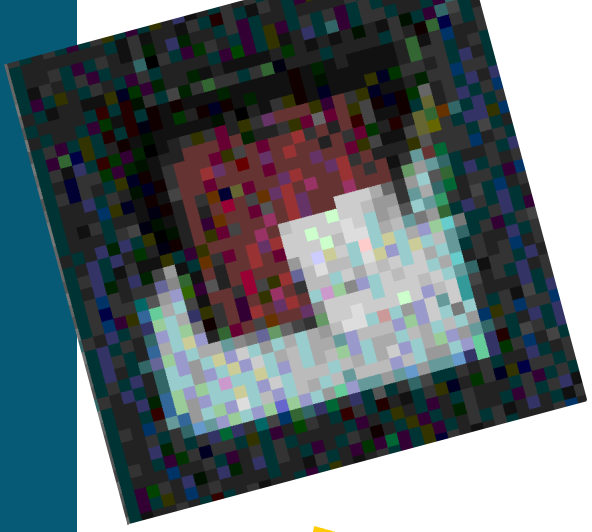
chapter 8



part three

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3

possibilities, preferences, and choices

OBJECTIVES

After studying this chapter, you will be able to:

- Calculate and graph a household's budget line and work out how the budget line changes when prices and income change
- Make a map of preferences by using indifference curves
- Identify a household's most preferred affordable consumption choices
- Predict the effects of price and income changes on consumption choices
- Use the model to explain other household choices, such as how long to work and how much to save

key elements

KEY TERMS

Diminishing marginal rate of substitution, 173
Income effect, 176
Indifference curve, 171
Marginal rate of substitution, 181
Price effect, 175
Real income, 170
Relative price, 170
Substitution effect, 177

KEY FIGURES AND TABLE

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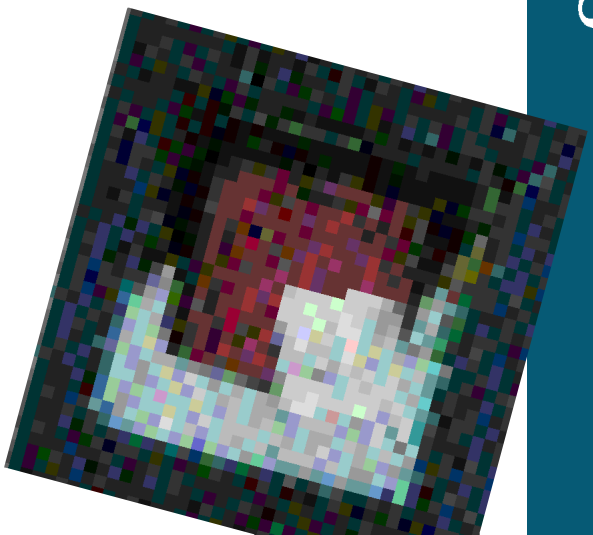


Like the continents floating on the earth's mantle, our spending patterns change steadily over time. On such subterranean movements, business empires rise and fall. Goods such as home videos and microwave popcorn now appear on our shopping lists, while 78 r.p.m. records and horse-drawn carriages have disappeared. Miniskirts appear, disappear, and reappear in cycles of fashion.

But the glittering surface of our consumption obscures deeper and slower changes in how we spend. In the last few years we've seen a proliferation of gourmet food shops and designer clothing boutiques. Yet we spend a smaller percentage of our income today on food and clothing than we did in 1950. At the same time the percentage of our income spent on fuel, housing, and medical care has grown steadily. Why does consumer spending change over the years? How do people react to changes in income and changes in the prices of the things they buy?

Similar subterranean movements govern the way we spend our time. For example, in 1889 in Australia the standard average work week was 48 hours, but there was a large range. Butchers worked 70-hour weeks. Masters of boats on Sydney Harbour were working 90-hour weeks. Although the average work week is now much shorter — about 40 hours a week for males — than it once was, far more people now have jobs. This change has been especially dramatic for women, who are much more likely to work outside the home than they were in previous generations. Why has the average work week declined? And why do more women work?

We're going to study a model of household choice that predicts the effects of changes in prices and incomes on what people buy, how much work they do, and how much they borrow and lend.

If you have read the preceding chapter on marginal utility theory, you have already met Lisa. The tale of her thirst for soft drink and zeal for movies recounted here will sound familiar to you — up to a point. But in this chapter we'll use a different method for representing preferences — one that does not require us to resort to the idea of utility. The idea of utility and its measurement is often regarded as a problem in the marginal utility theory presented in the last chapter.

CONSUMPTION POSSIBILITIES AND THE BUDGET LINE

A household's consumption choices are limited by its income and by the prices of the goods and services it buys. Households have a given amount of income to spend and cannot influence the prices of the goods and services they buy. They take prices as given. The limits to a household's consumption choices are described by its **budget line**.

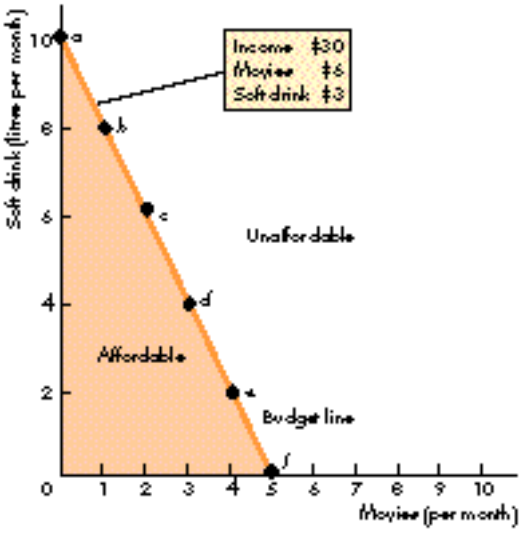
To make the concept of the household's budget line clear, we'll consider a concrete example. Lisa has an income of $30 a month to spend. She buys two goods — movies and soft drink. Movies cost $6 each; soft drink costs $3 a litre. If Lisa spends all of her income, she will reach the limits to her consumption of movies and soft drink.

In Fig. 8.1, each row of the table shows an affordable way for Lisa to consume movies and soft drink. Row *a* indicates that she can buy 10 litres of soft drink and see no movies. You can see that this combination of movies and soft drink exhausts her monthly income of $30. Row *f* says that Lisa can watch 5 movies and have no soft drink — another combination that exhausts the $30 available. Each of the other rows in the table also exhausts Lisa's income. (Check that each of the other rows costs exactly $30.) The numbers in the table define Lisa's consumption possibilities. We can graph Lisa's consumption possibilities as points *a* to *f* in Fig. 8.1.

DIVISIBLE AND INDIVISIBLE GOODS

Some goods — called divisible goods — can be bought in any quantity desired. Examples are petrol and electricity. We can best understand the model of household choice we're about to study if we suppose that all goods and services are

FIGURE 8.1
The Budget Line



Consumption possibility	Movies (per month)	Soft drink (litres per month)
a	0	10
b	1	8
c	2	6
d	3	4
e	4	2
f	5	0

Lisa's budget line shows the boundary between what she can and cannot afford. The table lists Lisa's affordable combinations of movies and soft drink when she has an income of $30 and when soft drink costs $3 a litre and movies cost $6 each. For example, row *a* tells us that Lisa can buy 10 litres and see no movies — a combination that exhausts her $30 income. The figure graphs Lisa's budget line. Points *a* to *f* on the graph represent rows of the table. For divisible goods, the budget line is the continuous line *af*.

divisible. For example, Lisa can consume a half a movie a month *on the average* by seeing one movie every two months. When we think of goods as being divisible, the consumption possibilities are not just the points *a* to *f* shown in Fig. 8.1, but those points plus all the intermediate points that form the line running from *a* to *f*. Such a line is a budget line.

CHANGES IN PRICES AND INCOME

The budget constraint changes when prices and household income change. We can illustrate this point by studying an equation that describes Lisa's consumption possibilities. The **budget equation** states the limits to consumption for a given income and for given prices.

Part 1 of Table 8.1 lists the variables that affect a household's budget — income, the prices of the goods consumed, and the quantities consumed. In Lisa's case, her income is $30, the prices are $6 for a movie and $3 for a litre of soft drink, and Lisa will choose the quantities of movies and soft drink to consume.

Part 2 of the table says that expenditure — equal to the sum of the expenditures on each of the goods — equals income. Expenditure on any one good equals its price multiplied by the quantity consumed.

Part 3 of the table shows you how to derive the budget equation:

$$Q_s = y/P_s - (P_m/P_s)Q_m$$

This equation tells us how the consumption of one good varies as consumption of the other good varies. To interpret the equation, let's go back to the budget line of Fig. 8.1 and check that the budget equation derived in Table 8.1 delivers the graph of the budget in Fig. 8.1. Begin by setting

TABLE 8.1
Calculating the Budget Equation

In general		In Lisa's case
1. The variables		
Income	$= y$	$y = \$30$
Price of movies	$= P_m$	$P_m = \$6$
Price of soft drink	$= P_s$	$P_s = \$3$
Quantity of movies	$= Q_m$	$Q_m =$ **Lisa's choice**
Quantity of soft drink	$= Q_s$	$Q_s =$ **Lisa's choice**
2. The budget		
$P_s Q_s + P_m Q_m = y$		$\$3Q_s + \$6Q_m = \$30$
3. Calculating the budget equation		
• **Divide the budget equation by P_s to obtain:** $Q_s + (P_m/P_s) Q_m = y/P_s$		• **Divide the budget equation by $3 to obtain:** $Q_s + 2Q_m = 10$
• **Subtract $(P_m/P_s)Q_m$ from both sides to obtain:** $Q_s = y/P_s - (P_m/P_s)Q_m$		• **Subtract $2Q_m$ from both sides to obtain:** $Q_s = 10 - 2Q_m$

the quantity of movies, Q_m, equal to zero. In this case, the budget equation tells us that the quantity of soft drink, Q_s, will be y/P_s, which is \$30/\$3, or 10 litres. This combination of Q_s and Q_m is the same as that shown in row *a* of the table in Fig. 8.1. Setting Q_m equal to 5 makes Q_s equal to zero (row *f* of the table in Fig. 8.1). Check that you can derive the other rows of the table in Fig. 8.1.

