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CHAPTER 9

# The Role of Emotion in Economic Behavior

SCOTT RICK and GEORGE LOEWENSTEIN

## IMMEDIATE AND EXPECTED EMOTIONS

### Consequentialist Models of Decision Making

Economic models of decision making are consequentialist in nature; they assume that decision makers choose between alternative courses of action by assessing the desirability and likelihood of their consequences, and integrating this information through some type of expectation-based calculus. Economists refer to the desirability of an outcome as its "utility," and decision making is depicted as a matter of maximizing utility.

This does not, however, imply that consequentialist decision makers are devoid of emotion or immune to its influence. To see why, it is useful to draw a distinction between "expected" and "immediate" emotions (Loewenstein, Weber, Hsee, & Welch, 2001; Loewenstein & Lerner, 2003). Expected emotions are those that are anticipated to occur as a result of the outcomes associated with different possible courses of action. For example, if Laura, a potential investor, were deciding whether to purchase a stock, she might imagine the disappointment she would feel if she bought it and it declined in price, the elation she would experience if it increased in price, and possibly emotions such as regret and relief that she might experience if she did not purchase the stock and its price either rose or fell. The key feature of expected emotions is that they are experienced when the outcomes of a decision materialize, but not at the moment of choice, at the moment of choice they are only cognitions about future emotions.

Immediate emotions, by contrast, are experienced at the moment of choice and fall into one of two categories. "Integral" emotions, like expected emotions, arise from thinking about the consequences of one's decision, but integral emotions, unlike expected emotions, are experienced at the moment of choice. For example, in the process of deciding whether to purchase the stock, Laura might experience immediate fear at the thought of the stock's losing value. "Incidental" emotions are also experienced at the moment of choice, but arise from dispositional or situational sources objectively unrelated to the task at hand (e.g., the TV pro-

gram playing in the background as Laura called her brokerage house).[1]

The notion of expected emotions is perfectly consistent with the consequentialist perspective of economics. Nothing in the notion of utility maximization rules out the idea that the utility an individual associates with an outcome might arise from a prediction of emotions; for example, one might assign higher utility to an Italian restaurant dinner than a French restaurant dinner because one anticipates being happier at the former. While not explicitly denying the idea that utilities might depend on expected emotions, however, most economists until recently viewed detailed accounts of such emotions as outside the purview of their discipline.

Integral immediate emotions can also be incorporated into a consequentialist framework, although it takes one farther afield from conventional economics. Integral emotions, it can and in fact has been argued, might provide decision makers with information about their own tastes—for instance, to help inform Laura of how she would actually feel if she purchased the stock and it rose or declined in value. However, this assumes, contrary to the usual assumption in economics, that people have an imperfect understanding of their own tastes.

An influence of incidental immediate emotions on decision making would pose a much more fundamental challenge to the consequentialist perspective, because such emotions, by definition, are irrelevant to the decision at hand. Any influence of incidental emotions would suggest that decisions are influenced by factors unrelated to the utility of their consequences.

Figure 9.1 presents a schematic representation of the traditional perspective of economics. Although immediate emotions are represented in the figure, they would not be part of any traditional economist's representation of their framework, because they play no role in decision making; they are "epiphenomenal" by-products of, but not determinants of, decisions.

However, a great deal of market activity can be understood in terms of *both* expected and immediate emotions. Much advertising attempts to inform consumers, whether accurately or not, about emotions that they can expect to feel if they do or do not buy a particular good. "One-day-only" sales, for example, are probably effective because they make consumers think that they will regret not seizing the

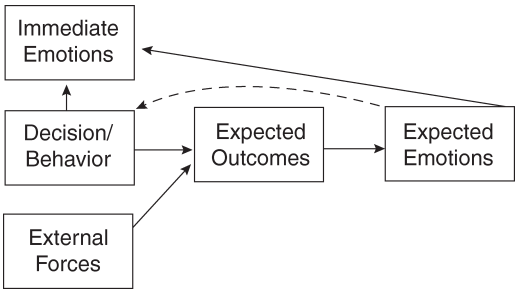


FIGURE 9.1. Consequentialist model of decision making.

opportunity. Marketers also attempt to capitalize on immediate emotions—for example, charitable organizations that make potential donors feel guilty about what they squander their money on while less fortunate people starve.

The food industry is particularly motivated to capitalize on immediate emotions. Mrs. Field's Cookies, for example, has been known to pump enticing cookie smells into the atmosphere of shopping malls to stimulate hunger (Hoch & Loewenstein, 1991). A company named "ScentAir" sells similar odors (e.g., "Glazed Donut," "Iced Cinnamon Pretzel," "Blue Cotton Candy") to businesses looking to stimulate hunger.[2] By contrast, the dieting industry often attempts to market its services by focusing people on the positive emotions they can anticipate experiencing once they are finally able to fit into the perfect pair of jeans.

## Enter Behavioral Economics

Fortunately, many economists would view the snapshot of their discipline presented above as outdated. This is largely attributable to the advent of "behavioral economics," a subdiscipline of economics that incorporates more psychologically realistic assumptions to increase the explanatory and predictive power of economic theory. The field first achieved prominence in the 1980s and has been gaining influence since then. And much of the thrust of behavioral economics has involved, or at least could be construed as involving, an enhanced understanding of emotions.

The first, and less controversial, interaction of behavioral economics with emotions was to question the neglect of the topic and to begin to examine exactly how utility depended on out-

comes. For example, whereas conventional economics assumes that the utility of an outcome depends only on the outcome itself, some economists showed how counterfactual emotions (e.g., regret), which arise from considering alternative outcomes that could have occurred, can influence decision making. Note that these analyses focus on expected emotions and hence help to elaborate the connection among outcomes, emotions, and utility, but do not challenge the consequentialist perspective.

More recently, economists as well as psychologists who are specifically interested in decision making have begun to take greater account of immediate emotions. Some of the research has shown that immediate integral emotions play a critical role in decision making. However, other research has shown that immediate emotions, and especially but not exclusively incidental emotions, often propel decisions in different directions from expected emotions—that is, in directions that run contrary to the predictions of a consequentialist perspective. The new research thus suggests that the consequentialist perspective is much too simple to be a descriptively valid account of actual behavior.

In this chapter, we review some of the critical (consequentialist) assumptions and predictions of the dominant economic models of risky decision making, intertemporal choice, and social preferences. For each of these areas, we first discuss behavioral phenomena that are anomalous from the consequentialist perspective, but that are rectified once the role of expected emotions is taken into account. Next, we discuss phenomena that can potentially be illuminated by taking account of immediate emotions, both integral and incidental. We conclude by proposing directions for future research on the role of emotion in decision making.

## DECISION MAKING UNDER RISK

Most decisions, including decisions of economic importance, entail an element of risk, because the consequences of alternative courses of action are rarely known with certainty. Thus decision making under risk is a central topic in economics.

