

Aspects of Investor Psychology

Beliefs, preferences, and biases investment advisors should know about.

Daniel Kahneman, Ph.D.
Eugene Higgins Professor of Psychology
Princeton University
Woodrow Wilson School of Public and International Affairs
Robertson Hall
Princeton, NJ 08544-1013

Mark W. Riepe
Vice President
Investment Products and Mutual Fund Research
Charles Schwab & Co., Inc.
The Schwab Building
101 Montgomery Street
San Francisco, CA 94104

Reprinted with permission from Journal of Portfolio Management, Vol. 24 No. 4, Summer 1998, copyright Institutional Investor, Inc. For reprints of article or subscription information call (212) 224-3185.

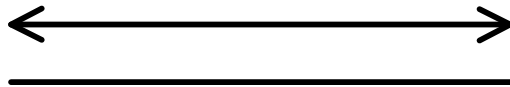
INTRODUCTION

Decision theorist Howard Raiffa [1968] introduces useful distinctions among three approaches to the analysis of decisions. *Normative* analysis is concerned with the rational solution to the decision problem. It defines the ideal that actual decisions should strive to approximate. *Descriptive* analysis is concerned with the manner in which real people actually make decisions. *Prescriptive* analysis is concerned with practical advice and help that people could use to make more rational decisions.

Financial advising is a prescriptive activity whose main objective should be to guide investors to make decisions that best serve their interests. To advise effectively, advisors must be guided by an accurate picture of the cognitive and emotional weaknesses of investors that relate to making investment decisions: their occasionally faulty assessment of their own interests and true wishes, the relevant facts that they tend to ignore, and the limits of their ability to accept advice and to live with the decisions they make. Our article sketches some parts of that picture, as they have emerged from research on judgment, decision-making and regret over the last three decades.

The biases of judgment and decision making have sometimes been called cognitive illusions. Like visual illusions, the mistakes of intuitive reasoning are not easily eliminated. Consider the example of Exhibit 1. Although you can use a ruler to convince yourself that the two horizontal lines are of equal length, you will continue to see the second line as much longer than the other. Merely learning about illusions does not eliminate them.

EXHIBIT 1 VISUAL ILLUSION



The goal of learning about cognitive illusions and decision-making is to develop the skill of recognizing situations in which a particular error is likely. In such situations, as in the case of Exhibit 1, intuition cannot be trusted and it must be supplemented or replaced by more critical or analytical thinking – the equivalent of using a ruler to avoid a visual illusion.

Providing timely warnings about the pitfalls of intuition should be one of the responsibilities of financial advisors. More generally, an ability to recognize situations in which one is likely to make large errors is a useful skill for any decision-maker.

We follow a long tradition in discussions of decision-making, which distinguishes two elements: beliefs and preferences. Decision theorists argue that any significant decision can be described as a choice between gambles, because the outcomes of possible options are not fully known in advance. A

gamble is characterized by the range of its possible outcomes and by the probabilities of these outcomes. People make judgments about the probabilities; they assign values (sometimes called *utilities*) to outcomes; and they combine these beliefs and values in forming preferences about risky options.

Judgments can be systematically wrong in various ways. Systematic errors of judgment are called biases. We start by dealing with a selection of judgment biases. Then we discuss errors of preference, which arise either from mistakes that people make in assigning values to future outcomes or from improper combinations of probabilities and values. In both cases, we introduce each bias with a question that illustrates the bias and conclude with recommendations for financial advisors to help mitigate the harmful effects of these biases.

We conclude the article with a checklist that advisors can use to measure their effectiveness at dealing with these biases.

Biases of Judgment

Financial decisions are made in situations of high complexity and high uncertainty that preclude reliance on fixed rules and compel the decision-maker to rely on intuition. Intuitions play a crucial role in most decisions.

We first discuss a cluster of related biases and cognitive illusions in intuitive judgment that are most likely to affect investment decisions. Investors who are prone to these biases will take risks that he does not acknowledge, experience outcomes that they did not anticipate, will be prone to unjustified trading, and may end up blaming themselves or others when outcomes are bad.

Overconfidence

Question 1. What is your best estimate of the value of the Dow Jones one month from today? Next pick a high value, such that you are 99% sure (but not absolutely sure) that the Dow Jones a month from today will be lower than that value. Now pick a low value, such that you are 99% sure (but no more) that the Dow Jones a month from today will be higher than that value.

If you carry out the instructions in the question, your probability that the Dow will be even higher than your high estimate should be 1%, and your probability that the Dow Jones will be lower than your low estimate should also be 1%. You have now determined your 98% subjective confidence interval for the value of the Dow one month from today. You could repeat this exercise for many other variables that concern investors (e.g., the rate of inflation over the next five years, the price of a particular stock, the general level of interest rates). Indeed, decision analysts recommend that decision-makers should always think of uncertain quantities in terms of confidence intervals, rather than point estimates or best guesses.