The budget equation contains two variables chosen by the household (Q_m and Q_s) and two variables (y/P_s and P_m/P_s) that the household takes as given. Let's look more closely at these variables.

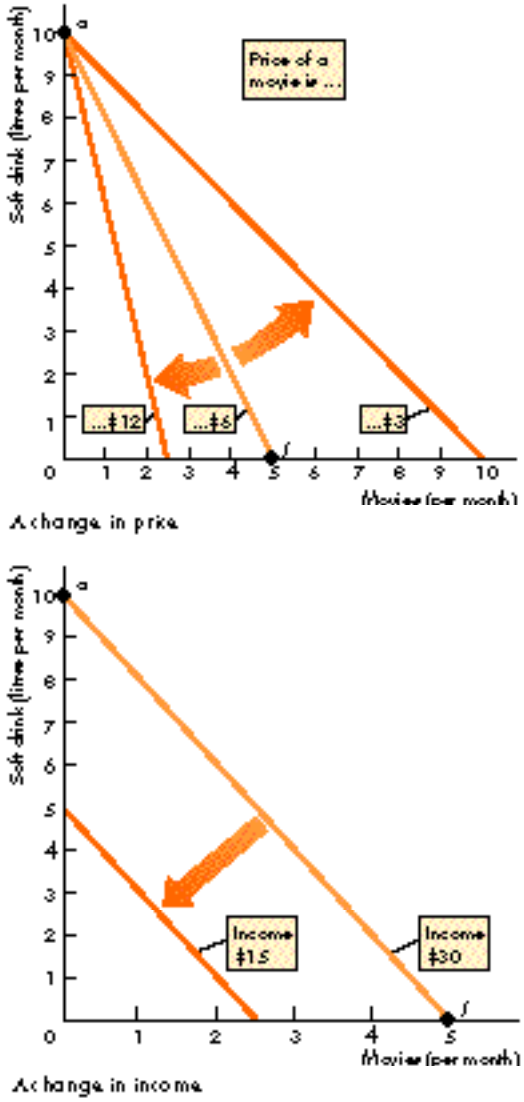
Real Income The variable y/P_s is the maximum number of litres that can be bought, and is called real income in terms of soft drink. **Real income** is income expressed in units of goods. It is dollar income divided by the price of a good. In Lisa's case, her real income in terms of soft drink is 10 litres. Real income is the point at which the budget line intersects the *y*-axis in Fig. 8.1.

Relative Price The variable (P_m/P_s) is the relative price of movies in terms of soft drink. A **relative price** is the price of one good divided by the price of another good. In the equation, P_m/P_s is equal to 2. That is, to see one more movie, Lisa must give up 2 litres of soft drink. In Fig. 8.1 the relative price of movies to soft drink is the magnitude of the slope of the budget line. To calculate the slope of the budget line, recall the formula for slope that was introduced in Chapter 2: the slope of a line equals the change in the variable measured on the *y*-axis divided by the change in the variable measured on the *x*-axis as we move along the line. In this case the variable measured on the *y*-axis is the quantity of soft drink, and the variable measured on the *x*-axis is the quantity of movies. Along Lisa's budget line, as soft drink decreases from 10 to 0 litres, movies increase from 0 to 5. Therefore the slope of the budget line is –10/5, or –2. The relative price of one good in terms of another is the opportunity cost of the first good in terms of the second. In Lisa's case, the opportunity cost of 1 movie is 2 litres of soft drink. Equivalently, the opportunity cost of 2 litres of soft drink is 1 movie.

A CHANGE IN PRICES

When prices change, so does the budget line. The lower the price of the good measured on the horizontal axis, other things remaining the same, the less steep is the budget line. For example, if the price of movies falls to \$3 a movie, the budget line shifts outward and becomes less steep, as shown in Fig. 8.2(a). The higher the price of the good measured on the horizontal axis, other things remaining the same, the steeper is the budget line. For example, if the price of movies rises to \$12 a movie, the budget line shifts inward and becomes steeper, as shown in Fig. 8.2(a).

FIGURE 8.2
Changes in Prices and Income



In part (a), the price of a movie changes. A fall in the price from \$6 to \$3 shifts the budget line outward and makes it less steep. A rise in the price from \$6 to \$12 shifts the budget line inward and makes it steeper. In part (b), income falls from \$30 to \$15, but prices remain constant. The budget line shifts leftward but its slope does not change.

The effect of a change in prices can also be illustrated using the budget equation. Remember that the slope of the budget line is P_m/P_s. When the price of movies rises, the top line of this expression increases. Therefore the slope gets bigger — that is, the line gets steeper.

A CHANGE IN INCOME

A change in income changes real income but leaves the slope of the budget line unchanged. The higher a consumer's income, the further to the right is the budget line. A higher real income means that budget lines cut the *y*-axis at a higher point. The lower a consumer's income, the further to the left is the budget line. The effect of a change in income on Lisa's budget line is shown in Fig. 8.2(b). The initial budget line is the same one that we began with in Fig. 8.1 when Lisa's income is $30. A new budget line shows how much Lisa is able to consume if her income falls to $15 a month. Her new line is parallel to the old one but closer to the origin. The two budget lines are parallel — have the same slope — because the relative price is the same in both cases. The new budget line is closer to the origin than the initial one because Lisa's real income has decreased.

WHAT IS A BUDGET LINE AND HOW DOES IT SHIFT WITH CHANGES IN PRICES AND INCOME?

- The budget line is the limit to a consumer's choices.
- It marks the boundary between what is affordable and what is unaffordable.
- A consumer can afford all the points on the line and inside it but cannot afford points outside the line.
- The constraint on consumption depends on prices and on income.
- A change in the price of one good changes the slope of the budget line. If the price of the good measured on the horizontal axis rises, the budget line gets steeper.
- A change in income makes the budget line shift, but its slope does not change.

PREFERENCES AND INDIFFERENCE CURVES

So far we have established the limits of a household's consumption. Within this limit the household has a number of alternatives. **Preferences** represent a person's likes and dislikes among these alternatives. We are going to discover the idea of drawing a map of a person's preferences. We can make a map of Lisa's preferences for movies and soft drink. Figure 8.3 shows how such a map is made.

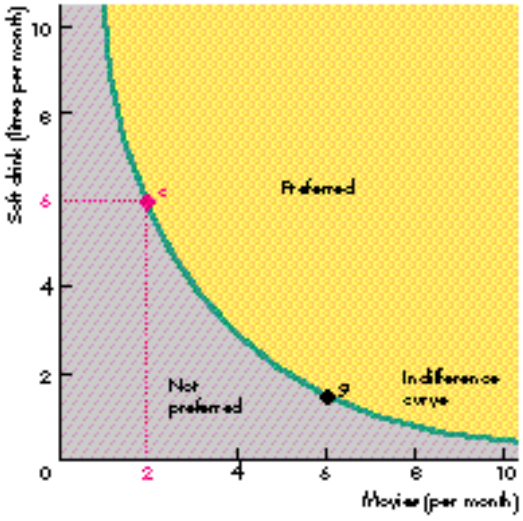
We measure the quantity of movies on the horizontal axis and the quantity of soft drink on the vertical axis — just as we do for the budget line. Focus on point *c*, where Lisa consumes 2 movies and 6 litres of soft drink. We will use this point as a reference and ask how Lisa likes other combinations in relation to the one represented by point *c*.

Lisa can say whether she prefers one combination to another or whether she is equally happy with one combination or another. In other words, she can rank all the possible combinations of movies and soft drink. Lisa is said to be *indifferent* among combinations with which she is equally happy. These combinations lie on one of Lisa's indifference curves. An **indifference curve** is a line that shows all the combinations of goods among which a consumer is *indifferent*. Such a curve is shown in Fig. 8.3 as the green line that passes through point *c*. Lisa is indifferent between point *c* and the other points on the curve, such as point *g*. Lisa prefers the points in the yellow area *a* to point *c*. But point *c* is preferred to all the points in the grey area. Therefore the indifference curve defines the boundary between points that Lisa prefers to point *c* — shown in yellow — and points she regards as inferior to point *c* — shown in grey.

The indifference curve shown in Fig. 8.3 is just one of a whole family of such curves. This indifference curve appears again in Fig. 8.4. It is labeled I_1 and passes through points *c* and *g*. Two other indifference curves are I_0 and I_2. Lisa prefers any point on indifference curve I_2 to those on indifference curve I_1, and she prefers any point on I_1 to those on I_0. We refer to I_2 as being a higher indifference curve to I_1 and I_1 as higher than I_0.