Since first proposed by Daniel Bernoulli (1738/1954), the "expected utility" (EU) model has served as the normative benchmark for decision making under risk in economics. EU assumes that people choose between alternative courses of action by assessing the desirability or "utility" of each action's possible outcomes and linearly weighting those utilities by their probability of occurring. The normative status of the EU model was enhanced by von Neumann and Morgenstern's (1944) demonstration that it could be derived from a primitive, intuitively appealing set of axioms—for example, that preferences are transitive (if *A* is preferred to *B*, and *B* is preferred to *C*, then *A* should be preferred to *C*). In addition to its normative appeal, this model's assumption that decisions are based on EU, rather than expected value, gives it descriptive appeal as well. For instance, it assumes that the difference in happiness (i.e., utility) between winning $1 and winning $2 is not necessarily equal to the difference in happiness between winning $101 and winning $102 (though the difference in *value* is equal).

However, empirical research has documented many behavioral phenomena that are inconsistent with the basic axioms, and thus inconsistent with the predictions of the EU model, and many of these anomalies can be attributed to unrealistic assumptions about the determinants of expected emotions and the influence of immediate emotions. Several models have accounted for some of these anomalies by making more realistic assumptions about the determinants of expected emotions. We next review some of these theoretical innovations. We then discuss anomalies that can potentially be explained by taking account of the influence of immediate emotions.

### Innovations to the EU Model Involving Expected Emotions

#### *Relaxing the Asset Integration Assumption*

In its original form, the EU model assumes that people do not narrowly focus on potential outcomes when making a decision, but rather on how those outcomes affect their overall wealth. Thus the utility of a particular outcome is not simply based on that outcome, but instead on the integration of that outcome with all assets accumulated to that point. However, as originally noted by Markowitz (1952) and developed more fully by Kahneman and Tversky (1979), people typically make decisions with a narrower focus. When evaluating the potential outcomes of a decision, people tend to think in

terms of incremental gains and losses, rather than in terms of changes in overall welfare.

Suppose, for example, that Bob must decide whether to accept or reject a gamble that offers a 50% chance of winning $20 and a 50% chance of losing $10. If Bob currently possesses $1 million in wealth, then the EU model assumes that he views the gamble as offering a 50% chance of experiencing the utility of $1,000,020 and a 50% chance of experiencing the utility of $999,990. Markowitz (1952) argued, however, that most people would instead process the gamble as it was presented, namely as offering a 50% chance of experiencing the utility of winning $20 and a 50% chance of experiencing the disutility of losing $10.[3]

### *Relaxing the Assumption That Utility Is Strictly Defined over Realized Outcomes*

Another problematic assumption of the EU model is that unrealized outcomes do not influence how we feel about realized outcomes. For example, suppose you anticipate a pay raise of $10,000 and subsequently receive a $5,000 raise. Although the raise is a gain relative to the status quo, you will likely code it as a loss, since it fails to meet expectations. Indeed, Koszegi and Rabin (2006) have recently proposed a model assuming that gains and losses are defined relative to expectations, rather than the status quo.

Additionally, several modifications of the EU model incorporate the tendency to compare what happens to what was expected to happen (e.g., Loomes & Sugden, 1986; Mellers, Schwartz, Ho, & Ritov, 1997). Other theories attempt to account for regret, a counterfactual emotion that arises from a comparison between the outcome one experiences as a consequence of one's decision and the outcome one could have experienced as a consequence of making a different choice. Early versions of regret theory (e.g., Loomes & Sugden, 1982) predicted that regret aversion could lead to violations of fundamental axioms of the EU model, such as monotonicity (i.e., stochastically dominating gambles are preferred to the gambles they dominate).

Regret can also lead to violations of transitivity. Consider, for example, the three gambles below. Assume that there are three equally likely states of nature; the table lists what each gamble pays if a particular state of nature is realized. If people care more about one big regret than they do about two smaller ones, as assumed in Loomes and Sugden (1982), then Gamble *A* will be preferred to Gamble *B*. Similarly, *B* is likely to be preferable to *C*. Since *A* is preferred to *B*, and *B* is preferred to *C*, then transitivity requires that *A* is preferred to *C*. However, in fact *C* is preferred to *A*, since choosing *A* over *C* exposes one to the risk of one large regret instead of two small ones.

| | State 1 | State 2 | State 3 |
|---|---|---|---|
| Gamble *A* | $10 | $20 | $30 |
| Gamble *B* | $20 | $30 | $10 |
| Gamble *C* | $30 | $10 | $20 |

Disappointment aversion and regret aversion theories have only met with modest empirical support. One problem with the predictive validity of regret aversion theories may be that anticipated regret only influences decision making when the possibility of regret is salient (Zeelenberg & Beattie, 1997; Zeelenberg, Beattie, van der Plight, & De Vries, 1996). Consider, for example, the following gambles, in which one of four colors can be drawn with varying probability:

| **Gamble *A*** | **Gamble *B*** |
|---|---|
| 90% chance of White, which pays $0 | 90% chance of White, which pays $0 |
| 6% chance of Red, which pays $45 | 7% chance of Red, which pays $45 |
| 1% chance of Green, which pays $30 | 1% chance of Green, which pays –$10 |
| 3% chance of Yellow, which pays -$15 | 2% chance of Yellow, which pays –$15 |

Since Green wins $30 in Gamble *A* and loses $10 in Gamble *B*, choosing *B* could produce regret if Green is drawn. This very salient potential for regret could lead to a preference for *A* over *B*, even though such a preference violates monotonicity. However, the gambles can be rewritten to make the possibility of regret less salient:

| **Gamble *A′*** | **Gamble *B′*** |
|---|---|
| 90% chance of White, which pays $0 | 90% chance of White, which pays $0 |
| 6% chance of Red, which pays $45 | 6% chance of Red, which pays $45 |
| 1% chance of Green, which pays $30 | 1% chance of Green, which pays $45 |
| 1% chance of Blue, which pays –$15 | 1% chance of Blue, which pays –$10 |
| 2% chance of Yellow, which pays –$15 | 2% chance of Yellow, which pays –$15 |

Note that Gambles *A′* and *B′* are equivalent to Gambles *A* and *B*, respectively; *A* and *A′* both have an expected value of $2.55, and *B* and *B′* both have an expected value of $2.75. However, the potential for regret is no longer salient. Rather, *B′* pays at least as much as *A′* for each possible color. Thus, even though *A* and *A′* are equivalent, *A′* is likely to be less attractive than *A*, only because the way *A′* and *B′* are framed obfuscates the potential for regret.[4]

However, note that regret is often more salient in prospect than in retrospect.[5] Consider, for example, a study by Gilbert, Morewedge, Risen, and Wilson (2004) that examined the extent to which subway passengers regretted missing their train. Passengers who entered a subway station within 6 minutes of missing the train (experiencers) were told that they missed their train by either 1 minute or 5 minutes. They were then asked to report how much regret they felt. These ratings were compared to the ratings of passengers leaving the station (forecasters), who were asked to imagine how much regret they would feel if they missed their train by 1 or 5 minutes. Forecasters anticipated feeling greater regret if they missed their train by 1 minute than by 5 minutes, though actual regret did not depend on how close experiencers came to catching the train. A subsequent study suggested that the effect was driven by forecasters' inability to realize how quickly they would absolve themselves of responsibility for the disappointing outcome.

