1 Decomposition on Demand

We change the price of a good and demand changes.

This process decomposes the change in demand for a good into two parts:

Substitution Effect- If the price of one good goes up, my demand for that good changes because I substitute to buying other goods instead.

Law of demand: *If the price of a good goes up. Demand will always go down due to substitution.*

The substitution effect will **always** decrease demand when the price of a good goes up.

Income Effect- If the price of a good goes up, my effective income goes down (because things are more expensive) and so my demand will change.

If the price of a good goes up, my effective income goes down. If the good is inferior, demand will go up.

If the price of a good goes up, my effective income goes down. If the good is normal, demand will go down.

1.0.1 Examples

For perfect complements, the change in demand due to a price change is **all** income effect.

For perfect substitutes, if I switch from buying one good to buying the other. The decrease in demand is due completely to substitution.

1.1 Possible Combinations

Because of the law of demand. If price increases, the **substitution effect will always decrease demand**.

Price of x_1 goes up.

Giffen Goods. Total Effect: Increase

Substitution effect decreases demand, Income effect Increases Demand so much that it overcomes the decrease due to substitution. The only way to get a giffen good is to have a good that is so inferior that the income effect overcomes the substitution effect.

Ordinary Goods. Total Effect: Decreases.

Inferior good. Substitution effect decreases demand, Income effect Increases Demand but not enough to overcome the substitution effect. An inferior is ordinary if the income effect does overcome the substitution effect.

Normal Good. Substitution effect decreases demand, Income effect Decreases Demand. A normal good is **always** ordinary.

1. Ordinary/Inferior

2. Ordinary/Normal.

3. Giffen/Inferior

Every giffen good is inferior.

1.2 Slutsky Decomposition

Our goal is to measure the income effect and the substitution effect.

We do this through a thought experiment called the 'Slutsky Decomposition'

We measure the **substitution effect** but using a thought experiment that allows us to control for the income effect by asking "what would this consumer buy if the prices change but we give them enough income to buy what they were buying before the price change?"

If we ask what a consumer buys with the new price but this extract income, the change from their original demand to the demand under the new prices but with extra income cannot be due to the **income effect**. Thus, any change in demand is due to the substitution effect and the rest can be contributed to the income effect.

1.3 Example Problem

Suppose $u = x_1 x_2$.
Marshallian Demands:

$$x_1 = \frac{\frac{1}{2}m}{p_1}, x_2 = \frac{\frac{1}{2}m}{p_2}$$

and $p_1 = 1$, $p_2 = 2$, $m = 10$. To find the optimal bundle plug these into the Marshallian demand. This is the "original bundle"

$$(5, 2.5)$$

Now suppose the price of good 1 changes to $p_1^{'} = 2$. The price of good 2 and income stay the same. New optimal bundle:

$$(2.5, 2.5)$$

Total Effect: The change in the original demand for x_1 new demand for x_1. Decrease of 2.5.

To calculate the substitution effect first, we calculate how much income the consumer would need to buy the old bundle at the new price.

$$(5, 2.5)$$

The cost of this bundle under the new price is:

$$5 * 2 + 2.5 * 2 \quad = \quad 15$$

The consumer needs \$15 to buy the old bundle at the new prices. **Compensated Income.**

Now we ask what the consumer would at the new prices but with the compensated income.

$$\frac{\frac{1}{2}(15)}{2}, \frac{\frac{1}{2}(15)}{2}$$

$$(3.75, 3.75)$$

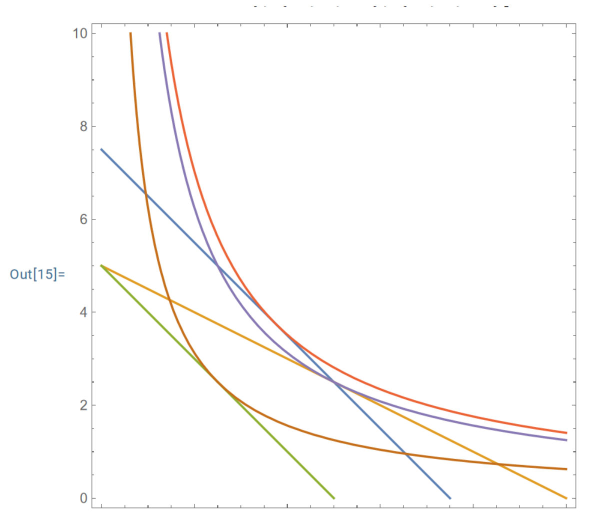
Originally, the consumer bought 5 units of x_1 and at the new prices but with compensated income they buy 3.75. **There is a decrease of** 1.25 **due the substitution effect.**

Total Effect: Decrease of 2.5

Substitution Effect: Decrease of 1.25

Income Effect: (Total Effect - Substitution Effect). 1.25

Total - Substitution = Income



$min\{x_1, x_2\}$. $p_1 = 1$, $p_2 = 2$, $m = 12$

Marshallian Demand:

$$\frac{m}{p_1 + p_2}, \frac{m}{p_1 + p_2}$$

Original Demand plug the budget into the marshallian demands:

$$(4, 4)$$

Now suppose the $p_1 = 2$

$$(3, 3)$$

The total effect is a decrease of one unit for x_1.

How much would the consumer need to buy $(4, 4)$ (the old bundle) at the new prices $p_1 = 2, p_2 = 2$.

$$4 * 2 + 4 * 2 = 16$$

$m = 16$ is the compensated income. Find the demand under the new prices with the compensated income.

$$(4, 4)$$

The substitution effect is zero, because I buy 4 under the old prices and 4 under the new prices with compensated income.

The entire effect is due to the income effect.