

CONSUMER PREFERENCES

The underlying foundation of demand, therefore, is a model of how consumers behave. The individual consumer has a set of preferences and values whose determination are outside the realm of economics. They are no doubt dependent upon culture, education, and individual tastes, among a plethora of other factors. The measure of these values in this model for a particular good is in terms of the real opportunity cost to the consumer who purchases and consumes the good. If an individual purchases a particular good, then the opportunity cost of that purchase is the forgone goods the consumer could have bought instead.

We develop a model in which we map or graphically derive consumer preferences. These are measured in terms of the level of satisfaction the consumer obtains from consuming various combinations or bundles of goods. The consumer's objective is to choose the bundle of goods which provides the greatest level of satisfaction as they the consumer define it. But consumers are very much constrained in their choices. These constraints are defined by the consumer's income, and the prices the consumer pays for the goods.

We will formally present the model of consumer choice. As we go along, we will establish a vocabulary in order to explain the model. Development of the model will be in three stages. After a formal statement of the consumer's objectives, we will map the consumer's preferences. Secondly, we present the consumer's budget constraint; and lastly, combine the two in order to examine the consumer's choices of goods.

THE THEORY OF THE CONSUMER

Consumer make decisions by allocating their scarce income across all possible goods in order to obtain the greatest satisfaction. Formally, we say that consumers maximize their utility subject to budget constraint. **Utility** is defined as the satisfaction that a consumer derives from the consumption of a good. As noted above, utility's determinants are decided by a host of non-economic factors. Consumer value is measured in terms of the relative utilities between goods. These reflect the consumer's preferences.

Theory of Consumer Preferences

Consumer **preferences** are defined as the subjective (individual) tastes, as measured by utility, of various bundles of goods. They permit the consumer to rank these bundles of goods according to the levels of utility they give the consumer. Note that preferences are independent of income and prices. Ability to purchase goods does not determine a consumer's likes or dislikes. One can have a preference for Porsches over Fords but only have the financial means to drive a Ford.

These preferences can be modeled and mapped through the use of indifference curves. In order to graphically portray consumer preferences, we need to define some terms. First, since we will be working in two dimensions (2-d graphs), we assume a two good world. These could be any

two goods. One common treatment is to define one good, say food, and let the other good be a composite of all other goods. For expository simplicity (making things easier for me), let's define the two goods as Good X and Good Y. The axes of the graph then measure amounts of Good X on the horizontal, and amounts of Good Y on the vertical. Each point in this Cartesian space then defines some combination of goods X and Y. We call these combinations **commodity bundles**.

The goal of the theory of preferences is for the consumer to be able to rank these commodity bundles according to the amount of utility obtained from them. In other words, the consumer has different preferences over the different combinations of goods defined by the set of commodity bundles.

In order to develop a model we need to make some assumptions about the consumer's preferences. There are four assumptions. The first is decisiveness. Here, given any two commodity bundles in commodity space, the consumer must be able to rank them. In Figure 1, suppose we randomly chose two commodity bundles A and B. This assumption means that the consumer must be able to say that they prefer commodity bundle A over B, or B over A, or that bundles A and B provide the same level of utility.

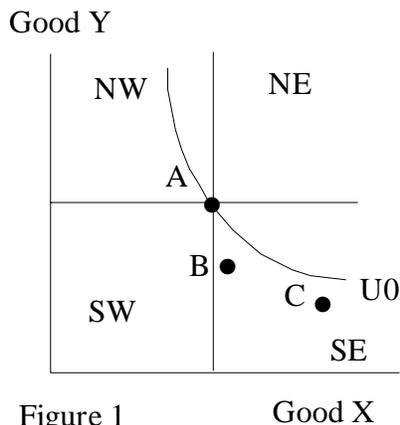


Figure 1

The second assumption is consistency. The consumer must be consistent in preference and rankings. Again referring to Figure 1, suppose we now include bundle C. Let the consumer prefer commodity bundle A over B, and also commodity bundle B over C. Then by this assumption the consumer must prefer A over C.

The following two assumptions are not required to develop the theory of the consumer, but simplify matters significantly.

