

stream. If revenues exceed production costs, substantial profits can result—as they have for Apple.

## The Diamond-Water Paradox

Early economists such as Adam Smith were puzzled by the fact that some “essential” goods had much lower prices than some “unimportant” goods. Why would water, essential to life, be priced below diamonds, which have much less usefulness? The paradox is resolved when we acknowledge that water is in great supply relative to demand and thus has a very low price per gallon. Diamonds, in contrast, are rare. Their supply is small relative to demand and, as a result, they have a very high price per carat.

Moreover, the marginal utility of the last unit of water consumed is very low. The reason follows from our utility-maximizing rule. Consumers (and producers) respond to the very low price of water by using a great deal of it—for generating electricity, irrigating crops, heating buildings, watering lawns, quenching thirst, and so on. Consumption is expanded until marginal utility, which declines as more water is consumed, equals its low price. On the other hand, relatively few diamonds are purchased because of their prohibitively high price, meaning that their marginal utility remains high. In equilibrium:

$$\frac{\text{MU of water (low)}}{\text{Price of water (low)}} = \frac{\text{MU of diamonds (high)}}{\text{Price of diamonds (high)}}$$

Although the marginal utility of the last unit of water consumed is low and the marginal utility of the last diamond purchased is high, the total utility of water is very high and the total utility of diamonds quite low. The total utility derived from the consumption of water is large because of the enormous amounts of water consumed. Total utility is the sum of the marginal utilities of all the gallons

### ORIGIN OF THE IDEA

#### 6.3

Diamond-water paradox

of water consumed, including the trillions of gallons that have far higher marginal utilities than the last unit consumed. In contrast, the total utility derived from diamonds is low since their high price means that relatively few of them are bought. Thus the water-diamond “paradox” is solved: Water has much more total utility (roughly, usefulness) than diamonds even though the price of diamonds greatly exceeds the price of water. These relative prices relate to marginal utility, not total utility.

## Opportunity Cost and the Value of Time

The theory of consumer behavior has been generalized to account for the economic value of *time*. Both consumption

and production take time. Time is a valuable economic commodity; by using an hour in productive work a person can earn \$6, \$10, \$50, or more, depending on her or his education and skills. By using that hour for leisure or in consumption activities, the individual incurs the opportunity cost of forgone income; she or he sacrifices the \$6, \$10, or \$50 that could have been earned by working.

Imagine a self-employed consumer named Linden who is considering buying a round of golf, on the one hand, and a concert, on the other. The market price of the golf game is \$30 and that of the concert is \$40. But the golf game takes more time than the concert. Suppose Linden spends 4 hours on the golf course but only 2 hours at the concert. If her time is worth \$10 per hour, as evidenced by the \$10 wage she can obtain by working, then the “full price” of the golf game is \$70 (the \$30 market price plus \$40 worth of time). Similarly, the full price of the concert is \$60 (the \$40 market price plus \$20 worth of time). We find that, contrary to what market prices alone indicate, the full price of the concert is really less than the full price of the golf game.

If we now assume that the marginal utilities derived from successive golf games and concerts are identical, traditional theory would indicate that Linden should consume more golf games than concerts because the market price of the former (\$30) is lower than that of the latter (\$40). But when time is taken into account, the situation is reversed and golf games (\$70) are more expensive than concerts (\$60). So it is rational for Linden to consume more concerts than golf games.

By accounting for the opportunity cost of a consumer’s time, we can explain certain phenomena that are otherwise quite puzzling. It may be rational for the unskilled worker or retiree whose time has little market value to ride a bus from Chicago to Pittsburgh. But the corporate executive, whose time is very valuable, will find it cheaper to fly, even though bus fare is only a fraction of plane fare. It is sensible for the retiree, living on a modest company pension and a Social Security check, to spend many hours shopping for bargains at the mall or taking long trips in a motor home. It is equally intelligent for the highly paid physician, working 55 hours per week, to buy a new personal computer over the Internet and take short vacation at expensive resorts.

People in other nations often feel affluent American are “wasteful” of food and other material goods but “overly economical” in their use of time. Americans who visit developing countries find that time is used casually or “squandered,” while material goods are very highly prized and carefully used. These differences are not a paradox or a case of radically different temperaments. The difference

are primarily a rational reflection of the fact that the high productivity of labor in an industrially advanced society gives time a high market value, whereas the opposite is true in a low-income, developing country.