Although work remains to be done to incorporate more determinants of expected emotions into consequentialist models of decision making under risk, great progress has been made. We now discuss risky choice phenomena driven by immediate emotions.

## Innovations to the EU Model Involving Immediate Emotions

### *Integral Emotions Influence Risky Decision Making*

When sufficiently strong, immediate emotions can directly influence behavior, completely precluding cognitive decision making (Loewenstein, 1996). Ariely and Loewenstein (2005) experimentally examined the influence of sexual arousal on (hypothetical) risky decision making (see also Loewenstein, Nagin, & Paternoster, 1997). Male participants were given a laptop computer and asked to answer a series of questions. In the control treatment, participants answered the questions while in their natural (presumably not highly aroused) state. In the arousal treatment, participants were first asked to self-stimulate (masturbate) while viewing erotic photographs, and were presented with the same questions only after they had achieved a high but suborgasmic level of arousal. When asked about their intention to use birth control in the future, aroused participants were less likely to report intending to use a condom. Although arousal affected participants' risk *attitudes*, it did not affect their risk *perception*. For example, aroused participants were no less likely to endorse this statement: "If you pull out before you ejaculate, a woman can still get pregnant." Although the authors did not ask questions that would permit mediational analyses, the preliminary results suggest that immediate emotions had a direct effect on (predicted) behavior.

When experienced at more moderate levels, however, affect can mediate the relationship between cognition and behavior. Antonio Damasio and his colleagues (Damasio, 1994; Bechara, Damasio, Tranel, & Damasio, 1997) have argued that decision makers encode the consequences of alternative courses of action affectively, and that such "somatic markers" critically influence decision making. Damasio and colleagues have further argued that the ventromedial prefrontal cortex (VMPFC) plays a critical role in this affective encoding process. Bechara et al. (1997) investigated the proposed role of the VMPFC in an experiment in which patients suffering damage to the VMPFC and non-brain-damaged individuals played a game in which the objective was to win as much money as possible. Players earned hypothetical money by turning over cards that yielded either monetary gains or losses. On any given turn, players could draw from one of four decks, two of which included $100 gains and two of which contained $50 gains. The high-paying decks also included a small number of substantial losses, resulting in a net negative expected value for these decks. Bechara et al. (1997) found that both nonpatients and those with VMPFC damage avoided the high-paying decks immediately after incurring substantial losses. However, individuals with VMPFC damage resumed sampling from the high-paying decks more quickly than nonpatients did after encountering a substantial loss. Thus, even though patients understood the game and

wanted to win, they often went "bankrupt." Bechara et al. (1997) reasoned that patients "knew" the high-paying decks were risky, but that their failure to experience fear when contemplating sampling from these decks made risky draws more palatable.[6] While the Bechara et al. (1997) study has not been immune to criticism (see Maia & McClelland, 2004, for a particularly compelling critique, and Dunn, Dalgleish, and Lawrence, 2005, for a review of several critiques), the somatic marker hypothesis remains intuitively appealing.

Other evidence suggesting that integral emotion influences decision making comes from studies of consumers' willingness to insure against a variety of risks. Johnson, Hershey, Meszaros, and Kunreuther (1993), for example, asked participants how much they would be willing to pay for flight insurance that protected against death due to "any act of terrorism" or "any reason." Since terrorism is only one of many reasons why a plane might crash, consequentialist models of decision making predict that participants will pay more for insurance covering all types of crashes than for insurance just covering terrorism. However, Johnson et al. (1993) found that participants were willing to pay slightly more for insurance protecting against terrorism.[7]

Additional evidence of integral emotions' impact on risky decision making comes from studies of probability weighting. The EU model assumes that the weight an outcome's probability receives in decision making is independent of the outcome; in fact, the model assumes linear probability weighting (i.e., that outcomes are weighted in exact proportion to their likelihood of occurring). However, more recent models of decision making under risk have challenged this assumption, suggesting instead that probabilities are weighted nonlinearly, as in Figure 9.2 (Kahneman & Tversky, 1979). Kahneman and Tversky's (1979) proposed "probability-weighting function" suggests that small probabilities are overweighted and large probabilities are underweighted.

Despite the innovation, models such as Kahneman and Tversky's (1979) still assume that probability weights are independent of outcomes. This suggests, for example, that a 1% chance of losing $1 has the same psychological impact as a 1% chance of losing your life. Rottenstreich and Hsee (2001) suggest that the probability-weighting function is flatter for affect-rich outcomes than for affect-poor outcomes. They speculate that affect-rich prizes elicit greater degrees of hope and fear, and thus an extreme overweighting of small probabilities and an extreme underweighting of large probabilities. Indeed, Rottenstreich and Hsee (2001) found that participants' willingness to pay to avoid an electric shock was insensitive to the probability of the shock, whereas willingness to pay to avoid losing $20 was extremely sensitive to the probability of the loss.[8]

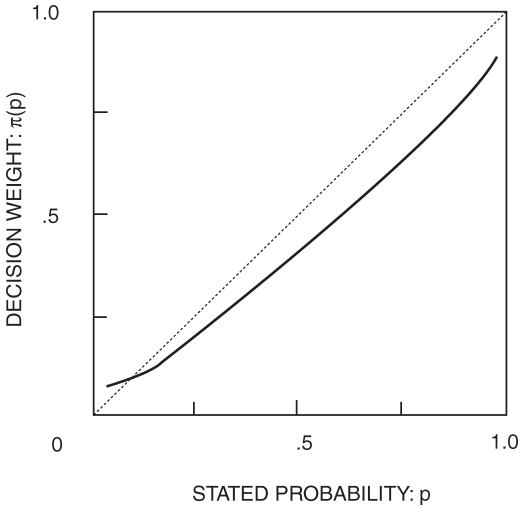


FIGURE 9.2. Kahneman and Tversky's probability-weighting function. From Kahneman and Tversky (1979). Copyright 1979 by the Econometric Society. Reprinted by permission.

