CHAPTER 5
CONSUMER CHOICE

What's in It for You?

Microeconomics seeks to understand the behavior of individual economic agents such as individuals and businesses. Economists believe that individuals' decisions, such as what goods and services to buy, can be analyzed as choices made within certain constraints. Generally, consumers are trying to get the most for their limited income budget but other constraints might also apply. Time and calories are two examples of non-income things that consumers frequently budget when making consumption decisions. In economic terms, consumers are trying to maximize total utility, or satisfaction, given their constraints.

Everyone has their own personal tastes and preferences. The French say: *Chacun à son goût*, or "Each to his own taste." An old Latin saying states, *De gustibus non est disputandum* or "There's no disputing about taste." If people's decisions are based on their own tastes and personal preferences, however, then how can economists hope to analyze the choices consumers make?

An economic explanation for why people make different choices begins with accepting the proverbial wisdom that tastes are a matter of personal preference. But economists also believe that all consumers' preferences satisfy a basic set of assumptions that lead to rational choices. This chapter introduces the economic theory of how rational consumers make choices about what to buy given fixed prices and limited incomes.

Learning Objectives

At completion of this learning module you are expected to be able to:

- Construct a consumer's budget set graphically and mathematically given prices and income, and show how the budget set changes with changes in prices and income
- Appraise the major assumptions economists make about consumer preferences
- Maximize a consumer's utility graphically and mathematically using marginal analysis
- Decompose changes in quantity demanded resulting from price changes into income and substitution effects using a graph
- Explain and give examples of how people make decisions that systematically deviate from those predicted by rational choice models and how markets take advantage of these tendencies.

5.1 Consumption Possibilities: The Budget Set

Consider the typical consumer's budget problem. Consumers have a limited amount of income to spend on the things they need and want. Suppose Alphonso has $10 in spending money each week that he can allocate between bus tickets for getting to work and the burgers that he eats for lunch. Burgers cost $2 each, and bus tickets are 50 cents each. Alphonso's budget set describes all combinations of burgers and bus tickets that Alphonso can afford given fixed prices and income. In other words, it includes all combinations that satisfy the following inequality:

Alphonso's Expenditures on Burgers +
Alphonso's Expenditures on Bus Tickets ≤ Alphonso's Income

Letting B represent the number of burgers he purchases and T represent the number of bus tickets he purchases, we can simplify the description of his budget set to:

$$2B + 0.50T \leq 10$$

The budget set identifies all the opportunities for spending, including those that leave him with income left over. For example, Alphonso could afford one burger and one ticket (cost = $2 + $0.50 = $2.50) so this combination is part of his budget set. The budget line indicates all the combinations of burgers and bus tickets Alphonso can afford when he exhausts his budget. The formula for his budget line would be given by:

$$2B + 0.50T = 10$$

We can show Alphonso's budget set and his budget line on the graph in Figure 1, where we measure the quantity of bus tickets on the vertical axis and the quantity of burgers on the horizontal axis. The thick blue line shows all combinations of tickets and burgers that cost exactly $10. The red shaded area represents combinations that cost less than his income of $10. The line is therefore Alphonso's budget line while budget set includes all combinations on the line but also those in the shaded area below the line. The intercepts represent the extreme situations where Alphonso either spends all of his money on bus tickets or on burgers. If Alphonso chooses to consume only bus tickets, he could afford 20 bus tickets per week ($10 income per week ÷ $0.50 per ticket = 20 tickets per week) and no burgers. Likewise, he could choose to spend his entire income on burgers in which case he could afford 5 burgers per week ($10 income per week ÷ $2 per burger = 5 burgers per week) and no tickets.

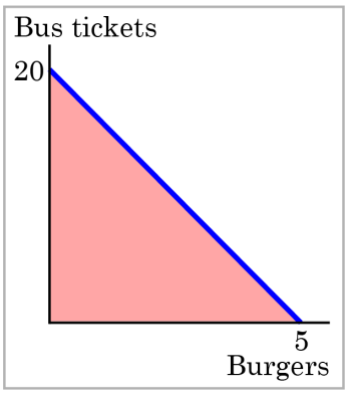

Figure 1 The budget set: consumption possibilities

If Alphonso is like most people, he will likely choose some combination that includes both bus tickets and burgers. That is, he will choose some combination on the budget line that connects the vertical intercept and the horizontal intercept. Any point beyond the budget line is not affordable, because it would cost more money than Alphonso has available in his budget.

Opportunity Cost and the Budget Line

The budget line clearly shows the tradeoff Alphonso faces in choosing between burgers and bus tickets. Suppose he is currently purchasing 20 bus tickets and zero burgers. What would it cost Alphonso to have one burger? It would be natural to answer $2, but that's not the way economists think. Instead they ask, how many bus tickets would Alphonso have to give up to get one more burger, while staying within his budget? The answer is four bus tickets.

Recall from Chapter 1 that economists use the term opportunity cost to indicate what must be given up to obtain something that is desired. The idea behind opportunity cost is that the cost of one item is the lost opportunity to do or consume something else. When Alphonso buys a burger, he spends $2. How many bus tickets could he have purchased with that money? The answer is given by the relative price of burgers:

$$\frac{P_B}{P_T} = \frac{\$2}{\$0.50} = 4$$

Notice that the slope of the budget line in Figure 1 represents the opportunity cost of burgers. The slope of the line is −4 / 1, meaning Alphonso must give up four bus tickets (−4 = rise) in order to gain one additional burger (+1 = run). The opportunity cost describes what Alphonso must do and is a function of the prices of the two goods only. The fact that prices dictate that he must give up four bust tickets to afford one additional burger does not necessarily mean that he would be willing to do so. For two generic goods X and Y with prices P_X and P_Y, the following summary may be helpful:

Equation for the budget set	$P_X \times X + P_Y \times Y \leq I$
Equation for the budget line	$P_X \times X + P_Y \times Y = I$
Opportunity Cost of one more unit of good X	P_X / P_Y
Opportunity Cost of one more unit of good Y	P_Y / P_X

As we discussed in Chapter 1, a fundamental principle of economics is that every choice has an opportunity cost. If you sleep through your economics class (not recommended, by the way), the opportunity cost is the learning you miss from not attending class. If you spend your income on video games, you cannot spend it on movies. If you choose to marry one person, you give up the opportunity to marry anyone else. In short, opportunity cost is all around us and part of human existence.

In many cases, it is reasonable to refer to the opportunity cost as the price. If your cousin buys a new bicycle for $300, then $300 measures the amount of "other consumption" that he has given up. For practical purposes, there may be no special need to identify the specific alternative product or products that could have been bought with that $300, but sometimes the price as measured in dollars may not accurately capture the true opportunity cost. This problem can loom especially large when costs of time are involved.

In some cases, realizing the opportunity cost can alter behavior. Imagine, for example, that you spend $8 on lunch every day at work. You may know perfectly well that bringing a lunch from home would cost only $3 a day, so the opportunity cost of buying lunch at the restaurant is $5 each day (that is, the $8 buying lunch costs minus the $3 your lunch from home would cost). $5 each day does not seem to be that much. However, if you project what that adds up to in a year—250 days a year × $5 per day equals $1,250, the cost, perhaps, of a decent

vacation. If the opportunity cost is described as "a nice vacation" instead of "$5 a day," you might make different choices.

Changes in the Budget Set

The budget set is defined for fixed prices and income. If either of these things change, the budget set and budget line will also change. For instance, if Alphonso's income were to increase from $10 to $20 he would clearly have an expanded budget set. Notice that the slope of his budget line, given by $-P_B / P_T$, would not be affected since it does not depend on his income. This change in his budget line is shown in Figure 2. A decrease in Alphonso's income would have the opposite effect: the budget line would shift in closer to the origin while maintaining the same slope. Decreases in income shrink the budget set but leave the opportunity cost of either good unchanged.