Indifference curves never intersect each other. To see why, consider indifference curves I_1 and I_2 in Fig. 8.4. We know that point *j* is preferred to point *c*. We also know that all points on indifference curve I_2 are preferred to all points on indifference curve I_1. If these indifference curves did intersect, the consumer would be indifferent between the combination of goods at the intersection point and combinations *c* and *j*. But we know that *j* is preferred to *c*, so such a point cannot exist. Hence the indifference curves never intersect.

FIGURE 8.3
Mapping Preferences



If Lisa consumes 6 litres of soft drink and 2 movies, she consumes at point *c*. Lisa can rank all the possible combinations of the two goods on the scale preferred, not preferred, or indifferent. The boundary between points that she prefers to point *c* and those to which *c* is preferred is an indifference curve. Lisa is indifferent between points such as *g* and *c* on the indifference curve. She prefers any point above the indifference curve (yellow area) to any point on it, and she prefers any point on the indifference curve to any point below it (grey area).

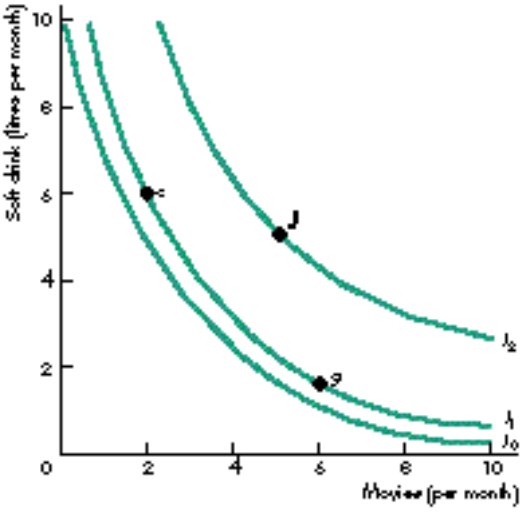
A preference map consists of a series of indifference curves. The indifference curves shown in Fig. 8.4 are only a part of Lisa's preference map. Her entire map consists of an infinite number of indifference curves, all of them sloping downward and none of them intersecting. They resemble the contour lines on a map measuring the height of mountains. An indifference curve joins points representing combinations of goods among which a consumer is indifferent in much the same way that contour lines on a map join points of equal height above sea level. By looking at the shape of the contour lines on a map, we can draw conclusions about the terrain. In the same way, by looking at the shape of a person's indifference curves, we can draw conclusions about preferences. Interpreting a preference map is challenging. It also requires some way of describing the shape of the indifference curves. In the next two sections we'll learn how to 'read' a preference map.

MARGINAL RATE OF SUBSTITUTION

The concept of the marginal rate of substitution is used to describe the shape of an indifference curve. The marginal rate of substitution (or MRS) is the rate at which a person will give up good *y* (the good measured on the *y*-axis) in order to get more of good *x* (the good measured on the *x*-axis) and at the same time remain indifferent. The marginal rate of substitution is measured from the slope of an indifference curve (ignoring its sign). If the indifference curve is steep, the marginal rate of substitution is high. The person is willing to give up a large quantity of good *y* in exchange for a small quantity of good *x* while remaining indifferent. If the indifference curve is flat, the marginal rate of substitution is low. The person is willing to give up only a small amount of good *y* and must be compensated with a large amount of good *x* to remain indifferent.

Let's work out the marginal rate of substitution in two cases, both illustrated in Fig. 8.5. The curve labeled I_1 is one of Lisa's indifference curves.

FIGURE 8.4
A Preference Map



A preference map consists of an infinite number of indifference curves. Here, we show just three — I_0, I_1, and I_2 — which are part of Lisa's preference map. Each indifference curve shows points among which Lisa is indifferent. For example, she is indifferent between point *c* and point *g* on indifference curve I_1. But points on a higher indifference curve are preferred to points on a lower indifference curve. For example, Lisa prefers all the points on indifference curve I_2 to all the points on indifference curve I_1; she prefers point *j* to points *c* or *g*.

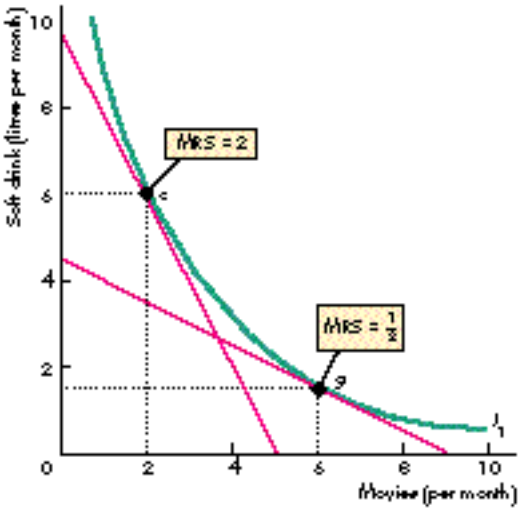
Suppose that Lisa drinks 6 litres of soft drink and watches 2 movies (point *c* in the figure). What is her marginal rate of substitution at this point? It is calculated by measuring the magnitude of the slope of the indifference curve at that point. To measure the slope, place a straight line against, or tangential to, the indifference curve at that point. The slope of that line is the change in the quantity of soft drink divided by the change in the quantity of movies as we move along the line. As soft drink consumption decreases by 10 litres, movie consumption increases by 5. The slope of the line is –2. Thus when Lisa is consuming 2 movies and 6 litres of soft drink, her marginal rate of substitution is 2. She is willing to give up 2 litres of soft drink for an extra movie while remaining indifferent.

Now, suppose that Lisa is consuming 6 movies and 1.5 litres (point *g* in Fig. 8.5). What is her marginal rate of substitution at this point? The answer is found by calculating the slope of the indifference curve at that point. That slope is the same as the slope of the straight line drawn tangential to the indifference curve at point *g*. Here, as soft drink consumption decreases by 4.5 litres, movie consumption increases by 9. Hence, the slope equals $-\frac{1}{2}$. Lisa's marginal rate of substitution is $\frac{1}{2}$. Thus when Lisa sees 6 movies and consumes 1.5 litres of soft drink a month, she is willing to substitute movies for soft drink at the rate of half a litre per movie while remaining indifferent.

Notice that if Lisa drinks a lot of soft drink and does not see many movies, her marginal rate of substitution is high. If she watches a lot of movies and does not drink much soft drink, her marginal rate of substitution is low. This feature of the marginal rate of substitution is the central assumption of the theory of consumer behaviour and is referred to as the diminishing marginal rate of substitution. The assumption of **diminishing marginal rate of substitution** is a general tendency for the marginal rate of substitution to diminish as the consumer moves along an indifference curve, increasing consumption of good *x* and decreasing consumption of good *y*.

You may be able to appreciate why we assume the principle of a diminishing marginal rate of substitution by thinking about your own preferences. Imagine two situations: in one, you are watching 3 movies a night but have no soft drink. In the other, you have 6 litres of soft drink and no movies. In the first situation, you will probably willingly give up seeing 1 movie if you can get just a small amount of soft drink in exchange. In the second situation, you will probably be willing to give up quite a lot of soft drink to watch just 1 movie. Your preferences satisfy the principle of diminishing marginal rate of substitution.

FIGURE 8.5
The Marginal Rate of Substitution



The magnitude of the slope of an indifference curve is called the marginal rate of substitution, or MRS. The marginal rate of substitution tells us how much of one good a person is willing to give up to gain more of another good, while remaining indifferent. The marginal rate of substitution at point *c* is 2; at point *g* it is 1/2.

The shape of the indifference curves incorporates the principle of the diminishing marginal rate of substitution because the curves are bowed toward the origin. The tightness of the bend of an indifference curve tells us how willing a person is to substitute one good for another while remaining indifferent.

To illustrate this point, consider a pair of goods which are very close substitutes for each other, like two brands of petrol. Shell and Mobil petrol substitute so easily for each other that we may not even remember which brand we bought last! Indifference curves between these two brands may almost be straight lines. Even at low levels of consumption of Shell petrol, the rate at which you are willing to switch to Mobil petrol is about the same as that at high levels of Shell purchases. Other goods, like chocolates or chips that we could

buy at the counter when we pay for our petrol, are not so perfect substitutes. Our willingness to give up chocolates for chips changes depending on how many chocolates we have eaten. The indifference curves of chocolates and chips will be more tightly bowed — like Lisa's curves for movies and soft drink.

HOW CAN PREFERENCES BE MAPPED USING INDIFFERENCE CURVES?

- A person's preferences can be represented by a preference map that consists of a series of indifference curves.
- Indifference curves slope downward, bow towards the origin, and do not intersect each other.
- The magnitude of the slope of an indifference curve is called the marginal rate of substitution.
- The marginal rate of substitution diminishes as a person consumes less of the good measured on the *y*-axis and more of the good measured on the *x*-axis.

