

NBER WORKING PAPER SERIES

FINANCIAL DECISION-MAKING
IN MARKETS AND FIRMS: A
BEHAVIORAL PERSPECTIVE

Werner F. M. De Bondt
Richard H. Thaler

Working Paper No. 4777

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
June 1994

Earlier versions of this paper were presented to TIAS (Tilburg, The Netherlands), the 7. Kolloquium "Empirische Kapitalmarktforschung" in Osnabruck (Germany), and the University of Wisconsin-Madison. We thank the participants for helpful comments. We also thank Bill Ziemba (the editor), Warren Bailey, Ken French, Narasimhan Jegadeesh, Jay Ritter, and Alex Triantis. This paper is part of NBER's research program in Asset Pricing. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

FINANCIAL DECISION-MAKING
IN MARKETS AND FIRMS: A
BEHAVIORAL PERSPECTIVE

ABSTRACT

In its attempt to model financial markets and the behavior of firms, modern finance theory starts from a set of normatively appealing axioms about individual behavior. Specifically, people are said to be risk-averse expected utility maximizers and unbiased Bayesian forecasters, i.e., agents make rational choices based on rational expectations. The rational paradigm may be criticized, however, because (1) the assumptions are descriptively false and incomplete, and (2) the theory often lacks predictive power.

One way to make progress is to characterize actual decision-making behavior. Efforts along these lines are made by behavioral economists and psychologists. This paper provides a selective review of recent work in behavioral finance. First, we ask why economists should be concerned with the psychology of decision-making. Next, we discuss a series of key behavioral concepts, e.g., people's well-known tendencies to give too much weight to vivid information and to show excessive self-confidence. The body of the paper illustrates the relevance of these concepts to important topics in investment theory and corporate finance. In each case, behavioral finance offers a new perspective on results that are anomalous within the standard approach.

Werner F.M. De Bondt
School of Business
University of Wisconsin-Madison
1155 Observatory Drive
102 Commerce Building
Madison, WI 53706

Richard H. Thaler
Johnson School of Management
Malott Hall
Cornell University
Ithaca, NY 14853
and NBER

FINANCIAL DECISION-MAKING IN MARKETS AND FIRMS:
A BEHAVIORAL PERSPECTIVE

"The economist may attempt to ignore psychology, but it is sheer impossibility for him to ignore human nature. .. If the economist borrows his conception of man from the psychologist, his constructive work may have some chance of remaining purely economic in character. But if he does not, he will not thereby avoid psychology. Rather, he will force himself to make his own, and it will be bad psychology."

John Maurice Clark, "Economics and Modern Psychology,"
Journal of Political Economy, 1918, Vol. 26, p. 4

1. INTRODUCTION

Financial economics is, perhaps, the least behavioral of the various subdisciplines of economics. In other areas, what people actually do is, if not in the foreground, at least part of the picture. Labor economists investigate how people choose where to work and how much education to obtain. In public finance there is concern about how taxpayers respond to changes in the law. Even in macroeconomics, analyses of consumption and saving start with people making choices. In contrast, in finance, we simply insist that, whatever people do, they do it right. People optimize but otherwise their behavior is like a black box. The finance literature reveals little interest in investor decision processes or in the quality of judgment. As a result, it is nearly devoid of "people."¹

It has not always been this way. Earlier generations of economists such as Irving Fisher, John Maynard Keynes, and Benjamin Graham (as well as many others, see Loewenstein and Elster, 1992, Chapter 1) put great emphasis on the fallible nature of human decision-making. Modern finance replaces these realistic characterizations of human conduct with representative agent models in which everyone in the economy is

¹Indeed, successful finance texts such as Brealey and Myers (1988) or, at the doctoral level, Ingersoll (1987) do not even list an index entry for "investor psychology." However, Brealey and Myers consider the question of "How are major financial decisions made?" as one of ten major "unsolved problems that seem ripe for productive research" (p. 883).

assumed to be as smart as Sandy Grossman and everyone looks toward the future in a way that would make econometricians proud.² Most economists readily agree that the behavior of the people they observe most often (e.g., their spouses, colleagues, and Deans) does not fit this model. Yet, the rational agent paradigm endures. Why?

There are two standard justifications for retaining the assumption of universal rationality. The first, often attributed to Milton Friedman (1953), is the "as if" defense. Although a baseball outfielder cannot solve the set of differential equations necessary to compute where a fly ball will land, he nonetheless can run to exactly the right place to catch it. He acts "as if" he could solve the problem. Friedman argues that theories should be judged not on the basis of their assumptions but rather on the validity of their predictions. Theory unavoidably involves simplification! Although we are happy to accept this criterion for evaluating theories, we do not find the evidence of great comfort.³ Firms pay dividends. Closed-end funds sell at prices that diverge from net asset value. Most stock portfolios are actively managed even though portfolio managers typically underperform index funds. Stock returns run in seasonal patterns and are more predictable than anyone ever suspected, even five years ago. And, of course, on October 19, 1987 prices fell over 20% on a day in which the only financial news was the crash itself.⁴

With facts such as these, it may be time to have another look at the assumptions. A close look does suggest problems. Over the past twenty years, psychologists (most notably Daniel Kahneman and Amos Tversky) have found again and again that the usual axioms of finance theory (expected utility theory; risk aversion; Bayesian updating; rational expectations) are descriptively false. For example, people display overconfidence in their own judgment, and they make decisions that depend as much on how a problem is "framed" as on its objective payoffs. Importantly, deviations from the normative model are systematic. Therefore, they do not disappear with simple aggregation.

²Emphasising its normative appeal, Herbert Simon (1983) calls this vision of rationality the "Olympian model." It "serves, perhaps, as a model of the mind of God, but certainly not as a model of the mind of man" (p. 34). Hayek (1944) traces the Olympian model back to Descartes' Discourse on Method. He contrasts the "false" Cartesian view with the antirationalistic approach of 18th century English individualism (e.g., Adam Smith, Edmund Burke, or Bernard Mandeville) which regards man as a "...fallible being, whose individual errors are corrected only in the course of a social process" (pp. 8-9). (These and other concepts of rationality are discussed in Elster (1979, 1983, and 1989).)

³Indeed, we have heard the following joke: finance consists of theories for which there is no evidence and empirical facts for which there is no theory.

⁴French and Roll (1986) and Roll (1988) provide more systematic evidence suggesting that the stock market "has a life of its own." Romer (1993) offers two rational interpretations of price movements without news.

The second line of defense relies on market forces. In competitive markets, the argument goes, irrational agents lose their wealth and go out of business, or somehow are rendered irrelevant by smart arbitrageurs who jump in to exploit the opportunities created by irrationality. In financial markets, where stakes are large and transactions costs small, this argument is thought to have special force.⁵

One way to investigate this issue carefully is to construct models with two kinds of agents, some fully rational and some less so (i.e., quasi-rational or noise traders) (see, e.g., De Long et al., 1990a, and Russell and Thaler, 1985). What are the conditions for market prices to be identical to what they would be if all agents were rational? One needs: (1) a date T at which the true value becomes known; (2) costless short-selling over a period long enough to include T; (3) investors with time horizons that include T; (4) not "too many" quasi-rational traders; (5) short selling by rational traders only.⁶ These conditions are not likely to be met. Thus, the simple point is that, even if price diverges from intrinsic value, that fact does not always per se create an arbitrage opportunity (see also Black, 1986, and Shleifer and Summers, 1990).

It is similarly dangerous to argue that irrational investors necessarily lose wealth over time when interacting with rational traders.⁷ De Long et al. (1990b, 1991) show that, in some circumstances, noise traders may actually earn higher returns than rational traders. Since they do so by unintentionally bearing more risk, the noise traders have lower expected utility but higher wealth. Also, rational people may have an incentive to join the crowd rather than to go against it. In general, evolutionary forces tend to be slow in their effects, so even if noise traders do earn lower expected returns, they will still affect asset prices.

As is true in other branches of economics, the problems with modern finance theory are created by its presumed dual purpose, characterizing optimal choice and describing actual choice. The validity of the theory for the first purpose is not in question. However, since it is assumed that actual people do optimize (or behave as if they did), the theories are also thought to be good descriptive models. Of course, if people

⁵Graham and Dodd (1934) give color to this question by asking whether the stock market is "a weighing machine, on which the value of each issue is recorded by an exact and impersonal mechanism" or a "voting machine, whereon countless individuals register choices which are the product partly of reason and partly of emotion" (p. 27).