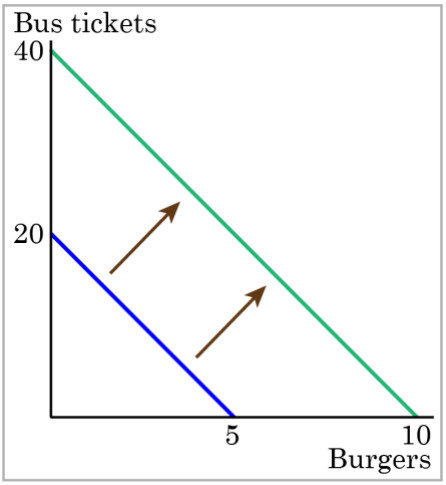

Figure 2 Changes in the budget set: an increase in income

A change in a good's price will also have an impact on the budget set and budget line. If Alphonso finds that the price of burgers has increased from $2 to $2.50, this will affect not only the set of available options but also the opportunity cost of either good. Graphically, an increase in price of one good will shrink the budget set and also change the slope of the budget line. The blue shaded area in Figure 3 represents the loss in Alphonso's budget set when the price of burgers increased. Notice that the maximum number of bus tickets he can afford has not changed, while the maximum number of burgers he could afford has decreased from ten to eight. The new slope of −5 indicates that he now must give up five bus tickets in order to consume an additional burger. While the opportunity cost of a burger has increased, the opportunity cost of bus tickets has fallen: he now only gives up one-fifth of a burger each time he takes the bus ($0.50 ÷ $2.50 = 1/5 of a burger per bus ticket).

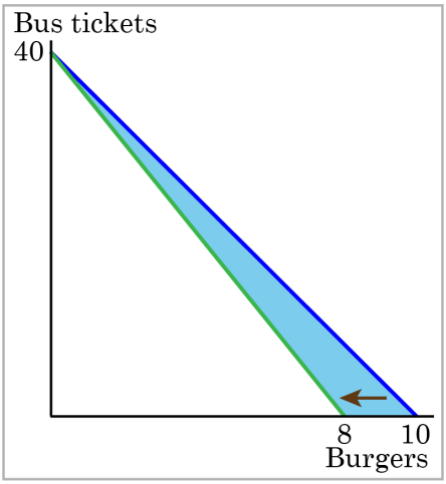

Figure 3 An increase in the price of burgers

A decrease in the price of burgers would have expanded Alphonso's budget set while lowering the opportunity cost of a burger—the slope would become flatter. Likewise, changes in the price of bus tickets would affect the slope of the budget line by altering the vertical intercept while leaving the maximum number of burgers he could afford unchanged. An increase in the price of bus tickets would lower the opportunity cost of a burger and a decrease in the price of bus tickets would raise the opportunity cost of a burger.

5.2 Consumer Preferences

In the previous section we learned how to represent Alphonso's budget set both graphically and mathematically. We even said that he would likely prefer to consume at some point on the interior of his budget line rather than at one of the extremes where he spends all of his income on a single good. What does it mean to be like most consumers? Is it possible that Alphonso doesn't have any need to take the bus? What if Alphonso doesn't like burgers? In describing his budget set, we have shown all of the options available to Alphonso but we have not said anything about what combination of burgers and bus tickets Alphonso might prefer. Likewise, the slope of the budget line allowed us to say what he must do in order to attain an additional burger but it did not tell us whether he would actually be willing to do so. In order to gain insight into how a consumer will choose among the alternatives available in the budget set, we first need to make some basic assumptions. Because each consumer is unique and we want our results to be widely applicable, it is important that we have confidence that these assumptions apply to *all* consumers.

What it means for Consumers to be Rational

In order to analyze the choices that consumers make in a formal way, it is necessary for consumers to behave in a rational manner. The first assumption we will make about consumers is that they are able to compare any two options by saying that either they like one better than the other or that they are completely indifferent between the two. In other words, we assume that preferences are **complete**. Sometimes we are offered a choice between two undesirable alternatives. Does this imply that we have incomplete preferences? Absolutely not. If a vegetarian is offered a choice between ham and turkey, they will report that they are indifferent—they receive exactly zero satisfaction, or utility, from either option!

The second assumption we will make about consumers is that they have consistent preferences. If you report that you prefer tacos to sushi and that you prefer sushi to burgers, then it must be the case that you prefer tacos to sushi. The assumption we are making here is that preferences are **transitive**. Transitivity also works with indifference between two options: if you are indifferent between jogging and swimming and you prefer cycling to swimming, then you must also prefer cycling to jogging. While this assumption may seem uncontroversial for an individual consumer, transitivity may fail to hold if we aggregate the preferences of a group. It is possible that a group of friends could vote for tacos over sushi and sushi over burgers but then vote for burgers over tacos. In what follows, however, we will consider only the preferences of a single individual.

These rationality assumptions do not imply that everyone will make the same choices or that consumers always make the choice that turns out to be best for them. Risky decisions and poorly informed decisions can also be perfectly rational decisions. What our assumptions do mean is that consumers are capable of choosing among alternatives and that their rankings of those alternatives are logically consistent.

Another common, but somewhat more controversial assumption that economists make is that consumers believe that **more is better**. By qualifying this statement slightly, we can have more confidence that it will hold for consumers in general. First, more of an *economic good* is better. Other things being equal, more disease is clearly not better. Disease in this case would be considered an *economic bad*. We can still analyze consumers' choices regarding disease by considering a related good rather than the bad itself: health would be a good and,

other things equal, more health would be better. Other times, we consume so much of a good that it actually lowers our overall utility. You may love pizza, but it is possible to eat too much and end up feeling sick. In this case, more doesn't turn out to be better. There are two reasons that this is at most a minor problem for our study of consumer choice. First, what we really mean is that a *little* more is better. Is one more bite of pizza better? The answer is probably yes. Second, even if one more bite of pizza makes us sick the important thing is that when we made the decision to take that bite we *believed* that one more was going to be better. In any case, it is a good idea to be aware of this assumption and realize when it might not hold so that we can adjust our analysis accordingly.

Based on the more is better assumption, we can already make one prediction about the choice that consumers will make. Consumers will choose a point on the budget line rather than the interior of the budget set. In other words, **consumers will spend all of their income**. Otherwise, they could afford more of either or both goods thereby making themselves better off. Keep in mind that this does not preclude savings. Future consumption can be considered a good just like any other and we can allocate some of our income to savings and still be considered to be spending all of our income.

Utility and Diminishing Marginal Utility

People desire goods and services for the utility those goods and services provide. When we declare that we prefer option A to option B it is because option A provides us with greater utility than does option B. Utility is subjective but that does not make it less real. Our assumption that more is better means that the more of a good one consumes, the more utility one obtains. At the same time, the increase in utility a person receives from consuming the first unit of a good is typically more than the increase in utility received from consuming the fifth or the tenth unit of that same good. The increase in utility when we consume one additional unit of a good is called **the marginal utility (MU)**.

$$\text{MU} = \frac{\text{Change in total utility}}{\text{Change in consumption}}$$

Economists typically assume that as we increase our consumption of one good while holding all else constant, the marginal utility of that good will eventually decline. This is known as the **law of diminishing marginal utility**. When Alphonso chooses between burgers and bus tickets, for example, the first few bus rides that he chooses might increase his utility a great deal—perhaps they help him get to a job interview or a doctor's appointment. But later bus rides might provide much less utility—they may only serve to kill time on a rainy day. Similarly, the first burger that Alphonso chooses to buy may be on a day when he missed breakfast and is ravenously hungry. However, if Alphonso has a burger every single day, the last few burgers may taste pretty boring. The general pattern that consumption of the first few units of any good tends to bring a higher level of utility to a person than consumption of later units is a common pattern. Notice that we are not assuming that marginal utility always falls as we consume more. It could very well be that Alphonso barely tastes that first burger because he eats it so fast due to his hunger. Perhaps the second burger actually increases his utility by more than the first burger. The law of diminishing marginal utility only says that as he consumes more burgers, his marginal utility will *eventually* decline.

The law of diminishing marginal utility explains why people and societies rarely make all-or-nothing choices. You would not say, "My favorite food is ice cream, so I will eat nothing but ice cream from now on." Instead, even if you get a very high level of utility from your favorite food, if you ate it exclusively, the additional or marginal utility from those last few servings would not be very high. Similarly, most workers do not say: "I enjoy leisure, so I'll never work." Instead, workers recognize that even though some leisure is very nice, a combination of all leisure and no income is not so attractive.

Indifference Curves: A Graphical Representation of Preferences

Rather than trying to compare each and every combination of goods that Alphonso can buy, we can use a graph to represent his preferences among these combinations in a simple way. An **indifference curve** shows graphically all combinations of goods that provide an equal level of utility. In other words, an indifference curve shows all combinations of goods among which the consumer is *indifferent*. Indifference curves allow us to graphically depict the amount of utility a consumer derives from two goods and to rank all potential combinations of those goods. For example, Figure 4 shows three indifference curves that represent Lilly's preferences for the tradeoffs that she faces in her two main relaxation activities: eating doughnuts and reading paperback books. Each indifference curve (U_L, U_M, and U_H) represents one level of utility. First we will explore the meaning of one particular indifference curve and then we will look at the indifference curves as a group.