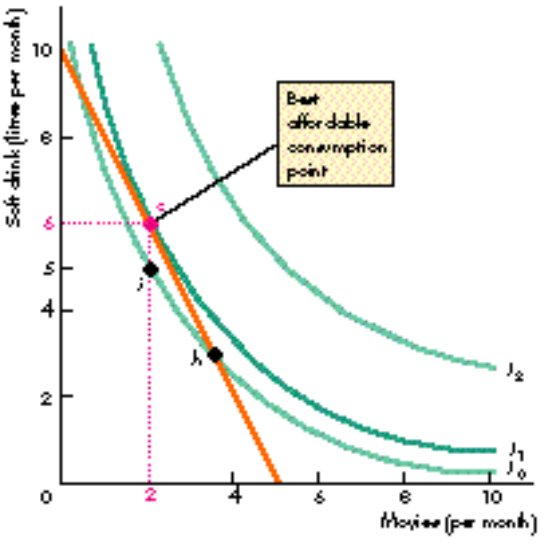
MOST PREFERRED AFFORDABLE CHOICE

The two components of the model of household choice are now in place: the budget line and the preference map. We will now use these components to work out the consumer's choice.

We are now going to bring Lisa's budget line and indifference curves together and discover her best affordable way of consuming movies and soft drink. What are the quantities of movies and soft drink that Lisa *chooses* to buy? You can see in Fig. 8.6 the budget line from Fig. 8.1 and the indifference curves from Fig. 8.4. First focus on point *h* on indifference curve I_0. That point is on Lisa's budget line, so we know that she can afford it. But does she *choose* this combination of movies and soft drink over all the other affordable combinations? No, she does not. To see why not, consider point *c*, where she consumes 2 movies and 6 litres. Point *c* is also on Lisa's budget line, so we know she can afford to consume at this point. But point *c* is on indifference curve I_1, a higher indifference curve than I_0. Therefore we know that Lisa prefers point *c* to point *h*.

Are there any affordable points that Lisa prefers to point *c*? There are not. All Lisa's other affordable consumption points — all the other points on or below her budget line — lie on indifference curves that are below I_1. Indifference curve I_1 is the highest indifference curve on which Lisa can afford to consume.

FIGURE 8.6
The Best Affordable Consumption Point



Lisa's best affordable consumption point is *c*. At that point she is on her budget line and so spends her entire income on the two goods. She is also on the highest attainable indifference curve. Higher indifference curves (such as I_2) do not touch her budget line and so she cannot afford any point on them. At point *c* the marginal rate of substitution (the magnitude of the slope of the indifference curve) equals the relative price of movies (the magnitude of the slope of the budget line).

A point such as *h* on the budget line is not Lisa's best affordable consumption point because at that point she is willing to give up more movies in exchange for soft drink than she has to. She can move to a point such as *i*, which she regards as being just as good as point *h* and which allows her to still have some income left over. She can spend that income and move to *c*, a point that she prefers to point *i*.

PROPERTIES OF THE MOST PREFERRED AFFORDABLE POINT

The most preferred affordable point — point *c* in this example — has two properties. It is *on*:

- The budget line
- The highest attainable indifference curve

On the Budget Line The best affordable point is *on* the budget line. If Lisa chooses a point inside the budget line, she will have an affordable point on the budget line at which she can consume

more of both goods. Lisa prefers that point to the one inside the budget line. The best affordable point cannot be outside the budget line because Lisa cannot afford such a point.

On the Highest Attainable Indifference Curve The chosen point is on the highest attainable indifference curve where that curve has the same slope as the budget line. Stated another way, the marginal rate of substitution between the two goods (the magnitude of the slope of the indifference curve) equals their relative price (the magnitude of the slope of the budget line).

To see why this condition describes the best affordable point, consider point *h*, which Lisa regards as inferior to point *c*. At point *h*, Lisa's marginal rate of substitution is less than the relative price — indifference curve I_0 is flatter than Lisa's budget line. As Lisa gives up movies for soft drink and moves up indifference curve I_0, she moves inside her budget line and has some money left over. She can move to point *i*, for example, where she consumes 2 movies and 5 litres of soft drink and has $3 to spare. She is indifferent between the combination of goods at point *i* and at point *h*. But she prefers point *c* to point *i*, since at *c* she has more soft drink than at *i* and sees the same number of movies.

By moving along her budget line from point *h* towards point *c*, Lisa passes through a whole array of indifference curves (not shown in the figure) located between indifference curves I_0 and I_1. All of these indifference curves are higher than I_0 and therefore any point on them is preferred to point *h*. Once she gets to point *c*, Lisa has reached the highest attainable indifference curve. If she keeps moving along the budget line, she will now start to encounter indifference curves that are lower than I_1.

HOW DO HOUSEHOLDS MAKE CHOICES?

- The consumer has a given income and faces fixed prices and must choose the quantities of various goods to buy.
- Affordable combinations of goods are described by the consumer's budget line.
- The consumer's preferences are described by indifference curves.
- The consumer's best affordable allocation of income occurs when all income is spent (on the budget line) and when the marginal rate of substitution (the magnitude of the slope of the indifference curve) equals the relative price (the magnitude of the slope of the budget line).

PREDICTING CONSUMER BEHAVIOUR WHEN PRICES AND INCOMES CHANGE

We will now use this model of household choice to make some predictions about changes in consumption patterns when income and prices change. We'll start by looking at the effect of a change in price. By studying the effect of such a change on a consumer's choice, holding all other effects constant, we are able to derive a consumer's demand curve.

A CHANGE IN PRICE

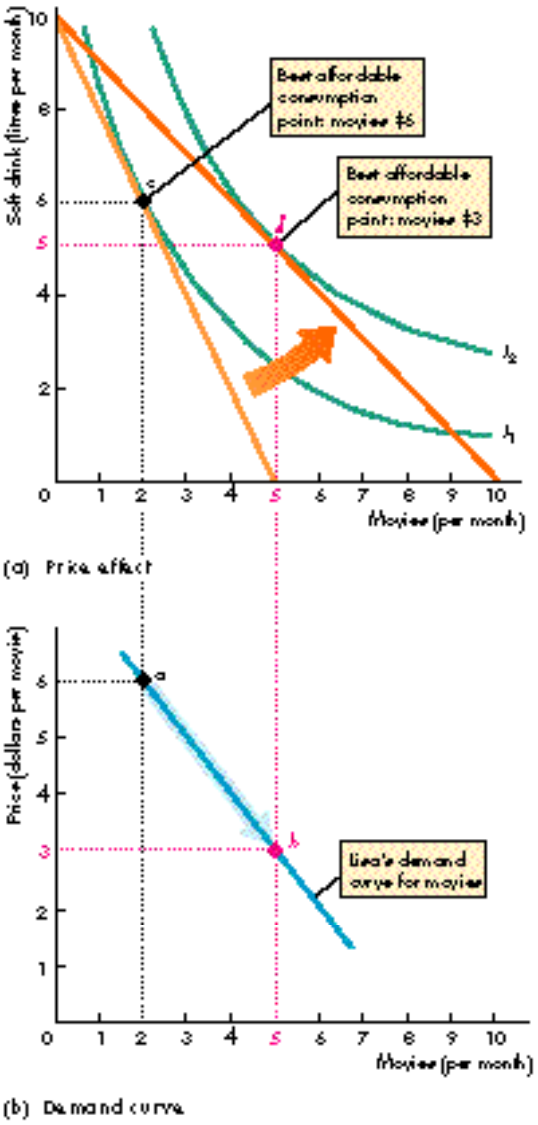
The effect of a change in price on the quantity of a good consumed is called the **price effect**. We'll use Fig. 8.7(a) to work out the price effect of a fall in the price of movies. We start with movies costing $6 each, soft drink costing $3 a litre, and with Lisa's income at $30 a month. In this situation, she consumes at point *c*, where her budget line is angential to her highest attainable indifference curve, I_1. She consumes 6 litres and 2 movies a month.

Now suppose that the price of a movie falls to $3. We've already seen how a change in price (in Fig. 8.2 a) affects the budget line. With a lower price of movies, the budget line moves outward and becomes less steep. The new budget line is the dark orange one in Fig. 8.7(a). Lisa's best affordable point is *j*, where she consumes 5 movies and 5 litres of soft drink. As you can see, Lisa drinks less soft drink and watches more movies now that movies cost less. She reduces her soft drink consumption from 6 to 5 litres, and increases her movie consumption from 2 to 5. Lisa substitutes movies for soft drink when the price of a movie falls, and the price of soft drink and her income remain constant.

THE DEMAND CURVE

Recall that the demand curve graphs the relationship between the quantity demanded of a good and its price, holding constant all other influences on the quantity demanded. We can derive Lisa's demand curve for movies by lowering the price of movies and working out how many movies she sees by finding her best affordable point at different prices. Figure 8.7(b) highlights just two

FIGURE 8.7
Price Effect and Demand Curve



Initially, Lisa consumes at point *c* (part a). If the price of a movie falls from $6 to $3, she consumes at point *j*. The increase in the consumption of movies from 2 to 5 a month is the price effect. When the price of a movie falls, Lisa consumes more movies. She also consumes less soft drink. Lisa's demand curve for movies is shown in part (b). When the price of movies is $6, she consumes 2 a month, at point *a*. When the price of movies falls to $3, she consumes 5 a month, at point *b*. The demand curve is traced by varying the price of a movie and calculating Lisa's best affordable consumption of movies at each different price.

prices and two points that lie on Lisa's demand curve for movies. When the price of a movie is $6, Lisa consumes two movies a month at point *a*. When the price falls to $3, she increases her consumption to 5 movies a month at point *b*. The entire demand curve is made up of these two points plus all the other points that tell us Lisa's best affordable consumption of movies at each price — more than $6, between $6 and $3, and less than $3 — given the price of soft drink and Lisa's income. As you can see, Lisa's demand curve for movies slopes downward — the lower the price of a movie, the more movies she watches each month. This is the law of demand.