The third assumption is non-satiation. In other words, more is always better than less. More formally, any commodity bundle with at least as much of one good and more of the other must be preferred. Commodity bundle A in Figure 1 has two straight lines running through it. This creates four quadrants, to the northeast, southeast, southwest and northwest of bundle A. All

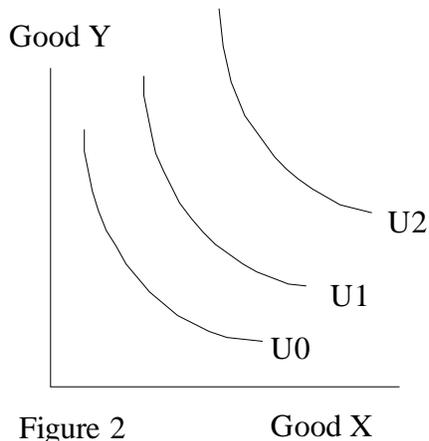
commodity bundles to the northeast of A contain more of both X and Y than does A. Therefore, by the assumption of non-satiation, any bundle in this quadrant is preferred to A. The opposite is true for bundles to the southwest of A. They contain less X and Y than does A, hence must be less preferred. The quadrants to the southeast and northwest contain more of one good but less of the other; hence we cannot determine preference rankings with respect to A.

The last of the assumptions is convexity, which is the most difficult to explain. It is based on the notion that as a consumer consumes more and more of a particular good, the additional utility obtained decreases. We define marginal utility as the change in utility due to an incremental increase in the consumption of a given good. Convexity says that marginal utility declines as consumption increases. Note that the total utility continues to increase if marginal utility is positive (which it must be for non-satiation to hold), but total utility increases at a decreasing rate if marginal utility is declining.

An **indifference curve** is a collection of all commodity bundles which provide the consumer with the same level of utility. The indifference curve is so named because the consumer would be indifferent between choosing any one of these commodity bundles. In Figure 1 the curved line which passes through commodity bundle A represents an indifference curve. All the commodity bundles on U_0 provide the same utility as does bundle A.

Any commodity bundle above the U_0 indifference curve must be preferred to any commodity bundle on U_0 . Conversely, any commodity bundle on U_0 must be preferred to any bundle below it. The choice of commodity bundle A to derive U_0 was completely arbitrary. It could have been any other commodity bundle. This means that each commodity bundle has an indifference curve running through it.

Figure 2 shows a family of three indifference curves. An indifference curve represents a greater level of utility as we move further to the northeast from the origin. Why? (The student should examine the consumer preference assumptions for the answer.) Therefore indifference curve U_2 has a higher utility level than U_1 which has a higher utility level than U_0 .



Note that indifference curves are negatively sloped. This is the case because of non-satiation. Indifference curves can not be upward sloping because the consumer cannot be indifferent between two commodity bundles if one has more of both goods.

The big question is why the indifference curve is bowed inwards. The quick and dirty answer is the assumption of convexity. Recall that convexity results from diminishing marginal utility, i.e., as a consumer consumes more and more of a given good, the additional unit of that good provides less utility. As we move along an indifference curve from left to right, the consumer is consuming more and more of good X and less and less of good Y. Thus the marginal utility of the additional unit of good X declines whereas the marginal utility of the foregone Y increases. Since by an indifference curve's definition that each commodity bundle provides the same level of utility, the consumer is willing to give up less and less good Y as he or she consumes more and more good X in order to hold utility constant. This trade off between goods X and Y along an indifference curve is an important topic. It is called the marginal rate of substitution (MRS).

Figure 3 shows four commodity bundles, A, B, C and D, along an indifference curve. As we move to the right along U1, we are increasing the amount of good X by equal increments of an

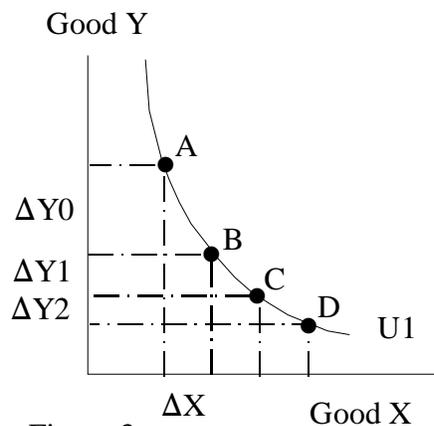


Figure 3
 amount ΔX . The amount of good Y that must be given up as we move from bundle A to bundle

B (ΔY_0), from B to C (ΔY_1), and from C to D (ΔY_2) gets smaller and smaller. This is true because the additional utility from the additional increment in good X provides less and less utility, while the additional unit of good Y the consumer is giving up contains more and more utility. This gives rise to why the indifference curve bows inwards.