⁶This last condition is necessary because, if quasi-rational traders are allowed to sell short, no equilibrium exists.

⁷In other words, here rationality is seen as evolutionary adaptation and "it isn't important how people go about making decisions" (Simon, 1983, p. 38). The fact itself that people survive is sufficient proof that they make rational decisions. See Lucas (1986).

fail to optimize, this is not the case.⁸ The solution is to retain the normative status of optimization (e.g., teach students to maximize expected utility and to use Bayes' rule) but develop explicitly descriptive models of behavior in markets and organizations. We call this effort behavioral finance.

This paper provides a selective review of recent work in behavioral finance.⁹ Our goal is a modest one. We wish to establish that the optimal quantity of research on this topic is strictly positive. Consistent with this limited goal, we believe that the assumptions and results of modern finance are often adequate and that many aspects of the perfect markets-perfect people approach should be retained. For example, the assumptions that the typical investor in the stock market is motivated by self-interest and prefers more wealth to less even when wealth is very large (non-satiation) are good first approximations, even if some investors have a preference for politically correct portfolios and if some wealthy people give away large sums of money. Similarly, the Black-Scholes formula serves admirably well both as a characterization of option prices in a rational world and as a description of actual prices. (Notice that the conditions for a rational equilibrium described above are met in this case.) Nevertheless, exploring the implications of psychology for financial markets does offer the promise of helping us understand aspects of finance that appear puzzling within the standard paradigm.

To some, it will seem that the introduction of psychological factors conflicts with "good" economic theory and that it is merely a clever way to introduce free parameters. Cochrane (1991), for instance, states that "the central problem for fad models" is overcoming the charge that "they are just a catchy name for a residual" (p. 480).¹⁰ Not surprisingly, we disagree. Following Akerlof (1984), our view of good theory is that "it poses interesting "if .. then" propositions relevant to some economic issue" (p. 3). This maxim does not rule out unconventional assumptions and, certainly, the research in behavioral finance has not been criticized for boredom! Miller (1986a) argues instead that behavioral finance is "too interesting and thereby distracts us from the pervasive market forces that should be our principal concern" (p. 283).

⁸In some cases, the axioms of rationality are "too strong." While they describe what a well-informed investor may want to do, bounded rationality prevents maximizing agents from taking truly optimal decisions. In other circumstances, the reverse problem occurs. That is, the standard axioms are "too weak." For instance, Kreps (1990) makes the case for bounded rationality and retrospection based on the observation that important problems in game theory have many Nash equilibria and the theory "isn't any help" (p. 97) in choosing between them.

⁹For a collection of relevant papers, see Thaler (1993).

¹⁰Presumably, the same perspective leads Schwert to ask, in his discussion of the small firm effect, that new theory "be developed that is consistent with rational maximizing behavior on the part of all actors in the model" (1983, p. 10, our emphasis).

The problem with the "lack-of-discipline" criticism is that it is applied asymmetrically. Of course, free parameters can be used to shore up any theory. But rational models are not immune to this disease. Rationality itself is often ill-defined and does not impose enough discipline.¹¹ Furthermore, skillful theorists can rationalize almost any empirical fact, a practice Fama (1991, p. 1593) refers to as "model dredging." In an important sense, therefore, behavioral research is more disciplined than the rational paradigm. At least, it wants to start the analysis with assumptions that are approximately true! That is, the basic building blocks of new theory must derive empirical and experimental support from our sister social sciences. As stated eloquently by John Maurice Clark, our constructive theoretical work thereby retains a chance "of remaining purely economic in character." In this chapter, we hope to show that a concern with the quality of financial decision-making can produce many interesting, relevant, and refutable theories.

¹¹As Arrow (1986) points out, rationality per se does not yield much predictive power. The rational paradigm often derives its predictions from subsidiary assumptions such as homogeneity.

2. MICRO-FOUNDATIONS OF BEHAVIORAL FINANCE: A SAMPLER

Although modern finance typically makes predictions about market outcomes and the behavior of firms, there is an underlying set of assumptions about individual behavior that are used to derive these predictions. Specifically, people are said to be risk averse expected utility maximizers and unbiased Bayesian forecasters. In other words, agents make rational choices based on rational expectations. This set of assumptions can be criticized on two counts: 1. Some assumptions are false, e.g., people violate the substitution axiom of expected utility theory; 2. The set is incomplete. That is, the theory has little to say about important aspects of economic behavior such as the role of social norms. Thus, to make progress, one needs to better characterize behavior in the usual domains of finance theory (e.g., portfolio selection) and to enrich the theory to incorporate new domains upon which finance has been silent. Efforts along these lines are made both by behavioral economists and by other social scientists, especially psychologists and sociologists. Of course, we cannot adequately summarize this work in this chapter. Instead, we offer a selection of behavioral concepts that we find most useful to finance.¹²

2.1 Overconfidence

Perhaps the most robust finding in the psychology of judgment is that people are overconfident (e.g., Lichtenstein et al., 1982). One manifestation of this phenomenon is that people overestimate the reliability of their knowledge. When people say that they are 90 percent sure that an event will happen or that a statement is true, they may only be correct 70 percent of the time. Similarly, elicited confidence limits are too narrow. People also overestimate their abilities. One famous finding is that 90 percent of the automobile drivers in Sweden consider themselves "above average" (Svenson, 1981). Comparable results occur for other traits: nearly all people consider themselves above average in their ability to get along with others. A specific finding of relevance to finance is that the degree of overconfidence varies across domains. People are more confident of their predictions in fields where they have self-declared expertise, holding their actual predictive ability constant (Heath and Tversky, 1991).

2.2 Non-Bayesian Forecasting

Are predictions and forecasts made as if people have a working knowledge of

¹²More discussion of specific psychological concepts relevant to economics is found in Mitchell (1914), Clark (1918), Hayes (1950), Katona (1951), Slovic (1972), Thaler (1987), and Loewenstein and Elster (1992). Kahneman et al. (1982) and Nisbett and Ross (1980) provide a systematic overview of the literature on judgment and decision-making.

Bayes' rule? Numerous studies conclude that the answer to this question is no. Kahneman and Tversky show that, instead of using Bayes' rule, people appear to make probability judgments using similarity or what they call the "representativeness heuristic." People evaluate the probability of an uncertain event, or a sample, "by the degree to which it is: (i) similar in essential properties to its parent population; and (ii) reflects the salient features of the process by which it is generated" (1972, p. 431). Although the heuristic is generally useful, it can lead to systematic errors. In the context of Bayes' rule, representativeness induces people to give too much weight to recent evidence and too little weight to the base rate or prior odds. For example, subjects were asked to judge from the description of a man whether he was a lawyer or an engineer. Their answers were insensitive to whether they had been told that the description came from a sample with 70 percent lawyers or 30 percent lawyers. Grether (1980) obtained similar findings in a design in which subjects had a financial incentive to give correct answers.

Representativeness also leads people to make forecasts that are too extreme, given the predictive value of the available information. Another Kahneman and Tversky (1973) experiment illustrates this finding. Subjects were asked to predict a student's raw grade point average (GPA) using the percentile scores of one of three variables: the student's GPA, the results of a test of mental concentration, and of a test of sense of humor. Since the percentile score for sense of humor is a much worse predictor of raw GPA than the percentile GPA score, subjects should have provided less extreme forecasts when given the former predictor. Instead, the variability of the forecasts was similar in the three cases. The subjects can be said to be "overreacting" to the data about sense-of-humor.

2.3 Loss Aversion, Framing, and Mental Accounting

A strong intuition about preferences is that people treat gains and losses differently and, in particular, that losses loom larger than gains. This intuition was expressed by Markowitz (1952) —who suggested semi-variance might be a better measure of risk than variance— and was formally incorporated into Kahneman and Tversky's prospect theory, a descriptive theory of decision making under uncertainty. In prospect theory the carriers of value are changes in wealth, rather than levels, and negative changes are weighted more heavily than gains. (Empirical tests indicate that losses are weighted about twice as heavily as gains. See Kahneman et al., 1990.)