Suppose that you have made such judgments on a large set of unrelated propositions, and have waited for all outcomes to be known. For each proposition there are three possibilities:

1. The real outcome could be even higher than your high estimate (in technical terms, this is a high surprise).
2. The outcome could be lower than your low estimate (a low surprise).
3. The outcome could be inside your confidence interval.

If your judgments are not biased in particular ways and if you are a good judge of the limits of your knowledge, you should expect to encounter approximately 1% of high surprises and 1% of low surprises. In 98% of cases, the true value should fall inside your confidence interval. Individuals who set confidence intervals that satisfy this requirement are said to be well-calibrated in their judgments of probability.

Unfortunately, few people are well-calibrated. A vast amount of research documents a highly systematic bias in subjective confidence intervals; there are far too many surprises, indicating that the intervals were set too tightly. A typical outcome in many studies is a surprise rate of 15-20%, where accurate calibration would yield 2%. This phenomenon, known as overconfidence, is widespread and robust. Overconfidence has been confirmed even when it is in the best interest of the research subjects to be well-calibrated.

Calibration can also be measured when people accompany their statements by numerical probabilities. For example, when someone tells you that she is "99% sure" that an event will occur, what probability should you assign to that event? In general, if you are told that someone is 99% sure, you might be well-advised to assume that the relevant probability is 85%. Perhaps most painful, this advice applies even to your own intuitive feelings of confidence!

Two groups of professionals have been found to be reasonably well-calibrated: meteorologists and handicappers at race tracks. Individuals in these professions learn to be well calibrated because of three characteristics of their trade: they face similar problems every day; they make explicitly probabilistic predictions; and they obtain swift and precise feedback on outcomes. When these conditions are not satisfied, overconfidence should be expected, for both experts and non-experts.

These conditions for good calibration may be satisfied for some finance professionals; they are never satisfied for non-professional investors, who are therefore prone to display overconfidence.

Recommendation 1:

- *Keep track of instances of your own overconfidence.*
- *Be mindful of your propensity for overconfidence when making statements to clients. Bold statements may help attract clients, but failure to live up to them will come back to haunt the advisor.*
- *Make clients aware of the uncertainty involved with investment decisions.*
- *Do not let clients project their own overconfidence onto you. If you do, you will create an unreasonably high standard of performance that will lead to short-lived client relationships.*

Optimism

Question 2. How good a driver are you? Compared to the drivers you encounter on the road, are you above average, average, or below average? If an acquaintance purchased a stock that later did badly, do you think of this as a mistake, or as a case of bad luck?

Another powerful bias exists which has asymmetric effects: Most people's beliefs are biased in the direction of optimism. Optimists exaggerate their talents: this is why more than 80% of drivers believe they are, like all the children of Lake Woebegon, above average. Many of them must be mistaken.

Optimists also underestimate the likelihood of bad outcomes over which they have no control. Most undergraduates, for example, believe that they are less likely than their roommates to develop cancer or to have a heart attack before the age of fifty.

Finally, optimists are also prone to an illusion of control (i.e., they exaggerate the degree to which they control their fate). They tend to underestimate the role of chance in human affairs and to misperceive games of chance as games of skill.

The combination of overconfidence and optimism is a potent brew, which causes people to overestimate their knowledge, underestimate risks and exaggerate their ability to control events. It also leaves them vulnerable to statistical surprises. As we see next, however, people are often not as surprised as they should be by events they have failed to predict.

Recommendation 2:

- *Resist the natural urge to be overoptimistic about the courses of action you recommend for your clients. Think, for example, of things that could go wrong.*
- *Because you are more likely to remember your successes, keep a list of past recommendations you made that were not successful.*
- *Communicate realistic odds of success to your clients.*
- *When presenting historical data to clients, resist the temptation to focus on the upside.*
- *Optimists who are also regret-prone have the worst combination of traits, both for themselves and for the professionals who try to help them. Early identification of such tendencies is therefore useful.*

Hindsight

Question 3. Recall the latest action of the Fed about which there was speculation in the press. On the day before the event, what was your estimate of the probability that the Fed would act as it did?

Are you sure that you can accurately recollect your beliefs of the day before the event? If you can perform this task accurately, you are in a minority. Psychological evidence indicates that people can rarely reconstruct, after the fact, what they thought about the probability of an event before it occurred. Most are honestly deceived when they exaggerate their earlier estimate of the probability that the event would occur. This is one of the manifestations of a collection of hindsight biases.

Because of another hindsight bias, events that the best-informed experts did not anticipate often appear almost inevitable after they occur. Financial punditry provides an unending source of examples. Within an hour of the market closing every day, experts can be heard on the radio explaining with high confidence why the market acted as it did. A listener could well draw the incorrect inference that the behavior of the market was so reasonable that it could have been predicted earlier in the day.

If the behavior had been predictable, of course, the event would have caused many people to change what they were doing – and the market would have behaved differently. Everyone who deals with market events is familiar with this chain of reasoning, but the fascination with interpretations of the past persists.