A CHANGE IN INCOME

The effect of a change in income on consumption is called the **income effect**. We can work out the income effect by examining how consumption changes when income changes with constant prices. Figure 8.8(a) shows the income effect when Lisa's income falls. With an income of $30 and with a movie costing $3 and soft drink $3 a litre, she consumes at point *j* — 5 movies and 5 litres. If her income falls to $21, she consumes at point *k* — consuming 4 movies and 3 litres of soft drink. Thus with a lower income, Lisa consumes fewer of both goods. The income effect is shown by the arrow in part (a).[1]

THE DEMAND CURVE AND THE INCOME EFFECT

A change in income leads to a shift in the demand curve and this shift is shown in Fig. 8.8(b). With an income of $30, Lisa's demand curve is D_0, the same as in Fig. 8.7. But when her income falls to $21, her demand curve shifts leftward to D_1 and she plans to buy fewer movies at each price.

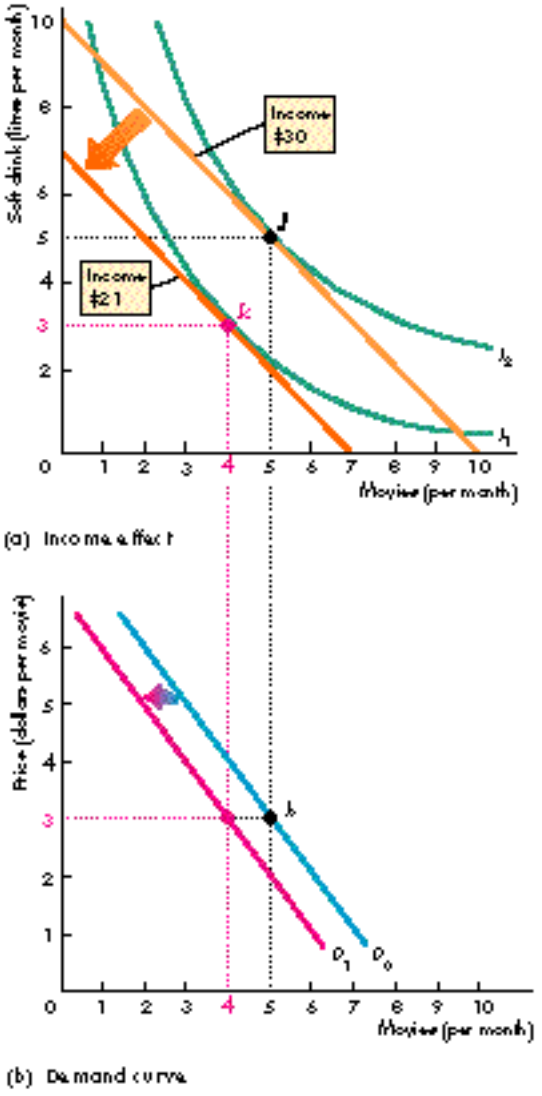
SUBSTITUTION EFFECT AND INCOME EFFECT

We've now worked out the effects of a change in the price of a movie and the effects of a change in Lisa's income on the consumption of movies and soft drink. We've discovered that when her income increases, she increases her consumption of both

[1]For Lisa, movies and soft drink are *normal* goods. When her income falls, she consumes less of both goods and when her income rises, she consumes more of both goods. Some goods are *inferior* goods. When income rises, the consumption of an *inferior* good decreases. Try to draw some indifference curves that illustrate an inferior good.

goods. Movies and soft drink are *normal goods*. When the price of a movie falls, Lisa increases her consumption of movies and decreases her consumption of soft drink. A fall in the price of a normal good leads to an increase in the consumption of that good, as well as to a decrease in the consumption of the substitutes for that good. In this example, a fall in the price of a movie leads to an increase in its consumption, as well as to a decrease in the consumption of soft drink, a substitute for movies. To see why these changes in spending patterns occur when there is a change in price, we separate the price effect into two parts. One part is called the substitution effect; the other part is called the income effect.

FIGURE 8.8
Income Effect and Change in Demand



A change in income shifts the budget line and changes consumption. In part (a) Lisa consumes less of both soft drink and movies (as shown by the arrows) when her income decreases. In part (b), when Lisa's income decreases, her demand curve for movies shifts leftward. There is a decrease in her demand for movies because she will now plan to buy fewer movies at each price of movies.

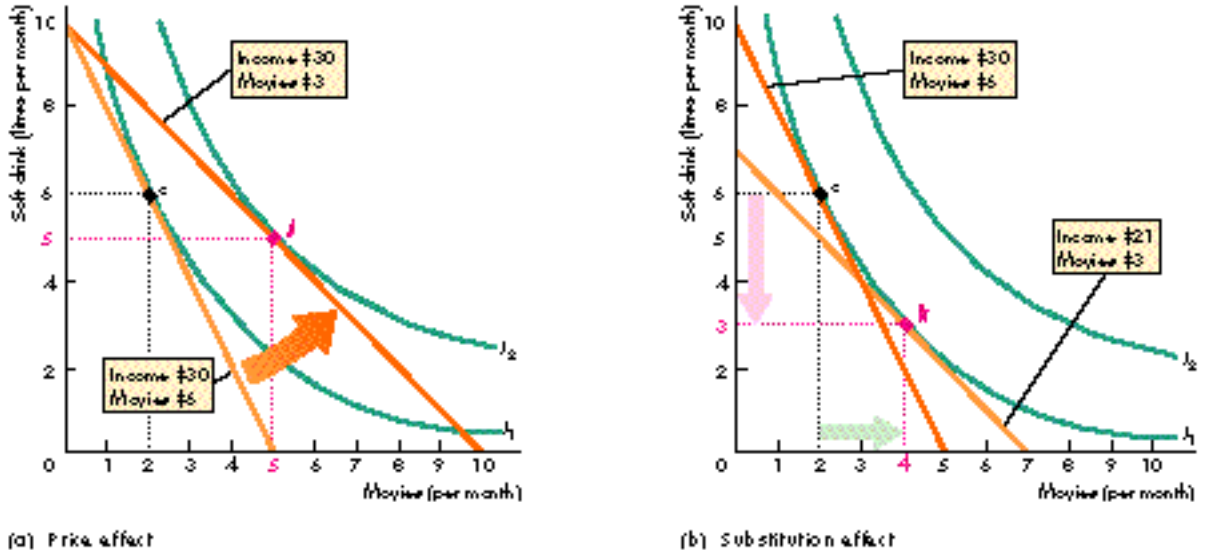
The price effect and its separation into a substitution effect and an income effect are illustrated in Fig. 8.9. Part (a) shows the price effect that you've already worked out in Fig. 8.7. Let's see how that price effect comes about, first by isolating the substitution effect.

Substitution Effect The **substitution effect** is the effect of a change in price on the quantities consumed when the consumer (hypothetically) remains indifferent between the original and the new combinations of goods consumed. To work out Lisa's substitution effect, we have to imagine that when the price of a movie falls, Lisa's income also decreases by an amount that is just enough to leave her on the same indifference curve as before.

The substitution effect is illustrated in Fig. 8.9(b). When the price of a movie falls from $6 to $3, let's suppose that Lisa's income decreases to $21. What's special about $21? It is the income that is just enough, at the new price of a movie, to keep Lisa's best affordable point on the same indifference curve as her original consumption point *c*. Lisa's budget line in this situation is the light orange line shown in Fig. 8.9(b). With the new price of movies and the new lower income, Lisa's best affordable point is *k* on indifference curve I_1. The move from *c* to *k* isolates the substitution effect of a price change. The substitution effect of the fall in the price of a movie is an increase in the consumption of movies from 2 to 4 and a decrease in the consumption of soft drink. The direction of the substitution effect never varies: when the relative price of a good falls, the consumer substitutes more of that good for the other good.

Income Effect To calculate the substitution effect, we gave Lisa a $9 pay cut. Now let's give Lisa her money back. This means shifting Lisa's budget line, as shown in Fig. 8.9(c). That move does not involve any change in prices. The budget line shifts outward, but its slope does not change.

FIGURE 8.9
Price Effect, Substitution Effect, and Income Effect



The price effect can be separated into substitution effect and an income effect. The price effect is shown in part (a) and is the same as that in Fig. 8.7(a).

The substitution effect in part (b) is calculated by imagining that Lisa's income decreases at the same time as the fall in the price of a movie, so that when she chooses her best affordable point, she is indifferent between that and the original situation. The move from *c* to *k* is the substitution effect. The substitution effect of a price change always results in more consumption of the good whose price has fallen. The pink and green arrows show the changes in consumption.

The income effect (part c) is calculated by reversing the imaginary pay cut. Income is increased and prices are constant at their new level. The budget line moves outward and more of both goods is consumed, as shown by the green arrows. The move from *k* to *j* is the income effect.

This change in the budget is similar to the one that occurs in Fig. 8.8 where we study the effect of income on consumption. As Lisa's budget line shifts outward, her consumption possibilities expand and her best affordable point becomes *j* on indifference curve I_2. The move from *k* to *j* isolates the income effect of a price change. In this example the increase in income increases the consumption of both movies and soft drink; they are normal goods.