## Medical Care Purchases

The method of payment for certain goods and services affects their prices at the time we buy them and significantly changes the amount purchased. Let's go back to Table 6.1. Suppose the \$1 price for apples is its "true" value or opportunity cost. But now, for some reason, its price is only, say, \$.20. A rational consumer clearly would buy more apples at the \$.20 price than at the \$1 price.

That is what happens with medical care. People in the United States who have health insurance pay a fixed premium once a month that covers, say, 80 percent of all incurred health care costs. This means that when they actually need health care, its price to them will be only 20 percent of the actual market price. How would you act in such a situation? When you are ill, you would likely purchase a great deal more medical care than you would if you were confronted with the full price. As a result, financing health care through insurance is an important factor in explaining today's high expenditures on health care and the historical growth of such spending as a percentage of domestic output.

Similar reasoning applies to purchases of buffet meals. If you buy a meal at an all-you-can-eat buffet, you will tend to eat more than if you purchased it item by item. Why not eat that second dessert? Its marginal utility is positive and its "price" is zero!

## Cash and Noncash Gifts

Marginal-utility analysis also helps us understand why people generally prefer cash gifts to noncash gifts costing the same amount. The reason is simply that the noncash gifts may not match the recipient's preferences and thus may not add as much as cash to total utility. Thought of differently, consumers know their own preferences better than the gift giver does, and the \$100 cash gift provides more choices.

Look back at Table 6.1. Suppose Holly has zero earned income but is given the choice of a \$2 cash gift or a noncash gift of 2 apples. Because 2 apples can be bought with \$2, these two gifts are of equal monetary value. But by spending the \$2 cash gift on the first orange, Holly could obtain 24 utils. The noncash gift of the first 2 apples would yield only 18 (= 10 + 8) units of utility. Conclusion: The noncash gift yields less utility to the beneficiary than does the cash gift.

Since giving noncash gifts is common, a considerable value of those gifts is potentially lost because they do not match their recipients' tastes. For example, Uncle Fred may have paid \$15 for the Frank Sinatra CD he gave you for the holidays, but you would pay only \$7.50 for it. Thus, a \$7.50, or 50 percent, value loss is involved. Multiplied by billions of gifts a year, the total potential loss of value is huge.

But some of that loss is avoided by the creative ways individuals handle the problem. For example, newlyweds set up gift registries for their weddings to help match up their wants to the noncash gifts received. Also, people obtain cash refunds or exchanges for gifts so they can buy goods that provide more utility. And people have even been known to "recycle gifts" by giving them to someone else at a later time. All three actions support the proposition that individuals take actions to maximize their total utility.

## Prospect Theory

Up to this point, we have restricted ourselves to dealing with consumer-choice situations in which people only have to deal with "goods" as opposed to "bads." When deciding on how to spend a budget, people only consider items that can bring them positive marginal utility—that is "good" things. They then use the utility-maximizing rule to select how much of each of those good things they should consume to get as much utility as possible from their limited budgets.

Unfortunately, life often forces us to deal with bad things, too. Our houses may burn down. A potential investment may go bad. The money we lend out may not be repaid.

How people deal with these negative possibilities is a central focus of **behavioral economics**—the branch of economics that combines insights from economics, psychology, and neuroscience to better understand those situations in which actual choice behavior deviates from the predictions made by earlier theories, which incorrectly concluded that people were *always* rational, deliberate, and unswayed by emotions. By studying how people actually deal with the prospect of bad things as well as good things, behavioral economists discovered three very interesting facts about how people react to goods and bads:

- People judge good things and bad things in relative terms, as gains and losses relative to their current situation, or **status quo**.
- People experience both diminishing marginal utility for gains (as you have already seen) as well as diminishing marginal disutility for losses (meaning that each successive unit of loss hurts, but less painfully than the previous unit).

- People are **loss averse**, meaning that for losses and gains near the status quo, losses are felt *much* more intensely than gains—in fact, about 2.5 times more intensely. Thus, for instance, the pain experienced by an investor who loses one dollar from his current status quo level of wealth will be about 2.5 times more intense than the pleasure he would have felt if he had gained one dollar relative to his current level of wealth.

