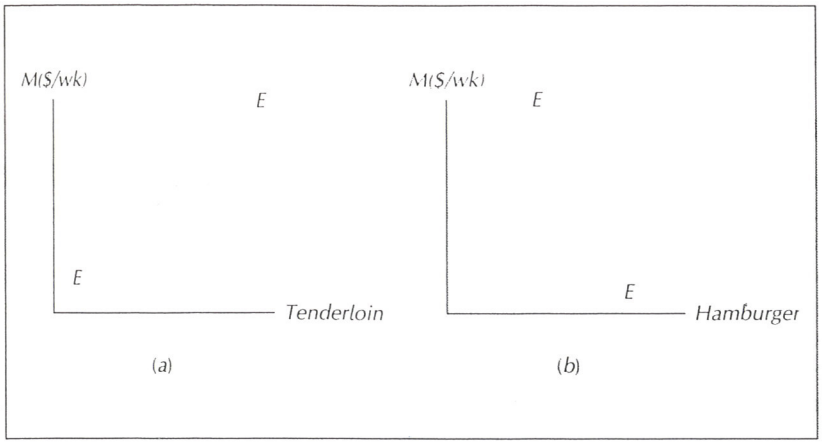

FIGURE 4.5
The Engel Curves for Normal and Inferior Goods
(*a*) This Engel curve is for a normal good. The quantity demanded increases with income. (*b*) This Engel curve for hamburger has the negative slope characteristic of inferior goods. As the consumer's income grows, he switches from hamburger to more desirable cuts of meat.

NORMAL AND INFERIOR GOODS

normal good one whose quantity demanded rises as income rises.

inferior good one whose quantity demanded falls as income rises.

Note that the Engel curve in Figure 4.5*a* is upward-sloping, implying that the more income a consumer has, the more tenderloin steak he will buy each week. Most things we buy have this property, which is the defining characteristic of a **normal good.** Goods that do not have this property are called **inferior goods.** For such goods, an increase in income leads to a reduction in the quantity demanded. Figure 4.5*b* is an example of an Engel curve for an inferior good. The more income a person has, the less hamburger he will buy each week.

Why would someone buy less of a good following an increase in his income? The prototypical inferior good is one with several strongly preferred, but more expensive, substitutes. Supermarkets, for example, generally carry several different grades of ground beef, ranging from hamburger, which has the highest fat content, to ground sirloin, which has the lowest. A consumer trying to restrict the amount of fat in his diet will switch to a leaner grade of meat as soon as he can afford it. For such a consumer, hamburger is an inferior good.

For any consumer who spends all her income, it is a matter of simple arithmetic that not all goods can be inferior. After all, when income rises, it is mathematically impossible to spend less on all goods at once. It follows that the more broadly a good is defined, the less likely it is to be inferior. Thus, while hamburger is an inferior good for many consumers, there are probably very few people for whom "meat" is inferior, and fewer still for whom "food" is inferior.[1]

THE INCOME AND SUBSTITUTION EFFECTS OF A PRICE CHANGE

substitution effect that component of the total effect of a price change that results from the associated change in the relative attractiveness of other goods.

In Chapter 2 we saw that a change in the price of a good affects purchase decisions for two reasons. Consider the effects of a price increase. (The effects of a price reduction will be in the opposite direction.) When the price of a good rises, close substitutes become more attractive than before. For example, when the price of rice increases, wheat becomes more attractive. This is the so-called **substitution effect** of a price increase.

The second effect of a price increase is to reduce the consumer's purchasing power. For a normal good, this will further reduce the amount purchased. But for

[1]Another useful way to partition the set of consumer goods is between so-called *necessities* and *luxuries.* A good is defined as a luxury for a person if he spends a larger proportion of his income on it when his income rises. A necessity, by contrast, is one for which he spends a smaller proportion of his income when his income rises. (More on this distinction follows.)