PRICE EFFECT

As Fig. 8.9 illustrates, we have separated the effect of a change in the price in part (a) into two parts: part (b) keeps the consumer indifferent between the two situations (by making a hypothetical change in income at the same time) and looks at the substitution effect of the price change; part (c) keeps prices constant and (hypothetically) restores income to its original level. It looks at the income

effect of the price change. The substitution effect always works in the same direction — the consumer slides along an indifference curve, buying more of the good whose price has fallen. The direction of the income effect depends on whether the good is normal or inferior. By definition, normal goods are ones whose consumption increases as income increases. In our example, movies and soft drink are normal goods because the income effect increases their consumption. Both the income effect and the substitution effect increase Lisa's consumption of movies.

The substitution and income effects of a price change are shown by the arrows in parts (b) and (c) of Fig. 8.9. The move from point *c* to point *k* is the substitution effect, and the move from point *k* to point *j* is the income effect. For movies, the income effect reinforces the substitution effect, with the result that Lisa's consumption of movies increases. For soft drink, the substitution effect and the income effect work in opposite directions, with the result that Lisa's consumption of soft drink decreases.

The example we have just studied is that of a change in the price of a normal good. The effect of a change in the price of an inferior good is different. Recall that an inferior good is one whose consumption decreases as income increases. For an inferior good, the income effect is negative. Thus for an inferior good it is not always the case that a lower price leads to an increase in the quantity demanded. The lower price has a substitution effect that tends to increase the quantity demanded. But the lower price also has a negative income effect, which reduces the demand for an inferior good. Thus the income effect offsets the substitution effect to some degree.[2]

We started this chapter by observing how consumer spending has changed over the years. The theory of consumption choice studied in this chapter can be used to explain those changes. Spending patterns are interpreted as being the best choices households can make, given their preferences and incomes and given the prices of the goods they consume. Changes in prices and in income lead to changes in the best possible choice — changes in consumption patterns. Reading Between the Lines (pp. 184–5) looks at some recent real-world examples of changes in consumption patterns and their origins.

Models based on the same ideas that you've studied here are used to explain the actual changes that occur and to measure the response of consumption to changes in prices and in income — the price and income elasticities of demand. You met some measures of these elasticities in Chapter 5. Most of those elasticities were measured by using models of exactly the same type that we've studied here (but models that have more than two goods).

HOW DO HOUSEHOLDS RESPOND TO CHANGES IN PRICES AND INCOMES?

- When income increases, a consumer buys more (normal) goods. If prices are held constant, the change in consumption resulting from a change in income is called the income effect.
- The change in consumption resulting from a change in the price of a good is called the price effect. The price effect can be divided into a substitution effect and an income effect.
- The substitution effect is calculated as the change in consumption resulting from the change in price accompanied by a (hypothetical) change in income that leaves the consumer indifferent between the original situation and the new situation.
- The substitution effect of a price change always results in an increase in consumption of the good whose price has decreased.
- The income effect of a price change is the effect of (hypothetically) restoring the consumer's original income but keeping the price of the good constant at its new level.
- For a normal good, the income effect reinforces the substitution effect. For an inferior good, the income effect offsets the substitution effect.

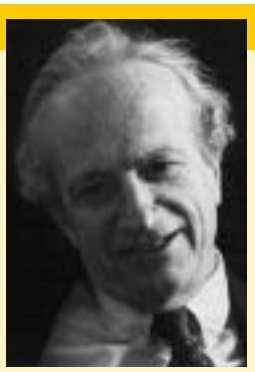
OTHER HOUSEHOLD CHOICES

The model of household choice can do much more than explain consumption choices. It can be used to explain a wide range of other household choices. Two key choices are:

- How many hours to work
- How much to save

[2]It has been suggested that the negative income effect for some goods is so large that it dominates the substitution effect. As a result, a lower price leads to a decrease in the quantity demanded for such a good. Goods of this type are called 'Giffen' goods, named after Sir Robert Giffen, an Irish economist. During a potato famine in Ireland in the nineteenth century, Giffen noticed that when the price of potatoes increased, the quantity of potatoes consumed also increased. Potatoes made up such a large part of the diets of these impoverished people that when the price of potatoes rose, consumers couldn't afford to buy meat or other substitutes, which were all even more expensive.

GARY BECKER SHARES HIS VIEWS



Gary Becker has devoted much of his lifetime's research to applying the economic way of thinking to problems traditionally studied by sociologists. Professor Becker holds professorships in the departments of economics and sociology at the University of Chicago in the United States. Michael Parkin spoke with him about how the economics of human behaviour sheds light on social issues.

Professor Becker, can we really hope to explain all human choices by using models that were invented to explain and predict choices about the allocation of income among alternative consumer goods?

All human decisions involve scarcity. Should I watch television or read a book? Should I go out on a date or drink beer with my friends? Should I get married now or remain single? In all these problems, I'm deciding how to allocate my money, my time, my effort, and my love among various uses. We live in a rich society, but we're not rich in time or energy. We're limited even in money. It's natural to ask, how do people make their choices? Do they make different types of choices when they decide what to watch on television than when they plan how to spend their money in a grocery store? Do they make different types of choices in deciding whether to get divorced or what job they should take? When I try to understand what people are doing, I don't believe they make rational choices sometimes and at other times they make irrational choices. It's far more natural to suspect that they use the same criteria in making all their decisions. That's really the economic approach to choice, or what's called the rationality assumption.

Other social sciences consider social issues and problems. How do they differ from economics?

Economics is, uniquely I believe, a way of thinking about social issues. I think it's fair to say that economics is the most powerful of all the social sciences in providing a general organizing theory. In other respects, it's inferior to the other social sciences. Sociologists are more ingenious at conducting surveys. Anthropologists are wonderful observers and recorders of information. Psychologists are good experimenters. So all the social sciences contribute, but economics' main contribution is its analytical framework.

In this economic framework, which principles have been most fruitful for your own work?

I like to stress four principles. First, that people maximize — that's what economists sometimes associate with rational behaviour. People try to do the best they can, given limited income or time. They want to use their time and resources effectively. Next, people's goals are stable over time and don't shift around. If people's goals changed readily, it would be very hard for us to talk about their behaviour. And third, people try to anticipate the adverse consequences of their behaviour. If I'm going to smoke, what's going to happen to me? I may still do it, but I try to anticipate the consequences. Finally, at the group level, these different individuals interact and end up with some aggregate solution, or what we call equilibrium. These are the basic principles. They sound simple, but it's a little more complicated to see all their implications.

What are the achievements of the economics of human behaviour? To what questions do we have convincing answers?

We have answers to many questions! For example, if we raise the tax on cigarettes, we can predict with confidence not only that the consumption of cigarettes will decline, but by how much. If the price goes up, people consume less. Even those addicted to cigarettes will consume less. We can predict outcomes in labour markets, and say, for example, that when firms have to provide paid child care, the wages of women will fall. Or perhaps firms will try not to hire women.

I'm willing to say we also know a good deal about less conventional areas. We know that if you increase the likelihood that you'll catch criminals and stiffen their punishment, you get less crime. Lots of recent studies demonstrate that. We know that if you have unemployment, you'll increase the amount of crime.

When you first suggested that children could be treated as durable consumer goods, the suggestion was treated with derision. Thirty years later, what are the concrete payoffs gained from making that assumption?

Thirty years later, many more economists are taking this approach. And it's accepted not only by economists but by groups who didn't accept it then, by sociologists, demographers, and the like. Let me give you an example of its success. What would the economic approach emphasize in looking at the demand for children? It would naturally look at the benefits and costs of having children, including the value of the mother's time. You would predict with this approach that if the value of the mother's time went up, it would raise the cost of having children and mothers would have fewer children. Now some people would say, that's such a materialistic view. People have children because they love them. Well, of course people have children because of love. We wouldn't have any children with all the difficulties of

raising kids if we didn't love them, but love has its price.

Now, if you're a sceptic, you'll want to see the evidence. And the evidence shows that as the value of the time women have goes up, they have fewer children, in every country that I know of. The theory also says that you might substitute. When people have fewer children, they give them more education, and they may spend more time with each child. For example, China has had an official 'one child policy' of family planning. There's much discussion now in Chinese newspapers about the so-called Emperor Child. The child who gets lots of toys, whose parents are pushing to get him into the best nursery school. That's just what the theory predicts. The substitution between quantity not quality.

Some people think it's immoral to reduce choices of a deeply personal nature to mere economic calculations. How do you respond to this objection?

First of all, when we use an economic approach, we don't concentrate on money alone. I never claim that people marry only according to how much money they're going to get out of it, or that when they have children, they reckon up each child as a profit or loss. That's ridiculous. Money is just a part of it. There have certainly been lots of family fights over money, but it's not the whole of life or any human behaviour. The economic approach doesn't say that it's the whole of life. It just says that people maximize. What they're maximizing may include love towards children or a spouse. I think it's a great virtue to say, life is short and full of hardships, so let's try to get as much out of life as we can. Not the least, but the most.

Many people who are not economists don't believe that the 'rationality assumption' should be taken seriously. They look inside themselves, examine their own behaviour, and don't find it rational. So how can you fairly assume that other people behave rationally?

I disagree with the premise of that question. I believe that, on reflection, people will say that a lot of things they do are in fact rational. Let me pose some simple questions. You're a college student and you're thinking of going to the movies and a happy hour. You're worried about how much the evening wil cost. Suppose there's no student discount and the movie will cost $6. Will you change your behaviour? Well, if you don't think you can afford $6, you'll maybe watch television instead. Are you behaving rationally? Are you thinking about the consequences? Yes. That's rationality.