These three facts about how people deal with goods and bads form the basis of **prospect theory**, which sheds important light on how consumers plan for and deal with

### CONSIDER THIS . . .



#### Rising Consumption and the Hedonic Treadmill

For many sensations, people's brains are wired to notice changes rather than states. For example, your brain can sense

acceleration—your change in speed—but not speed itself. As a result, standing still feels the same as moving at a constant 50 miles per hour. And if you accelerate from one constant speed to another—say, from 50 miles per hour to 70 miles per hour—you will feel the acceleration only while it's happening. Once you settle down at the new higher speed, it will feel like you are standing still again.

Consumption appears to work in much the same way. If you are used to a given level of consumption—say, \$50,000 per year—then you will get a lot of enjoyment for a while if your consumption accelerates to \$100,000 per year. But, as time passes, you will get used to that higher level of consumption, so that \$100,000 per year seems ordinary and doesn't bring you any more pleasure than \$50,000 per year used to bring you when it was your status quo.

Economist Richard Easterlin coined the term *hedonic treadmill* (pleasure treadmill) to describe this phenomenon. Just as a person walking on a real treadmill gets nowhere, people trying to make themselves permanently happier by consuming more also get nowhere, because they end up getting used to any higher level of consumption. Indeed, except for the extremely poor, people across the income spectrum report similar levels of happiness and satisfaction with their lives. This has led several economists, including Robert Frank, to argue that we should all stop trying to consume more, because doing so doesn't make us any happier in the long run. What do you think? Should we all step off of the hedonic treadmill?

### ORIGIN OF THE IDEA

6.4

Prospect theory

life's ups and downs as well as why they often appear narrow-minded and fail to "see the big picture." To give you an ide

of how powerful prospect theory is—and why its pioneer Daniel Kahneman, was awarded the Nobel Prize in Economics—let's go through some examples of consumer behavior that would be hard to explain without the insight provided by prospect theory.

### Losses and Shrinking Packages

Because people see the world in terms of gains and losses relative to the status quo situations that they are used to, businesses have to be very careful about increasing the prices they charge for their products. This is because once consumers become used to a given price, they will view any increase in the price as a loss relative to the status quo price they were used to.

The fact that consumers may view a price increase as a loss explains the otherwise curious fact that many food producers react to rising input costs by shrinking the size of their products. The company most famous for doing this was Hershey's chocolates, which during its first decades of operation about 100 years ago would always charge exactly 5 cents for one of its Hershey's chocolate bars. But the size of the bars would increase or decrease depending on the cost of the company's inputs. When the cost of raw materials rose, the company would keep the price fixed at 5 cents but decrease the size of the bars. When the cost of raw materials fell, it would again keep the price fixed at 5 cents but increase the size of the bar.

This seems rather bizarre when you consider that consumers were not in any way *actually* being shielded from the changes in input prices. That is because what should rationally matter to consumers is the price per ounce that they are paying for Hershey's Bars. And that *does* go up and down when the price remains fixed but the size of the bars changes.

But people aren't being fully rational here. They mentally fixate on the product's price because that is the characteristic that they are used to focusing on when making their purchasing decisions. And because the 5-cent price had become the status quo that they were used to, Hershey's understood that any price increase would be mentally categorized as a loss. Thus, Hershey's wisely chose to keep the price of its product fixed at 5 cents even when input prices were rising.

Other companies employ the same strategy today. In 2008, the prices of many raw materials, including sugar

...and corn, rose substantially. Many major manufacturers reacted by reducing product sizes while keeping prices fixed. Kellogg's reduced the size of its Frosted Flakes and Rice Krispies cereal boxes from 19 to 18 ounces. Frito-Lay reduced Doritos bags from 12 to 10 ounces. Dial Soap bars shrank from 4.5 to 4 ounces. And Procter and Gamble reduced the size of Bounty paper towel rolls from 60 to 52 sheets.

## Framing Effects and Advertising

Because people evaluate situations in terms of gains and losses, their decision-making can be very sensitive to the mental frame that they use to evaluate whether a possible outcome should be viewed as a gain or a loss. Here are a couple of examples in which differences in the context or "frame" change the perception of whether a situation should be treated as a gain or loss. See how you react to them.