### *Incidental Emotion Influences Risky Decision Making*

In a study of market index returns across 26 countries from 1982 to 1997, Hirshleifer and Shumway (2003) found that the amount of sunshine (relative to expected amount of sunshine for a given time of year) was positively and significantly correlated with market returns. The authors speculate that the phenomenon may be driven by incorrect attributions of good mood to positive economic prospects rather than correct attributions to the sunshine (cf. Schwarz & Clore, 1983). Similarly, Edmans, García, and Norli (2007) have found that stock market returns plummet when a country's soccer team is eliminated from an important tournament (e.g., the World Cup). They also document a dip in market returns following important losses in other sports (e.g.,

cricket, rugby, and hockey) in countries where those sports are popular.[9]

## INTERTEMPORAL CHOICE

Models of intertemporal choice address how decision makers choose between alternatives involving costs and benefits that are distributed over time. The "discounted utility" (DU) model is the dominant model of intertemporal choice in economics (Samuelson, 1937). Structurally, this model is closely parallel to the EU model—and, like the EU model, has been derived from a series of intuitively compelling axioms (Koopmans, 1960). However, a number of anomalies have been identified that call into question the descriptive validity of these axioms, and thus the predictions of the DU model (Loewenstein & Prelec, 1992). We next review anomalies that can be reconciled with this model once more realistic assumptions are made about the determinants of expected emotions; we then discuss anomalies that can be explained by taking account of immediate emotions.

### Innovations to the DU Model Involving Expected Emotions

#### *Relaxing the Assumption That Utility Is Strictly Defined over Realized Outcomes*

Like the EU model, the DU model assumes that utility (and thus expected emotion) is only a function of realized outcomes. If people devalue future emotions, they should want to experience pleasurable outcomes immediately and postpone painful outcomes whenever possible. However, contrary to this basic assumption, in many situations people prefer to get unpleasant outcomes over with quickly, or to "leave the best for last." In an early study documenting this phenomenon, Loewenstein (1987) asked 30 undergraduates how much they would be willing to pay immediately to obtain a kiss from the movie star of their choice and to avoid receiving a (nonlethal) 110-volt shock, after several time delays. Contrary to the predictions of the DU model, respondents were willing to pay more to experience a kiss delayed by 3 days than an immediate kiss or one delayed by 3 hours or 1 day, and were also willing to pay more to avoid a shock that was delayed for 1 year or 10 years than to avoid a shock experienced within the next 3 days.

These anomalies can be reconciled with the DU model if one takes account of the observation that utility is not strictly a function of realized outcomes, but also of emotions experienced while waiting for those outcomes to occur. Loewenstein (1987) proposes that people derive utility from "savoring" future good outcomes and disutility from dreading bad outcomes.[10] Indeed, in a brain imaging study in which participants were confronted with the prospect of a *real* impending shock, Berns et al. (2006) found that components of the brain's "pain matrix" (a cluster of regions that are activated during the experience of pain) are also active in anticipation of shock. Furthermore, providing support for the idea that utility from anticipation plays a causal role in the desire to expedite negative outcomes, individual differences in activation in response to anticipatory pain predict individual tendencies to expedite shocks.[11]

#### *Incorporating Affective Forecasting Errors*

For the DU model to be descriptively valid, people must be able to forecast accurately how they will react emotionally to future outcomes. However, there is by now substantial evidence that people have difficulty making such forecasts. Consider, for instance, a study by Brickman, Coates, and Janoff-Bulman (1978) in which lottery winners, persons with paraplegia or quadriplegia, and a control group were asked to report their current happiness on a 5-point scale. The lottery group ($n$ = 22) consisted of people who had recently won at least $50,000 in the Illinois state lottery. The paraplegic and quadriplegic participants ($n$ = 29) had become paralyzed within the past year. Lottery winners reported a mean level of happiness virtually identical to that of the control group (4.00 vs. 3.82), whose happiness was significantly different from, but surprisingly close to, the mean happiness level among paraplegic and quadriplegic participants (2.96). Although the lottery winners and the paraplegic and quadriplegic participants were not prospectively asked to predict their future happiness (since they could not be identified beforehand), it seems likely that both groups would have overestimated the hedonic impact of their future circumstances.[12]

Loewenstein and Adler (1995) examined whether people could predict falling subject to

the "endowment effect" (Thaler, 1980), which refers to the tendency for people to value an object more highly if they possess it than they would value the same object if they did not. In the typical demonstration of the effect (see, e.g., Kahneman, Knetsch, & Thaler, 1990), some participants (sellers) are endowed with an object and given the option of trading it for various amounts of cash; other participants (choosers) are not given the object, but are given a series of choices between receiving the object and receiving various amounts of cash. Although the objective wealth position of the two groups is identical, as are the choices they face, endowed participants hold out for significantly more money than those who are not endowed. Loewenstein and Adler (1995) informed some participants that they would be endowed with an object (a mug engraved with their school logo) and asked them to predict the price at which they would sell the object back to the experimenter once they were endowed. These participants, and others who did not make a prediction, were then endowed with the object and given the opportunity to sell it back to the experimenter. Participants who were not yet endowed substantially underpredicted their own postendowment selling prices. In a second study, selling prices were elicited from participants who were actually endowed with an object and from others who were told they had a 50% chance of getting the object. Selling prices were substantially higher for the former group, and the valuations of participants who were not sure of getting the object were indistinguishable from the buying prices of participants who did not have the object.

Loewenstein and Adler's (1995) results suggest that participants who were not endowed with an object failed to predict how painful it would be to part with the object once they possessed it. That is, non-endowed participants made "affective forecasting" errors when predicting their future attachment to the object. However, a recent study by Kermer, Driver-Linn, Wilson, and Gilbert (2006) suggests that it may be the *sellers* who are making the affective forecasting error (see also Galanter, 1992). Kermer et al. (2006) first asked participants to report their baseline affect. Participants then received a $5 show-up fee and were told that a coin would be flipped to determine whether they would win an additional $3 or lose $2. Next, they predicted how they would feel immediately after the coin toss. The experimenter then flipped a coin and paid participants accordingly. Participants then rated how they felt at that moment. Some participants were also asked to report what they would think after the coin toss, and once the coin had actually been tossed, they were asked to report their actual thoughts. Kermer et al. (2006) found that people expected losing $3 to diminish their happiness (relative to happiness reported at the beginning of the experiment) more than it actually did.[13] This suggests that the predictors in Loewenstein and Adler (1995) may have accurately based their predicted selling prices on how they would actually feel after losing an object. Sellers, by contrast, may have based their selling prices on unrealistically negative forecasts of how they would feel after losing an object.[14]

In a behavioral economic model of intertemporal choice that incorporates affective forecasting errors, Loewenstein, O'Donoghue, and Rabin (2003) propose that people exaggerate the degree to which their future tastes will resemble their current tastes. Conlin, O'Donoghue, and Vogelsang (2007) find evidence of such "projection bias" in catalog orders of cold-weather-related clothing items and sports equipment. People are overinfluenced by the weather at the time they make decisions, as measured by their likelihood of returning the item: A decline of 30° F on the date an item is ordered increases the probability of a return by 3.95%.