Loss aversion implies that decision-making is sensitive to the description of the action choices, that is, to the way the alternatives are "framed" (Tversky and Kahne-

man, 1981). For example, a store that offers cash customers a discount is less likely to upset its credit card clientele than another store --with the same prices-- that imposes a credit card surcharge (Thaler, 1980). Individuals also have opportunities to create their own frames, a process called mental accounting (Thaler, 1985). Consider, e.g., an investor holding 1000 shares each of two stocks, both with a current price of \$10 per share. One stock was purchased at \$5, the other at \$13. If the investor contemplates selling the stocks separately he may resist selling the loser because of loss aversion, but if the two transactions are combined, producing a net gain, no loss need be felt. Mental accounting may also be used to mitigate self-control problems, for example by setting up special accounts (e.g., the children's education account) that are considered off-limits to spending urges (Thaler and Shefrin, 1981).

2.4 Fashions and Fads

An obvious fact of life is that people are influenced by each other. Twenty years ago, joggers were considered health nuts, mineral water was difficult to find in America, and many people wore bell-bottomed trousers and leisure suits. Fashions change. What we once considered odd or distasteful somehow becomes normal and even desirable. Far from controversial, these remarks would be judged banal in any other field of social science. In economics, however, it is not yet fashionable to discuss fashions.

We will not attempt here to summarize all of sociology and social psychology. It is enough to stress that people are influenced by their social environment and that they often feel pressure to conform (Aronson, 1991). It is certainly possible to construct models in which such behavior is "rational" (see, e.g., Bikhshandani et al., 1992). Safety-in-numbers is, after all, one reason why animals herd. However, as with other heuristics, herding may also lead people astray, e.g., when they follow a market guru. Regardless, for our purposes, the normative status of this behavior is less important than its pervasiveness. Fashions and fads are as likely to emerge in financial markets as anywhere else.

2.5 Regret, Responsibility, and Prudence

Regret is the feeling of ex post remorse about a decision that led to a bad outcome. Even for those trained to differentiate between bad decisions and bad outcomes, it is often difficult not to feel regret after a bad outcome. Regret becomes of interest to theorists if decision-makers take steps to avoid regret (Bell, 1982). One tactic is to shift the responsibility for a decision onto someone else, i.e., hiring an agent. This

introduces what amounts to a negative agency cost. Holding the quality of decisions constant, if the agency relationship reduces the regret felt, the expected utility of the principal rises.

Another way to reduce anticipated regret is to follow standard social and legal norms of "prudent" decision-making. Regret is larger for an unconventional decision than for a routine one. For example, a portfolio of three large blue chip stocks may be considered more prudent than a portfolio of 30 AMEX companies, regardless of the objective risk characteristics of the two portfolios. Thus, prudence may be relevant for asset pricing. It raises the required return for small firms, especially if they are unsuccessful, but it lowers the return for large well-established corporation and "glamour stocks" that get favorable news coverage (Shefrin and Statman, 1993b).

3. INVESTOR PSYCHOLOGY AND MARKET PRICES

The previous sections have established two necessary conditions for the study of behavioral finance to be interesting and valuable. First, in direct tests, the axioms of rationality upon which modern finance is based are often violated, and the departures are systematic. Second, markets cannot, in general, be relied upon to eliminate traces of irrationality. With this established, where should we expect the new tools to be applied most productively? As suggested by Thomas Kuhn (1970), a reasonable place to start is with the study of anomalies, i.e., empirical facts for which there is wide agreement that the standard paradigm lacks explanatory power.¹³ Notice that this strategy is completely in keeping with Friedman's positive approach. If the theory predicts well, we care less about the realism of the assumptions. Therefore, this review emphasizes the anomalous domains where psychology is likely to be useful. In so doing we do not intend to suggest that these domains are the most important, merely that they highlight the potential of a new approach. Conversely, by discussing these limited domains, we do not wish to imply that psychological factors are only present in the periphery but rather that these are situations where the role of psychology is most apparent.

3.1 Trading and Active Portfolio Management

By-and-large, the past literature on capital markets has paid only peripheral attention to trading volume. In rational expectations models, differences in private information may cause disagreement among investors. However, without noise traders (dropped into the model as a *deus ex machina*), the lack of consensus will not generate trading if rationality is common knowledge (Aumann, 1976; Milgrom and Stokey, 1982). This is sometimes called the Groucho Marx Theorem. Just as Groucho did not want to join any club that would have him as a member, no rational trader would want to trade with another rational trader (if she is selling, why should I buy?). In reality, many investors "agree to disagree" and they actively bet on their information. This seems to reflect the belief of investors that they can outwit other market participants. In other words, investors with access to the same information disagree about its proper interpretation (Harris and Raviv, 1992). While some trading may occur for the purposes of consumption or portfolio rebalancing, it is hard to see how these motives by themselves can

¹³Of course, some "anomalies" may be statistical illusions, the products of relentless data mining. (Lakonishok and Smidt (1988) and Lo and MacKinlay (1990) discuss data-snooping.) However, many financial market regularities are observed world-wide. See, e.g., Ziemba (1993) and Hawawini and Keim (this volume). Also, some anomalies are confirmed for later time periods. The concept that "good ideas made public carry the seeds of their own destruction" does not always hold. For instance, Hensel et al. (1994) find a turn-of-the-month anomaly for stock index futures between 1982 and 1992. Ariel's well-known (1987) study of this effect was based on data for the 1963-1981 period.

produce 200 million shares of daily volume on the NYSE.

The high trading volume on organized exchanges is perhaps the single most embarrassing fact to the standard finance paradigm. Lowenstein (1988) reports that, in 1987, annual market-wide trading costs for S&P companies equalled 17.8% of the annual earnings reported by these firms. It must be stressed that the high volume is not produced by amateur investors. The average turnover rate for institutional investors is much higher than the rate for individuals. Of course, high volume is only one aspect of a more general puzzle. Why are most funds actively managed? It has been known for years (see, e.g., Jensen, 1968, or Ippolito and Turner, 1987) that few active portfolio managers earn returns above the S&P 500, and yet index funds (with lower fees) still garner a modest share of the market.

The key behavioral factor needed to understand the trading puzzle is overconfidence. Overconfidence explains why portfolio managers trade so much, why pension funds hire active equity managers, and why even financial economists often hold actively managed portfolios—they all think they can pick winners. High trading volume and the pursuit of active investment strategies thus seem inconsistent with common knowledge of rationality.¹⁴

3.2 Contrarian Investment Strategies

An important tenet of the efficient market hypothesis (EMH) is that one cannot earn abnormal profits by trading on publicly available information. Over the last decade, numerous apparent “exceptions” to this rule have been documented. Because Hawanini and Keim review the asset pricing anomalies (Chapter X, this volume), we focus here on results that fall under the general category of contrarian investment strategies.

At least since the publication of Graham and Dodd's Security Analysis (1934), there has been a school of investors who follow value-based investment strategies.¹⁵ Presumably, unusual returns could be earned by buying out-of-favor stocks and holding them for the long term. We include in this category companies with low price-earnings (P/E) ratios (Basu, 1978; Jaffe et al., 1989), low ratios of market value to book value,

¹⁴The agency relationship between clients and money managers also plays a role (De Bondt, 1992a). It is difficult to distinguish luck from skill in investment. Merely by chance, there will always be some investment advisors who look like true gurus. But representativeness makes it hard to recognize this. Also, clients may want to believe that investment advice can be valuable (cognitive dissonance). Either way, money managers are forced to signal competence, e.g., through hard work, elegant presentations, and the employment of celebrated analysts. Most importantly, among themselves, the advisors play a performance ranking game. It is critical that, besides dollar profits, rank matters. This rule rewards prudent investing in conventional/fashionable stocks. Also, with frequent evaluation, portfolio insurance and other stop-loss strategies that limit downward risk are seen to fulfill useful roles.

and low past returns (De Bondt and Thaler, 1985, 1987).