Hindsight errors are pernicious in two ways. First, hindsight tends to promote overconfidence, by fostering the illusion that the world is a more predictable place than it is. Second -- and this is a lesson that financial advisors often learn painfully -- hindsight often turns reasonable gambles into foolish mistakes in the minds of investors. After a stock has dropped in value, its fall appears to have been inevitable. So why didn't the advisor suggest selling it earlier?

Hindsight is an important element of investor regret, an unfortunate fact of life to which we return later.

Over-Reaction to Chance Events

Question 4. Which of the following sequences is more likely to occur when a coin is tossed – HHHTTT or HTHHTH?

The two sequences in this question are equally likely to occur when a fair coin is tossed. Only one of the sequences in the question appears random, however; the other appears systematic. Most people erroneously believe that the second sequence is more likely than the first. More important, many people will be far too quick to perceive causal regularity in random sequences of events. This observation is sometimes called the “hot hand” fallacy, because it was most extensively documented by Gilovich, Vallone, and Tversky [1985] in their classic study of professional basketball players.

Observers and participants in the game are universally convinced that players are sometimes “hot” and sometimes “cold” relative to their long-term average. Gilovich, Vallone, and Tversky analyzed the outcomes of players’ shots, both from the field and from the free throw line, in hundreds of games. An extensive analysis failed to turn up more deviations from a player’s long-term shooting percentage than one would expect to occur purely from chance.

At least in professional basketball, the hot hand is an illusion. The human mind is a pattern-seeking device, and it is strongly biased to adopt the hypothesis that a causal factor is at work behind any notable sequence of events.

The hot hand fallacy is ubiquitous in the world of finance, where it lends unfounded credibility to the claims of fund managers who have been successful for a few years in a row. The tendency to attribute causal significance to chance fluctuations also leads investors to overreact to any information to which their attention is drawn. In the context of basketball, the hot hand fallacy may cause coaches to overreact to fluke sequences of hits or misses by directing play toward a “hot” player or by prematurely benching a “cold” player. In the context of finance, the same psychological quirk causes investors to perceive trends where none exist, and to take action on these erroneous impressions.

Odean [1998b] reports a striking pattern of results in his analysis of hundreds of thousands of individual transactions made with a brokerage firm. He finds that when individual investors sold a stock and quickly bought another, the stock they sold outperformed the stock they bought by 3.4 percentage points in the first year, on average (excluding the costs of transactions). This costly overtrading may be explained in terms of two of the biases that we have discussed: people perceive patterns where none exist, and they have too much confidence in their judgments of uncertain events.

Recommendation 3:

- *Ask yourself whether you have real reasons to believe that you know more than the market.*
- *Before making an active decision, consider the possibility that the trade is based on random factors. List the reasons why it isn't before making the trade.*

ERRORS OF PREFERENCE

Students of decision-making analyzed all decisions under uncertainty as if they involved a choice among gambles or bets. This framework is particularly appropriate in analyzing financial decisions. We have discussed some of the ways in which investors (and their advisors) may be wrong in judging the probabilities associated with different options. Now we present some evidence about the way in which people use probability information in evaluating risky prospects, assign values to outcomes, and combine values and probabilities into preferences.

Non-Linear Weighting of Probabilities

Question 5.

You are facing a chance for a gain of \$20,000. You do not know the exact probability. Consider the three pairs of outcomes:

- A. The probability is either 0 or 1%*
- B. The probability is either 41% or 42%*
- C. The probability is either 99% or 100%*

Are the three differences, A, B and C, equally significant to a decision-maker? Could you order them by their impact on preferences?

The theory of rational choice tells us that uncertain prospects should be evaluated by a weighted average of the utilities of possible outcomes, each weighted by its probability. Weighting by probability implies that a possible outcome that has a probability of 1% should be weighted ten times as much as an outcome that has a probability of 0.1%. Another implication is that an increment of 1 percentage point in the probability of an event should have the same effect on the weighting of outcomes, whether the initial probability is 0%, 41%, or 99%.

As the reader will surely discover in considering Question 5, intuitions about risks and opportunities do not obey this rule. People will pay more to raise the probability of a desirable event from 0 to 1%, or from 99% to 100%, than they will pay to increase the probability from 41% to 42%.

People deviate from the principle of weighting by probability in highly systematic ways. Relative to the weight assigned to a certainty (which is assumed to be 1), people overweight low probabilities and underweight

moderate and high probabilities; the underweighting of high probabilities is especially pronounced.

This rule explains much of what we know about decision-making under risk and uncertainty. In particular, it explains why people like long shots better than other gambles of equal expected value; long shots are preferred because low probabilities of winning are greatly overweighted. Thus, most people will find a 1% chance to win \$1,000 more attractive than a \$10 gift. And most people who have a 99% chance to win \$1,000 will be willing to pay much more than \$10 to eliminate the possibility of missing the prize. In general, the non-proportional weighting of probabilities makes people like both lottery tickets and insurance policies.¹

People Value Changes, not States

Question 6. Imagine that you are richer by \$20,000 than you are today, and that you face a choice between options:

A. receive \$5,000 or B. a 50% chance to win \$10,000 and a 50% chance to win nothing.

Question 7. Now imagine that you are richer by \$30,000 than you are today, and that you are compelled to choose one of two options:

C. lose \$5,000 or D. a 50% chance to lose \$10,000 and a 50% chance to lose nothing.

If you are like most other people, then 1) you probably paid very little attention to the initial statement about being richer than you are by a specified amount; 2) you probably feel that the two problems are quite different; and 3) if you choose the gamble in one of the problems and the sure thing in the other, you probably chose the gamble in Question 7 and the sure thing in Question 6.

