading to more of the substitute good consumed.
What is a complementary good?
A complementary good is a product that is used or consumed jointly with another product; tennis rackets and tennis balls are one example.
Another example of complementary goods could be shoes and shoelaces.

Figure 3

When the price of shoes increases, the quantity of shoelaces demanded declines at each price of shoelaces. Shoes and shoelaces are complements. The demand curve for shoelaces shifts to the left.
There are many other examples of complementary goods.

Hot dogs and hot dog buns, e.g. If you buy one good, you are quite likely to buy the other.

Bread and butter, or tea and sugar, or paint and paintbrushes, are just a few of those that are closely connected.

Can you think of any others?
What effect does a change in the price of one good have on the demand for a complementary or substitute good?

<table>
<thead>
<tr>
<th>Complements (coffee and doughnuts)</th>
<th>Substitutes (coffee and tea)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducing the price of one...</td>
<td>Increasing the price of one...</td>
</tr>
<tr>
<td><em>increases</em> the demand for the other.</td>
<td><em>increases</em> the demand for the other.</td>
</tr>
<tr>
<td>Increasing the price of one...</td>
<td>Reducing the price of one...</td>
</tr>
<tr>
<td><em>reduces</em> the demand for the other.</td>
<td><em>reduces</em> the demand for the other.</td>
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Elasticity, or responsiveness of either demand or supply to a change in price, is also an important economic concept. It can also be measured.
Elasticity of demand

- Elasticity of demand is a measure of the sensitivity of consumers to a change in price. Sometimes a small change in price will cause an equal or even greater change in demand. If this is the case, economists then speak of demand as being highly sensitive (or elastic) to changes in price.
- On the other hand, if a change in price has little or no effect on demand for a product, economists speak of demand as being inelastic.
Elasticity of supply is a measure of the sensitivity of producers to a change in price. Just as with demand, supply could be affected anywhere from a little to a lot by changes in the price of an object.
How do we measure elasticity of demand or supply? Let us consider first elasticity of demand.

\[
E_d = \frac{\text{Percentage Change in Quantity Demanded of Product } X}{\text{Percentage Change in Price of Product } X}
\]
Elasticity can be measured by the following formula:

\[
\text{Elasticity} = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}} = \frac{(\text{new quantity} - \text{old quantity}) \times 100}{\text{old quantity}} = \frac{(\text{new price} - \text{old price}) \times 100}{\text{old price}}
\]

\[
E = \frac{10000 - 5000}{10000} \times \frac{10000}{10000} = \frac{5000}{10000} \times 100 = 50\%
\]

\[
E = \frac{25000 - 20000}{20000} \times \frac{20000}{20000} = \frac{5000}{20000} \times 100 = 25\%
\]

\[
E = \frac{2}{2} = 2
\]
Elasticity of Demand Formula

When calculating demand elasticity we divide the percentage change in quantity demanded by the percentage change in price.

If the value is greater than 1.0 the demand is elastic. If the value is less than 1.0 the demand is inelastic.

(A) Demand Elasticity = \( \frac{\% \Delta Q_d}{\% \Delta P} \) (percentage change in quantity demanded) (percentage change in price)

\[
\text{(A) Demand Elasticity} = \frac{6}{10} = \frac{25\%}{60\%} = 0.416
\]

Greater Than 0.416 = Inelastic

(A) is Inelastic

(B) Demand Elasticity = \( \frac{\% \Delta Q_d}{\% \Delta P} \) (percentage change in quantity demanded) (percentage change in price)

\[
\text{(B) Demand Elasticity} = \frac{2}{4} = \frac{80\%}{50\%} = 1.6
\]

Greater Than 1.6 or Less Than 1.0 = Elastic

(B) is Elastic
Elasticity of supply. Determining elasticity of supply is much like determining elasticity of demand.

Price elasticity of supply = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}
Two other related concepts are the substitution effect and the income effect.
The substitution effect

The substitution effect often occurs when people are no longer able or willing to purchase a good or service. Typically this occurs because their income goes down. It is of course entirely to be expected that people will consume less of an item if they can no longer afford it. Instead, they will substitute some other less-expensive good that will satisfy their expectations in a way similar to the good that they can no longer afford.
The income effect

People’s preferences also change when they gain more income. People are now able to afford some goods that they previously could not. As a result, they will purchase one or more more expensive items than they did before.
<table>
<thead>
<tr>
<th></th>
<th>Substitution effect</th>
<th>Income effect</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal good</td>
<td>Increases quantity</td>
<td>Increases quantity</td>
<td>Increases quantity demanded; downward sloping demand curve</td>
</tr>
<tr>
<td></td>
<td>demanded</td>
<td>demanded</td>
<td></td>
</tr>
<tr>
<td>Inferior good</td>
<td>Increases quantity</td>
<td>Decreases quantity</td>
<td>Increases quantity demanded; downward sloping demand curve</td>
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<td>Increases quantity</td>
<td>Decreases quantity</td>
<td>Decreases quantity demanded; upward sloping demand curve</td>
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<td></td>
<td>demanded</td>
<td>demanded</td>
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Cross elasticity of demand

- Cross elasticity of demand measures the responsiveness to the demand for one good to a change in the price of another good.

- If two goods are close substitutes (e.g., Gala Apples and Fuji Apples), there will be a high cross elasticity of demand.

- If goods are weak (or not such close) substitutes (such as chicken and sushi), there will be weak cross elasticity of demand.

- Cross elasticity of demand is obtained by dividing the percentage change in quantity demanded for good A by the percentage change in price for good B.

- Cross elasticity of demand can be either positive or negative.

- Complementary goods have a negative cross elasticity while substitute goods have positive cross elasticity.
Lastly, a few reminders
Aggregate demand is the sum of all the demand in an economy at different price levels.
Aggregate supply is the sum of all the goods and services supplied by an economy at a given point in time at different price levels.
Marginal utility is the extra satisfaction or pleasure achieved from an increase of one additional unit of a good or service.
As with almost every good or service, there is a point at which the costs start to outweigh the benefits of getting one more unit of something.
Here is yet another way to look at the matter.

<table>
<thead>
<tr>
<th>Units of Consumption of Commodity x</th>
<th>Total Utility</th>
<th>Marginal Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>125</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>140</td>
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<tr>
<td>5</td>
<td>148</td>
<td>08</td>
</tr>
<tr>
<td>6</td>
<td>148</td>
<td>00</td>
</tr>
<tr>
<td>7</td>
<td>145</td>
<td>-03</td>
</tr>
</tbody>
</table>
Diminishing returns