Graham's original logic for adopting a contrarian strategy was certainly based on psychology. In his view, the prices of out-of-favor firms are irrationally depressed by investors focusing on the here-and-now: "The market is always making mountains out of molehills and exaggerating ordinary vicissitudes into major setbacks" (1959, p. 110). Dreman (1982) went further and made explicit use of modern psychology. He argued that P/E ratios can be interpreted as market forecasts of future profit growth. In practice, the forecasts of many investors are naive extrapolations of recent experience. But predicting future profits is difficult. This means that rational earnings forecasts should lie in a narrow range, especially if they are long-term. In fact, the extreme variability of P/E ratios suggests that consistent with representativeness earnings forecasts are systematically too extreme. Interestingly, the data confirm this theory for security analysts (De Bondt and Thaler, 1990). But, if the bias applies to experts, it seems likely that it also applies to common investors.¹⁶ Thus, too extreme earnings expectations may explain the anomaly that low P/E stocks outperform high P/E companies.

De Bondt and Thaler (1985) extended Dreman's reasoning to predict a new anomaly. We reasoned that, if the excessive optimism or pessimism about future prospects was real, it should be possible to earn excess returns simply by investing in the stocks of companies that had done extremely poorly in past years. In other words, past performance would serve a proxy for investor sentiment. Consistent with this hypothesis, a strategy of buying extreme losers over the past two to five years (the rank period) earns significant excess returns over later years (the test period). Prior losers outperform prior winners by about 8 percent per year (see also Chopra et al., 1992).

A common critique of contrarian strategies is that the firms selected are risky rather than undervalued (e.g., Chan, 1988; Ball and Kothari, 1989).¹⁷ Of course, in

¹⁵As far as we can determine, the terms "contrary thinking" or "contrarian investing" were first popularized by Humphrey Neill (1954). Neill, in turn, credits William Stanley Jevons with the concept. Jevons stated in his *Primer of Political Economy* that "in making investments it is foolish to do just what other people are doing, because there almost sure to be too many people doing the same thing" (quoted in Neill, 1985, pp. 64-65).

Traditionally, contrarian investment strategies require much "patience" and they look for prices to gravitate towards value over a period of several months or years. Below, we narrow our discussion to these longer-term strategies. However, there is also a growing literature on short-term overreaction in stock prices (see, e.g., De Bondt and Thaler, 1989; Jegadeesh, 1990; Lehmann, 1990; Lo and MacKinlay, 1990) and the overreaction of long-maturity option prices to the implied volatility of short-maturity options (Stein, 1989). The speculative dynamics of asset price behavior are further discussed in Cutler et al. (1991) and Jegadeesh and Titman (1993).

¹⁶Perhaps as a consequence, it is possible to earn abnormal profits by systematically betting against financial analysts' earnings forecasts. See De Bondt (1992b).

principle, one can attribute any apparent abnormal returns to some unmeasured risk factor but this tautological approach does not help. If a strategy is said to be risky, the investors that use it should be exposed to the chance of being worse off. Different methods have been tried to test this explanation. Using capital asset pricing model betas as measures of risk, De Bondt and Thaler (1987) found that during the test period past losers are more risky than winners, though not nearly enough to explain the difference in returns. Furthermore, we found that loser firms only had higher betas in years when the market was rising. Betas in "up markets" were on average 1.39 while betas in down markets were only .88, not an unattractive combination.

In our (1987) paper, we also observed that other contrarian strategies earn excess returns, for instance, buying stocks with low market- to book-value ratios (MVBV) —a result later replicated by Fama and French (1992). Lakonishok et al. (1993) ask whether the apparent predictive power of MVBV-ratios may yet be interpreted as proper compensation for risk. If value-based strategies outperform "glamour stocks," an interesting question is whether the strategy does poorly at times when the marginal utility of consumption may be expected to be high, i.e., in recessions. As it turns out, value strategies do well even in these "bad states of the world."

While traditional risk measures seem unable to explain the success of contrarian investing, risk may yet be an important part of the story. For example, there is no denying that equity risk premia are time-varying. However, we think it essential to distinguish perceived risk from true objective risk (see also Arrow, 1982). People often misjudge probabilities, e.g., counter to fact, homicides are generally judged more frequent than suicides. Because companies selected by value money managers definitely have the appearance of extreme riskiness (e.g., because of declining earnings or big losses), investing in such companies requires courage and it goes against the consensus summarized in the market price. Unconventional choices repel since investors are aware that they may cause regret. Also, to outsiders, these decisions are likely to look imprudent.¹⁸

¹⁷A recent paper by Conrad and Kaul (1993) raises two more issues. First, they correctly question De Bondt and Thaler's use of cumulative average returns because these returns assume costless monthly portfolio rebalancing and are not truly obtainable by investors. Buy-and-hold returns are a better performance measure. Second, they claim that much of the return to losers is a low price effect.

The arguments are rebutted by Loughran and Ritter (1994). As it turns out, the use of buy-and-hold returns increases the performance differential between winners and losers. Second, the relationship between price levels and returns in Conrad and Kaul is largely (although not entirely) due to the confounding of time-series and cross-sectional return patterns. That is, high returns to low-priced stocks occur mostly during the 1930s and 1940s when most stocks had low prices, and the negative returns to high-priced stocks occur during the late 1960s when most stocks had high prices. Thus the low price effect partly reflects mean reversion at the market level. Also, almost all low-priced stocks on the NYSE have been big losers over some prior interval.

Notice that the mere appearance of imprudence or risk can raise the required rate of return. If, for any reason, investors are reluctant to hold certain assets and if not enough rational traders are willing to step in, then perceived risk and true risk have a similar effect on asset prices. This argument is precisely the same as the ritual disclaimer in finance that all efficient market tests are joint tests with an asset pricing model. While Fama and French (1988) conclude that it may be hopeless to distinguish behavioral from rational explanations of return predictability, we are considerably less pessimistic. A future horse race between models is possible as soon as a behavioral theory of the equilibrium trade-off between return and perceived risk is formulated.

The behavioral explanation for the success of contrarian strategies relies on the combination of biased forecasts of future profit and misperceptions of risk. It is not, however, the case that on a minute-by-minute basis stock prices always overreact. At this time, we do not have a complete psychological theory of the impact of new information on security prices. Underreaction, rather than overreaction, to specific news items is suggested by the literature on the post-earnings announcement drift. Bernard and Thomas (1989, 1990) examine the stock price reaction to quarterly earnings announcements made by publicly-traded companies for the years between 1971 and 1986, in total nearly 90,000 earnings reports. Earnings reports deserve our attention because we want to know whether the market reacts properly to what is likely the most visible piece of company information. Generally, good quarterly earnings news follows good news and bad follows bad. However, after the initial announcement of unusually high earnings, the market is apparently "surprised" to receive more good news during the next three quarters. Further, while extremely good earnings are rarely matched in the corresponding quarter of the following year, the market appears "surprised" at that. Thus, on average, the post-earnings announcement return drift lasts for three quarters and then is partially reversed. The abnormal profit that can be obtained by selling "bad earnings" stocks and buying "good earnings" stocks is about eight percent per year. It is even more impressive for small companies.

3.3 Asset Pricing and Investor Sentiment

Another tenet of efficient markets is that asset prices are equal to intrinsic value.

¹⁸And "worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally" (Keynes, 1936, p. 158). Lynch (1989) argues similarly that "between the chance of making an unusually large profit on an unknown company and the assurance of losing only a small amount on an established company, the normal .. portfolio manager would jump at the latter. .. If IBM goes bad and you bought it, the clients .. will ask "What's wrong with that damn IBM lately?" But if La Quinta Inns goes bad, they'll ask: "What's wrong with you?"" (p. 44). See also Shefrin and Statman (1993b).

But this hypothesis is not easy to test because intrinsic value is typically unobservable. The variance bounds tests proposed by Shiller (1981, 1989) –which rely on the contrast between observed market volatility and the variability in the ex post present value of dividends paid to shareholders– offer an illustration of how difficult such tests can be.

In contrast, closed-end mutual funds offer a much easier test of market efficiency. Since, by law, these funds are required to report the net value of the assets held in the portfolio (NAV), the figures can be compared with share prices (P) directly. Indeed, the Wall Street Journal publishes both sets of numbers every week.