This way of thinking about the two problems, although it feels entirely natural, violates an important rule of rational decision making. A fully rational decision-maker would treat the two decision problems as identical, because they are identical when formulated in terms of states of wealth. In both problems, you have a choice between being \$25,000 richer than you are today or taking a gamble in which you could end up richer by \$20,000 or by \$30,000, with equal probabilities.

The argument is simple: what matters to a perfectly rational decision-maker is where he or she gets to in the end, not the gains or losses along the way. Such a decision-maker will choose either the gamble or the sure thing in both Questions 6 and 7, instead of flipping preferences as most people do. In this analysis, a decision-maker who makes different choices in the two problems must have been influenced by the irrelevant emotions associated with gains and losses, instead of keeping in mind the more important goal of maximizing the utility of wealth.

The logical argument for the equivalence of Questions 6 and 7 is compelling, but hardly transparent. No one would ever go through the seemingly pointless exercise of adding his or her wealth to all outcomes of the gamble. Indeed, most readers probably sail past the initial statement about their changed wealth, because such a change of wealth would be very unlikely to change their preferences. It is a universal practice to simplify decision problems by considering only the gains and losses that depend directly on the choice that is to be made. However, this universal practice is a source of errors, because it causes people to make inconsistent choices in alternative formulations of “the same” problem.

There are several important morals to be drawn from this story. First, it is always possible to frame the same decision problem in broader terms (such as wealth) or in narrower terms (such as gains and losses); broad and narrow frames often lead to different preferences. Second, rationality is best served by adopting broad frames, and by focusing on states (such as wealth) rather than on changes (such as gains and losses). We admit, however, narrow framing is easier, more natural, and much more common.

Recommendation 4:

- *When presenting alternative courses of action to clients, do so using the broadest available frame.*
- *Make sure the frame chosen has relevance for the client (e.g., wealth).*
- *For clients whose primary goal is retirement, consider converting the level of wealth into the amount of annuity income that can be expected during retirement.*

Value Function

The value function summarizes much of what has been learned about how people value gains and losses. The value function takes a value of zero for a neutral outcome, which is called the reference point. The reference point is often equal to the status quo (e.g., the current state of wealth), but in some cases, the reference point corresponds to an outcome that the individual had reason to expect, sometimes because other people have obtained it. In other situations, which we discuss later, the reference point is determined by the framing of the problem.

Two characteristics of the value function are important in understanding many decisions.

1. The function is steeper for losses than for gains, a feature called loss aversion.
2. The two limbs of the function are each described by a particular mathematical relationship, which implies a result that we will call *near-proportionality of risk attitudes*.

Question 8. Someone offers you a bet on the toss of a coin. If you lose, you lose \$. 100. What is the minimal gain that would make this gamble acceptable?

The answers to Question 8 typically fall in the range \$200 to \$250 – an extraordinarily high ratio of gain to loss. This number reflects the sharp asymmetry between the values that people put on gains and losses. This asymmetry, called loss aversion, explains decisions in many domains.

For example, an important recent article by Benartzi and Thaler (1995) explores the role of loss aversion in the pricing of stocks and bonds. The authors start from the observation that the historical annual real return on stocks has been 7%, while the return to T-bills has been less than 1%. The market for the two classes of assets is in equilibrium in spite of this striking discrepancy.

Their solution to this *equity-premium puzzle* is that people consider the probability distributions of annual returns for both assets, and weight possible losses 2.5 times more heavily than possible gains, as in the value function of Exhibit 2. The probability of loss is, of course, higher for stocks, and the extra weighting of negative outcomes requires the full compensation of the higher return to match the attractiveness of a safer asset.

Recommendation 5:

- *Some individuals may be more loss averse than others. Assess how loss averse your client is.*
- *Do not recommend very risky investments to loss-averse clients. They will accept such investments only if they optimistically underestimate the risks*

Question 9. What sure gain is just as attractive as this risky prospect— a 50% chance to gain \$1,000 or a 50% chance to gain nothing?

The cash-equivalent of a risky prospect is the sure amount of gain or loss that is as attractive or repellant as the prospect. Most people will set a cash-equivalent of less than \$400 for the gamble of Question 9.

Now answer the same question, assuming that the amount that could be gained is \$5,000, then \$20,000. You are likely to find that your cash equivalent grows almost proportionately with the size of the prize— although probably a little more slowly than the prize. A robust finding in the study of cash-equivalents is that, when all the possible outcomes of a prospect are increased by a small multiple, the cash-equivalent is multiplied by almost the same factor. This

observation is known as near-proportionality of risk attitudes. As we shall see later, it is a source of some important errors in financial decision-making.