The **marginal rate of substitution** reflects the maximum amount of good Y the consumer would be willing to give up in order to obtain an additional unit of X. The consumer would be happy to give less Y since it would place the consumer above U_1 at a higher utility level. However, the consumer would not be willing to give up more Y since it would place the consumer below U_1 at a lower level of utility.

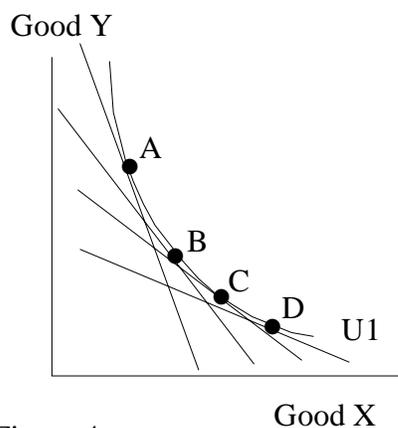


Figure 4

The MRS can be portrayed as the slope of the indifference curve. This would show the amount of good Y given up per unit of X. The slope between points A and B is $\Delta Y_0/\Delta X$, between B and C is $\Delta Y_1/\Delta X$, and between C and D is $\Delta Y_2/\Delta X$. Notice that since ΔY is declining, the slope is getting flatter and flatter. For very small increases in good X, the slope of the indifference curve becomes the slope of the tangent to it. We general define MRS as the absolute slope of the tangent to an indifference curve. In Figure 4 the tangent gets flatter and flatter as we move from A to B, B to C and C to D.

To sum up, the slope of the indifference curve represents the value to the consumer of the additional unit of X in terms of the amount of Y they are willing to give up. As we move from left to right along an indifference curve, the slope gets flatter reflecting a decrease in the value of the additional unit of good X.

This theory of the consumer has given us many tools. Indifference curves map or graphically represent consumer preferences. The properties of these indifference curves reflect the four consumer preference assumptions. The slope of an indifference curve, the MRS, reflects the value placed on the additional unit of a good in terms of the other goods the consumer would be willing to give up. These concepts will be used extensively in the next few chapters.

The Budget Constraint

Using these families of indifference curves, we can model consumer preferences showing how the consumer would rank commodity bundles according to the utility each bundle provides. Having a map of consumer preferences, however, is not enough to explain the choices consumers make. Choices are also a function of our constraints, namely the consumer's income and the price of goods.

In order to simplify the presentation, we assume that income is exhausted over the consumer purchases. This means we are excluding savings. The budget constraint would then say that income is equal to the sum of consumer expenditures. Expenditures on a particular good is the product of the amount of the good purchased times its price. We can then write the budget constraint as:

$$I = P_x * X + P_y * Y.$$

In this equation the consumer has expended all income, I , across both goods X and Y , where P_x and P_y are the prices of X and Y , respectively. To graph this budget constraint into commodity space requires rewriting the budget constraint in terms of good Y , the variable on the vertical axis. Using simple algebra, we can rearrange terms to produce the following budget line:

$$Y = I/P_y - P_x/P_y * X.$$

In the equation of a line ($Y = mX + b$), the slope is given by m , the number multiplied with X , and the Y intercept is given as b . Referring to the budget line, its slope is P_x/P_y and the Y intercept is I/P_y . Figure 5 illustrates these characteristics of the budget line.

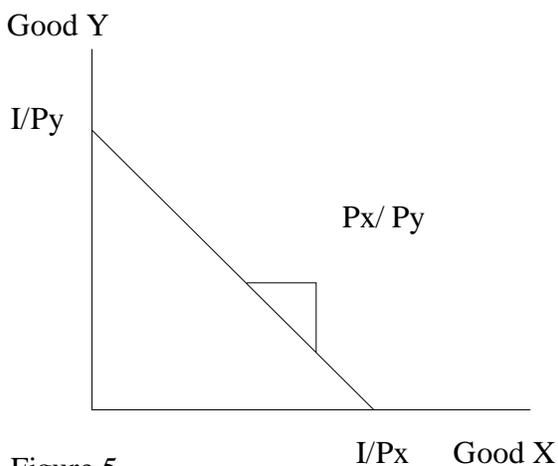


Figure 5

The budget line divides commodity space into two. The commodity bundles which are affordable are shown as being on or below the line. Income is completely spent for those bundles on the line. We exclude the commodity bundles below the budget line since all income is not being spent. The commodity bundles above and to the right of the budget line are beyond the reach of the consumer, given their income and the prices of goods X and Y.