Closed-end funds usually sell at a discount from net asset value, i.e., $P < NAV$. Graham (1959) observed that this discount “may be viewed as an expensive monument erected to the inertia and stupidity of stockholders” (p. 242). On occasion, some funds sell at a premium ($P > NAV$). For example, at the end of the 1980s, we observed a remarkable bubble in closed-end “country” funds. For several months, the prices of the Spain and Germany funds exceeded the NAV by as much as 100 percent! Although high management fees, other agency costs, or unrealized capital gains liabilities may partially explain why price might be less than net asset value, it is somewhat of a mystery why anyone would pay \$2 to acquire \$1 worth of assets in countries with few restrictions on foreign investment.

A behavioral interpretation of closed-end fund pricing is offered by De Long et al. (1990a) in the context of a noise trader model. Briefly, they propose that investor sentiment varies through time. For example, when noise traders are optimistic, the prices of closed-end funds rise, causing the discounts to narrow (or premia to increase). Rational traders are subject to two types of risk: (1) fundamental risk that NAV may decline; and (2) noise trader risk that the discount may widen. To compensate for this risk, rational traders only buy closed-end funds at a discount.

This theory is tested by Lee et al. (1992) who find many aspects of the data consistent with the noise trader model. First, closed-end fund discounts move together through time, so that the average discount can indeed be seen as a sentiment index. Secondly, new funds often get started when discounts on existing funds are low. Third, the stock returns of small firms vary inversely with the discount. That is, when the discounts shrink, small stocks do well (even controlling for the macro-factors that vary with security returns in general). Finally, in later work, Bodurtha et al. (1993) find that the discounts of closed-end country funds traded in the U.S. also move together. The fund returns reflect the performance of U.S. stocks rather than the performance of the stock indices of the countries in which they invest (see also Bailey and Lim, 1992).

The relevance of small individual investors to the pricing of closed-end funds suggests that in other circumstances where these investors are disproportionately represented —e.g., the case of initial public offerings of stock (IPOs)— behavioral factors may also play a role. IPO volume moves to some extent with the major market indices and it comes in industry “waves.” The prices of firms issued in high-volume (“hot”) markets not only rise sharply right after issuance (Ritter, 1984) but also exhibit the poorest subsequent performance. Initially, IPOs appear to be (on average) “underpriced.”¹⁹ But, from a long run perspective, the issues seem “overpriced.” For example, considering all major IPOs during the 1975-84 period, Ritter (1991) finds that an investor who purchased these companies at the end of the first day of public trading would have been left, three years later, with 83 cents relative to each dollar from a group of comparable firms. Nevertheless, the average IPO outperformed the market by 14.1% on its first trading day. Both the under- and overpricing are even stronger for small-size start-up firms with little or no prior sales. From an aggregate time-series perspective, the initial underpricing —i.e., the average return on the first day of trading for all firms that go public during the month— typically leads total IPO volume by 6 to 12 months.

The data clearly suggest a scenario where, at times, investors are overoptimistic about the profit potential of growth companies and where entrepreneurs (with the help of investment bankers) take advantage of these opportunities. In the majority of cases, the excitement turns to disappointment. It is important to ask: What is the source of the initial “optimism”? It often seems as if a “concept” is sold (rather than a proven record). For example, in the early 1990s, new software firms have often been marketed as “the next Microsoft.” This is consistent with representativeness. An altogether different interpretation is that investors buy IPOs as lottery tickets and are willing to lose on average in order to obtain some chance for a large gain. Finally, it may be that investment bankers act as impresarios and purposely underprice some IPOs to create excess demand and to enhance their reputation (Shiller, 1990). When later IPOs are launched, people who missed out are eager to buy, so as to escape more future regret.

¹⁹The theoretical literature on this topic is large. It almost always assumes that the offering price is too low rather than the first aftermarket price too high. Possible underpricing rationales include: (1) Underwriters collude and, as monopsonists, underpay entrepreneurs. The IPOs are offered to favorite customers as a way of rebating commissions. (2) Underwriters know more than entrepreneurs about the market value of the IPO. The low offering price reduces the investment bankers’ risk that the IPO “doesn’t sell.” (3) The underpricing is necessary to attract uninformed investors bedeviled by the winner’s curse. (4) The low offering price is seen as “insurance” against liability suits. (5) Underwriters want “to leave a good taste” with investors so that future underwritings (of the same or a different company) are sold more easily. They may also want to create a shortage illusion. For detailed references, see Ibbotson et al. (1988) and Ibbotson and Ritter (this volume).

3.4 The Equity Premium Puzzle

A topic that has received much attention in recent years is the return differential between stocks and the risk free rate, the equity premium. In the U.S., the real return on equities from 1926 to the early 1990s is roughly 7 percent, while the return on long-term bonds is about 1 percent. This is an impressive gap, especially when the rates are compounded over sixty or more years! Many observers wonder: Is the equity premium too large to be consistent with standard rational models? Mehra and Prescott (1985) first posed this question formally. They investigate how risk averse the representative investor (with an additively separable expected utility function) has to be in order to explain the historical return data. They conclude that the equity premium would only be this large if people were extraordinarily risk averse. As a result, Mehra and Prescott declare the magnitude of the equity premium a puzzle.²⁰

There have been several attempts to explain the puzzle, some with a behavioral character. For example, Constantinides (1990) proposes a theory based on habit formation, in which investors are reluctant to reduce their consumption from one period to the next. Also, Epstein and Zin (1990) question the assumption of expected utility maximization and replace it with an alternative model. Neither approach is completely successful. Benartzi and Thaler (1993) offer a more explicitly behavioral explanation that builds on the concepts of loss aversion and mental accounting. Loss aversion agrees with Kahneman and Tversky's prospect theory, in which the disutility of a marginal loss is roughly twice as large as the utility of a marginal gain. Mental accounting plays a role because, in this model, the attractiveness of a risky investment depends on the frequency with which it is evaluated. The intuition is straightforward. Suppose an investor checks the value of her portfolio every day, and values the change according to prospect theory. This investor will find equities very unattractive since, on a daily basis, stocks fall about as often as they rise, and losses are felt twice as keenly as gains. Compare this case with an investor who buys an equity portfolio and then forgets about it for twenty years. The second investor faces a very small chance of a loss, and so would find equities attractive. Within this framework, Benartzi and Thaler ask how often investors would have to re-evaluate their portfolios in order to make stocks and bonds equally attractive. The answer is about one year. The authors dub this combination of short horizons and sensitivity to losses "myopic loss aversion". They estimate that, if the horizon of the typical investor were 20 years, the equity premium would fall to 1.5 percent.

²⁰The estimated coefficient of relative risk aversion is about 40. This number is not only much higher than other estimates (usually close to 1.0) but, in the Mehra-Prescott model, high risk aversion implies a low intertemporal elasticity of substitution which is inconsistent with the low risk free rate.

4. FINANCIAL DECISION-MAKING IN CORPORATIONS

Like proprietorships, partnerships, or non-profits, corporations are a type of organization, i.e., a "system of coordinated action among individuals and groups whose preferences, information, interests, or knowledge differ" (March and Simon, 1993, p. 2). Of course, much economic action is coordinated by market processes. As Ronald Coase (1937) initially observed, economic theory should explain why organizations exist and it should rationalize their structure. The Modigliani-Miller irrelevance propositions for financing and dividend policy—the traditional starting points in the study of corporate finance—may be interpreted as special cases of Coase's later (1960) theorem. That is, in the absence of contracting costs, taxes, and other frictions, the assignment of property rights should not affect either the firm's operations or its market value. Starting from this polar case, modern corporate finance studies (1) the various ways in which taxes, information asymmetries, and self-interest in contracting relationships change optimal financing and investment decisions and (2) the economic forces that push the organization toward its optimal (equilibrium) ownership structure.

Thus, modern finance emphasizes the essential contractual nature of organizations (Jensen and Meckling, 1976; Fama and Jensen, 1983). Accordingly, the decision-making behavior of the various constituencies (shareholders, bondholders, management, suppliers, customers, etc.) that make up the firm becomes very relevant. In particular, insofar as actual decisions differ from their normative ideal, corporate finance takes on a new dimension. Our examples below are meant to illustrate this general proposition. First, we ask how shareholders' preference for dividends affects dividend policy. Next, we describe executives' efforts to manage investors' perceptions of firm value. Finally, we discuss two aspects of managerial behavior that mattered a great deal in the corporate restructuring of the 1980s: (1) hubris and (2) the reluctance to walk away from money-losing projects.