Economists have incorporated more realistic assumptions about expected emotions into models of intertemporal choice. However, some phenomena, driven by immediate emotions, remain anomalous from the perspective of such models. We now turn to these phenomena.

## Innovations to the DU Model Involving Immediate Emotions

### *Relaxing the Assumption of Exponential Discounting*

The DU model assumes that people discount future flows of utility at a fixed discount rate based on when the utility will be experienced. Discounting at a fixed rate (i.e., "exponential" discounting) means that a given time delay leads to the same amount of discounting regardless of when it occurs. According to the DU model, delaying the delivery of a good by 1 day leads to the same degree of time discount-

ing whether that delay makes the difference between consuming the good tomorrow rather than today or in 101 days rather than 100 days. However, an overwhelming amount of empirical work suggests that people (as well as animals) do not discount the future exponentially (Kirby & Herrnstein, 1995; Rachlin & Raineri, 1992). Rather, people care more about the same time delay if it is proximal rather than distal—a general pattern that has been refereed to as "hyperbolic time discounting" (Ainslie, 1975). For example, delaying consumption of a pleasurable good from today to tomorrow is more distressing than delaying consumption from 100 days from now to 101 days from now. Hyperbolic time discounting predicts that people will behave farsightedly when the consequences of their decision are delayed. In such situations, decision makers will place great weight on long-term costs and benefits. However, when consequences are immediate, hyperbolic time discounting will produce behavior that appears impulsive.[15]

Consider, for example, an experiment by Read, Loewenstein, and Kalyanaraman (1999) in which participants were asked to select 1 of 24 movies to watch. Some of the movies were "highbrow" (e.g., *Schindler's List*), and some were "lowbrow" (e.g., *The Mask*). Some participants were asked to choose a movie to watch that night, whereas others were asked to choose a movie to watch in the future. Consistent with hyperbolic discounting, "lowbrow" movies (ones that are high in short-run benefits, but low in long-run benefits) were most popular among participants selecting a movie for immediate viewing.[16]

Behavioral economists have made great progress in modeling hyperbolic discounting (e.g., Laibson, 1997). Such models implicitly assume that discounting leads to impulsive behavior by diminishing the importance of expected emotions. However, when the timing of consumption is held constant, various other situational factors can also lead to impulsivity. Walter Mischel (1974) and colleagues, for example, have extensively studied the impact of physical proximity of rewards on the impulsivity of children. Children faced with the choice between a small immediate reward (e.g., one marshmallow immediately or two marshmallows in 15 minutes) and a larger delayed reward (two marshmallows) tend to behave more impatiently when the immediate reward is visible.

Thus impulsivity may reflect factors other than a devaluation of expected emotions. Immediate emotions may also produce nonexponential discounting. To examine the influence of immediate emotions on impulsivity, McClure, Laibson, Loewenstein, and Cohen (2004) measured the brain activity of participants with functional magnetic resonance imaging (fMRI) while they made a series of intertemporal choices between small proximal rewards ($\$R$ available at delay $d$) and larger delayed rewards ($\$R'$ available at delay $d'$), where $\$R < \$R'$ and $d < d'$. Rewards ranged from $5 to $40 Amazon.com gift certificates, and the delay ranged from the day of the experiment to 6 weeks later. McClure et al. (2004) investigated whether there were brain regions that showed elevated activation (relative to a resting state benchmark) only when immediacy was an option (i.e., activation when $d = 0$, but no activation when $d > 0$), and whether there were regions that showed elevated activation when participants were making any intertemporal decision irrespective of delay. McClure et al. (2004) found that time discounting is associated with the engagement of two neural systems. Limbic and paralimbic cortical structures, which are known to be rich in dopaminergic innervation, were preferentially recruited for choices involving immediately available rewards. In contrast, fronto-parietal regions, which support higher cognitive functions, were recruited for all intertemporal choices. Moreover, the authors found that when choices involved an opportunity for immediate reward, thus engaging both systems, greater activity in fronto-parietal regions than in limbic regions was associated with choosing larger delayed rewards.[17] These results suggest that the experience of immediate emotion rather than the devaluation of expected emotion may, at least in some situations, drive impulsivity.[18]

### *Integral Emotions Influence Intertemporal Choice*

Suppose you are deciding whether or not to buy a CD for $10. The DU model predicts that you will buy the CD if the anticipated pleasure of listening to it exceeds its "opportunity cost" (i.e., the forgone pleasure that could have been purchased with the $10). However, Frederick, Novemsky, Wang, Dhar, and Nowlis (2006) suggest that people do not spontaneously consider opportunity costs when deciding whether

or not to purchase goods. Frederick et al. (2006) asked participants whether they would (hypothetically) be willing to purchase a desirable video for $14.99. They simply varied whether the decision not to buy it was framed as "not buy this entertaining video" or "keep the $14.99 for other purchases." Although the two phrases described objectively equivalent actions, the latter highlighted the pleasure that would be forgone by purchasing the video. Frederick et al. (2006) found that drawing attention to opportunity costs significantly reduced the proportion of participants willing to purchase the video, suggesting that many participants were not spontaneously considering opportunity costs (cf. Jones, Frisch, Yurak, & Kim, 1998).

If many people do not take opportunity costs into account when deciding whether or not to purchase goods, then how do they make such decisions? In a project wiht Brian Knutson, Elliott Wimmer, and Drazen Prelec (Knutson, Rick, Wimmer, Prelec, & Loewenstein, 2007), we investigated this question in an experiment in which participants chose whether or not to purchase a series of discounted consumer goods while having their brains scanned with fMRI. The goods ranged in retail price from $10 to $80, and were offered at a 75% discount to encourage spending. Participants were given $20 to spend and were told that one of their decisions would be randomly selected to count for real. At the conclusion of the experiment, participants indicated how much they liked each product and how much they would be willing to pay for it.

We found that the extent to which participants reported liking the products correlated positively with activation in nucleus accumbens, a target of dopaminergic projections that has previously been associated with anticipation of gains and self-reported happiness (Knutson, Adams, Fong, & Hommer, 2001). Moreover, consumer surplus (i.e., the difference between self-reported willingness to pay for the good and its price) correlated positively with activation in medial prefrontal cortex, a region previously associated with the receipt of unexpectedly large gains (e.g., Knutson, Fong, Bennett, Adams, & Hommer, 2003). We also found that activation in both regions correlated positively with purchasing decisions. However, we found that activation in insula during the period when subjects first saw the price correlated negatively with purchasing decisions. Insula activation has previously been observed in connection with aversive stimuli such as disgusting odors (Wicker et al., 2003), unfairness (Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003), and social exclusion (Eisenberger, Lieberman, & Williams, 2003). Thus when the delayed costs of immediage indulgence are not explicitly represented (as in, e.g., McClure et al., 2004), but rather implicitly captured by prices, participants appear to rely on an anticipatory "pain of paying" (Prelec & Loewenstein, 1998) to curtail their spending.