I'd ask more questions of this 19-year-old: how many beers are you going to have at the happy hour? Well, the legal drinking age is 21, but maybe you have a fake ID, so you get in under age. But suppose you're caught by campus security. You've got to spend the night in gaol and get thrown out of school. Do you think you'd be willing to try to get in under age? Well, you might very well answer, what's my chance of being caught? And that's exactly a rational choice: worrying about your chances of being caught and about the likely punishment.

But even if you don't actually analyse your actions in these terms, it doesn't mean you're acting irrationally. Let me give you another example. Orel Hershiser is a top baseball player. He effectively knows all the laws of motion, of eye and hand coordination, about the speed of the bat and the ball, and so on. He's in fact solving a complicated physics problem when he steps up to pitch, but obviously he doesn't have to know physics to do that. Likewise, I'm saying that when people solve problems rationally, they're really not thinking that, well, I have this budget and I look at my marginal utility or my indifference curve. They don't do that, but it doesn't mean they're not being rational any more that Orel Hershiser is Einstein.

WORK HOURS AND LABOUR SUPPLY

Every day we allocate our 24 hours between leisure and work. When we work we are supplying labour. We can understand our labour supply by using the theory of household choice. Supplying more labour is the same as demanding less leisure. Leisure is a good, just like movies and soft drink. We have indifference curves for leisure and other goods similar to those we've already studied. The magnitude of the slope of our indifference curve tells us the **marginal rate of substitution** — the rate at which we will be willing to give up consumption of goods and services to get one more hour of leisure while remaining indifferent. We 'buy' leisure by not working, which in turn means by not being able to buy other goods. The opportunity cost of an hour of leisure is the hourly wage rate. Our choice of consumption and leisure is just like our choice of movies and soft drink. We get on to the highest possible indifference curve by making the marginal rate of substitution between consumption and leisure equal to the wage rate relative to the price of consumption goods.

As hourly wage rates have increased over the years, the opportunity cost of leisure has increased. This fact on its own makes us predict a substitution effect away from leisure and towards more work. But instead, we've cut our work hours. Why? Because leisure is a normal good and the higher wage also has an income effect. As real incomes increase, people demand more of all normal goods, so they demand more leisure. The work patterns described at the beginning of this chapter are thus explained by the theory of household choice. But many women still work very long hours — in the home and outside in the labour market. The theory of household choice explains why more and more women work outside the home. The wage and job opportunities have improved and lead to a substitution effect.

SAVING

We don't have to spend all our income here and now. Nor are we constrained to consuming only our current income. We can consume less than our current income, saving the difference for future consumption. Or we can consume more than our current income, borrowing the difference but putting ourselves in a position where we must consume less later in order to repay our loan. Choosing when to consume, how much to save, and how much to borrow can also be understood by using the same theory of household choice that explained Lisa's allocation of her income to movies and soft drink.

Other things remaining the same, more consumption today is preferred to less. Also, other things remaining the same, more consumption in the future is preferred to less. As a consequence, we have indifference curves for consumption now and in the future that are similar to our indifference curves for any pair of goods. Of course, we cannot consume as much as we'd like to today or in the future. Our choices are constrained. The constraint on our choices depends on our income and the interest rate that we can earn on our savings or that we have to pay on our borrowing. The interest rate is a relative price — the relative price of consumption today versus consumption in the future. We choose the timing of consumption (and the amount of saving or borrowing to undertake) by making the marginal rate of substitution between current and future consumption equal to the interest rate. Thus high interest rates will discourage borrowing and lead to lower current consumption and higher future consumption.

HOW DO HOUSEHOLDS CHOOSE BETWEEN WORK AND LEISURE, AND BETWEEN SAVINGS AND CONSUMPTION?

- Households have preferences over many aspects of their lives, not just goods like movies and soft drink.
- Preferences for work compared to leisure, or saving compared to current consumption, can be considered in the same framework.
- In each case, households are confronted by a budget constraint.
- Changes in the price of leisure (the wage rate) or the price of current consumption (the interest rate) create both income and substitution effects.

LOOKING AHEAD

We've now completed our study of household choices. We've seen how we can derive the law of demand from a model of household choice. We've also seen how that same model can be applied to a wide range of other choices, including the demand for leisure and the supply of labour.

In the chapters that follow we'll study the choices made by firms. We'll see how, in the pursuit of profit, firms make choices governing the supply of goods and services and the demand for factors of production (inputs).

After completing these chapters, we'll then bring the analysis of households and firms back together again, studying their interactions in markets for goods and services and factors of production.

THE BUDGET LINE

The budget line shows the limits to a household's consumption given its income and the prices of goods. The budget line is the boundary between what the household can and cannot afford.

The point at which the budget line intersects the *y*-axis is the household's real income in terms of the good measured on that axis. The magnitude of the slope of the budget line is the relative price of the good measured on the *x*-axis in terms of the good measured on the *y*-axis.

A change in income shifts the budget line (rightward for an increase and leftward for a decrease) but does not change its slope. A change in price changes the slope of the budget line. The lower the price of the good measured on the *x*-axis, the less steep is the budget line. (pp. 168–71)

PREFERENCES AND INDIFFERENCE CURVES

A consumer's preferences can be represented by indifference curves. An indifference curve joins all the combinations of goods among which the consumer is indifferent. A consumer prefers points above an indifference curve to the points on it and points on an indifference curve to all points below it. Indifference curves bow towards the origin.

The magnitude of the slope of an indifference curve is called the marginal rate of substitution. A key assumption is that the marginal rate of substitution diminishes as consumption of the good measured on the *y*-axis decreases and consumption of the good measured on the *x*-axis increases. (pp. 171–4)

MOST PREFERRED AFFORDABLE CHOICE

A household consumes at the most preferred affordable point. Such a point is on the budget line and on the highest attainable indifference curve. At that point the indifference curve and the budget line have the same slope — the marginal rate of substitution equals the relative price. (pp. 174–5)

PREDICTING CONSUMER BEHAVIOUR

When income increases, a consumer buys more (normal) goods. If prices are held constant, the change in consumption resulting from a change in income is called the income effect.

The change in consumption resulting from a change in the price of a good is called the price effect. The price effect can be divided into a substitution effect and an income effect. The substitution effect is calculated as the change in consumption resulting from the change in price accompanied by a (hypothetical) change in income that leaves the consumer indifferent between the original situation and the new situation. The substitution effect of a price change always results in an increase in consumption of the good whose price has decreased. The income effect of a price change is the effect of (hypothetically) restoring the consumer's original income but keeping the price of the good constant at its new level. For a normal good, the income effect reinforces the substitution effect. For an inferior good, the income effect offsets the substitution effect. (pp. 175–9)

OTHER HOUSEHOLD CHOICES

The model of household choice also enables us to understand household choices regarding the allocation of time between leisure and work, the allocation of consumption over time, and decisions on borrowing and saving. (pp. 179–82)

REVIEW QUESTIONS

1 What determines the limits to a household's consumption choices?

2 What is the budget line?

3 What determines the intercept of the budget line on the *y*-axis?

4 What determines the slope of the budget line?

5 How does the budget line shift as a result of a fall in price of the good measured on the horizontal axis or a rise in the price of the good measured on the vertical axis?

(Review questions continued p. 186)

Changing preferences

Thirsty drinkers prefer water to wet their whistle

By JUSTINE FERRARI

Forget the cola wars, the drink thirsty Australians are increasingly reaching for is plain H_2O — cool, clear water.

A survey of beverage consumption released yesterday shows almost twice as many people are drinking from the tap and water coolers than two years ago, making it the second most popular beverage after milk.

While the proportion indulging in the traditional pursuit of swilling beer has increased, beer has dropped in its placing in the nation's top 10 drinks since 1993, falling two places to ninth place.

The second survey of What Australia Drinks, of 1000 people in Sydney, Melbourne, Brisbane and Perth conducted in February, reveals that the increased health consciousness evident in better diets and fitter lifestyles also influences people's choice of drinks.

Mr Rod Curtis of The Food Team, a food marketing consultancy which conducts the surveys along with What Australians Eat, said Australians were moving towards healthier and more natural drinks.

'It's remarkable. I think it's partly due to the fact that we had a couple of hot days when we did the survey, but the trend is clear . . . we're seeing people topping up their beverage repertoire with a lot of lighter or fresher or cleaner beverages,' he said.

The results echo the latest survey of national drinking habits by the CSIRO division of human nutrition, which found that coffee was the most widely consumed in late 1993, followed by water and milk.

The report, sponsored by Schweppes Cottee's, says milk is the most widely used thirst-quencher, drunk by 83 per cent compared with 76 per cent in the first survey conducted in 1993.

Water was chosen by 81 per cent of people, compared with 45 per cent two years ago, followed by coffee, steady on about 70 per cent, and tea, also relatively stable on about 60 per cent.

New products, including sports drinks, bottled still water, iced tea and clear carbonated fruit drinks, have grown dramatically, with 16 per cent of people drinking the 'New Age' beverages.