4.1 Dividend Policy

Why do firms pay dividends? To repeat, in perfect markets, dividend policy does not matter to the value of the firm (Miller and Modigliani, 1961). But, when dividends are taxed at a higher rate than capital gains, stockholders should complain if a firm pays cash dividends. Instead, stockholders often do the opposite—they complain when dividends are cut. A different way to think about this puzzle is from the perspective of management. Over long periods, corporate executives seem to fail to respond to large tax incentives. Firms could hoard cash and purchase their own securities or the securi-

ties of other firms. But, in fact, managers systematically fail to benefit their shareholders by converting high-taxed dividends to low-taxed capital gains.²¹

Shefrin and Statman (1984) offer a behavioral explanation based on mental accounting and self-control. Essentially, dividends are paid because investors want them. People psychologically resist dipping into capital. (Until recently, colleges and universities usually did not spend the capital gains earned by their endowments.) This rule is a self-control device. Also, dividends can be savored as a separate gain when the stock price rises and used as a silver lining if the price drops. This is a mental accounting explanation. Financing consumption out of dividends further avoids the anticipated regret of selling a stock that rises in value. Shefrin and Statman's theory suggests clientele effects that are in fact observed. For example, retired investors typically hold a larger portion of their stock portfolio in income securities than do young investors. In surveys, retirees also rate "dividend income" as a much more important investment goal than "short-term capital gains" (Lease et al., 1976).

We speculate that other aspects of dividend policy are similarly influenced by public relations and the need to manage shareholder perceptions. Among other things, modern finance fails to explain dividend smoothing, stock dividends, and why dividends have labels. For instance, some dividends are designated as "special." A psychological perspective suggests that, in this way, subsequent elimination is not experienced as a loss. Stock dividends create a different illusion: the mirage of an actual dividend without a dollar payout. Perhaps this technique softens the blow on investors as they sell off shares. Finally, in his classic study of dividend smoothing, John Lintner suggested that the practice "helps to minimize adverse stockholder reactions" (1956, p. 100). This makes sense if, as predicted by the self-control theory, consumption closely tracks (dividend) income.

4.2 Earnings Management

Executives also pay careful attention to reported earnings-per-share. For example, many managers and investors seem to like a steady upward trend in earnings with clear future targets (Barth et al., 1992). Other firms maximize short-term earnings.²² Managers often behave as if there were a mechanical relation between reported account-

²¹Easterbrook (1984) offers two rationales for dividends based upon agency theory. The first is the need to monitor corporate management. The other is to ensure that managers do not reduce risk. However, stock repurchases that force managers to frequent the capital markets accomplish the same objective and they are cheaper than dividends. Notice that, from a (third) signalling perspective, stock repurchases may also dominate dividends.

ting earnings and stock prices. For example, Hand (1989) finds that many firms report paper gains on debt-equity swaps in ways that smooth a transitory fall in earnings.²³ More generally, Brealey and Myers admit that managers “seem to assume that investors suffer from financial illusion.” “Some firms devote enormous ingenuity to the task of manipulating earnings to stockholders .. choosing accounting methods which stabilize and increase reported earnings” (1984, p. 276).

The intellectual challenge posed by earnings management is why it happens if (1) an efficient market looks through the manipulation and (2) it wastes time and resources. Schipper offers the possibility that (2) is false because earnings management provides “a means for managers to reveal their private information” (1989, p. 91). Earnings management may also be self-serving, e.g., if reported earnings are tied to executive compensation. But managers often feel ambushed by a short-sighted stock market. With bad earnings news, they say, their companies easily turn into takeover targets.

4.3 Corporate Growth, Decline, and Reorganization

Corporate expansion can take two forms: internal growth or external acquisition of assets. Similarly, corporate retrenchment either occurs through plant closings, or through divestitures and a company break-up. Clearly, all the evidence suggests that expansion occurs more readily than the redeployment or destruction of existing assets. For example, event studies show that the market often reacts positively to sell-offs and project cancellations (see, e.g., Hite et al., 1987) and that it believes that some CEOs enhance their effectiveness with death.

Jensen blames information problems, agency costs, as well as the “mindset of managers” (1993, p. 847) for the myopic focus on sunk costs and the difficulty of exit. “Even when managers do acknowledge the requirement for exit, it is often difficult for them to accept and to initiate the shutdown decision. .. firms with large positive cash flow will often invest in even more money-losing capacity..” (1993, p. 848). Jensen’s psychological insights agree with the literature on status quo bias (Samuelson and Zeckhauser, 1988) and the non-rational “escalation of commitment” (Staw, 1976). Decision

²²Further examples of earnings management include (1) the tendency to delay bad earnings reports and (2) the so-called big bath. In years of unusually low profits or losses, earnings are reduced further “to clear the deck.” Accounting write-offs that are taken now improve the chances for improved earnings later.

²³Does it work, or do stock prices behave instead as if investors unscramble the true cash flow implications of the accounting data? Hand (1990) concludes that prices are set in part by unsophisticated investors, “functionally fixated” on reported earnings.

makers who have chosen a particular course of action tend to "throw good money after bad," perhaps to reaffirm the wisdom of the initial decision (and to protect their professional reputation). There appear to be multiple reasons why escalation comes about (see Bazerman, 1986, Chapter 4). One explanation relies on framing and the role of reference points. Entrapment occurs as people become effectively risk-seeking in their attempts to recoup past losses and to "break-even."

Of course, in addition, we should not forget that executives gain from running large companies and managing more assets. Perhaps the most robust finding in the literature on executive pay is that dollar compensation is strongly and positively related to firm size (see, e.g., Baker et al., 1988). The consumption value of perquisites and status are also likely to increase with firm size.

Corporate expansion brings us to the literature on mergers and takeovers, reviewed by Jensen and Ruback (1983) and Jarrell et al. (1988). Many takeovers can be explained by synergy, inefficient target management, or taxes. However, while target firm shareholders typically do very well when their firm is purchased, stockholders in the acquiring firm do not appear to make any money. In fact, in most cases, they lose wealth. For the 1980s, Servaes (1991) finds statistically significantly negative returns of -3.4% on the announcement date (see also Bradley et al., 1988, Jarrell and Poulsen, 1989, or Loderer and Martin, 1990). Based on an exhaustive sample of mergers and tender offers with returns on CRSP between 1955 and 1987, Agrawal et al. (1992) report a significant loss of about 10% over the five-year post-merger period.²⁴

What causes mergers and acquisitions if the profits are one-sided? Roll (1986) offers the hubris hypothesis as an answer. Put simply, managers of bidder firms, flush with cash from recent successes (perhaps due to luck), are convinced that they can run the target firm better than current management. As a result, they systematically overestimate the benefits of corporate combination. In Roll's words, "...If there really are no gains in takeovers, .. the phenomenon depends on the overbearing presumption of bidders that their valuations are correct." Hubris is consistent with a large body of evidence in psychology and increasing evidence in finance (e.g., Giliberto and Varaiya, 1989)

²⁴The returns tend to be more negative if (1) the Tobin's *q* of the bidder is "low" (Lang et al., 1989), (2) top executives own a smaller percentage of the bidding firm (Lewellen et al., 1985), (3) the takeover is financed with equity issues rather than cash (Travlos, 1987), (4) the acquisition turns out to be "a failure" *ex post* (Kaplan and Weisbach, 1992).

The post-outcome negative bidder returns are "unsettling" to Jensen and Ruback (1983) "because they are inconsistent with market efficiency and suggest that changes in stock prices during takeovers overestimate the future efficiency gains from mergers" (p. 20).

that individuals tend to be overconfident.²⁵ Roll's view of the takeover research is that managers are boundedly rational but that markets are not. His reliance on event-study results assumes market efficiency.

A competing view says that opportunistic executives knowingly overpay for target firms because they gain personally through job security, diversification of human capital, and further non-pecuniary benefits (Morck et al., 1990). Seyhun (1990) studies the trading behavior of insiders to make inferences about their motivation. He finds that, prior to takeover announcements, top executives of bidder firms increase their net purchases. This suggests that, even if managers understand the winner's curse, they nevertheless persist in their beliefs because of overweening pride.