### *Incidental Emotions Influence Consumer Choice*

In other research conducted wiht Cynthia Cryder (Rick, Cryder, & Loewenstein, 2008) investigated whether individuals chronically differed in their tendency to experience anticipatory pain when making purchasing decisions. We hypothesized that individuals who typically experience an intense pain of paying may generally spend less than they would ideally like to spend, whereas individuals who experience minimal pain of paying may typically spend more than they would ideally like to spend. We developed a "Spendthrift–Tightwad" scale to measure individual differences in the pain of paying and found that tightwads outnumbered spendthrifts by a 3:2 ratio in a sample of more than 13,000 people. Rick (2007) hypothesized that incidental sadness could help both tightwads and spendthrifts overcome their prepotent affective responses to spending. The hypothesis was based on previous experimental work suggesting that sadness deepens deliberation (e.g., Tiedens & Linton, 2001) and motivates people to change their circumstances (e.g., Lerner et al., 2004). Rick (2007) tested the hypothesis in an experiment in which tightwads and spendthrifts decided whether or not to purchase a variety of goods while listening to neutral or sad music. As predicted, tightwads spent more when sad than when in a neutral state, and spendthrifts spent less when sad than when in a neutral state.

## SOCIAL PREFERENCES

Although there are widely accepted normative benchmarks for risky decision making and intertemporal choice, no such benchmarks exist for how people should behave toward others.

However, many economic models make the simplifying, but unrealistic, assumption that people are strictly self-interested. Below we review behavioral economic models of social preferences that have incorporated more realistic assumptions about the determinants of expected emotions in social interactions. We then review anomalies driven by immediate emotions.

### Expected Emotion: Relaxing the Pure Self-Interest Assumption

Economists frequently study social preferences in the context of the "ultimatum game" (Guth, Schmittberger, & Schwarze, 1982). In the typical ultimatum game, a "proposer" offers some portion of an endowment to a "responder," who can either accept the offer or reject it. If the responder accepts the offer, the money is divided according to the proposed split. If the responder rejects the offer, both players leave with nothing. Since purely self-interested responders should accept any positive offer, self-interested proposers should offer no more than the smallest positive amount possible. However, average offers typically exceed 30% of the pie, and offers of less than 20% are frequently rejected (see Camerer, 2003).

Several behavioral economic models have emerged that incorporate a taste for fairness.[19] Rabin (1993) proposes a model in which people derive utility from reciprocating intentional (un)kindness with (un)kindness (see also Dufwenberg & Kirchsteiger, 2004). Blount (1995) conducted an interesting variant of the ultimatum game to investigate the role of intentions in social behavior. Some responders were told that the proposer with whom they were paired would make an offer, as in the standard ultimatum game. Other responders were told that the offer would be randomly generated. Blount (1995) found that responders were willing to accept significantly less when the offer was generated randomly than when it came from the proposer.

Sanfey, Rilling, Aronson, Nystrom, and Cohen (2003) conducted a similar study in which participants played the ultimatum game while having their brains scanned with fMRI. Participants, all responders, were told they would play the ultimatum game with 10 different human proposers (though offers were actually determined by the experimenters). Responders received five "fair" offers ($5 for proposer, $5 for respondent) and five unfair offers. In 10 other trials, responders received the same offer, but this time from a computer. As in Blount (1995), participants were more willing to accept low offers from computer proposers than from human proposers. Moreover, activation in anterior insula, a region commonly implicated in the experience of pain (e.g., Knutson et al., 2007), was greater for unfair offers from human proposers than for fair offers from human proposers. Insula activation was also significantly greater in response to unfair offers from human proposers than in response to unfair offers from computer proposers. In fact, whether players rejected unfair offers from human proposers could be predicted reliably by the level of their insula activity. Thus it appears that integral emotions influence responders' behavior in the ultimatum game (cf. Pillutla & Murninghan, 1996).

Behavioral economists have created more descriptively valid models of social preferences by relaxing the assumption of pure self-interest. However, some phenomena driven by immediate emotion cannot be explained by such models. We review such anomalies below.

### Integral Emotions Influence Social Preferences

Recent work on the "identifiable-victim effect" (Small & Loewenstein, 2003), which refers to the tendency to give more to identifiable victims than to statistical victims, suggests that integral emotions play a role in generosity toward others (see also Schelling, 1968; Kogut & Ritov, 2005). Subsequent research has demonstrated that people are also more punitive toward identifiable wrongdoers than toward equivalent but unidentified wrongdoers, and that anger mediates the effect of identifiability on punishing behavior (Small & Loewenstein, 2005). To capture these phenomena, as well as a variety of experimental findings, Loewenstein and Small (2007) have proposed a dual-process model of helping behavior in which a sympathetic but highly immature emotional system interacts with a more mature but uncaring deliberative system.

### Incidental Emotions Influence Social Preferences

Andrade and Ariely (2006) investigated the impact of incidental emotions on behavior in the ultimatum game. They induced either inciden-

tal happiness or anger, and then had participants play the role of responder in an ultimatum game in which they were offered $4 of a $20 endowment. After deciding whether to accept or reject the offer, participants then played the role of proposer in a second ultimatum game, with a presumably different partner than in the first game. Andrade and Ariely (2006) found that happy responders were less likely than angry responders to reject unfair offers in the initial ultimatum game. Surprisingly, however, proposers who were initially induced to feel happy made *more* selfish proposals in the second ultimatum game. The authors reasoned that angry individuals, who were more likely to reject unfair offers than happy individuals in the initial ultimatum game, misattributed their behavior to stable preferences rather than to incidental affect. Later, due to a "false-consensus effect" (Ross, Greene, & House, 1977; but see Dawes & Mulford, 1996), the previously angry individuals inferred that others would also be likely to reject unfair offers and therefore, as proposers, made very generous offers. By contrast, the authors reasoned that happy individuals, who were less likely to reject unfair offers than angry individuals in the initial ultimatum game, also misattributed their behavior to stable preferences. Accordingly, previously happy individuals inferred that others would also be unlikely to reject unfair offers and therefore, as proposers, made very selfish offers.[20]

## CONCLUSION

As the foregoing review indicates, emotions influence economic behavior in two distinct ways. First, people anticipate, and take into account, how they are likely to feel about the potential consequences of alternative courses of action. As discussed, such a role for *expected* emotions is entirely consistent with consequentialist economic accounts of decision making. Research on the role of expected emotions in decision making has taken a variety of directions. It has assessed the types of emotions that people actually experience when different outcomes are realized, with a special focus on counterfactual emotions. It has examined people's predictions of what emotions they will experience, and the accuracy of such predictions. And, it has sought to determine the degree to which decisions are in fact guided by predicted emotions.