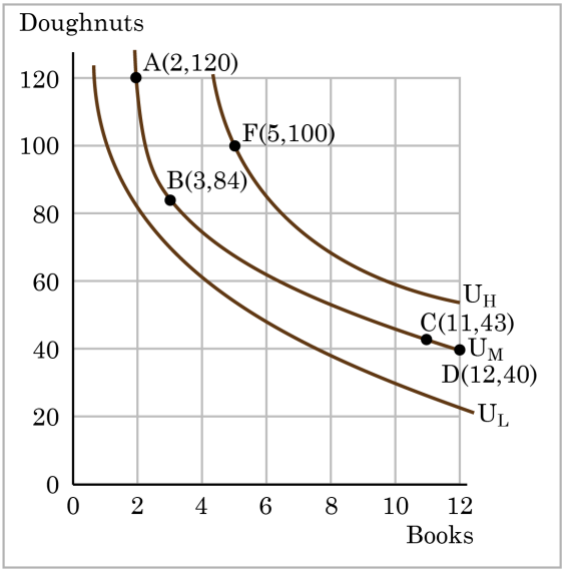

Figure 4 Indifference curves

Characteristics of Indifference Curves

The indifference curve U_M has four points labeled on it: A, B, C, and D. Since an indifference curve represents a set of choices that have the same level of utility, Lilly must receive an equal amount of utility, judged according to her personal preferences, from two books and 120 doughnuts (point A), from three books and 84 doughnuts (point B) from 11 books and 43 doughnuts (point C) or from 12 books and 40 doughnuts (point D). She would also receive the same utility from any of the unlabeled intermediate points along this indifference curve.

The assumptions we have made about preferences tell us quite a bit about how indifference curves should look. For example, we know that Lilly's **indifference curves will be negatively sloped** because of our assumption that more is better. If we give her more books, we will have to take away some doughnuts or else she will be made better off. Likewise, we would need to take away some books in order to keep her indifferent if we were to give her more doughnuts.

In addition to being downward sloping from left to right, **indifference curves tend to be convex with respect to the origin**. In other words, they are steeper on the left and flatter on the right. The slope of an indifference curve tells us how much of the good on the vertical axis (doughnuts in Lilly's case) the consumer is *willing* to give up in order to consume one additional unit of the good on the horizontal axis (books for Lilly). Contrast this with the slope of the consumer's budget line, which tells us how much of the good on the vertical axis *must* be given up in exchange for one additional unit of the good on the horizontal axis. This willingness to trade one good for a *marginal* (i.e., one unit) increase in the other good while holding total utility constant is known as the **Marginal Rate of Substitution (MRS)**.

The convex shape of typical indifference curves means that the marginal rate of substitution decreases as we move down along an indifference curve. This shape results from another of our assumptions: that the law of diminishing marginal utility holds. Thus, the increase in utility that Lilly would gain from, say, increasing her consumption of books from two to three must be equal to the decrease in utility when her consumption of doughnuts was cut from 120 to 84 so that her overall utility remains unchanged between points A and B. At point A, where she has relatively large number of doughnuts and therefore her marginal utility from doughnuts will be relatively small. At the same time, she has relatively few books and therefore has a relatively high marginal utility for books. Viewed in terms of the marginal utilities of the two goods, it is easy to see why Lilly is willing to give up 36 doughnuts to increase the number of books she has from 2 to 3. When Lilly has a larger number of books and fewer doughnuts at point C in Figure 4, she will have a lower marginal utility for books and a higher marginal utility for doughnuts. In going from point C to point D, she is only willing to give up 3 of the now precious doughnuts for yet another book.

Computationally, the MRS is equal to the ratio of the marginal utilities of the two goods:

$$\text{MRS}_{\text{Y,X}} = \frac{\text{MU}_{\text{X}}}{\text{MU}_{\text{Y}}}$$

To understand why this is true, consider a consumer who receives $MU_X = 20$ from good X and $MU_Y = 4$ from good Y. How many units of good Y would the consumer be willing to substitute for one additional unit of good X? The one additional unit of good X will increase her total utility by 20. To remain on the same indifference curve, we need a decrease in good Y that will exactly offset this increase. A decrease of 5 units of good Y, which each give her 4 units of utility, known as **utils**, at the margin will lower total utility by the necessary 20 utils, leaving Lilly's overall utility unchanged:

$$\text{MRS}_{\text{Y,X}} = \frac{20}{4} = 5$$

Our assumption that preferences are complete implies that **there exists an indifference curve through every combination**. Thus, Lilly's preferences will include an infinite number of indifference curves lying nestled together on the diagram—even though only three of the indifference curves, representing three levels of utility, appear on Figure 4. In other words, an infinite number of indifference curves are not drawn on this diagram but you should remember that they exist.

The combination of the more is better and transitivity assumptions assure us that **higher indifference curves represent a greater level of utility** than lower ones. In Figure 4, indifference curve U_L can be thought of as a "low" level of utility, while U_M is a "medium" level of utility and U_H is a "high" level of utility. All of the choices on indifference curve U_H

are preferred to all of the choices on indifference curve U_M, which in turn are preferred to all of the choices on U_L.

To understand why higher indifference curves are preferred to lower ones, compare point B on indifference curve U_M to point F on indifference curve U_H. Point F has greater consumption of both books (5 to 3) and doughnuts (100 to 84), so point F is clearly preferable to point B due to our assumption that more is better. The more is better assumption, however, does not allow us to directly compare point F to point C, since point F has more has more doughnuts but point C has more books. Transitivity gives us the desired result: since point F is preferable to point B and point B gives the same level of utility as point C, point F is also preferable to point C. Given the definition of an indifference curve—that all the points on the curve have the same level of utility—if point F on indifference curve U_H is preferred to point B on indifference curve U_M, then it must be true that all points on indifference curve U_H have a higher level of utility than all points on U_M.

More generally, for any point on a lower indifference curve, like U_L, you can identify a point on a higher indifference curve like U_M or U_H that has a higher consumption of both goods. Since one point on the higher indifference curve is preferred to one point on the lower curve, and since all the points on a given indifference curve have the same level of utility, it must be true that all points on higher indifference curves have greater utility than all points on lower indifference curves. A final point to note is that **indifference curves never cross**. If they did, then we would have a single combination—where the curves intersect—that would be assigned two levels of utility and transitivity would be violated.

These arguments about the shapes of indifference curves and about higher or lower levels of utility do not require any numerical estimates of utility, either by the individual or by anyone else. They are only based on the assumptions that we have made in this section. Given these gentle assumptions, an indifference map can be constructed to describe the preferences of any individual.

The Individuality of Indifference Curves and Special Cases

Each person determines their own preferences and utility. Thus, while indifference curves have the same general characteristics—they exist, they are downward sloping, and they never cross—the specific shape of indifference curves can be different for every person. Figure 4, for example, applies only to Lilly's preferences. Indifference curves for other people would probably travel through different points. Also, the convexity of typical indifference curves is just that—typical. Not all indifference curves have this same type of curvature. Figure 5 shows two examples of indifference curves that are not convex to the origin.

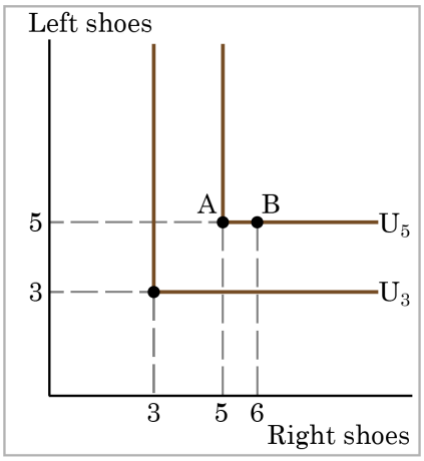

Figure 5-a Perfect complements

In Figure 5-a we have Jim's preferences over left shoes and right shoes. These goods are **perfect complements** for Jim, meaning he always consumes them together. The bend in the indifference curves represents situations where Jim has equal amounts of left and right shoes,

meaning he has a number of complete pairs of shoes. If, starting from Point A where Jim has exactly five pairs of shoes, we were to give him an extra right shoe would he be made better off? Not likely. Point B, where Jim has five left shoes and six right shoes, is therefore on the same indifference curve as Point A. The same would be true if we were to increase only his consumption of right shoes. Indifference curves for perfect complements are therefore L-shaped. Notice that not all examples of perfect complements are consumed in a 1:1 ratio. If you wear glasses, for example, you likely consume two lenses for each set of frames. Since perfect complements are always consumed together in a constant ratio, it is unsurprising that they also tend to be sold together as a bundle.