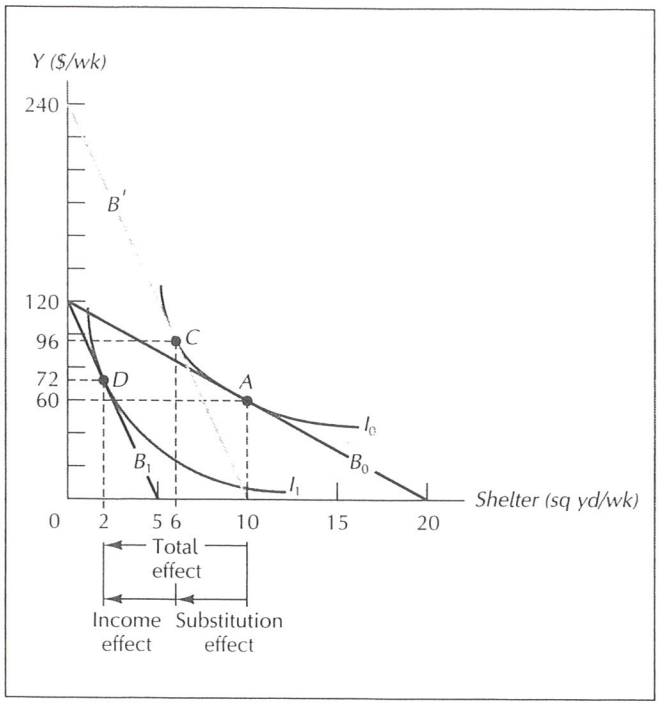

FIGURE 4.7
The Substitution and Income Effects of a Price Change
To get the substitution effect, slide the new budget B_1 outward parallel to itself until it becomes tangent to the original indifference curve, I_0. The movement from *A* to *C* gives rise to the substitution effect, the reduction in shelter due solely to the fact that shelter is now more expensive relative to other goods. The movement from *C* to *D* gives rise to the income effect. It is the reduction in shelter that results from the loss in purchasing power implicit in the price increase.

The hypothetical budget constraint B' tells us that even if the consumer had enough income to reach the same indifference curve as before, the increase in the price of shelter would cause him to reduce his consumption of it in favor of other goods and services. *For consumers whose indifference curves have the conventional convex shape, the substitution effect of a price increase will always reduce consumption of the good whose price increased.*

The income effect stems from the movement from *C* to *D*. The particular good shown in Figure 4.7 happens to be a normal good. The hypothetical movement of the consumer's income from \$240/wk to \$120/wk accentuates the reduction of his consumption of shelter, causing it to fall from 6 sq yd/wk to 2 sq yd/wk.

Whereas the income effect reinforces the substitution effect for normal goods, the two effects tend to offset one another for inferior goods. In Figure 4.8, B_0 depicts the budget constraint for a consumer with an income of \$24/wk who faces a price of hamburger of \$1/lb. On B_0 the best affordable bundle is *A*, which contains 12 lb/wk of hamburger. When the price of hamburger rises to \$2/lb, the resulting budget constraint is B_1 and the best affordable bundle is now *D*, which contains 9 lb/wk of hamburger. The total effect of the price increase is thus to reduce hamburger consumption by 3 lb/wk. Budget constraint B' once again is the hypothetical budget constraint that enables the consumer to reach the original indifference curve at the new price ratio. Note that the substitution effect (the change in hamburger consumption associated with movement from *A* to *C* in Figure 4.8) is to reduce the quantity of hamburger consumed by 4 lb/wk—that is, to reduce it by more than the value of the total effect. The income effect by itself (the change in hamburger consumption associated with the movement from *C* to *D*) actually increases hamburger consumption by 1 lb/wk. The income effect thus works in the opposite direction from the substitution effect for an inferior good such as hamburger.

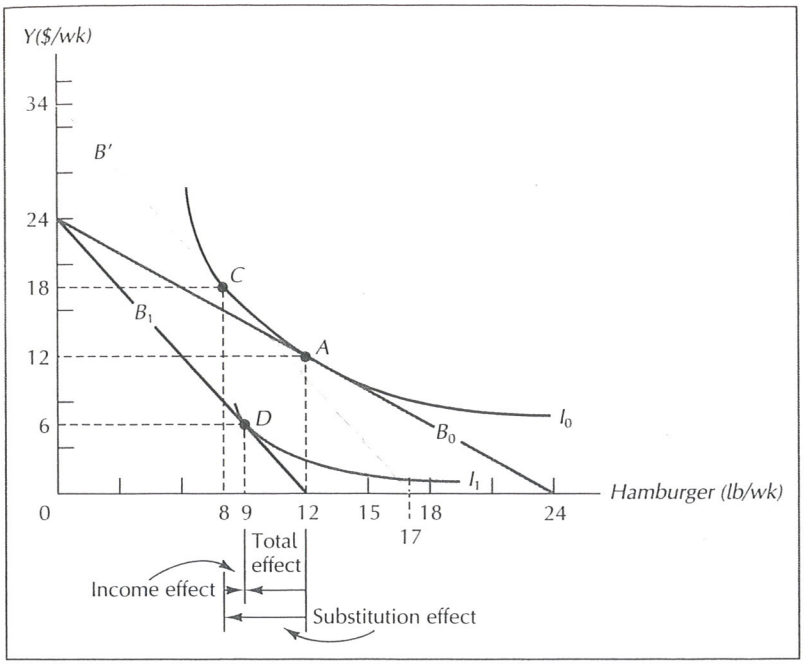

FIGURE 4.8
Income and Substitution Effects for an Inferior Good
By contrast to the case of a normal good, the income effect acts to offset the substitution effect for an inferior good.

GIFFEN GOODS

A **Giffen good** is one for which the total effect of a price increase is to increase, not reduce, the quantity purchased. Since the substitution effect of a price increase is always to reduce the quantity purchased, the Giffen good must be one whose income effect offsets the substitution effect. That is, the Giffen good must be an inferior good—so strongly inferior, in fact, that the income effect is actually larger than the substitution effect.