²⁵Referring to Adam Smith and others, Knight (1921) argues similarly that, on average, entrepreneurs may not be properly compensated for their risk-taking. According to Knight, "...these "risks" do not relate to objective external probabilities, but to the value of the judgment and executive powers of the person taking the chance. It is certainly true that .. most men have an irrationally high confidence in their own good fortune, and that is doubly true when their personal prowess comes into the reckoning, when they are betting on themselves. .. To these considerations must be added the stimulus of the competitive situation, .., as in an auction sale, where things often bring more than any one thinks they are worth. Another large factor is .. tenacity [where], once committed, .. the general rule is to hold on to the last ditch .. The prestige of entrepreneurship .. must also be considered" (pp. 365-366).

5. CONCLUSION

Modern finance assumes that the study of substantively rational solutions to normative problems forms an adequate basis for understanding actual behavior. Of course, substituting mathematical logic for empirical observation is convenient. Financial economists can cut down on their reading and they can (sometimes proudly) admit to being ignorant about advances in other social sciences. In addition, the optimality principle is less "messy" than the complexity of the real world. Many ideas do not easily lend themselves to mathematical representation. This puts a premium on simple notions and tractable models, so long as they offer testable predictions.²⁶

However, an uncritical reliance on the optimality principle also has substantial costs. First, it diverts our attention from actual decision processes, perhaps based on the view that process does not affect outcome. As a result, numerous engaging questions do not even get posed. But people trade in financial markets. Are the vital statistics that describe these markets (prices, transaction volumes, etc.) any different because of their presence? For the most part, we do not know. Second, the optimality principle sometimes results in tortuous and absurd rationalization—where auxiliary assumptions play a big role (e.g., who knows what?) and where, ultimately, the premises are derived from the conclusions. Finally, there is the danger of a stubborn confirmation bias that repeats "if it could still be rational, it must be."²⁷

The purpose of this paper has not been to diminish the achievements of modern finance. Rather, we have argued that, in order to make scientific progress, some diversity in methods is probably a good thing. In particular, much is gained—and, possibly, some anomalies could be resolved—by careful observation of what people actually do. We look for general behavioral principles that apply in multiple economic contexts, e.g., excessive self-confidence. Some principles are suggested and confirmed by psychological experiments. Others are age-old.

Admittedly, past work on the psychology of financial markets was often sketchy

²⁶Yet, we should not confuse what is tractable with what is right. Neither should we confuse what is internally consistent (starting from so-called first principles) with what is right.

To repeat our discussion above, models that build on the optimality principle may yet be useful as normative tools or as benchmarks to evaluate the quality of actual investor decision-making. Also, they may describe the synchronous behavior of two financial markets if arbitrage between these markets is nearly costless and risk-free. Finally, these models may capture long-run equilibrium outcomes when behavior is fully adapted to changing conditions.

²⁷For a broader discussion of the optimality principle as a heuristic of science, see Schoemaker (1991).

and anecdotal. It relied on dramatic evidence relating to stock market crashes, banking panics, and other memorable events, e.g., the Florida land price bubble of the 1920s or the 17th century Dutch tulipmania (Kindleberger, 1989; for a critique, see Garber, 1989). Maybe because the facts were so unusual, there was a tendency to explain each instance by unique historical circumstances.²⁸

In contrast, we have provided a systematic review of evidence that behavioral factors matter outside the laboratory, i.e., even when a lot of money is at stake. The papers that were discussed are best described as pragmatic empirical work. Their purpose is to collect a set of robust empirical facts that stand out, no matter which way one cuts the data. (Thus, the results rely less on statistical acrobatics than on judiciously chosen natural experiments.) Following Friedman (1946) and Summers (1991), our view of theory is that "it should generalize interesting facts."

The study of financial decision-making (at the level of the individual, the market, the organization) is a wide-open field. Commenting on the extensive downsizing and exit that will be required from mature industries in the 1990s, Jensen laments that finance "has concentrated on how capital investment decisions should be made, with little systematic study of how they actually are made in practice" (1993, p. 870). He calls for positive (descriptive) theories of organizations. The possible "fragmentation" of the finance profession he calls "progress, not failure" (p. 872). Obviously, we concur.

One topic that especially draws our attention is the unprecedented financial innovation during the last few decades. Merton (1990) sees three driving forces: (1) the demand for "completing the market"; (2) the lowering of transactions costs; and (3) reductions in agency and monitoring costs. Miller (1986b) interprets the innovation as a response to regulatory changes. Our own view is that these forces, while relevant, leave out the central question of the design and the marketing of financial products (Shefrin and Statman, 1993a). Consider, for example, portfolio insurance. This product became more popular on Wall Street once it was framed as "insurance." Neither the success nor the faltering of portfolio insurance are easily explained by the traditional arguments, but "to know thy customers" may well be key.

²⁸Witness, similarly, all the attempts to explain the world-wide 1987 stock market crash with institutional factors that are specific to the United States, e.g., portfolio insurance. Whatever their merits, such exercises evidently do not lead us towards a general theory of financial panics. For more discussion, see Kleidon (this volume).

REFERENCES

- Elliot Aronson, The Social Animal. New York: W.H. Freeman, 1991 (6th edition).
- Anup Agrawal, Jeffrey F. Jaffe, and Gerahon N. Mandelker, "The Post-Merger Performance of Acquiring Firms: A Re-examination of an Anomaly," Journal of Finance, 47, 4, 1992, 1605-1621.
- George A. Akerlof, An Economic Theorist's Book of Tales. Cambridge: Cambridge University Press, 1984.
- Kenneth J. Arrow, "Risk Perception in Psychology and Economics," Economic Inquiry, 20, 1982, 1-9.
- Kenneth J. Arrow, "Rationality of Self and Others in an Economic System," in R.M. Hogarth and M.W. Reder (eds.), Rational Choice: The Contrast Between Economics and Psychology, Chicago: University of Chicago Press, 1986.
- R.J. Aumann, "Agreeing to Disagree," Annals of Statistics, 4, 6, 1976, 1236-1239.
- Warren Bailey and J. Lim, "Evaluating the Diversification Benefits of the New Country Funds," Journal of Portfolio Management, Spring 1992, 74-80.
- George P. Baker, Michael C. Jensen, and Kevin J. Murphy, "Compensation and Incentives: Practice vs. Theory," Journal of Finance, 43, 1988, 593-616.
- Ray Ball and S.P. Kothari, "Nonstationary Expected Returns: Implications for Tests of Market Efficiency and Serial Correlation in Returns," Journal of Financial Economics, 25, 1989, 51-74.
- Mary E. Barth, John A. Elliott, and Mark W. Finn, "Market Rewards for Increasing Earnings Patterns," Working Paper #93-041, Harvard Business School, November 1992.
- Sanjoy Basu, "Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios," Journal of Finance, 32, 3, 1977, 663-682.
- Max H. Bazerman, Judgment in Managerial Decision Making. New York: Wiley, 1986.
- David E. Bell, "Regret in Decision-Making Under Uncertainty," Operations Research, 10, 1982, 961-981.
- Shlomo Benartzi and Richard H. Thaler, "Myopic Loss Aversion and the Equity Premium Puzzle," Working Paper, Johnson Graduate School of Management, Cornell University, 1993.
- Victor L. Bernard and Jacob K. Thomas, "Post-Earnings-Announcement Drift: Delayed Price Response or Risk Premium?" Journal of Accounting Research, 27, Supplement 1989, 1-48.
- Victor L. Bernard and Jacob K. Thomas, "Evidence that Stock Prices Do Not Fully Reflect the Implications of Current Earnings for Future Earnings," Journal of Accounting and Economics, 13, 1990, 305-340.
- Sushil Bikhchandani, David Hirshleifer, and Ivo Welch, "A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades," Journal of Political Economy, 100, 1992, 992-1026.
- Fischer Black, "Noise," Journal of Finance, 41, 1986, 529-543.