Figure 5-b shows Sally's preferences for blue pencils and yellow pencils. Since Sally has no preference over the color of the pencil she uses, the goods are **perfect substitutes**. She will trade one blue pencil for an additional yellow pencil no matter how many of each she has currently. What matters to Sally is not the number of each color but the total number of pencils. In this case the marginal rate of substitution is constant which implies that the indifference curves are linear. The key to perfect substitutes is that the marginal rate of substitution is constant, not that it is necessarily equal to one. Sally would be willing to trade 2 five-packs of pencils for one 1 ten-pack of pencils regardless of how many of each size package she has currently.

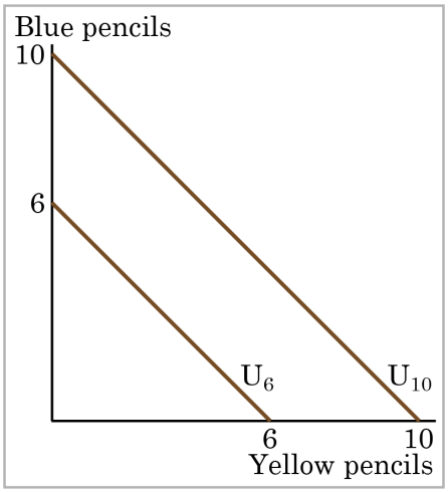

Figure 5-b Perfect substitutes

5.3 Two Approaches to Utility Maximization

Now that we have formalized our description of the budget set in Section 5.1 and the description of preferences in Section 5.2, we are ready to maximize a consumer's utility. As always, we will make decisions at the margin, comparing the incremental effects of any option we are considering. There are two equally valid ways we can approach the problem of utility maximization. In this section we will consider both methods.

Utility Maximization Using Indifference Curves and Budget Lines

People seek the highest level of utility, which means that they wish to be on the highest possible indifference curve. However, people are limited by their budget sets, which show what tradeoffs are actually possible.

Return to the situation of Lilly's choice between paperback books and doughnuts. Say that books cost $6, doughnuts are 50 cents each, and that Lilly has $60 to spend. This information provides the basis for the budget line shown in Figure 6. Along with the budget line are shown the three indifference curves from Figure 4. What is Lilly's utility-maximizing choice? Several possibilities are identified in the diagram.

The choice of F with five books and 100 doughnuts is highly desirable, since it is on the highest indifference curve of those shown in the diagram (U_H). However, it is beyond Lilly's budget set and is therefore not affordable given Lilly's income and the goods' prices. The

choice of H with three books and 70 doughnuts on indifference curve U_L is in her budget set but cannot be utility maximizing since more is better and she could afford more of both goods

Utility Maximization Condition 1:

Consume at a point *on* the budget line.

$$P_X \times X + P_Y \times Y = I$$

starting from this point. As we noted in the previous section, Lilly will always prefer a choice on the budget constraint itself. This is the first condition of utility maximization.

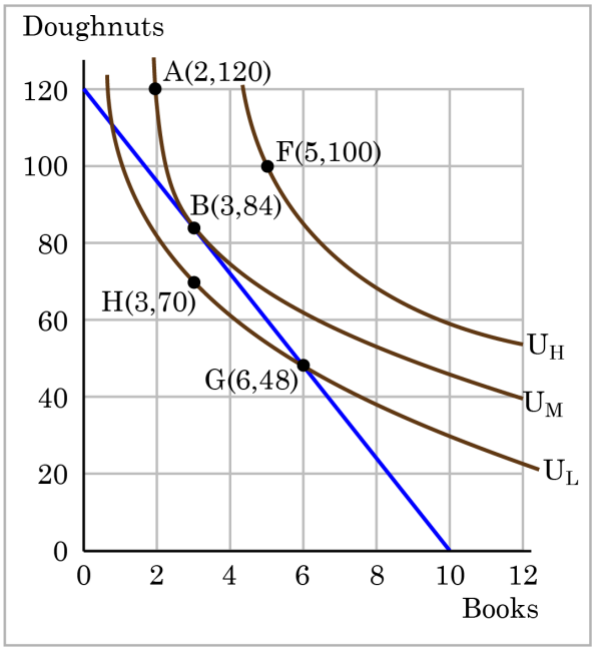

Figure 6 Indifference curves and budget constraint

Choices B and G are both on the budget line. However, choice G of 6 books and 48 doughnuts is on lower indifference curve U_L than choice B of 3 books and 84 doughnuts, which is on the indifference curve U_M. Consider choice G, where the budget line is steeper than the indifference curve. Recall that the slope of the budget line tells us the opportunity cost of a book and the slope of the indifference curve tells us Lilly's marginal rate of substitution. At point G, the opportunity cost of a book is greater than Lilly's MRS. At this point, she must give up more doughnuts (opportunity cost) than she is willing to give up (marginal rate of substitution) for an additional book. This means that she gave up more than she was willing for the last book consumed and would therefore be made better off by consuming fewer books and more doughnuts, so she should move towards point B. At point B, Lilly's marginal rate of substitution is exactly equal to the opportunity cost of a book. This means that consuming one more or one less book would cost her exactly what it is worth to her—she cannot be made no better off by adjusting her consumption. The highest achievable indifference curve touches the opportunity set at a single point of tangency. This condition that the slope of the budget line exactly equals the slope of the indifference curve is the second condition for utility maximization.

Since an infinite number of indifference curves exist, even if only a few of them are drawn on any given diagram, there will always exist one indifference curve that touches the budget line at a single point of tangency. All higher indifference curves, like U_H, will be completely above the budget line and, although the choices on that indifference curve would provide higher utility, they are not affordable given the budget set. All lower indifference curves, like

Utility Maximization Condition 2:

Consume at a point of tangency between an indifference curve and the budget line.

$$\frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$$

U_L, will cross the budget line in two separate places. When one indifference curve crosses the budget line in two places, however, there will be another, higher, attainable indifference curve sitting above it that touches the budget line at only one point of tangency.

Utility Maximization by Comparing Bang-for-the-Buck

The second, equally valid, approach to utility maximization relies on logic rather than the graphs we have developed above. As before, our consumer is going to want to spend all of their income in order to maximize their utility. The first condition for utility maximization is therefore the same as above.

Utility Maximization Condition 1:

Spend *all* income.

$$P_X \times X + P_Y \times Y = I$$

Since decisions should always be made *at the margin*, we should approach spending our income by incrementally considering where to spend each dollar. Having learned about utility, your initial reaction may be to spend your next dollar on the good that offers you the greatest utility. That approach, however, would be misguided. For many of us, that approach would lead to choose a good that is critical to our survival, like water. Presumably, being alive brings us much satisfaction. Why do we not continually purchase more water? The answer lies in the distinction between *total* and *marginal* utility. While water brings us a high level of overall utility, *another* glass of water probably won't add much to that level of happiness. This is the law of diminishing marginal utility at work. You've likely already consumed water today and the next glass will not make the difference between life and death.

If not the good that offers the greatest level of utility, perhaps we should spend the next dollar on the good that offers the greatest marginal utility. This is certainly an improvement over choosing the good offering the greatest total utility, but it will still lead us to making questionable decisions. What good would increase your overall happiness the most if you had one more unit? Perhaps an exotic sports car or maybe a trip to the South Pacific? Sounds good, right? Well, now imagine what happens if you show up at the car dealership with one dollar to spend. You're not going to be driving away in a new car! You would be lucky to get a key chain and more likely you would be laughed out of the dealership. So if you shouldn't spend the next dollar on the good offering either the greatest utility or the greatest marginal utility, where should you spend it? The answer is that **you should always spend the next dollar on the good offering the greatest marginal utility per dollar spent (MU / P)**. In other words, you should spend your next dollar on the good that offers you the most "bang-for-the-buck".