- Would you be happy with a salary of \$100,000 per year? You might say yes. But what if your salary last year had been \$140,000? Are you still going to say yes? Now that you know you are taking a \$40,000 pay cut, does that \$100,000 salary seem as good as it did before?
- Similarly, suppose you have a part-time job. One day, your boss Joe walks in and says that he is going to give you a 10 percent raise. Would that please you? Now, what if he also mentioned that *everyone else* at your firm would be getting a 15 percent raise. Are you still going to be just as pleased? Or does your raise now seem like a loss compared to what everyone else will be getting?

Changes in people's preferences that are caused by new information that alters the frame used to define whether situations are gains or losses are referred to as framing effects. These are important to recognize because they can be manipulated by advertisers, lawyers, and politicians to try to alter people's decisions. For instance, would an advertising company be better off marketing a particular brand of hamburger as "20% fat" or as "80% lean"? Both phrases describe the same meat, but one frames the situation as a loss (20 percent fat) while the other frames it as a gain (80 percent lean).

And would you be more willing to take a particular medicine if you were told that 99.9 percent of the people who take it live or if you were told that 0.1 percent of the people who take it die? Continuing to live is a gain, whereas dying is clearly a loss. Which frame sounds better to you?

Finally, note that framing effects have important consequences for the utility-maximizing rule that we studied ear-

lier in this chapter. If a frame alters people's valuations of marginal utility, it *will* affect their consumption decisions!

## Anchoring and Credit Card Bills

Before people can calculate their gains and losses, they must first define the status quo from which to measure those changes. But it turns out that irrelevant information can unconsciously influence people's feelings about the status quo. Here's a striking example. Find a group of people and ask each person to write down the last two digits of his or her Social Security number. Then ask each person to write down his or her best estimate of the value of some object that you display to them—say, a nice cordless keyboard. What you will find is that the people whose Social Security numbers end in higher numbers—say, 67 or 89—will give higher estimates for the value of the keyboard than people whose Social Security numbers end in smaller numbers like 18 or 37. The effect can be huge. Among students in one MBA class at MIT, those with Social Security numbers ending between 80 and 99 gave average estimates of \$56 for a cordless keyboard, while their classmates whose Social Security numbers ended in numbers from 00 to 20 gave average estimates of just \$16.

Psychologists and behavioral economists refer to this phenomenon as **anchoring** because people's estimates about the value of the keyboard are influenced, or "anchored," by the recently considered information about the last two digits of their Social Security numbers. Why irrelevant information can anchor subsequent valuations is not fully understood. But the anchoring effect is real and can lead people to unconsciously alter how they evaluate different options.

Unfortunately, credit card companies have figured this out. They use anchoring to increase their profits by showing very small minimum-payment amounts on borrowers' monthly credit card statements. The companies could require larger minimum payments, but the minimum-payment numbers that they present are only typically about 2% of what a customer owes. Why such a small amount? Because it acts as an anchor that causes people to unconsciously make smaller payments each month. This can make a huge difference in how long it takes to pay off their bill and how much in total interest they will end up paying. For a customer who owes \$1000 on a credit card that charges the typical interest rate of 19 percent per year, it will take 22 years and \$3398.12 in total payments (including accumulated interest) to pay off the debt if he only makes 2 percent monthly payments. By showing such small minimum-payment amounts, credit card companies anchor many customers into the expensive habit of paying off their debts slowly rather than quickly.

### Behavioral Economists Have Recently Found Success in Using People's Behavioral Quirks to "Nudge" Them Toward Making Better Decisions.\*

Behavioral economics began as a descriptive science, meaning that its first goal was to develop theories that accurately described human economic behavior. In particular, it sought to explain a number of behaviors that at first glance seemed irrational. Now that behavioral economics has made significant headway in explaining many of those behaviors, some economists are suggesting that its insights be used to nudge people toward choices that are better for themselves and others.

A key feature of "nudges" is that they are subtle. This subtlety means that nudges can cause large changes in behavior without making people feel bullied or coerced—and also without imposing stringent new rules or having to offer people big monetary incentives or disincentives to get them to do what you want.

Take retirement savings. As you may know, people tend to consume too much in the present and therefore undersave for

\*The term "nudge" was popularized by Richard Thaler and Cass Sunstein in their book *Nudge: Improving Decisions about Health, Wealth, and Happiness*, Yale University Press, 2008.

