Preferences and utility

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October 17, 2016

Prediciting what the individual will do

A consumer’s demand functions are determined by her budget constraint and her preferences.

What if, any, is the relationship between Preferences and Utility

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We devoted a whole lecture to budget constraints.

Up to now we have said that economists assume that an individual has preferences: can rank consumption bundles.

Consumer theory simply says that of all the consumption bundles the individual can afford (in their budget set) they will consume the one that they rank the highest (most prefer).

An individual’s demand for a product is the amount of the product in their chosen bundle.

Everytime an individual’s budget constraint changes, the demands for products change.
We typically measure preference over bundles with something we call utility, utility is simply a number we attach to a bundle such that more preferred bundles get higher numbers. (The exact number is not important as long as more preferred bundles are assigned larger numbers.)

That is:

- if you prefer bundle \( i \) to bundle \( j \), \( x^i \succ x^j \), we say you get more utility (a higher number of utils) from bundle \( i \): \( u^i > u^j \)

- if you prefer bundle \( j \) to bundle \( i \), \( x^j \succ x^i \), we say you get more utility from bundle \( j \): \( u^j < u^i \)

- if you are indifferent between two bundles, \( x^i \sim x^j \), the same utility number is attached to each bundle: \( u^i = u^j \)

The ranking is the primitive; utility numbers are simply a way of keeping track of what is preferred to what.

For simplicity, assume the world consists of only two goods: \( x_1 \) and \( x_2 \), so a consumption bundle consists of some amount of good \( x_1 \) and some amount of good \( x_2 \) - the world has little variety.

A bundle is, simply, an amount of \( x_1 \) and an amount of \( x_2 \)

For each individual, we assume that there is a utility function that correctly describes their ranking of bundles. That is, there is some mathematical function, \( u \), a function of \( x_1 \) and \( x_2 \) such that it attaches a number to each bundle such that bundles that are higher ranked are associated with higher numbers.

\[
u = u(x_1, x_2)\]

where \( x_1 \) is the amount of good 1 you consume and \( x_2 \) is the amount of good 2 you consume. \( u(x_1, x_2) \) is a function with the name \( u \).

The correct function could, for example, be the following: \( u = u(x_1, x_2) = x_1^3 x_2^{1.5} \)
utility as a function of the amount of x1 and x2 consumed

Let me graph it only as a function of $x_1$ holding $x_2 = 1$ (blue), then $x_2 = 3$ (red) and the $x_2 = 5$ (green)
I am taking slices in the $x_1$ direction, holding $x_2$ constant. (Picture it in a room.)

Now I will graph it only as a function of $x_2$ holding $x_1 = 1$ (blue), then $x_1 = 3$ (red) and then $x_1 = 5$ (green)

Slices in the $x_2$ direction.
These are the equivalent to the following graph in KW.

KW are graphing utility as a function of clams holding constant the consumption of the other good
(a) Cassie's Utility Function

Total utility (utils)

Quantity of clams

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Envision a utility function for two commodities where one commodity is a good and one is a bad.

An example?

Draw a utility function for two commodities where both start off as goods but both eventually turn into bad.

An example?
Draw a utility function for two commodities: a good and a medicine that is only effective in the dose of 6 drops.

If \( x_1 \) is a good and \( x_2 \) is a bad.
First picture it in three dimensions.

If we hold \( x_1 = 2 \) and graph this as a function of \( x_2 \), the bad (less is preferred to more: pollution might be an example).
Utility as a function of $x_2$ holding $x_1=2$
A different example:
Holding $x_1$ constant, an example where $x_2$ starts as a good (initially more is preferred to less) but at some level of consumption it turns into a bad (more of it is less preferred).
An example where $x_2$ is a medicine that only works if the dose is 6 drops. What does it look like?

It is a horizontal line at the utility level experienced if one takes the medicine in a dose different from 6 drops, and utility is higher at 6.

I used two different colors so the graph on the horizontal line would stand out more.
Return to the utility function \( u = u(x_1, x_2) = x_1^3 x_2^{1.5} \).

Look again at the graphs of utility from \( x_1 \) with \( x_2 = 1 \) (blue), \( x_2 = 3 \) (red) and \( x_2 = 5 \) (green).

What happens to the slopes of each of these lines as \( x_1 \) increases?

They get less steep. What does this mean?

As the consumption of \( x_1 \) increases, holding constant the consumption of \( x_2 \), the utility from each additional unit of \( x_1 \) declines.

How much utility increases when \( x_1 \) consumption is increased by one unit, holding the consumption of \( x_2 \) constant, is called the marginal utility of \( x_1 \)?

ms graphs wrt \( x_1 \), and in the KW graphs, marginal utility is decreasing: while more \( x_1 \) is preferred to less \( x_1 \), each additional unit of \( x_1 \) consumption adds less and less to total utility. (Note that in my example, the marginal utility of \( x_2 \) is always increasing.)
This is called diminishing marginal utility in the consumption of $x_1$: \( \frac{\Delta u}{\Delta x_1} \) declines as $x_1$ increases.

Let’s graph the marginal utility of $x_1$ curves that correspond to the utility curves drawn above.

These graphs demonstrate the principle of diminishing marginal utility.\(^1\)

In the words of KW,

Note the principle is not a universal truth. That is, it does not necc. hold for all commodities, or even all goods.

Note that for our example utility function, the marginal utility of $x_2$ is increasing.

\(^1\)Think about what the marginal utility of $x_2$ graphs look like; they are becoming more positive as $x_2$ increases.
The principle of diminishing marginal utility is why most of us do not consume just one good - you get to a point where it makes sense to spend the rest of your money on something else.

Consuming BMW convertibles: the first one adds greatly to utility, the second one a bunch, but not as much as the first (you can only drive one at a time), and the third less than the second. There are many more people who own one BMW convertible than people who own two.

Can you think of a good where the marginal utility of consuming the good is always a positive constant?
People will consume different bundles of goods for two reasons:

Preferences vary across individuals
Budget constraints vary across individuals