Second, substantial research supports the idea that immediate emotions also play an important role in decision making. Integral immediate emotions arise from contemplating the potential outcomes of a decision. In some cases, these emotions seem to play a beneficial role in decision making, informing decision makers about their own values. But in other cases, such as the disproportionate fear commonly associated with flying as opposed to driving, integral emotions may cause people to act contrary to their own material interests. In contrast to the mixed role played by integral emotions, it is much more difficult to justify the well-documented role of incidental emotions, which by definition are unrelated to the decision at hand.

In general, research on expected emotions is far more advanced than that on immediate emotions. As a result, there is a pressing need for more research to examine the causes and consequences of immediate emotions, and to understand the complex interplay of immediate and expected emotions in the production of behavior. In some cases, immediate and expected emotions seem to complement one another. This is true, for example, when immediate emotions provide decision makers with a better understanding of their own values—an understanding that may help them to better predict their own future feelings. For instance, the experience of anticipatory guilt may help students who are contemplating cheating on an exam to appreciate the guilt they would experience after doing so. In other cases, however, immediate and expected emotions come into conflict. For example, the immediate effect of a positive mood may be to make decision makers more inclined to take risks—but, by a different, consequentialist path, a positive mood might also make decision makers more risk-avoidant, with the goal of not risking a disturbance to the positive feelings (Isen, Nygren, & Ashby, 1988; Kahn & Isen, 1993).

The clash between immediate and expected emotions is also a major cause of self-control problems. For example, people are often driven by immediate emotions to eat, drink, and make merry, but in some of these situations, contemplation of expected emotional consequences may discourage indulgence. Psychologists have for decades been developing "dual-process" models that can be interpreted in such terms (see Evans, 2008, for a review), and in recent years economists have begun to follow their

lead. Thaler and Shefrin (1981) were the first economists to do so; their model adopts a principal–agent framework, in which a farsighted planner (the principal) attempts to reconcile the competing demands of a series of myopic doers (the agents). More recently, many dual-process models have focused on the problem of self-control (Brocas & Carrillo, 2006; Fudenberg & Levine, 2006; Benhabib & Bisin, 2005; Loewenstein & O'Donoghue, 2004; Bernheim & Rangel, 2004).

Although most of the dual-process models proposed by economists have sought to adhere to the standard consequentialist perspective, introducing a role for immediate emotions should raise questions about whether such a perspective is "up to the job" of providing a useful account of human behavior. Behavior under the control of immediate emotions bears little resemblance to the reflective weighing of costs and benefits that is the prototype of rational economic decision making. Instead, it is a much more reflexive process that often drives behavior in exactly the opposite direction from that suggested by a weighing of costs and benefits. Whether behavior driven by immediate emotions even warrants the label of "decision making" seems questionable.

In closing, we note two potential (and, we believe, fruitful) directions for future research on the role of emotion in decision making. The first is the need to study stronger emotions than have generally been examined in the empirical literature. Many vitally important decisions are made "in the heat of the moment," and indeed important economic decisions such as major purchases often evoke powerful emotions. But studying the impact of such emotions is difficult—in part because it is difficult if not impossible to manipulate such strong emotional states experimentally, and in part because people generally do not like to be studied when they are in heightened emotional states. Gaining a better understanding of the role of immediate emotions in economic decision making, therefore, is going to require researchers who are willing to extend themselves into "hot" situations and creative enough to find natural experiments in which people are naturally assigned to different emotional states before they make important decisions.

The second pressing need is for economic research that takes fuller account of the range of insights that psychologists are developing into emotions. Thus, for example, economists studying the impact of weather on the stock market have generally taken a rather simplistic view—that bad weather should lead to negative emotions, which should in turn lead to negative price movements. But psychologists studying the impact of emotions on risk taking find that different specific negative emotions can have very different effects. More relevant to the central theme of this chapter, that they have found negative emotions can exert conflicting effects on risk taking, depending on whether the mechanism is consequentialist or more reflexive.

Economists' understanding of the role of emotions in economic behavior has made enormous strides in recent decades. However, there is still a long distance to go.

## NOTES

1. Note that the distinction between expected and immediate emotions closely maps onto other commonly discussed distinctions in economics and psychology, such as the broad distinction between cognition and emotion, or Adam Smith's (1759/1981) distinction between the "impartial spectator" and the "passions."
2. On the surface, it seems somewhat unethical to artificially induce visceral states in order to sell products. However, food companies that failed to prey on the affective vulnerability of consumers would probably be driven out of business by other companies that did. Hence one could argue that food companies that pump artificial smells into the atmosphere to stimulate hunger are not evil, but rather are doing what they must to stay afloat.
3. Note that narrowly focusing on gains and losses rather than on changes in overall welfare suggests that all people, regardless of their current wealth position, view gambles the same way. Indeed, such a narrow focus may explain why some extraordinarily wealthy individuals take big risks to achieve small gains and avoid small losses (e.g., Martha Stewart, worth hundreds of millions of dollars, engaged in insider trading to avoid a loss of less than $50,000).
4. As Sugden (1986) notes, another problem with regret-aversion models may be that it is *recrimination*—regret accompanied by the feeling that one should have behaved differently—rather than regret that one cares about and attempts to avoid. Suppose, for example, you take your car to your regular mechanic, Sue, for an oil change. You have never had a problem with this mechanic's work, but this time she uses the wrong type of oil, which causes the car to break down. In this situation, you surely regret that the mistake was made, but you probably

do not blame yourself for taking it to Sue, since you had no reason to anticipate such a mistake based on her past performance. Now suppose that you instead had decided to change your own oil. You have never done so before, but you decide it is worth trying to save the money. Your inexperience leads you to use the wrong type of oil, causing the car to break down. As in the previous scenario, you regret that the mistake was made. However, now there is likely to be recrimination as well: You think that you should have known better than to try to change your own oil.