### Mental Accounting and Overpriced Warranties

The utility-maximizing rule assumes that people will look at all of their potential consumption options simultaneously when trying to maximize the total utility that they can get from spending their limited incomes. But economist Richard Thaler famously noted that people sometimes look at consumption options in isolation, thereby irrationally failing to look at all their options simultaneously. Thaler coined the term **mental accounting** to describe this behavior, because it was as if people arbitrarily put certain options into totally separate "mental accounts" that they dealt with without any thought to options outside of those accounts.

An example of where this suboptimal tendency leads is the warranties that patrons of big electronic stores are offered when they purchase an expensive product, such as a plasma TV that costs \$1000. These

retirement. But as it turns out, this unfortunate behavioral tendency can be easily offset by another behavioral tendency: the tendency people have to stick with default options. In terms of retirement savings, this comes down to designing corporate retirement programs in which each worker is "defaulted into" her company's retirement savings program.

Under those savings programs, money is automatically deducted each month from a worker's paycheck and deposited in her retirement savings account. It used to be the case that the default for such programs was for workers to start out *not* enrolled in them. To get enrolled, they would have to request to join the program. That is, they would have to choose to go against the default option of not being enrolled.

And because people have the behavioral tendency of sticking with whatever option is presented to them as the default, relatively few workers would make the change and enroll in their company's savings program. That was disappointing. But instead of being deterred, behavioral economists saw an opportunity. Why not change the default? Why not make automatic enrollment the default option? By making that change, people's tendency to stick with default options would work in their own favor—they would stay enrolled and save money for retirement.

When this strategy of switching the default was actually implemented, the number of workers participating in retirement

warranties are very much overpriced given that the products they insure hardly ever break down. Personal financial experts universally tell people not to buy them. Yet many people do buy them because they engage in mental accounting.

They do this by mentally labeling their purchase of the TV as an isolated, individual transaction, sticking it into a separate mental account in their brain that might have a title like, "Purchase of New TV." Viewing the purchase in isolation exaggerates the size of the potential loss that would come from a broken TV. Customers who view the transaction in isolation see the possibility of a \$1000 loss on their \$1000 purchase as a potential total loss—"Holy cow! I could lose \$1000 on a \$1000 TV!" By contrast, people who see the big picture compare the potential loss with their entire future income stream—thereby seeing it correctly as a relatively minor loss. Because of this difference, mental accounting inclines people to pay for overpriced warranties.

savings programs skyrocketed—jumping from 60 percent to 98 percent. Those workers can now look forward to much more pleasant retirements thanks to this simple change that works *with* people's preference to stick with default options.

People's tendency to look around them for social cues as to what constitutes good behavior can also be exploited to modify their consumption behavior. But you have to be careful about how you do it, as was discovered by a California power company that wanted to encourage its customers to conserve electricity. Its first attempt to use social cues involved sending each customer a bill that showed not only his or her own usage of electricity in kilowatt-hours, but also the average usage of nearby houses. The company hoped that by showing the average usage of neighbors, customers would receive a subtle hint about their own usage. In particular, it was hoped that customers who used more than their neighbors would feel that they were being wasteful and would thus cut back on their usage.

And that did indeed happen. *But*, their reduction in electricity usage ended up being completely swamped by an increase in electricity usage on the part of the customers who had previously been below-average users. Those customers interpreted the new



information that they were below-average electricity users to mean that they should feel free to consume more. After all, why should they use so little when their neighbors were using so much more?

The power company finally hit upon a solution that worked. Smilies. Yes, symbols like ☺ and ☹. In addition to printing people's own usage and the average usage of their neighbors, the company also started printing a ☺ on a customer's bill if his usage was below average and a ☹ on his bill if his usage was above average. The unhappy smilies embarrassed the heavy users into reducing their consumption even more, while the happy smilies gave a pat on the back to the light users—a pat on the back that kept their usage low.

Bear in mind that both the electricity customers and the workers saving for retirement were being *manipulated* by the people who designed the nudges. This fact is perhaps even more disturbing when you consider that the changes in behavior that were caused by the nudges were most likely *unconscious* on the part of those being manipulated. Keep this in mind as you consider for yourself when and if it is morally or ethically acceptable to use nudges to guide people's behavior.

