Chapter 3

Consumer behavior

The purpose of this chapter is to bring together the consumer's budget constraint with their preferences. Together, the two components comprise a powerful tool for studying behavior. Indeed, these two elements comprise the fundamental building blocks for understanding the quantities of goods and services that people purchase. With this in mind, we turn to essential definition for this chapter

Optimality

Our working definition is sensible. The objective for each consumer is to maximize their happiness. There would not be much for economics to do if we could obtain infinite happiness, or perfect bliss. So, instead, we examine cases where happiness is constrained. The natural constraint is the quantity of resources—that is, income—that defines the bundles of items that we can afford.

> Definition: From among the set of bundles that a person can afford, the optimal bundle satisfies the following condition: a person does not prefer any other bundle to the optimal bundle.

This definition pins down exactly what we want to find. Recall from the previous chapter that each person has a utility function that assigns a number to each bundle. With a higher the number, the person derives more the more utility—that is, more happiness—from the bundle. We want to identify the bundle that yields the greatest happiness.

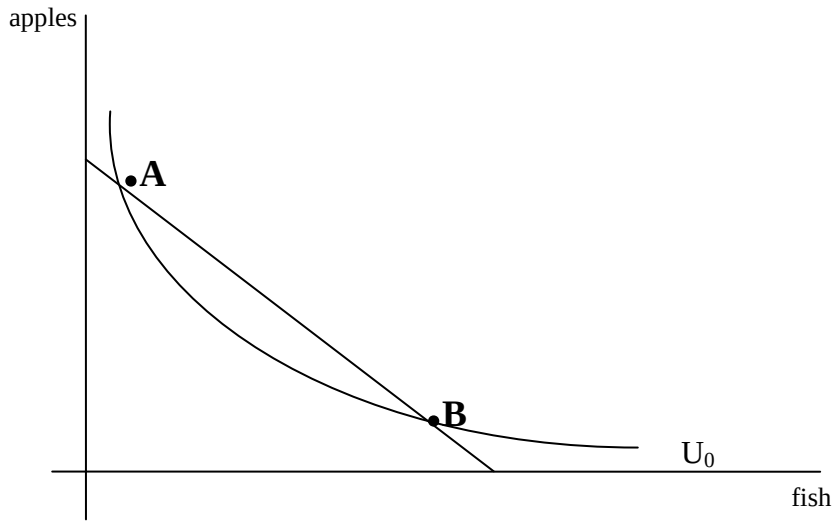
Note that the definition is general enough to allow for a person to identify more than one bundle. For example, if two bundles give exactly the same utility number, and this value is greater than the utility number for any two other bundles, then the person has two optimal bundles. For our setup, however, we will show that there is a unique optimal bundle.

To illustrate the process that identifies the optimal bundle, we turn to the graphs of the budget constraint and the indifference curves developed in the previous chapter. To begin, consider a case in which there are two equally liked bundles that are affordable.

We will approach the identification through a proof by contradiction; that is, we will show two such bundles and then demonstrate why they are not optimal bundles.

Figure 3.1 shows an arbitrary indifference curve and a budget constraint. The indifference curve is labeled U_0 indicating that each fish-apple bundle on this curve yields exactly the same level of utility. I have labeled two points on indifference curve U_0, A

Figure 3.1



and B. Both bundle A and bundle B are affordable because they each lie on the budget constraint. Because each is on the same indifference curve, each yields the same level of happiness. As such, both bundles are candidates for being identified as optimal bundles.

The key question is, Can this person afford a bundle that makes them even happier? The answer is yes. A follow-up question is, Is there something about Bundles A and B that indicate the problem? Again, the answer is yes.

Identification of optimal bundle

We know that this person is indifferent between two affordable bundles labeled A and B. What feature of these bundles helps us understand why these two bundles are not optimal. This illustration may be helpful.

First, let us begin by going back to what the slope of the indifference curve means. Note that the slope of the indifference curve at bundle A is steeper than the slope of the budget constraint. Put another way, the marginal rate of substitution between fish and apples is greater than the relative price of fish to apples. Breaking the analysis down further, the marginal rate of substitution tells us the rate at which this person will substitute apples for fish in order to stay on the same indifference curve. When the marginal rate of substitution is high, it tells us that the person is getting a lot of extra happiness from a little bit of fish relative to giving up a little bit of apple.