5. Interestingly, however, Kivetz and Keinan (2006) show that regret from choosing virtues over vices increases over time, whereas regret from choosing vices over virtues diminishes over time.
6. Note that the extent to which emotional deficits lead to poor decision making depends largely on situational factors. In a similar study in which risky choices had a higher expected value than riskless choices, Shiv, Loewenstein, Bechara, Damasio, and Damasio (2005) found that patients with damage to brain regions associated with processing emotion earned *more* than control participants.
7. One natural explanation for these results is that "unpacking" vivid subsets of a larger set provides a more effective retrieval cue when people are recalling past causes of plane crashes (e.g., Tversky & Koehler, 1994). Such an account would be consistent with a consequentialist model of decision making that allows for errors in judging probabilities. However, other work suggests that this result should not be interpreted in purely cognitive terms. Slovic, Fischhoff, and Lichtenstein (1980), for example, speculated that people's willingness to insure themselves against unlikely losses may be related to how much these potential losses cause worry or concern. Consistent with this view, a number of studies have shown that knowing someone who has been in a flood or earthquake, or having been in one oneself, greatly increases the likelihood of purchasing insurance (Browne & Hoyt, 2000). Although this finding, like that of Johnson et al. (1993), could be explained in consequentialist terms as resulting from an increase in individuals' expectations of experiencing a flood or earthquake in the future, the effect remains significant even after subjective expectations are controlled for (Kunreuther et al., 1978).
8. Similarly, Ditto, Pizarro, Epstein, Jacobson, and MacDonald (2006) conducted an experiment in which participants were given the opportunity to play a game that would either result in winning chocolate chip cookies or being required to work on a boring task for an extra 30 minutes. Half of the participants were only told about the cookies, whereas for the other half the cookies were freshly baked in the lab and placed in front of the participants as they decided whether or not to play the game. Consistent with Rottenstreich and Hsee (2001), Ditto et al. (2006) found that participants' willingness to play the game was insensitive to the probability of winning cookies when the cookies were baked in the lab, whereas willingness to play was very sensitive to the probability of winning when the cookies were merely described.
9. Also, Lerner and Keltner (2001) find that dispositional (i.e., incidental) anger and fear have opposing effects on risk preferences. Specifically, angry people tend to prefer risk (see also Fessler, Pillsworth, & Flamson, 2004), whereas fearful people tend to avoid it. The authors explain their results in terms of the cognitive appraisals generated by the emotions (Smith & Ellsworth, 1985). Anger is generally associated with appraisals of certainty and individual control, whereas fear is generally associated with appraisals of uncertainty and situational control. These incidental emotions, through their associated appraisals, appear to influence participants' cognitive evaluations of the problem, thus influencing their subsequent decisions.
10. Loewenstein's model applies only to deterministic outcomes (e.g., a guaranteed kiss from a movie star in the future). Caplin and Leahy (2001) note that many anticipatory emotions (e.g., suspense) are driven by uncertainty about the future. They propose a model that modifies the EU model to incorporate such anticipatory emotions, and then show that it can explain a variety of phenomena (e.g., the overwhelming preference for riskless bonds over stocks).
11. In addition to savoring and dread, an entirely different type of anticipation may also drive intertemporal choice: the anticipation of *memories* (Elster & Loewenstein, 1992). For example, people may perform challenging but unpleasant activities (e.g., mountain climbing) partly because they savor the pleasant memories of conquering the challenge (see also Keinan, 2006).
12. Addressing an important limitation of the Brickman et al. (1978) study, Gilbert et al. (1998) conducted a study in which affective forecasts could be elicited prior to an important life event. Specifically, Gilbert et al. (1998) studied assistant professors' forecasts of how they would feel after their tenure decisions; the investigators compared these forecasts to the self-reported well-being of others whose tenure decisions had been made in the past. The sample consisted of all assistant professors who were considered for tenure in the liberal arts college of a major university over a 10-year period, and it was divided into three categories: current assistant professors, those whose decisions were made less than 5 years earlier, and those whose decisions were made more than 5 years earlier. Current assistant professors predicted that they would be much happier during the first 5 years after a positive decision, but that this difference would dissipate during the subsequent 5 years. Thus they expected to adapt much more slowly than others actually did: There was no

significant difference in reported well-being between those who had and had not received tenure in either the first 5 or the next 5 years afterward.

13. By contrast, participants accurately predicted how much winning the coin flip would increase their happiness.
14. Why are people often unable to accurately predict their affective reactions to negative events? Kermer et al. (2006) suggest that people do not realize how capable they are of finding "silver linings." For example, participants who were asked to report their thoughts before and after losing the coin flip were significantly more likely to think about their $2 profit after losing the coin flip than before the coin was flipped. Conversely, participants were more likely to think they would focus on the $3 loss before the coin was flipped than they actually did after losing the coin flip. Other researchers (e.g., Schkade & Kahneman, 1998) attribute affective forecasting errors to "focusing illusions," whereby people exaggerate the impact of specific narrow changes in their circumstances on well-being. Both are plausible explanations of the affective forecasting errors documented in the studies discussed here.
15. However, Kivetz and Simonson (2002) suggest that some people have a hard time selecting luxuries (items that are presumably high in short-run benefits, but low in long-run benefits) over cash when either would be received shortly after the decision. They demonstrate that choosing luxuries over cash is easier when the consequences of the decision are delayed.
16. Goldstein and Goldstein (2006) document a similar phenomenon among Netflix customers, who watch and return low-brow movies right away, but let high-brow movies sit around much longer before watching them.
17. However, note that since the rewards were gift certificates, the consumption they afforded was not immediate in any conventional sense. To address this limitation, McClure, Ericson, Laibson, Loewenstein, and Cohen (2007) ran an experiment in which participants were asked not to drink any liquids during the 3 hours preceding their session. While having their brains scanned with fMRI, participants made a series of choices between receiving a small amount of juice or water immediately (by having it squirted into their mouths) and receiving a larger amount of juice or water up to 20 minutes later. Like McClure et al. (2004), McClure et al. (2007) found that limbic regions were preferentially recruited for choices involving immediately available juice or water, whereas fronto-parietal regions were recruited for all choices.
18. The results are consistent with earlier behavioral research by Shiv and Fedorikhin (1999), who found that cognitive load increases the likelihood of choosing cake over fruit salad. The McClure et al. (2004) results suggest that cognitive load interfered more with activation in fronto-parietal regions than with activation in limbic regions, making participants' visceral attraction to the cake more influential.
19. But see Dana, Weber, and Kuang (2007) for evidence suggesting that some actions that appear to reflect a taste for fairness may in fact reflect a desire to appear to have a taste for fairness.
20. Incidental emotion also influences prosocial behavior. Darlington and Macker (1966), for example, found that incidental guilt increased participants' willingness to donate blood. Alice Isen and her colleagues (e.g., Isen & Levin, 1972; Isen, Horn, & Rosenhan, 1973; Isen, Clark, & Schwartz, 1976) have found in a variety of settings that incidental happiness (induced, e.g., by finding a dime in a phone booth or receiving free cookies) increases people's willingness to help others (e.g., by picking up their dropped papers or by helping the experimenter with a subsequent task; but see Isen & Simmonds, 1978). Incidental gratitude also increases people's willingness to help others (Bartlett & DeSteno, 2006). Although the preceding studies did not deal directly with money, note that the helping behavior they documented did involve expenditures of costly resources (e.g., blood, effort, attention).

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