Note the intercepts. The Y intercept represents a commodity bundle that contains only good Y. This is the amount of good Y that the consumer could purchase if they spent their entire income on good Y. The same is true for good X's intercept. $1/P_x$ is the maximum amount of good X that this consumer can purchase, given their income and the two goods' prices.

The budget line plays two important roles. The first is determined by the level of income. The more income the consumer has to spend the greater number of the commodity bundles that are affordable. An increase in income would be portrayed as a parallel shift outwards of the budget line. It is a parallel shift because we are holding the prices of goods X and Y constant, therefore there would be no change in the line's slope.

The second role for the budget line is to act as a price line. A price line demonstrates the relative price of two goods. A **relative price** is the price of one good in terms of another. For example, let $P_b = \$0.50/\text{banana}$ be the price of bananas, and $P_o = \$1.00/\text{orange}$ the price of oranges. The relative price of a banana in terms of oranges is $\frac{1}{2}$ orange. If the consumer buys a banana then they necessarily forgo purchasing one half orange. If we take the ratio of the banana's price to the price of an orange, we get:

$$\frac{P_b}{P_o} = \frac{\$0.50/\text{banana}}{\$1.00/\text{orange}} = \frac{1}{2} \frac{\text{oranges}}{\text{banana}}.$$

Thus the slope of the budget line shows the relative price of good X in terms of good Y. If the price of good X increases, then the amount of good Y that is foregone increases. There is an increase in the relative price of good X. Since we are holding income and the price of good Y constant, this increase in good X's price results in a decrease of the budget line's X intercept. The line swivels inward.

Relative price is an important tool. It shows how much of one good that the consumer must necessarily give up in order to obtain more of another. The flatter the budget line, the less costly the good on the horizontal axis in terms of the good on the vertical axis. The steeper the budget line, the more costly the good. Note that relative price is shown solely as the budget line's slope. The distance from the origin does not reflect prices.

Consumer Choice

The consumer's objective is to allocate income between goods X and Y so that they achieve the greatest amount of utility, i.e., to reach the highest indifference curve possible within their budget constraint. They must choose that commodity bundle on their budget line which has the highest level of utility. Utility levels, as we have seen, are measured by indifference curves; therefore the consumer tries to reach the highest feasible indifference curve.

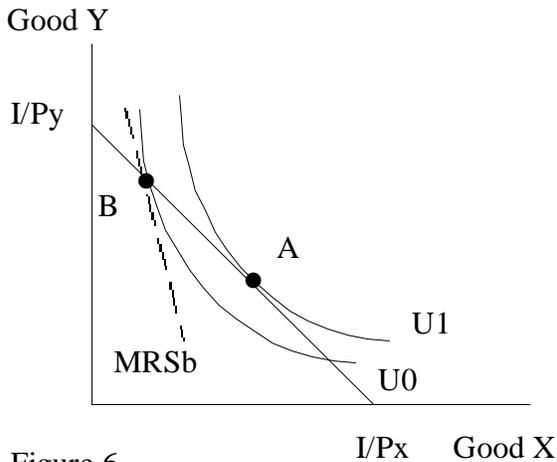


Figure 6

In Figure 6, we examine several possible choices for a consumer. Should they choose commodity bundle B? It is on their budget line and so exhausts income. But does B provide the highest level of utility? The answer is no because there are other affordable commodity bundles within the budget constraint that lie on a higher indifference curve. The commodity bundle which maximizes utility is commodity bundle A. All other feasible commodity bundles lie below A's indifference curve.

The utility maximizing commodity bundle is determined by the tangency of the indifference curve to the budget line. At the point of tangency, the slope of the indifference curve is equal to the slope of the budget line. In other words, the marginal rate of substitution is equal to the relative price of X in terms of Y. This means that the amount of good Y that the consumer must give up for another unit of good X is equal to the amount they are willing to give up.

$$\text{Utility Maximization: } MRS = P_x / P_y.$$

Recall that MRS can be interpreted as the value to the consumer of the additional unit of good X. The relative price of good X represents the consumer's opportunity cost. Therefore, utility maximization is achieved when the marginal benefit of consuming more good X is equal to its marginal cost in terms of Y.

Returning to Figure 6, commodity bundle B is not utility maximizing. Note that the tangent to U0 at B is steeper than the budget line's slope. In other words, $MRS_b > P_x/P_y$. This says that the value to the consumer of the additional unit of X is greater than its costs. Utility rises by

consuming more good X at the expense of less Y. This would move the consumer down to the right along the budget line. Utility is again maximized at commodity bundle A.