Next, we revisit the meaning of the slope of the budget constraint. The slope of the budget constraint is the rate at which a person can trade fish for one apple; it is the relative price of these two goods.

Now, we combine these two concepts. When the marginal rate of substitution is greater than the slope of the budget constraint, the person is getting a lot of extra happiness from apple at a relatively low price. We also know that the extra utility gained from apples is small compared to the price of the apple. In this case, our consumer will opt for more fish. At Point A, fish is a bargain in terms of the gain to our consumer's happiness. Since the gain from happiness is declining with larger purchases of fish and the gain in happiness is increasing as fewer apples are purchased, the process will converge to a point where the marginal rate of substitution is equal to the relative price. From Point A, the consumer will keep consuming additional fish until the price of the last gain in happiness from fish is equal to the price of the gain in happiness from the last apple.

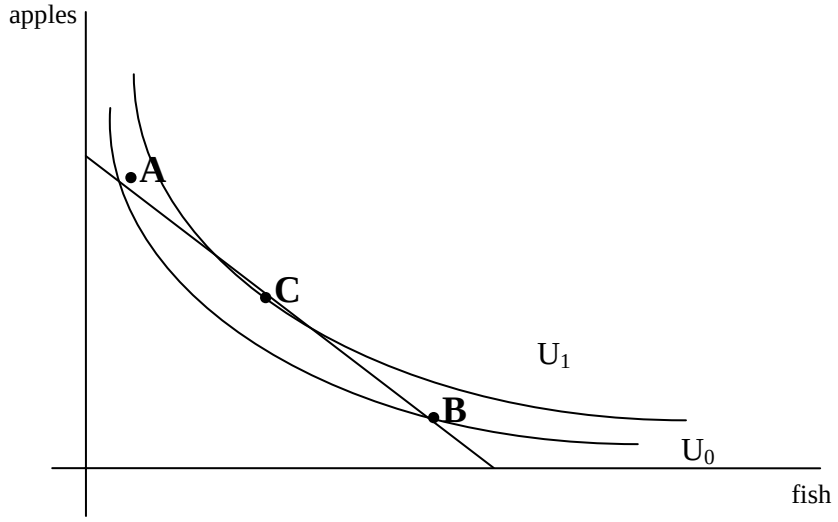
We also consider the opposing case. At Point B, the marginal rate of substitution is smaller than the relative price. Thus, our consumer is getting a lot of extra happiness from fish compared to the extra happiness obtained from the last apple. This implies that fish are a bargain; our consumer can purchase a lot of extra happiness by buying fish at the existing relative price and only give up a little extra happiness by foregoing the quantity of apples. Our consumer wants to be happier so she buys more fish. This process continues, resulting in smaller gains in happiness from fish and larger gains in happiness from apples. Indeed, the process culminates when the price of the extra happiness from the last bit of fish is equal to the price of the extra happiness from the last bit of apple. In

other words, the convergence ends where the marginal rate of substitution equals the relative price.

Thus, our consumer is not as happy as she can be at Point A because the gain in happiness from apples is relatively cheap. At Point B, total happiness can be higher by purchasing more fish since the gain in happiness from fish is relatively inexpensive. The process to greater total happiness converges from Point A and from Point B to a bundle of goods at which the price of the extra happiness is equal across fish and apples.

The next step moves toward identifying the optimal bundle. Figure 3.2 includes the same indifference curve U_0 and another indifference, U_1. First, note that the bundles

Figure 3.2



on indifference curve U_1 are greater than the utility level for bundles on indifference curve U_0. Moreover, the point labeled C is affordable. So, at first pass, we are moving in the right direction: happier is better. Point C actually has lots of attributes. First, it is the only point at which the indifference curve touches the budget constraint.[1] The feature is important because it excludes other indifference curves, associated with greater happiness, from touching the budget constraint; more specifically, there is no indifference curve

[1] For those with any calculus background, Point C is the tangency point between the indifference curve and the budget constraint.

with higher utility that is affordable. We can rule this out because, higher utility indifference curves mean being farther out from the origin. Shifting away from the origin means that no indifference curve to the northeast of U_1 consists of bundles that are affordable. All bundles on indifference curves northeast of U_1 are outside the set of affordable bundles. Thus, Point C is the bundle of apples and fish that is affordable and makes this person the happiest. Note further that at Point C, the marginal rate of substitution is equal to the relative price. So, Point C embodies the necessary condition for optimality that we identified when we explained why Points A and B are not optimal.