0.1 Changes in "Other" Price

$x_1 = \frac{\frac{1}{2}m}{p_1}$

$$2x_1p_1 = m$$

Engle Curve. x_1 on the horizontal axis and m on the vertical axis.

Income offer curve. Plot bundles purchased at different levels.

x_1x_2 demand: $\left(\frac{1}{2}m, \frac{1}{2}m\right)$

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

Solve for m from the demand for x_1:

$$m = 2x_1$$

$$x_2 = \frac{1}{2}(2x_1)$$

$$x_2 = x_1$$

Changes in own price.

Ordinary good is one which when the price of the good goes up, you buy less.

Giffen good is one which when the price of the good goes up, you buy more.

Demand plot is a plot of price of the vertical axis and demand on the horizontal axis.

Price offer curve. A plot of bundles as one of the prices change.

$$\left(\frac{\frac{1}{2}m}{p_1}, \frac{\frac{1}{2}m}{p_2}\right)$$

Let's suppose $p_2 = 1$ and $m = 10$

$$\left(\frac{5}{p_1}, 5\right)$$

Let's assume $p_1 = 1$ and $m = 10$ and plot the price offer curve for p_2

$$\left(5, \frac{5}{p_2}\right)$$

0.1.1 Complements/Substitutes

How does the demand for a good change when we change the price of the other good?

x_1 is a **complement** for x_2 when if p_2 goes up demand for x_1 goes down.

x_1 is a **substitute** for x_2 when if p_2 goes up demand for x_1 goes up.

If x_1 does not change when p_2 changes, then we say they are **neither complements nor substitutes.**

0.1.2 Example of Perfect Complements

$u = min\{x_1, x_2\}$

No waste condition:

$$x_1 = x_2$$

Budget equation:

$$p_1x_1 + p_2x_2 = m$$

Solve these:

$$p_1x_1 + p_2x_1 = m$$

$$(p_1 + p_2)\, x_1 = m$$

$$x_1 = \frac{m}{p_1 + p_2}$$

$$x_2 = \frac{m}{p_1 + p_2}$$

$$\left(\frac{m}{p_1 + p_2}, \frac{m}{p_1 + p_2}\right)$$

When p_2 increases, x_1 decreases. x_1 is a complement for x_2 and x_2 is a complement for x_1. These goods are **complements.**

0.1.3 Example of Cobb Douglass

$u = x_1 x_2$

Tangency condition:

$$-\frac{x_2}{x_1} = -\frac{p_1}{p_2}$$

$$p_1 x_1 + p_2 x_2 = m$$

Demand:

$$\left(\frac{\frac{1}{2}m}{p_1}, \frac{\frac{1}{2}m}{p_2}\right)$$

These goods are neither complements nor substitutes for each-other.

0.1.4 Example of Quasi-Linear

$u = ln\left(x_1\right) + x_2$

$$MU_1 = \frac{\partial\left(ln\left(x_1\right) + x_2\right)}{\partial x_1} = \frac{1}{x_1}$$

$$MU_2 = \frac{\partial\left(ln\left(x_1\right) + x_2\right)}{\partial x_2} = 1$$

$$MRS = -\frac{MU_1}{MU_2} = -\frac{\frac{1}{x_1}}{1} = -\frac{1}{x_1}$$

Tangency condition:

$$-\frac{1}{x_1} = -\frac{p_1}{p_2}$$

$$x_1 = \frac{p_2}{p_1}$$

Budget equation:

$$p_1 x_1 + p_2 x_2 = m$$

Plug in $x_1 = \frac{p_2}{p_1}$ to get x_2

$$p_1 \left(\frac{p_2}{p_1}\right) + p_2 x_2 = m$$

$$p_2 \left(1 + x_2\right) = m$$

$$x_2 = \frac{m - p_2}{p_2}$$

$$\left(\frac{p_2}{p_1}, \frac{m - p_2}{p_2}\right)$$

Demand for x_1 increases when increases p_2. x_1 is a substitute for x_2.

Demand for x_2 doesn't change when I change p_1. x_2 is neither a complement nor a substitute for x_1.

0.2 Quasi-linear corner solution

$$\left(\frac{p_2}{p_1}, \frac{m - p_2}{p_2}\right)$$

Suppose $p_1 = 1$ and $p_2 = 1$

$$(1, m - 1)$$

If $m \geq 1$ that is the demand. $(1, m - 1)$

If $m < 1$ this involves a negative amount of x_2 which is impossible.

$$MU_1 = \frac{\partial \left(ln\left(x_1\right) + x_2\right)}{\partial x_1} = \frac{1}{x_1}$$

$$MU_2 = \frac{\partial \left(ln\left(x_1\right) + x_2\right)}{\partial x_2} = 1$$

If $m \geq 1$

$$(1, m-1)$$

If $m < 1$

$$(m, 0)$$

$$-\frac{MU_1}{MU_2} = -\frac{p_1}{p_2}$$

$$\frac{MU_1}{p_1} = \frac{MU_2}{p_2}$$

1 Slutsky Decomposition

Income Effect. A change in price makes income less effective in buying that good. In this sense, a price change is "like" an income change. This change demand depending on whether the good in inferior of normal.

Substitution Effect. When the price changes for one good, I substitute into buying other goods.

Law of Demand- the substitution effect will always lead you to buy less of a good. The substitution effect is always negative.

1.1 Three Possibilities

Ordinary/Normal:

Ordinary/Inferior:

Giffen/Inferior:

1.2 Slutsky Decomposition.

1.3 Example Problem

Suppose $u = x_1 x_2$. Suppose $p_1 = 1$, $p_2 = 2$, $m = 40$. Then, p_1 changes to $p_1 = 2$.