Consider the situation of José, who likes to wear t-shirts and watch movies. José has a total of $77 to spend on these goods each month. The price of t-shirts is $14 and the price of movies is $7. José wishes to choose the combination that will provide him with the greatest utility. Table 1 shows how José's utility is connected with his consumption of t-shirts or movies. The first column of the table shows the quantity of t-shirts consumed. The second column shows the total utility, or total amount of satisfaction, that José receives from consuming that number of t-shirts. The third column shows **marginal utility**. Notice that José's preferences satisfy our assumption that more is better—consuming additional goods

Table 1 Marginal utility per dollar spent

Quantity of t- shirts	Total utility	Marginal utility	Marginal utility per dollar spent	Quantity of movies	Total utility	Marginal utility	Marginal utility per dollar spent
1	25	25	25/$14=1.8	1	18	18	16/$7=2.3
2	**47**	**22**	**22/$14=1.6**	2	35	17	17/$7=2.4
3	68	21	21/$14=1.5	3	50	15	15/$7=2.14
4	88	20	20/$14=1.4	4	64	14	14/$7=2
5	106	18	18/$14=1.3	5	77	13	13/$7=1.9
6	122	16	16/$14=1.1	6	89	12	12/$7=1.7
7	136	14	14/$14=1	**7**	**100**	**11**	**11/$7=1.6**
8	148	12	12/$14=1.2	8	101	10	10/$7=1.4

leads to greater total utility—and also the **law of diminishing marginal utility**—additional units increase his utility at a decreasing rate. For example, the first t-shirt José picks keeps him from being exposed to the elements and it gives him an addition of 22 utils. The fourth t-shirt is just to something to wear when all his other clothes are in the wash and yields only 18 additional utils. The final column shows how much marginal utility José receives per dollar spent. The rest of Table 1 shows the quantity of movies that José attends, his total and marginal utilities from seeing each movie, and his marginal utility per dollar spent for each number of movies. As with t-shirts, total utility from movies follows the expected pattern: it increases as the number of movies seen rises. Marginal utility also follows the expected pattern: each additional movie brings a smaller gain in utility than the previous one. The first movie José attends provides him with the highest level of utility or satisfaction. As he goes to more and more movies, the less he appreciates seeing yet another.

José's first purchase will be a movie. Why? Because it gives him the greatest marginal utility per dollar spent and it is affordable given his $77 income. Now, José has $70 left to spend and will choose a second movie since the second movie offers him more bang-for-the-buck than the first t-shirt. He will continue to purchase the good which gives him the highest marginal utility per dollar spent until he exhausts the budget. After purchasing the fifth movie, which still gives him more marginal utility per dollar spent (1.9 utils/dollar) than the first t-shirt (1.8 utils/dollar), José must choose between the sixth movie and the first t-shirt. The first t-shirt is now worth purchasing since it gives him more bang-for-the-buck than the seventh movie. After purchasing the first t-shirt, José chooses between the second t-shirt and the seventh movie. As you can see, he receives an equal level of marginal utility per dollar spent and is therefore indifferent between these two goods. Luckily, having purchased six movies for $7 each and one t-shirt for $14, he has $21 left to spend and can just afford both the seventh movie and the second t-shirt (it makes no difference which he consumes first). So José will choose to purchase seven movies and two t-shirts.

In the case of José, we assumed that he was constrained to buying whole units of movies and t-shirts. In general, economists assume that goods are perfectly divisible so that you can buy any amount of the good you desire, including fractional units. This was true on the budget

line and the indifference curves presented before. While it may seem unrealistic to assume that one could purchase half of a t-shirt or one and two-thirds of a movie, a shift in our interpretation can help to understand this simplifying assumption. Half a t-shirt means that José purchases one t-shirt every other month so that he consumes half a t-shirt in an average month. This process of decision making suggests a rule to follow when maximizing utility. If we always spend the next dollar on the good offering the greatest marginal utility per dollar spent, then what must be true when we've exhausted all of our income? The goods must offer the same bang-for-the-buck!

Reverting to generic goods X and Y, if we spend all of our money and find that

$$\frac{MU_X}{P_X} > \frac{MU_Y}{P_Y}$$

it is not possible that we have maximized our utility. Why? Imagine what would happen if we were to return one dollar's worth of good Y and use that dollar to buy one dollar's worth of good X. Our utility would fall by the bang-for-the-buck of the returned good Y but then it would rise by the bang-for-the-buck of the newly acquired good X. Having risen by more than it fell, our overall utility has increased. Anytime we get different bang-for-the-buck from different goods, we have the opportunity to increase our overall utility by exchanging a small amount of the good offering the lower marginal utility per dollar spent for more of the good with the higher marginal utility per dollar spent. The only time we can't make one of the small utility increasing trades is when the goods offer the same bang-for-the-buck. This is the second condition for utility maximization.

Utility Maximization Condition 2:

Equate the marginal utility per dollar spent for each good.

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$$

Clearly, the first condition for utility maximization is the same whether we use the indifference curve and budget line approach or we use the bang-for-the-buck approach. Consuming on the budget line is the same thing as spending all income. It turns out that the second conditions are also equivalent. If you multiply both sides of the above bang-for-the-buck condition by P_X and divide both sides by MU_Y, you will get the tangency condition from before:

$$\frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$$

Indeed, this tangency condition holds at José's utility maximization condition of two t-shirts and seven movies. He is willing trade two movies for one additional t-shirt:

$$MRS_{M,T} = \frac{MU_T}{MU_M} = \frac{22}{11} = 2$$

which is exactly the opportunity cost of an additional movie:

$$\frac{P_T}{P_M} = \frac{14}{7} = 2$$

How Changes in Income Affect Consumer Choices

Just as utility and marginal utility can be used to discuss making consumer choices along a budget line, these ideas can also be used to think about how consumers respond when the budget constraint shifts due to a change in income.

Let's return now to Alphonso's choice of how many burgers and bus tickets to buy. Figure 7 adds indifference curves to Figure 2, which showed the effect on Alphonso's budget line of a doubling of his income from $10 to $20. When his income is $10, he maximizes his utility by choosing the point on the budget line (Condition 1) where there is a tangency between the budget line and an indifference curve (Condition 2). At this point he consumes 2 burgers and 12 bus tickets. When his income increases, causing his budget line to shift out parallel to itself, he simply satisfies the same two conditions on his new budget line. In this case, Alphonso increased his consumption of burgers from 4 to 6 and his consumption of bus tickets from 12 to 16. **Normal goods** are defined as those for which consumption increases as income increases and vice versa. Because Alphonso increases his consumption of both goods when his income rises, they are both normal goods.

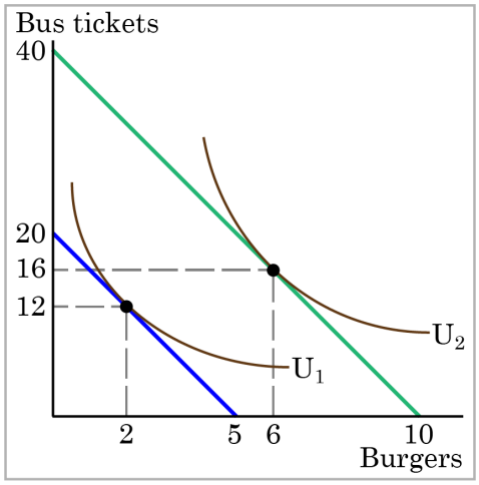

Figure 7-a An increase in

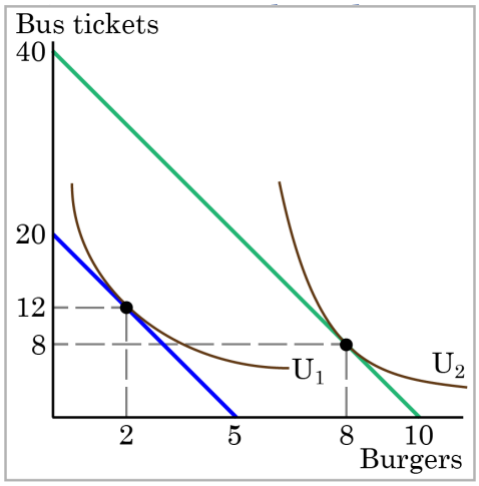

Figure 7-b An increase in income: an inferior good

Figure 7-b shows another possibility. In this case, Alphonso responds to the same increase in income by increasing his consumption of burgers from 2 to 8 but decreasing his consumption of bus tickets from 12 to 8. In this case, bus tickets are an **inferior good** for Alphonso since he reduces his consumption of them as his income rises.

It would also have been possible for the tangency point on the new budget line to be up and to the left of the original utility maximizing combination. In that case, burgers would be an inferior good and bus tickets would be a normal good. Notice that, since more is better, it is not possible for all goods to be inferior—Alphonso must consume more of at least one good when his income rises or he will no longer be consuming at a point on his budget line.