## The Endowment Effect and Market Transactions

Prospect theory also offers an explanation for the **endowment effect**, which is the tendency that people have to put a higher valuation on anything that they currently possess (are endowed with) than on identical items that they do not own but might purchase. For instance, if we show a person a new coffee mug and ask him what the maximum amount is that he would pay to buy it, he might say \$10. But if we then give the mug to him so that he now owns it, and we then ask how much we would have to pay him to buy it back, he will very likely report a much higher value—say, \$15.

The interesting thing is that he is not just bluffing or driving a hard bargain. Human brains appear wired to do this, to put a higher value on things we own than on things we don't. Economist John List has shown that this tendency can moderate if people are used to buying things for

resale—that is, buying them with the intention of getting rid of them—but without such experience the endowment effect can be quite strong. If it is, it can make market transactions between buyers and sellers harder because sellers will be demanding higher prices for the items they are selling (“Hey, *my* mug is worth \$15 to me!”) than the values put on those items by potential buyers (“Dude, *your* mug is only worth \$10 to me”).

Several researchers have pointed to the fact that human beings are loss averse as providing an explanation for the endowment effect. Once a person possesses something, the thought of parting with it seems like a potential loss. And because potential losses are felt so intensely (2.5 times more intensely than potential gains), the owners of items end up demanding a lot of money as compensation when asked to sell their property. The potential purchasers, on the other hand, do not own the property and thus do not feel any potential sense of loss. So they put lower valuations on the items in question than do the sellers.

## Summary

1. The law of diminishing marginal utility states that beyond a certain quantity, additional units of a specific good will yield declining amounts of extra satisfaction to a consumer.
2. The utility-maximization model assumes that the typical consumer is rational and acts on the basis of well-defined preferences. Because income is limited and goods have prices, the consumer cannot purchase all the goods and services he or she might want. The consumer therefore selects the attainable combination of goods that maximizes his or her utility or satisfaction.
3. A consumer's utility is maximized when income is allocated so that the last dollar spent on each product purchased yields the same amount of extra satisfaction. Algebraically, the utility-maximizing rule is fulfilled when

$$\frac{\text{MU of product A}}{\text{Price of A}} = \frac{\text{MU of product B}}{\text{Price of B}}$$

and the consumer's total income is spent.

4. The utility-maximizing rule and the demand curve are logically consistent. Because marginal utility declines, a lower price is needed to induce the consumer to buy more of a particular product.
5. The utility-maximization model illuminates the income and substitution effects of a price change. The income effect implies that a decline in the price of a product increases the consumer's real income and enables the consumer to buy more of that product with a fixed money income. The substitution effect implies that a lower price makes a product relatively more attractive and therefore increases the consumer's willingness to substitute it for other products.
6. Behavioral economics explains many consumption behaviors, including why irrelevant information can anchor valuations, how people value possibilities in terms of gains and losses relative to a status quo, and how framing effects can change people's decisions by affecting whether particular consumption possibilities seem like gains or losses.

## Terms and Concepts

law of diminishing marginal utility  
utility  
total utility  
marginal utility  
rational behavior  
budget constraint

utility-maximizing rule  
consumer equilibrium  
income effect  
substitution effect  
behavioral economics  
status quo

loss averse  
prospect theory  
framing effects  
anchoring  
mental accounting  
endowment effect

## Questions



1. Complete the following table and answer the questions below: LO1

Units Consumed	Total Utility	Marginal Utility
0	0	
1	10	10
2	—	8
3	25	—
4	30	—
5	—	3
6	34	—

- a. At which rate is total utility increasing: a constant rate, a decreasing rate, or an increasing rate? How do you know?

- b. "A rational consumer will purchase only 1 unit of the product represented by these data, since that amount maximizes marginal utility." Do you agree? Explain why or why not.
  - c. "It is possible that a rational consumer will not purchase any units of the product represented by these data." Do you agree? Explain why or why not.
2. Mrs. Simpson buys loaves of bread and quarts of milk each week at prices of \$1 and 80 cents, respectively. At present she is buying these products in amounts such that the marginal utilities from the last units purchased of the two products are 80 and 70 utils, respectively. Is she buying the utility-maximizing combination of bread and milk? If not, how should she reallocate her expenditures between the two goods? LO2
  3. How can time be incorporated into the theory of consumer behavior? Explain the following comment: "Want to make