1 Consumer behavior

1.1 Why consumers have to choose?

limited resources, unlimited wants: how do we approach this most basic problem?

1.2 Why do we need consumer theory?

to understand consumer behavior

1.3 Basic concepts of consumer theory

budget constraint, total utility, marginal utility, prices, demand curve, relative price

1.4 Consumer theory: mathematical representation

Consumer theory: the maths helps us understand consumer behavior. If we know how to use maths, it could be our powerfully ally in understanding everything better in the economy around us.

1) Consumers buy thousands of goods every year. For an introductory course, however, trying to encompass the entire richness of consumer behavior would not be possible. Economists have a very useful tool to simplify complex problems: using economics models. In a model, a rich set of reality is assumed to be very similar, and could therefore be classified in one group. Thus, for example, instead of buying thousands of goods, we assume the consumer buys one particular good, and everything else is taken as a separate good. This simplification of the reality allows for an elegant representation of the consumer problem. In this problem, the income of the consumer is divided among two goods: X_1 and X_2. Both have a given market price: p_1 and p_2. Assuming the consumer spends their entire income I, then the income of the consumer should be equal to their expenditure. Thus, $I = p_1x_1 + p_2x_2$, where the quantities the consumer buys are denoted with small caps. But there is another crucial issue here: How does the consumer decide how much to buy from each good? To answer this, we need the concept of utility.

2) Utility is, basically, the pleasure that the consumer gets from consuming goods and services. If they still consume both X_1 and X_2, then the total pleasure

they get depends on those two goods. We can use mathematics to represent this dependence. We say the utility U depends on the quantities of X_1 and X_2 consumed by the consumer, or $U = f(x_1; x_2)$. So the utility could be represented by $U(x_1, x_2)$. The goal of the consumer is to maximize his pleasure, or to maximize his utility function.

If the consumer could consume infinite amounts of everything, then there would be no economic problem. The consumer wants to consume as much from everything as he could. However, at some point his budget is running low, and the next moment it hits zero, in other words, the consumer exhausted his budget. So, the goal of the consumer is simply transformed into How do I maximize my pleasure given my income is limited?

With each additional unit of X_1 the person buys, the pleasure from consuming it declines: water, sunbathing, drinking at a bar. If this is the case – that each additional unit gives me a smaller and smaller pleasure – then I would obviously be less willing to pay for it. So, where do I stop buying the good? Where the additional pleasure given to me by consuming the good exactly equals the price I pay for it. Normally, I would pay the same price for every unit. So how much I would buy depends on the additional pleasure I get, or on the marginal utility from consuming X_1. However, what happens when I have more than one good to choose from? I solve a simple problem: if good X_1 is giving me lower utility for each additional unit, and good X_2 is giving me a declining utility as well, then I decide on the basis of which good is giving me a higher marginal utility per dollar/lev spent on each of those. Thus, to maximize my utility, I need to be in a situation, in which $\frac{MU_{X_1}}{p_1} = \frac{MU_{X_2}}{p_2}$.

Mathematically, I need to maximize my total utility $U(x_1, x_2)$ within my budget constraint $I = p_1x_1 + p_2x_2$. If I exhaust my entire income, then $x_2 = \frac{I}{p_2} - \frac{p_1}{p_2}x_1$. Plugging x_2 back into the utility function gives me $U(x_1; \frac{I}{p_2} - \frac{p_1}{p_2}x_1)$. Now my goal is to maximize this function with respect to consuming x_1 only, as I know that the optimal quantity of x_2 would be determined by what is the optimal consumption of x_1.

In general, when I have to maximize a function of two arguments, such as $U(x_1, x_2)$, I need to have its first derivative equal to zero. Then, taking the first derivative I have: $\frac{\partial U}{\partial x_1}dx_1 + \frac{\partial U}{\partial x_2}dx_2 = 0$. However, I also know that $dx_1 = 1$ and $dx_2 = -\frac{p_1}{p_2}$. Therefore, using the above arguments I have that $\frac{\partial U}{\partial x_1} + \frac{\partial U}{\partial x_2}(-\frac{p_1}{p_2}) = 0$.

Thus, $\frac{\partial U}{\partial x_1} = \frac{\partial U}{\partial x_2}\frac{p_1}{p_2}$. Dividing both sides by p_1, and seeing that $\frac{\partial U}{\partial x_i}$ is the marginal utility with respect to i, I conclude that

$$\frac{MU_1}{p_1} = \frac{MU_2}{p_2}, \tag{1}$$

which was also the logical conclusion from our intuition above. Now, if the price of one of the goods goes down, I can consume more of that particular good, and still maximize my utility, even though my marginal utility declines with more consumption.

1.5 Solving problems

You can find more class materials at the class web-site.