Risk proportionality is present in advisors as well. Kahneman and Thaler, in a training exercise, presented a group of financial consultants at a major institution with a scenario of a wealthy family seeking global financial advice. Half of the advisors were told that the family had assets of \$30 million, and yearly expenditures of \$200,000. The other advisors considered a scenario identical in all particulars, except for assets (\$6 million) and expenditures (\$120,000). The proportion of assets that the advisors recommended should be placed in equities was almost exactly the same for the two scenarios: 66% for the wealthier family, 65% for the less wealthy. When the same advisors were asked to consider both scenarios and to determine whether they would recommend the same proportion of equities to both, a substantial majority thought they would recommend more equity holdings for the wealthier family.

The Shape and Attractiveness of Gambles

Question 10. Consider the eight gambles shown in Exhibit 2. Are they ordered in descending order of attractiveness?

EXHIBIT 2 RELATIVE ATTRACTIVENESS OF GAMBLES WITH AN EQUAL EXPECTED VALUE.

Gamble	Payoff 1	Probability of Payoff 1(%)	Payoff 2	Probability of Payoff 2(%)
A	\$5,000	95	\$105,000	5
B	\$5,000	50	\$15,000	50
C	\$1,000	10	\$11,000	90
D	\$1,000	90	\$91,000	10
E	\$2,000	50	\$18,000	50
F	\$0	50	\$20,000	50
G	(\$2,000)	90	\$118,000	10
H	(\$5,000)	50	\$25,000	50

Note: Each gamble has a similar form. For example, in gamble A, the individual is faced with a gamble that has a 95% chance of returning \$5,000 and a 5% chance of returning \$105,000.

All the gambles in Exhibit 2 have two possible outcomes, and all have an expected value of \$10,000, but they differ in their "shape"; the two outcomes can have equal or very unequal probabilities, and the low-probability outcome can be either better or worse than the more probable outcome. Some of the gambles involve possible losses, others do not.

The order of the gambles in Exhibit 3 was determined by a group of financial analysts, who were asked to rank the gambles according to their attractiveness to investors. Individual deviations from the average ordering were generally small.

It is evident in Table 1 that the ideal gamble is one that combines a high probability of a moderate gain and a small probability of a very large gain. Lopes [1987] points out that individuals like gambles that combine a high level of security with some upside potential; these prospects are associated with much hope and little fear. In the terms introduced the ideal gamble combines the attractiveness of a lottery ticket (due to overweighting of the small probability of a large gain) and the attractiveness of a sure, smaller gain.

Recommendation 6:

- *Sophisticated advisors should consider using derivatives overlays that limit the downside while retaining at least some upside participation.*
- *Higher net worth clients are also likely to be receptive to many of the equity-linked structured notes that are becoming increasingly popular with institutional investors.*
- *For lower-end clients, equity-linked annuities are likely to be an attractive option.*
- *Advisors should, of course, shop around and compare prices for these instruments; the ratio of upside to downside is likely to vary substantially from issuer to issuer.*

THE PURCHASE PRICE AS A REFERENCE POINT

Question 11. Investor A owns a block of a stock, which he originally bought at \$100 per share. Investor B owns a block of the same stock for which she paid \$200 per share. The value of the stock was \$160 per share yesterday, and today it dropped to \$150 per share. Who is more upset?

Most readers will agree that B is more upset than A. The reason for this intuition is that investor A will probably treat the bad news as a reduction in a gain, while B will experience the same news as an increased loss. Because the value function is steeper for losses than for gains (see Exhibit2) the difference of \$10 in share price is more significant for B than for A.

As this example illustrates, we generally expect investors to be aware of the price at which they made a substantial investment in a stock, and to continue for some time to use this price as a reference point. Thus, the initial price determines whether selling the stock now will yield a gain or a loss.

An important consequence of this psychological fact is known as the *disposition effect*: a marked reluctance of investors to realize their losses. For example, consider an investor who needs cash and must sell one of two stocks that she owns; one of the stocks has gone up and the other has gone down. Odean [1998a] studied trade records for 10,000 individual investors and shows that investors are much more likely to sell the stock that went up.

Recommendation 7:

- *Risk of loss is an important aspect of risk for most investors, but loss is a relative term. Determine the reference point from which a gain or loss will be calculated.*
- *Since the disposition effect is a powerful bias, provide the client with specific real-life examples of where it was better to “let winners run” and “cut losses.”*
- *Before a purchase decision is made, discuss the conditions under which a sale would be made.*
- *In the education process, be careful not to inadvertently reinforce the tendency towards overreaction to chance events.*

Narrow Framing

Question 12. Imagine that you face the following pair of concurrent decisions. First examine both decisions, then indicate the option you prefer.