How Price Changes Affect Consumer Choices

For analyzing the possible effect of a change in price on consumption, let's consider how Alphonso's friend Ray responds to an increase in the price of burgers from \$2 to \$4 while holding the price of bus tickets constant at \$0.50 and holding income constant at \$20. Figure 8 shows the effect this has on Ray's budget line as well as the impact that it has on his utility maximizing choice. As in Section 5.1, the increase in the price of burgers lowers the maximum number of burgers he can afford while leaving the maximum number of bus tickets he can afford unchanged. His budget line becomes steeper as the opportunity cost of a burger (P_B/P_T) increases from four bus tickets to eight bus tickets and the opportunity cost of a bus ticket (P_T/P_B) falls from one-fourth of a burger to one-eighth of a burger. Before the price increase, Ray maximizes his utility by consuming 7 burgers and 12 bus tickets (note that Ray has different preferences than Alphonso). When the price of burgers increases, he finds his new utility maximizing combination of 4 burgers and 8 bus tickets.

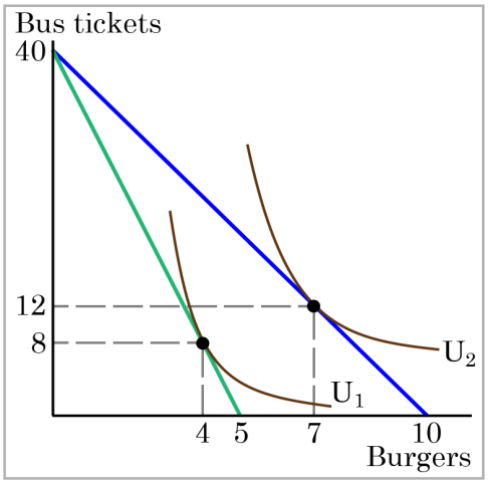

Figure 8 An increase in the price of burgers

The typical response to higher prices is that a person chooses to consume less of the product with the higher price. This is the law of demand: as price rises quantity demanded falls, and as price falls quantity demanded rises. In fact, we have just found two points on Ray's demand curve for burgers. By varying the price of burgers while holding all other factors constant, we can map out the entire relationship between the price of burgers and the quantity that Ray would like to consume—the definition of demand. In this case, the increase in the price of burgers caused Ray to also consume fewer bus tickets.

It would be easy to show that, for another set of indifference curves, Ray could just as easily have reduced his consumption of burgers while increasing his consumption of bus tickets. It is also possible that Ray could have increased his consumption of burgers when the price of burgers increased. This would represent a violation of the law of demand. Goods that violate the law of demand, known as **Giffen goods**, are theoretically possible given the limited assumptions we have made about preferences. In practice, it is exceedingly difficult to find a solid real world example of a Giffen good. It is therefore left to the reader to ponder their existence. We will take a closer look at the effects of a price change in Section 5.4.

The key takeaway from this analysis is that it would be imprudent to assume that a change in the price of a good will only affect the good whose price is changed, while the quantity consumed of other goods remains the same. Since Ray purchases all his products out of the same budget, a change in the price of burgers can also have a range of effects, either positive or negative, on the quantity of other goods consumed. In short, a higher price typically reduces the quantity demanded of the good in question, but it can affect the demand for other goods as well.

Measuring Utility with Numbers

This discussion of utility started off with an assumption that it is possible to place numerical values on utility, an assumption that may seem questionable. You can buy a thermometer for measuring temperature at the hardware store, but what store sells an "utiliometer" for measuring utility? However, while measuring utility with numbers is a convenient assumption to clarify the explanation, the key assumption is not that utility can be measured by an outside party, but only that individuals can decide which of two alternatives they prefer.

To understand this point, think back to the step-by-step process of finding the choice with highest total utility by comparing the marginal utility that is gained and lost from different combinations of t-shirts and movies. When José decides what to buy next, what matters is not the specific numbers that he places on his utility—or whether he uses any numbers at all—but only that he personally can identify which choices he prefers.

In this way, the step-by-step process of choosing the highest level of utility resembles rather closely how many people make consumption decisions. We think about what will make us the happiest; we think about what things cost; we think about buying a little more of one item and giving up a little of something else; we choose what provides us with the greatest level of satisfaction. The vocabulary of comparing the alternatives using prices and marginal utilities is just a set of tools for discussing this everyday process in a clear and specific manner. It is welcome news that specific utility numbers are not central to the argument, since a good utiliometer is hard to find. Do not worry—while we cannot measure utils, we can transform our analysis into something we can measure—demand.

Consumer Choice and Sunk Costs

As we could see in Chapter 1, economic decisions are made at the margin. This, of course, includes consumers' choices. Rational consumer do not look back to past choices. That is, **sunk costs**, which are costs that were incurred in the past and cannot be recovered, should not affect the current decision.

For example, consider the case of Selena, who pays $8 to see a movie, but after watching the film for 30 minutes, she knows that it is truly terrible. Should she stay and watch the rest of the movie because she paid for the ticket, or should she leave? The money she spent is a sunk cost, and unless the theater manager is feeling kindly, Selena will not get a refund. But staying in the movie still means paying an opportunity cost in time. Her choice is whether to spend the next 90 minutes suffering through a cinematic disaster or to do something else. The lesson here again is that sunk costs should not influence your decisions. Forget about the money and time that is irretrievably gone and instead focus on the marginal costs and benefits of current and future options.

From a Model with Two Goods to One of Many Goods

The budget set and indifference curves presented above, like most models used in this course, is not realistic. After all, in a modern economy people choose from thousands of goods. However, thinking about a model with many goods is a straightforward extension of what we discussed here. Instead of drawing just one budget constraint, showing the tradeoff between two goods, you can draw multiple budget constraints, showing the possible tradeoffs between

many different pairs of goods. In more advanced courses in economics you would use mathematical equations that include many possible goods and services that can be purchased, with their quantities and prices, and show how the total spending on all goods and services is limited to the overall budget available. The graph with two goods that was presented here clearly illustrates that every choice has an opportunity cost, which is the point that does carry over to the real world.

5.4 The Two Effects of a Price Change

As we have already seen in Figure 8, an increase in a good's price has two impacts on the budget set. First, the slope of the budget line increases—this represents an increase in the opportunity cost of that good and a decrease in the opportunity cost of the other good. At the same time, a portion of the overall budget set is lost—this represents a decrease in the purchasing power of the consumer's income. Conversely, a lower price for a good will lower that good's opportunity cost while raising the other good's opportunity cost and it will also increase the purchasing power of the consumer's income. We can explore the change in quantity demanded due to a price change in more detail by examining these changes separately. The **substitution effect** of a price change is caused by the change in relative prices (i.e., the slope of the budget line), holding purchasing power constant. The **income effect** of a price change is caused by the change in purchasing power, holding relative prices constant. The actual change in consumption due to a price change is a combination of these two effects, which depend on personal preferences.

If, for example, Rebecca goes to the store searching for broccoli and carrots to have with her dinner and finds that the price of broccoli has increased, she will likely reduce the amount of broccoli she buys. Partly, this is because she substitutes away from the now relatively expensive broccoli towards additional carrots, which have become relatively cheap. This is the substitution effect. At the same time, the increase in the price of broccoli has reduced Rebecca's overall set of affordable options—her budget set—making her feel less wealthy. The decrease in her purchasing power will cause Rebecca to buy less broccoli if broccoli is a normal good but will cause her to increase her broccoli consumption if broccoli is an inferior good. This is the income effect. It is important to note that we are not talking about an actual change in her income but rather a change in the purchasing power of her income. In a sense, an increase in price is "like" a decrease in income since they both reduce the consumer's purchasing power—making the consumer feel less wealthy. It might be more accurate to call the "income effect" a "purchasing power effect," but the "income effect" terminology has been used for decades, and it is not going to change during this course.

Notice that income and substitution effects work together (i.e., in the same direction) for normal goods. If the price of a normal good rises, the consumer substitutes away from that good towards another relatively cheap good. At the same time, the consumer feels less wealthy and therefore further reduces their consumption of the good. For normal goods, the income and substitution effects will both lead the consumer to buy less of the good when its price increases and will both lead the consumer to buy more of the good if its price falls. With inferior goods, the income and substitution effects work in opposite directions. When the price of an inferior good rises, the substitution effect still leads the consumer to substitute away from that good towards other goods that have become relatively cheap. The income effect, however, causes the consumer to increase their consumption since they now feel less wealthy because of the price increase. So the substitution effect always works in the opposite direction

of the price change but the income effect can go in either direction depending on the type of good.