Giffen good one for which the quantity demanded rises as its price rises.

A much-cited example of a Giffen good was the potato during the Irish potato famine of the nineteenth century. The idea was that potatoes were such a large part of poor people's diets to begin with that an increase in their price had a severe adverse effect on the real value of purchasing power. Having less real income, many families responded by cutting back on meat and other more expensive foods, and buying even more potatoes. (See Figure 4.9.) Or so the story goes.

Modern historians dispute whether the potato ever was really a Giffen good. Whatever the resolution of this dispute, the potato story does illustrate the

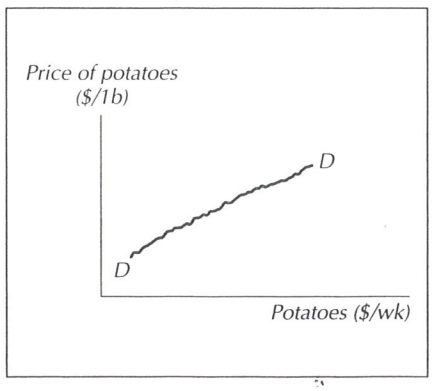

FIGURE 4.9
The Demand Curve for a Giffen Good
If a good is so strongly inferior that the income effect of a price increase dominates the substitution effect, the demand curve for that good will be upward sloping. Giffen goods are a theoretical possibility, but are seldom, if ever, observed in practice.

characteristics that a Giffen good would logically have to possess. First, it would not only have to be inferior, but also have to occupy a large share of the consumer's budget. Otherwise, an increase in its price would not create a significant reduction in real purchasing power. (Doubling the price of keyrings, for example, does not make anyone appreciably poorer.) The second characteristic required of a Giffen good is that it have a relatively small substitution effect, one small enough to be overwhelmed by the income effect.

In practice, it is extremely unlikely that a good will satisfy both requirments. Most goods, after all, account for only a tiny share of the consumer's total expenditures. Moreover, as noted, the more broadly a good is defined, the less likely it is to be inferior. Finally, inferior goods by their very nature tend to be ones for which there are close substitutes. The consumer's tendency to substitute ground sirloin for hamburger, for example, is precisely what makes hamburger an inferior good.

The Giffen good is an intriguing anomaly, chiefly useful for testing students' understanding of the subtleties of income and substitution effects. Unless otherwise stated, all demand curves used in the remainder of this text will be assumed to have the conventional downward slope.

EXAMPLE 4.1

Income and substitution effects for perfect complements. Suppose skis and bindings are perfect, one-for-one complements and Paula spends all her equipment budget of $1200/yr on these two goods. Skis and bindings each cost $200. What will be the income and substitution effects of an increase in the price of bindings to $400 per pair?

Since our goal here is to examine the effect on two specific goods (skis and bindings), we proceed by devoting one axis to each good and dispense with the composite good. On the original budget constraint, B_0, the optimal bundle is denoted A in Figure 4.10. Paula buys three pairs of skis per year and three pairs of bindings. When the price of bindings rises from $200 per pair to $400 per pair, we get the new budget constraint, B_1, and the resulting optimal bundle D, which contains two pairs of skis per year and two pairs of bindings. An equipment budget of $1800/yr is what the consumer would need at the new price to attain the same indifference curve she did originally (I_0). (To get this figure, slide B_1 out until it hits I_0, then calculate the cost of buying the bundle at the vertical intercept—here, nine pairs of skis per year at $200 per pair.) Note that because perfect complements have right-angled indifference curves, the budget

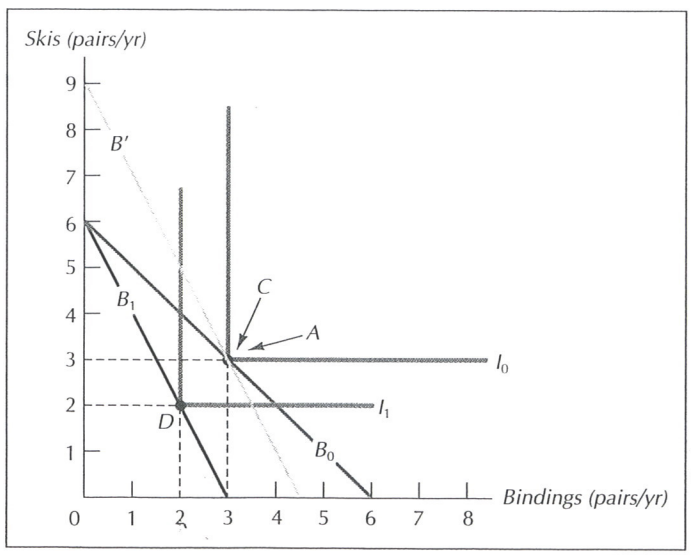

FIGURE 4.10
Income and Substitution Effects for Perfect Complements
For perfect complements, the substitution effect of an increase in the price of bindings (the movement from A to C) is equal to zero. The income effect (the movement from A to D) and the total effect are one and the same.