Decision 12-1: Choose between:

- A. A sure gain of \$2,400.*
- B. 25% chance to gain \$10,000 and 75% chance to gain nothing.*

Decision 12-2: Choose between

- C. a sure loss of \$7,500.*
- D. 75% chance to lose \$10,000 and 25% chance to lose nothing.*

A large majority of people (even when they have been warned to avoid narrow framing) choose A in decision 12-1 and D in decision 12-2. In Decision 12-1, the sure thing seems most attractive. In decision 12-2, the sure loss is repellent and the chance to lose nothing induces a preference for the gamble.

Most decision makers find it natural to follow their preference on each problem—what could be wrong with that? Now consider the following decision problem.

Question 13. Choose between:

- A. 25% chance to win \$2,400 and 75% chance to lose \$7,600.*
- B. 25% chance to win \$2,500 and 75% chance to lose \$7,500.*

Question 13 is easy. Everybody correctly prefers option B to option A. If you return to the previous problem, however, you will quickly discover that the inferior option A is obtained by choosing A and D, in Question 12, which is what

you probably did—most people do. The dominating option B in Question 13 is obtained by conjoining the two options that most people reject in the previous formulation.

A fully rational decision-maker would adopt an inclusive view of decisions 12-1 and 12-2. Indeed, this decision-maker would immediately incorporate the combined decision into an even broader view of his financial options, all denominated in terms of final states of wealth. An inclusive view would allow the decision-maker to avoid the dominated option in the first pair of problems—and in many other decisions of the same type—but few humans can match that feat.

There is an abundance of real-world examples of investors considering decision problems one at a time instead of adopting a broader frame. Some of these are simply mistakes, in which the investor misses an opportunity to diversify, hedge or self-insure. In other cases, narrow framing arises from the common practice of maintaining multiple mental accounts. There might be a budget for current expenses; there may be a special account of saving for a vacation, which is kept separate from saving for the children's education, and so on. Attitudes toward spending, saving and risk are quite different for different accounts. Thus, people may simultaneously save for the children's education and borrow to buy a car; they may invest in a risky venture if the cash is drawn from a windfall gain, but not if it is drawn from the savings earmarked for retirement.

Recommendation 8:

- *Encourage clients to adopt as broad a frame as possible when making investment decisions.*
- *When developing a client's investment policy, follow a top-down process, which accounts for all of the investor's objectives simultaneously. Avoid the common bottom-up approach in which a separate policy is set up for each investor objective.*
- *Alert the client the costs of narrow frames (e.g., the costs involved with simultaneous saving and borrowing).*
- *Don't go overboard. While broad frames are preferable, using mental accounts is probably the better option for those investors who use mental accounting as an instrument of self-control or who would suffer undue stress from losing money from a "safe" account.*

Repeated Gambles and Risk Policies

Question 14. What is your cash-equivalent for one play of the following gamble: 50% chance to win \$1,000 ,or a 50% chance to win nothing

Question 15. What is your cash-equivalent for five plays of the following gamble: a 50% chance to win \$1,000, or a 50% chance to win nothing.

Most readers will set a cash equivalent for Question 15 that is more than five times higher than their cash equivalent in Question 14. There is a good argument for doing so: because of statistical aggregation the second proposition is relatively less risky than the first. Now consider:

Question 16. You are offered one play of the gamble: a 50% chance to win \$1,000, or a 50% chance to win nothing

More opportunities to play this gamble may be available later. What is your cash equivalent for the present opportunity?

A decision-maker who frames options narrowly will not distinguish between Questions 14 and 16, and will set the same cash-equivalent in both. This is a potentially costly mistake, because it fails to take advantage of the fact that statistical aggregation will reduce the relative risk of a series of gambles. A decision-maker who fails to consider future risky opportunities always acts as if his current decision problem is the last one he will ever make. Except for death-bed decisions, this assumption is rarely appropriate.

Most decision-makers, as we have seen, adopt narrow frames, consider their decision problems one at a time, and are guided by the attractiveness of the options immediately available in making their decisions. In contrast, a rational decision-maker adopts a broader frame for evaluating outcomes, and makes particular decisions in light of a general risk policy. A sound policy also incorporates considerations of the frequency with which further risky opportunities are likely to be encountered.

In general, of course, life offers many more opportunities to play small gambles than large ones. A risk policy that is sensitive to this fact of life will tolerate substantially more risk for small gambles than for large ones. Decisions based on narrow frames tend to exhibit near-proportionality of risk taking; this normally means too little tolerance for risk with small gambles and too much risk taking with large ones.

Recommendation 9:

- *Encouraging clients to adopt and to follow a sensible risk policy is one of the important tasks of financial advisors.*
- *Part of that policy is to identify the client's degree of aversion to the different aspects of risk (e.g., shortfall risk, volatility, risk of loss).*
- *Drawing the investor's attention to the role of statistical aggregation is perhaps the best remedy to unreasonable loss aversion (i.e., you win a few and lose a few, but in the long run, you'll come out ahead).*

Short and Long Views

Question 17. In what percentage of months during the last seventy-one years did stocks make money? What was the ratio of the average loss to the average gain? Also answer the same questions for the percentage of consecutive five-year periods (starting at the beginning of a month)?