Income and substitution effects can tell us more about the possibility of Giffen goods, which were introduced in the previous section. A Giffen good violates the law of demand so that a price increase actually causes the consumer to buy more of the good. The hard part about finding an example of a Giffen good is making sure that an observed increase in quantity demanded is due to the price increased and not because some other influence on quantity demanded has changed. When we see people buying more bottled water at higher prices after a hurricane, for example, it is not the higher price that causes them to buy more but rather the preference for bottled water when other sources of water become unavailable. Likewise, when we buy more of a stock or collectible upon seeing its price rise we do not do so because the price went up but rather because we expect it to continue rising. In either of these examples, we have an outward shift in the entire demand curve rather than a demand curve with a positive slope. So what would it take to have a Giffen good? Since the substitution effect will always tell us to buy less of the good as price increases, Giffen goods must also be inferior goods. That is, the income effect must tell us to buy more of the good when its price rises. Not only must the good be inferior, the income effect must dominate the substitution effect so that the overall impact of a price change is that the consumer purchases more of the good. Normally, however, we expect the substitution effect to be stronger than the income effect.

Using indifference curves, we can illustrate the substitution and income effects graphically. In Figure 9, Rebecca chooses between broccoli and carrots. She originally faces the flatter blue budget line and maximizes her utility by purchasing 6 crowns of broccoli and 12 carrots.

When the price of broccoli increases, Rebecca's budget line rotates clockwise about the vertical axis to the new steeper green budget line, so Rebecca's budget line becomes steeper and she also loses a large portion of her budget set. Faced with the new higher price of broccoli, Rebecca now maximizes her utility by choosing 3 crowns of broccoli and 8 carrots. The 3 crown decrease in broccoli purchases is due to the combination of the substitution effect the income effect.

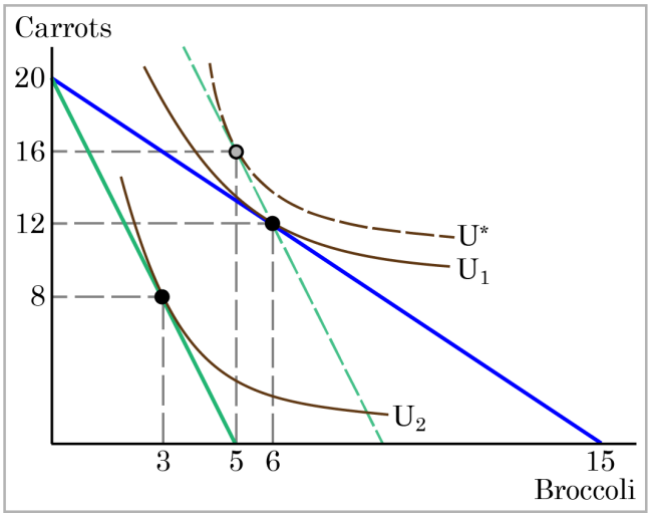

Figure 9 The substitution effect and the income effect

To separate the substitution effect from the income effect, we ask the following hypothetical question: How would Rebecca change her consumption if the relative prices of the two goods changed but this change in relative prices did not affect her purchasing power? The dashed green line in Figure 9 is an imaginary budget line that provides the answer to this question. The imaginary budget line is parallel with the new budget line, so it reflects

the new relative prices, but it passes through Rebecca's original choice of 6 crowns of broccoli and 12 carrots, so it reflects the original level of purchasing power.

If faced with this imaginary budget line, Rebecca can still just afford the original combination if she wants but, as we can see, the imaginary budget line actually allows her to reach the higher indifference curve (U*) by substituting away from broccoli towards more carrots. This movement from the original utility maximizing combination (6 crowns of broccoli and 12 carrots) to the utility maximizing combination on the imaginary budget line (5 crowns of broccoli and 16 carrots) is the substitution effect. That is, if we change the relative price of broccoli while holding Rebecca's purchasing power constant, she will reduce her consumption of broccoli from 6 crowns to 5 crowns and increase her consumption of carrots from 12 to 16.

The income effect tells us the portion of the overall decrease in broccoli consumption that is due to Rebecca's loss of purchasing power. The movement from the imaginary dashed budget line to the new budget line is a parallel inward shift. This is exactly the effect that a decrease in income would have on the budget line, and the change in consumption associated with this shift is the income effect. In Figure 9 the income effect causes Rebecca to reduce her consumption from 5 crowns to 3 crowns—a 2 broccoli crown decrease due to the income effect. Since the income effect causes her to buy less when price rises, broccoli is a normal good for Rebecca. The parallel inward shift from the imaginary budget line to the new budget line also allows us to determine that carrots are a normal good for Rebecca since she reduces her consumption of them (from 16 to 8) when the budget line shifts in this way.

Now, put the substitution and income effects together. When the price of broccoli increased, Rebecca consumed 3 fewer crowns of it for two reasons: the substitution effect of the higher price causes her to consume 1 crown less and the income effect causes her to consume 2 crowns less. While the substitution effect alone would have caused her to increase her carrot consumption by 4, it is overpowered by the income effect, which leads her to consume 8 carrots less, so she ends up consuming $8 - 4 = 4$ carrots less. Thus an increase in the price of broccoli causes Rebecca to consume less of both goods.

The size of these income and substitution effects will differ from person to person, depending on individual preferences. Typically, we expect the substitution effect to be stronger than the income effect but this is not always the case. For example, in the winter months of 2005, costs for heating homes increased significantly in many parts of the country as prices for natural gas and electricity soared, due in large part to the disruption caused by Hurricanes Katrina and Rita. Some people reacted by reducing the quantity demanded of energy; for example, by turning down the thermostats in their homes by a few degrees and wearing a heavier sweater inside. Even so, many home heating bills rose, causing a significant decrease in consumers' purchasing power. This large income effect reduced not only consumers' ability to afford natural gas or electricity but their ability to afford all goods.

A similar issue arises when the government imposes taxes on certain products, like it does on gasoline, cigarettes, and alcohol. Say that a tax on alcohol leads to a higher price at the liquor store, the higher price of alcohol causes the budget constraint to pivot left, and consumption of alcoholic beverages is likely to decrease. However, some people may have a relatively small substitution effect and respond mostly by cutting back on other purchases. If part of the goal of a tax is to alter consumers' behavior, it is important to be aware that a small substitution effect and a large income effect may lead to unintended consequences. If, however, the main goal of a tax is to raise revenue, then the government should seek out

goods for which the substitution effect is small in order to minimize the distortionary effects of the tax.

The consumer choice model serves as a constant reminder to think about the full range of effects that can arise from changes in income or price, not just effects on the one product that might seem most immediately affected. Finally, although the substitution and income effects are often discussed as a sequence of events, it should be remembered that they are twin components of a single cause—a change in price. Although you can analyze them separately, the two effects are always proceeding hand in hand, happening at the same time.

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The Economics of Gift Giving: May All Your Sweaters Be Ugly and Bright

Economists generally view gift giving as inefficient reallocation of goods resulting in a loss of their value to consumers. Joel Waldfogel, a University of Minnesota economics professor, even published a book called "Scroogenomics: Why You Shouldn't Buy Presents for the Holidays." We'll use the model of consumer choice discussed in this chapter to see where the value loss comes from. Our analysis here applies to person-to-person gifts as well as in-kind government transfers of, say, housing or food. In either case, the effect on the recipient's

budget set is different from that of an equivalent increase in his/her income, e.g., a cash gift of the same value.

Let's consider Mary's holiday party budget. Each year, Mary is invited to a series of holiday parties where it is customary to wear the ugliest holiday sweater one can find. She has budgeted $240 per year to spend on ugly sweaters and other items to take to the parties. Mary's problem is to choose the best (i.e., utility maximizing) combination of ugly sweaters and other goods to buy. The "other goods" in this example represents spending on all other items and therefore has a price of $1 (a dollar of other goods costs exactly one dollar). If an ugly sweater costs $30 and Mary has $240 to spend on ugly sweaters and other goods, her budget line is B_1 in Figure 10-a.