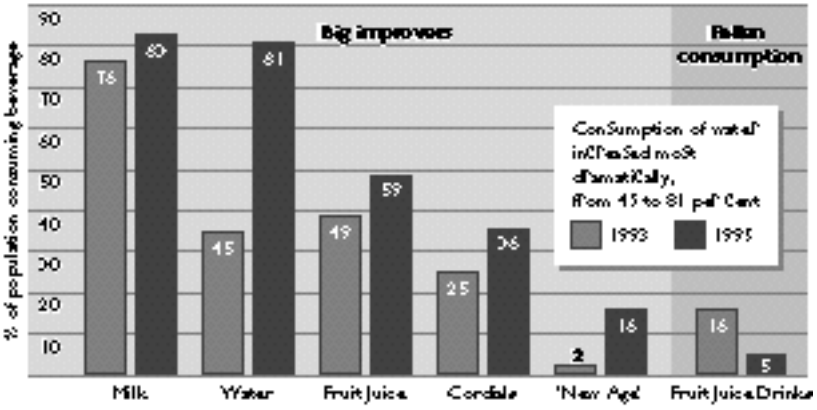
More than half those surveyed believed that non-fizzy drinks were healthier than fizzy drinks and about one in two agreed they prefer a non-fizzy drink when buying a cold drink.

Four out of five people thought it was widely accepted for people to sit on non-alcoholic drinks when out socially, with three in four people believing the attitude had

WHAT WE'RE DRINKING

Top 10 beverages	
1 Milk	(1)*
2 Water	(6)
3 Coffee	(2)
4 Tea	(3)
5 Fruit juice	(5)
6 Cola	(4)
7 Other fizzy drinks	–
8 Cordials	(9)
9 Beer	(7)
10 Wine	(10)

*1993 Ranking



changed over the past few years.

While beer dropped in the rank of consumption, 33 per cent of people drink beer, compared with 29 per cent two years ago and wine is almost stable with 20 per cent imbibing white wine and 10 per cent red wine. Rises in consumption were also recorded for fruit juice, chosen by 59 per cent, and cordials, 36 per cent, while the proportion of people selecting fruit juice drinks not containing 100 per cent juice fell 11 per cent.

Drinking habits vary from State to State with people in the hotter cities of Brisbane and Perth choosing water as the best thirst-quencher, while in Melbourne and Sydney an alcoholic beverage is considered more likely to satisfy a parched throat.

Milk is the most widely consumed beverage in Sydney, drunk by 82 per cent, and Brisbane, 86 per cent, followed by water, with 74 per cent in Sydney and 82 per cent in Brisbane.

About 83 per cent of Melburnians prefer their milk and water equally, but the most water is drunk in Perth where 90 per cent of people surveyed drink it with milk.

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ESSENCE OF THE STORY

- The top three beverages in Australia are milk, water, and coffee.
- There has been a rapid growth in consumption of water and of new products like sports drinks, bottled water, and carbonated fruit drinks.
- People's choice of drinks is influenced by health consciousness.

ANALYSIS

- Suppose you have a choice of drinking bottled water or cola. Your budget for spending on these drinks each week is \$10. Water costs \$1 a litre and cola costs \$2 a litre. At most you could drink 10 litres of bottled water a week or 5 litres of cola.
- Figure 1 shows your budget line *ab*. The relative price of cola to water is 2, which is the magnitude of the slope of the budget line.
- You are a 'cola freak'! Your indifference curves are very steep, like that labelled I_0. You are prepared to give up large amounts of bottled water in exchange for a small amount of cola. At point *c*, your marginal rate of substitution (the slope of the indifference curve) exceeds the relative price of cola to water. You therefore consume more cola and shift to a higher indifference curve. The best affordable consumption point turns out to be at point *a* in Fig. 1. At this point, your marginal rate of substitution is still greater than 2, but you can read no higher indifference than I_1 given your preferences.
- You become more conscious of your health. You worry about the effects of so much cola (nearly a litre a day) on your weight. The rate at which you are prepared to give up bottled water in order to have more cola falls. Your indifference curves become flatter, so much so that point *a* is no longer the best affordable consumption point.
- The result of the change in the shape of your preferences is shown in Fig. 2. We'll suppose that the budget line is fixed. The best affordable consumption point is now at *e*. You consume just over a litre of bottled water every day and cut back your cola consumption to a litre a week. Your indifference curve is that labelled I^*_0. At *c*, the marginal rate of substitution is now equal to 2.
- In a position like that in Fig. 1, you would respond to a survey of drinking choices by saying that you only drink cola. In Fig. 2, you become one of the rapidly growing group of people who nominate bottled water as well.

FIGURE 1

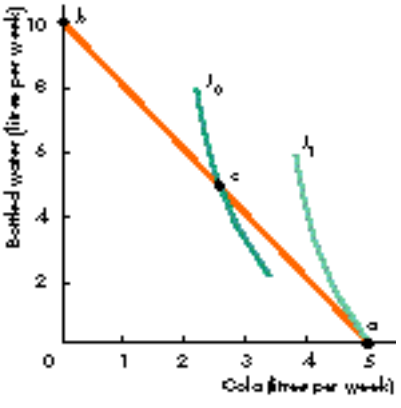
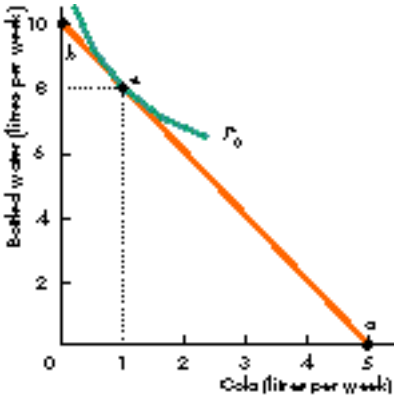


FIGURE 2



6 What do all the points on an indifference curve have in common?

7 What is the marginal rate of substitution?

8 What happens to the marginal rate of substitution as the quantity of the good measured on the *x*-axis increases?

9 What two conditions are satisfied when a consumer makes the best possible consumption choice?

10 What is the effect of a change in income on consumption?

11 What is the effect of a change in price on consumption?

12 Define and distinguish between the income effect and the substitution effect of a price change.

PROBLEMS

1 Sara has an income of $9 a week. Chips cost $1 a bag and cola costs $1.50 a can.

a) What is Sara's real income in terms of cola?

b) What is her real income in terms of chips?

c) What is the relative price of cola in terms of chips?

d) What is the opportunity cost of a can of cola?

e) What is Sara's budget equation?

f) Calculate the equation for Sara's budget line (placing cans of cola on the left side).

g) Draw a graph of Sara's budget line with chips on the *x*-axis.

h) In problem (g), what is the slope of Sara's budget line? What is it equal to?

2 Suppose that with the same income and prices as above, Sara chooses to consume 4 cans of cola and 3 bags of chips each week.

a) Is Sara on her budget line?

b) What is her marginal rate of substitution of cola for chips?

3 Now suppose that the price of cola doubles to $3 a can and the price of chips doubles to $2 a bag. At the same time, Sara's income doubles to $18 a week.

a) Can Sara still buy the same quantities of cola and chips as before if she wants to?

b) What now is Sara's real income? What now is the real price? Describe how Sara's budget line has changed.

4 In problem 3, what are your answers if only:

a) The price of cola changed?

b) The price of chips changed?

c) Sara's income changed?

5 Jason buys icecreams that cost $1 each and comic books that cost $2 each. Each month Jason buys 20 icecreams and 10 comic books. He spends all of his income. Next month the price of icecreams will fall to 50 cents, but the price of a comic book will rise to $3.

a) Will Jason be able to buy 20 icecreams and 10 comic books next month?

b) Will he want to?

c) If he changes his consumption, which good will he buy more of and which less?

d) Which situation does Jason prefer: icecreams at $1 and comic books at $2 or icecreams at 50 cents and comic books at $3?

e) When the prices change next month will there be an income effect and a substitution effect at work or just one of them? If there is only one effect at work, which one will it be?

6 Now suppose that the prices of icecreams and comic books are at their original levels — $1 and $2 respectively. Jason gets a pay rise of $10 a month. He now buys 16 comic books and 18 icecreams. For Jason, are icecreams and comic books normal goods or inferior goods?

7 Illustrate in a diagram similar to Fig. 8.7(a):

a) The effect of a rise in the wage rate on a person's choice between income and leisure.

Also indicate in the diagram the effect of a rise in wage rates on the number of hours worked. Identify the circumstances in which a rise in the wage rate will increase the number of hours worked.

b) The effect of a rise in the interest rate on the choice between current and future consumption.

Also indicate in the diagram your assumption about the income received in the current period and the future period (assume there are only two periods in this case). Also show

the extent to which the consumer borrows or lends in the current period and how much they pay back or are paid back in the future period. Identify the circumstances in which this person is more likely to be a lender.

8 The food consumption patterns of Australians are changing. Surveys indicate there is a growth in consumption of take-away or convenience foods compared to home-cooked meals (18–20-year-olds are often found to be especially likely to eat take-away food compared to other age groups). There is some concern about this outcome among dietitians because of the fat, salt, sugar, and low fibre content of the convenience items. It is argued that higher rates of consumption of this sort of food will lead to health problems later in life. Dietitians are also concerned that these problems will become greater because young people may never learn to cook healthy food! One argument about the origins of the change in consumption patterns is that mothers in households tend to be responsible for cooking food but more mothers are now spending more time out of the household working for wages, which has affected the demand for convenience food. Consumers when interviewed indicate that convenience food is appealing because it is quick to obtain, and it saves cooking. Comment on the reasons for the change in consumption patterns by considering:

a) The effects of the increase in household income as a result of increased female participation in the work force

b) The determinants of and changes in the relative price of home-cooked meals compared to take-aways