Investors who own risky assets must commit themselves psychologically to stay with their investments for some time. The amount of time probably varies greatly for different individuals. One expression of this commitment is the frequency with which the investor monitors the investment and checks how well it has done. Some nervous investors check very frequently; others are less concerned with short-term fluctuations. As Benartzi and Thaler [1995] show that this characteristic of investors is reflective of their experience in the market and it may determine their preferences for risk.

For an extreme case, imagine an observer who chooses an allocation of assets to stocks once a month, on the basis of the experience of the past month and expectations for the immediate future. Stocks made money during 62% of the months over the last seventy-one years, and the average loss was 97% as large as the average gain. A loss-averse investor with a one-month horizon will not like this gamble and will keep all his money in a safer asset one month at a time, forever.

Now imagine an investor who decides to be committed to an allocation for the next five years. The review of the same seventy-one-year history will look much better from the point of view of this investor: stocks made money during 90% of five-year periods, and the average loss was only 63% of the average gain.¹ Even a loss-averse investor will invest in stocks, if only she is willing to adopt a long-term view.²

Benartzi and Thaler [1995] apply this idea to an analysis of financial markets. They assume that investors are myopically loss averse, and use the observed difference in returns between stocks and bonds to derive the investment horizon for which such investors will find the two forms of investment to be equally attractive. It turns out to be about a year. One important conclusion from their analysis is that an investor who considers a longer horizon will be willing to take risks that a more myopic investor will reject, even if their underlying aversion to risk is the same.

Recommendation 10:

- *Teach the investor the importance of taking a long-term view.*
- *Many clients like to talk long term and act short term. Pay more attention to what investors have done in the past than what they say they'll do in the future.*
- *Recognize early which clients will find it most difficult to stay the course and to live with a long-term commitment.*
- *Don't let account statements reinforce short-term thinking. Design statements that give less prominence to the most recent quarter, and more to what has happened over the lifetime of the account.*
- *The advisor and investor should agree ahead of time on a set of procedures to follow in the event that the investor is tempted to make a portfolio alteration based on a hunch, or knee-jerk reactions to recent events.*
- *If the investor does cave in and drastically alter a portfolio based on short-term considerations and the trades do not turn out well, the advisor should tactfully point out the consequences of these actions the next time the urge arises.*

LIVING WITH THE CONSEQUENCES OF DECISIONS

The anticipation, diagnosis, and the management of investor discomfort and regret are central elements of responsible financial advising and therefore part of the financial advisor's job description. The following are some of the reasons:

1. Investment decisions have both emotional and financial consequences over time. There is potential for worry and for pride, for elation and for regret, and sometimes for guilt (such as when one has gambled and lost money that was saved for a purpose). A financially optimal decision (the one that a fully rational investor would make) is of little use to an investor who cannot live comfortably with uncertainty. And the optimal decision is certainly irrelevant if it is one that means the investor is likely to change course at the wrong time.
2. No one likes to lose, but regret makes losing hurt more. Clearly, the losing investor who believes that he should have anticipated the poor performance of his investment feels worse than if he believes the failure could not have been predicted.
3. Those prone to regret are also likely to blame their financial advisors for what they perceive as mistakes. The combination of hindsight bias and regret creates a powerful toxin. With the benefit of hindsight all things that happened are obvious, so why did the advisor fail to give good advice?

Recommendation 11:

- *Maximize the client's overall well-being (which includes their emotional as well as financial health). If you don't, then the client will ultimately thwart your attempts to undertake the steps that would maximize financial health.*
- *Objective factors (e.g., investment horizon, liquidity needs) as opposed to emotional factors (e.g., aversion to risk, irrational fear of certain asset classes, propensity for regret) should receive greater weight, but relative weights need not be the same for all clients.*
- *In most cases, we believe that objective factors should receive the greater weight. However, recommendations designed to minimize regret and loss are appropriate to fearful or regret-prone clients.*
- *When there is an extreme mismatch between the client's goals and what actions the client's emotional state will allow, the advisor should consider ending the relationship.*

Regrets of Omission and Commission

Question 18. Mr. Paul owned shares in company A. During the past year he considered switching to the stock of company B, but he decided against it. He now finds that he would have been better off by \$20,000 if he had switched to company B. Ms. George owned shares in company B. During the past year she switched to the stock of company A. She now finds that she would have been better off by \$20,000 if she had kept her shares of company B. Who is more upset?

Almost everyone agrees that Ms. George was probably more upset than Mr. Paul, although in economic terms their outcomes are the same. The essential difference between them is that Ms. George suffers from a regret of commission: she regrets something she did. In contrast, Mr. Paul suffers the weaker regret of omission: he regrets failing to do something that would have made him better off. The difference between the two occasions for regret is related to the well-documented difference between losses (which people feel acutely) and opportunity costs (failures to gain), which seem to cause relatively little pain.