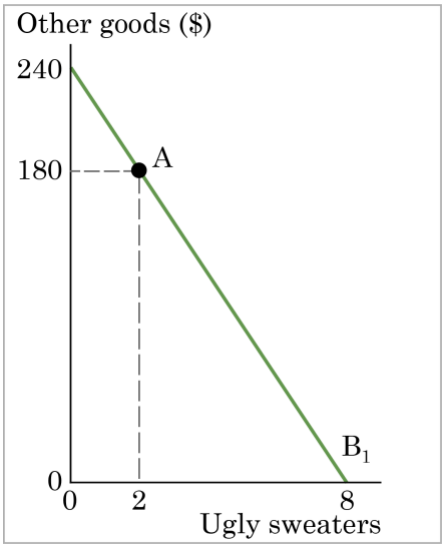

Figure 10-a Mary's budget line with no gift

If Mary spends all of her income on other goods, she can afford 240 units (dollars' worth). If, instead, she spends all of her money on ugly sweaters, she could afford 8 sweaters. The opportunity cost of an ugly sweater is the price of an ugly sweater divided by the price of other goods: $30/$1 = 30. That is, $30 worth of other goods is given up each time Mary buys an ugly sweater. For example, if Mary buys 2 ugly sweaters, she gives up $30×2 = $60 worth of other goods and has $240 − $60 = $180 left to spend on them, i.e. she consumes at point A on her budget line.

What will happen to Mary's budget constraint if she receives ugly sweaters as a gift? If Mary spends all of her income on other goods, she can still afford only $240 worth of those goods (plus the gifted ugly sweaters), but if she spends all of her money on ugly sweaters she will now have 8 of them plus the number gifted. For example, suppose Mary gets a gift of four ugly sweaters. The effect of this gift on her budget line is shown in Figure 10-b. The budget line shifts rightward by the value of the four sweaters ($4×30 = $120) so that the new budget line (B_2) is parallel to the original budget line (B_1), much like it would be if Mary's income increased by $120, except that points with more than $240 worth of other goods are not part of her new budget set.

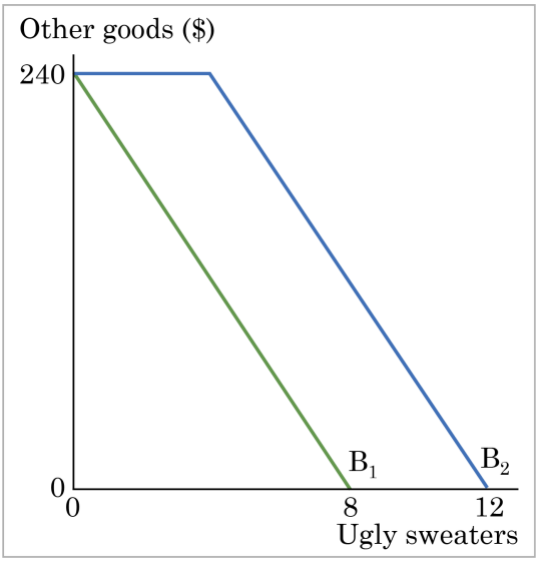

Figure 10-b Mary's budget line with a gift of four ugly sweaters (B_2)

Will this gift of four sweaters give Mary the same additional benefits as its cash equivalent would? Figure 10-c shows this possibility. Suppose that with no gift, Mary maximized her utility, i.e. reached her highest indifference curve (U_1) when consuming 2 ugly sweaters and $180 worth of other goods (point A). When her budget line shifts, whether as a result of the gift or an equivalent increase in income, she gets maximum utility when consuming 5 sweaters

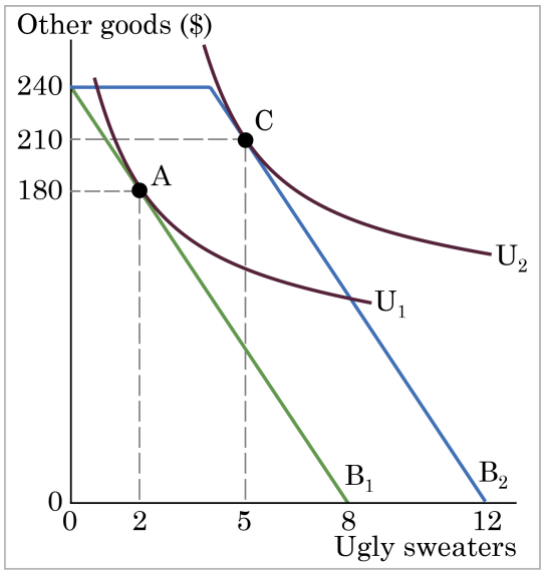

Figure 10-c A gift of four ugly sweaters raises Mary's utility to the same level as additional benefits as its cash equivalent would

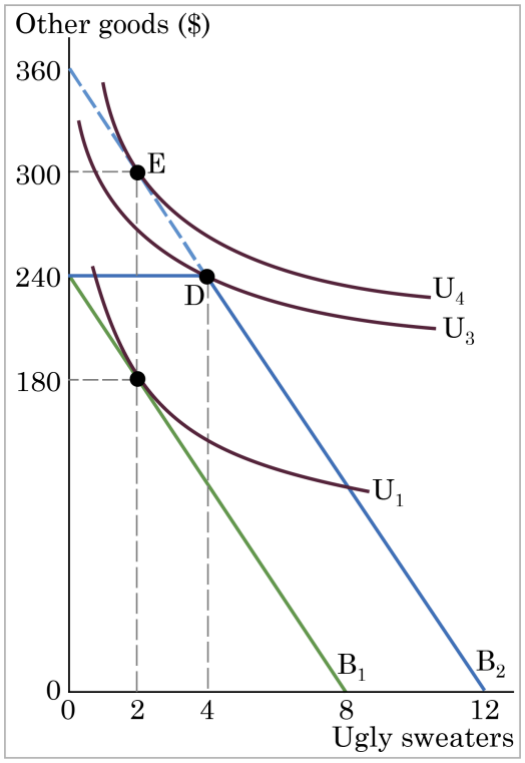

Figure 10-d Mary's utility gain from a gift of four ugly sweaters compared with that from the equivalent amount of cash

and $210 worth of other goods (point C). That is, with the new budget constraint, Mary buys only one sweater instead of two and spends the $30 freed up as a result to buy an extra $30 worth of other goods. Exactly the same would happen if Mary income increased by $120 due to a cash gift or something else. In each case Mary would receive the same utility gain, i.e. get on the same higher indifference curve, U_2.

But what if with her new budget line (B_2) Mary's utility maximizing choice is only four ugly sweaters? This situation is depicted in Figure 10-d. The highest indifference curve Mary can reach is U_3, at point D, where she consumes the four ugly sweaters given to her as a gift and buys no more sweaters, spending all her $240 budget on other goods. Now suppose that instead of the ugly sweaters, Mary is given $120 in cash. In that case, her budget line would not kink at $240, but would continue as a straight line until in intersects with the vertical axis at $360, reflecting that with the additional $120, Mary could spend $240 + $120 = $360 on other goods if she does not buy any ugly sweaters. As shown in Figure 10-d, Mary can now reach a higher indifference curve, U_4, consuming 2 ugly sweaters and $300 worth of other goods (point E). Thus, when given ugly sweaters in kind, Mary is more constrained in her choice, which forces her to a lower level of utility than she could reach when given the equivalent amount of cash.

Note that beyond the possibility for Mary to lose utility because of her getting more sweaters than she would like, there is a good chance that the person who gives her that gift won't pick out the same ugly sweaters that Mary would have chosen for herself. In that case, Mary would probably go to the store and exchange the sweaters, which would cost her time and energy. This will result in more utility loss for her.

The problem in our example may seem rather trivial. After all, ugly sweaters are not that important in the big picture, and Mary could probably receive some additional utility from donating the sweaters to someone who could use them (although probably less than she would have received from the cash value of the sweaters). However, empirical economic studies show that utility losses from gift giving are generally quite substantial. Recipients value various gifts from holiday catalogs from 72% to 92% of the amount spent on them (depending on the kind of goods gifted and, remarkably, the value loss is highest for Christmas presents from grandparents).[1]

Furthermore, the same economic reasoning applies to in-kind government transfers, such as the federally-funded Supplemental Nutrition Assistance Program (SNAP). The idea is to give people aid that allows them to get enough food to meet basic nutritional needs. And it looks appealing because these benefits cannot be directly used to buy socially undesirable goods, such as alcohol or illegal drugs. However, like Mary with her ugly sweaters, recipients of these government transfers can simply reduce their expenditures on food by the amount of the assistance and spend their own money on other goods to maximize their utility. If the assistance is worth more than its recipients would have spent on food, then it is possible that they will get more nutrition. But it is also possible that they trade their benefits for a smaller amount of cash to spend on other goods.

[1] See "Economists Say 'Bah! Humbug!' to Christmas Presents." By Josh Zumbrun. The Wall Street Journal, December 23, 2015.