In general, people tend to ruminate on the unusual aspects of the events that led to bad outcomes, and to focus their regrets on such unusual or abnormal aspects. In particular, people are most likely to regret actions (or even failures to act) that they perceive as being "out of character" for them. If they followed someone's recommendations in straying from their normal path, the regret will easily turn into resentment and anger.

Regret and Risk-Taking

Question 19. Think of a bad financial decision that you made which you now regret. Was it a decision to do something, or to refrain from doing something? What was the role of chance in the outcome?

Although most people feel more regret about things they did than about things they did not do, there are exceptions, and these exceptions appear to be significant in the context of investment. Kahneman and Thaler, in an unpublished survey, asked more than a hundred wealthy investors to bring to mind the financial decision that they regretted the most, and to identify whether the decision they regretted had been to do something or not to do something. As in other groups, most of these wealthy people reported that their worst regret was about some action they had taken. The minority of individuals who reported a regret of omission tended to have another characteristic in common: they generally held an unusually high proportion of their portfolio in stocks. This study shows that people who regret the opportunities they missed tend to take more risks than people who regret attempts that failed.

Another characteristic of risk-takers concerns their views about the role of luck. All respondents were asked about the degree to which they attributed two outcomes to luck: one of which they were proud, the other an occasion for regret. The risk takers tended to assign little role to luck as a cause of both outcomes. In the terms we have discussed, the illusion of control helps people take risks and live with them. A short list of questions on these topics predicts the equity exposure of wealthy individuals with substantial accuracy— much better than conventional indicators such as wealth, age, or current income.

Recommendation 12:

- *Encourage investors to confront their propensity for regret.*
- *Determine the type of regret to which your client is most susceptible. Ask the investor "Will you feel like a fool if this stock shoots up and you don't buy it now?" or "If you buy, it goes up and then goes down, will you tell yourself I should have followed my instincts to get out in time after it had risen?"*
- *If clients are particularly prone to regret errors of commission, a radical change in their investment policy or decisions that are out of character for them should be taken with special caution, because the client may not be able to stay the course when bad things happen.*
- *Involve the client in the decision process so that the decisions are "ours" not the advisors' alone.*
- *Broad framing helps, because it often allows one to point out gains that offset the losses that are the current focus of regret. Redesign statements to give greater prominence to the performance of the overall portfolio.*

A CHECKLIST FOR FINANCIAL ADVISORS

Complete the checklist in Exhibit 4. Answer 'Never', 'Occasionally', or 'Frequently'. For each time you answer 'occasionally,' give yourself one point. For each time you answer 'frequently,' give yourself two points. The score analysis follows the checklist.

HOW FREQUENTLY DO YOU DO EACH OF THESE TASKS?

1. Encourage clients to adopt a broad view of their wealth, prospects and objectives.
2. Encourage clients to make long-term commitments to policies.
3. Encourage clients not to monitor results too frequently.
4. Discuss the possibility of future regret with your clients.
5. Ask yourself if a course of action is out of character for your client.
6. Verify that the client has a realistic view of the odds, when a normally cautious investor is attracted to a risky venture.
7. Encourage the client to adopt different attitudes to risk for small and for large decisions.
8. Attempt to structure the client's portfolio to the shape that the client likes best (such as insuring a decent return with a small chance of large gain).
9. Make clients aware of the uncertainty involved in investment decisions.
10. Identify the aversion of your clients to the different aspects of risk, and incorporate their risk aversions when structuring an investment program.

Score	Comment
16 to 20	You did not need to read this article
11 to 15	Not too bad.
6 to 10	Lots of improvement needed.

ENDNOTES

Preparation of this article was supported by Ibbotson Associates. The authors thank Paul D. Kaplan, Lori Lucas, Terrance Odean, Amy Ost and Tina Riepe for their helpful comments.

¹This is not to say that non-proportional weightings of probabilities are the only reason why people buy insurance, only that it is potentially a contributing factor.

² Five-year results were computed using overlapping time periods (e.g., the first period was January 1926 to December 1930, the second was February 1926 to January 1931, and so on).

REFERENCES

Benartzi, Shlomo, and Richard H. Thaler. "Myopic Loss Aversion and the Equity Premium Puzzle." *Quarterly Journal of Economics*, February 1995, pp. 73-92.

Gilovich Tom, Robert Vallone, and Tversky, Amos. "The Hot Hand in Basketball: On the Misperception of Random Sequences." *Cognitive Psychology*, 1985, pp. 295-314.

Lopes, Lola, "Between Hope and Fear: The Psychology of Risk," *Advances in Experimental Social Psychology*, 1987, pp. 255-295.

Odean, Terrance. "Are Investors Reluctant to Realize Their Losses?" Haas School of Business Research Program in Finance Working Paper Series, No. 269, November 1996.

----. "Do Investors Trade Too Much?" Working paper, University of California at Davis, April 1998b.

Raiffa, Howard. *Decision Analysis*. Reading, MA: Addison-Wesley, 1968

Tversky, Amos, and Daniel Kahneman. "Advances in Prospect Theory: Cumulative Representation of Uncertainty." *Journal of Risk and Uncertainty*, 1992, pp. 297-323