- James N. Bodurtha, Jr., Dong-Soon Kim, and Charles M.C. Lee, "Closed-end Country Funds and U.S. Market Sentiment," Working Paper, University of Michigan, February 1993.
- Michael Bradley, A. Desai, and E.H. Kim, "Synergistic Gains from Corporate Acquisitions and Their Division Between the Stockholders of Target and Acquiring Firms," Journal of Financial Economics, 21, 1988, 3-40.
- Richard A. Brealey and Stewart C. Myers, Principles of Corporate Finance. New York: McGraw-Hill, 1984, 1988.
- Colin F. Camerer, "Do Biases in Probability Judgment Matter in Markets? Experimental Evidence," American Economic Review, 77, 5, 1987, 981-997.
- K.C. Chan, "On the Contrarian Investment Strategy," Journal of Business, 61, 2, 1988, 147-163.
- Navin Chopra, Josef Lakonishok, and Jay R. Ritter, "Measuring Abnormal Performance: Do Stocks Overreact?" Journal of Financial Economics, 31, 1992, 235-268.
- John M. Clark, "Economics and Modern Psychology," Journal of Political Economy, 26, 1, 1918, 1-30.
- Ronald H. Coase, "The Nature of the Firm," Economica, 4, 1937, 386-405.
- Ronald H. Coase, "The Problem of Social Cost," Journal of Law and Economics, 3, 1960, 1-44.
- John H. Cochrane, "Volatility Tests and Efficient Markets," Journal of Monetary Economics, 27, 1991, 463-485.
- Jennifer Conrad and Gautam Kaul, "Long-Term Market Overreaction or Biases in Computed Returns?" Journal of Finance, 48, 1, 1993, 39-64.
- George M. Constantinides, "Habit Formation: A Resolution of the Equity Premium Puzzle," Journal of Political Economy, 98, 3, 1990, 519-543.
- David M. Cutler, James M. Poterba, and Lawrence H. Summers, "Speculative Dynamics," Review of Economic Studies, 58, 1991, 529-546.
- Werner F.M. De Bondt, "What Are Investment Advisors Paid For? The Shefrin-Statman and Competing Views," in John B. Guerard, Jr. and Mustafa N. Gultekin (eds.), Handbook of Security Analyst Forecasting and Asset Allocation. Greenwich, Connecticut: JAI Press, 1992a.
- Werner F.M. De Bondt, Earnings Forecasts and Share Price Reversals. Charlottesville: Institute of Chartered Financial Analysts, 1992b.
- Werner F.M. De Bondt and Richard H. Thaler, "Does the Stock Market Overreact?" Journal of Finance, 40, 3, 1985, 793-805.
- Werner F.M. De Bondt and Richard H. Thaler, "Further Evidence on Investor Overreaction and Stock Market Seasonality," Journal of Finance, 42, 3, 1987, 557-581.
- Werner F.M. De Bondt and Richard H. Thaler, "A Mean-Reverting Walk Down Wall Street," Journal of Economic Perspectives, 3, 1, 1989, 189-202.
- Werner F.M. De Bondt and Richard H. Thaler, "Do Security Analysts Overreact?" American Economic Review, 80, 2, 1990, 52-57.

- J. Bradford De Long, Andrei Shleifer, Lawrence H. Summers, and Robert J. Waldmann, "Noise Trader Risk in Financial Markets," *Journal of Political Economy*, 98, 4, 1990a, 703-738.
- J. Bradford De Long, Andrei Shleifer, Lawrence H. Summers, and Robert J. Waldmann, "Positive Feedback Investment Strategies and Destabilizing Rational Speculation," *Journal of Finance*, 45, 2, 1990b, 379-395.
- J. Bradford De Long, Andrei Shleifer, Lawrence H. Summers, and Robert J. Waldmann, "The Survival of Noise Traders in Financial Markets," *Journal of Business*, 64, 1, 1991, 1-20.
- David N. Dreman, *The New Contrarian Investment Strategy*. New York: Random House, 1982.
- Frank H. Easterbrook, "Two Agency-Cost Explanations of Dividends," *American Economic Review*, 74, 1984, 650-659.
- Jon Elster, *Ulysses and the Sirens*. Cambridge: Cambridge University Press, 1979.
- Jon Elster, *Sour Grapes*. Cambridge: Cambridge University Press, 1983.
- Jon Elster, *Solomonic Judgements*. Cambridge: Cambridge University Press, 1989.
- Larry G. Epstein and Stanley E. Zin, "First-Order Risk Aversion and the Equity Premium Puzzle," *Journal of Monetary Economics*, 26, 1990, 387-407.
- Eugene F. Fama, "Efficient Capital Markets: II," *Journal of Finance*, 46, 5, 1991, 1575-1617.
- Eugene F. Fama and Michael C. Jensen, "Separation of Ownership and Control," *Journal of Law and Economics*, 26, 1983, 301-325.
- Eugene F. Fama and Kenneth R. French, "Permanent and Temporary Components of Stock Market Prices," *Journal of Political Economy*, 96, 1988, 246-273.
- Eugene F. Fama and Kenneth R. French, "The Cross-Section of Expected Stock Returns," *Journal of Finance*, 47, 1992, 427-465.
- Kenneth R. French and Richard Roll, "Stock Return Variances: The Arrival of Information and the Reaction of Traders," *Journal of Financial Economics*, 17, 1986, 5-26.
- Milton Friedman, "Lange on Price Flexibility and Employment. A Methodological Criticism," *American Economic Review*, 36, 1946, 613-631.
- Milton Friedman, *Essays in Positive Economics*. Chicago: University of Chicago Press, 1953.
- Peter M. Garber, "Famous First Bubbles," *Journal of Economic Perspectives*, 4, 2, 1990, 35-54.
- S. Michael Giliberto and Nikhil P. Varaiya, "The Winner's Curse and Bidder Competition in Acquisitions: Evidence from Failed Bank Auctions," *Journal of Finance*, 44, 1, 1989, 59-75.
- Benjamin Graham, *The Intelligent Investor*. A Book of Practical Counsel. New York: Harper & Brothers, 1959 (3rd edition).
- Benjamin Graham and David Dodd, *Security Analysis*. New York: McGraw-Hill, 1934.
- David M. Grether, "Bayes' Rule as a Descriptive Model: The Representativeness Heuristic," *Quarterly Journal of Economics*, 95, 1980, 537-557.

- John R.M. Hand, "Did Firms Undertake Debt-Equity Swaps for an Accounting Paper Profit or True Financial Gain?" Accounting Review, 64, 4, 1989, 587-623.
- John R.M. Hand, "A Test of the Extended Functional Fixation Hypothesis," Accounting Review, 65, 4, 1990, 739-763.
- Milton Harris and Artur Raviv, "Differences of Opinion Make a Horse Race," Working Paper, University of Chicago, June 1992.
- Gabriel Hawawini and Donald B. Keim, "On the Predictability of Common Stock Returns: World-Wide Evidence," this volume.
- Friedrich A. Hayek, Individualism and Economic Order. Chicago: University of Chicago Press, 1948.
- Samuel P. Hayes, Jr., "Some Psychological Problems of Economics," Psychological Bulletin, 47, 4, 1950, 289-330.
- Chip Heath and Amos Tversky, "Preference and Belief: Ambiguity and Competence in Choice Under Uncertainty," Journal of Risk and Uncertainty, 4, 1991, 5-28.
- Chris R. Henkel, Gordon A. Sick, and William T. Ziemba, "The Turn-of-the-Month Effect in the U.S. Stock Index Futures Markets, 1982-1992," Review of Futures Markets, 1994, forthcoming.
- Gailen L. Hite, James E. Owers, and Ronald C. Rogers, "The Market for Interfirm Asset Sales: Partial Sell-Offs and Total Liquidations," Journal of Financial Economics, 18, 1987, 229-252.
- Roger G. Ibbotson, Jody L. Sindelar, and Jay R. Ritter, "Initial Public Offerings," Journal of Applied Corporate Finance, 1, 1988, 37-45.
- Roger G. Ibbotson and Jay R. Ritter, "Initial Public Offerings," this volume.
- Jonathan E. Ingersoll, Jr., Theory of Financial Decision Making. Totowa, New Jersey: Rowman & Littlefield, 1987.
- R.A. Ippolito and J.A. Turner, "Turnover, Fees, and Pension Plan Performance," Financial Analysts Journal, November/December 1987, 16-26.
- J. Jaffe, Donald B. Keim, and R. Westerfield, "Earnings Yields, Market Values and Stock Returns," Journal of Finance, 54, 1989, 135-148.
- Gregg A. Jarrell, James A. Brickley, and Jeffrey M. Netter, "The Market for Corporate Control: The Evidence Since 1980," Journal of Economic Perspectives, 2, 1988, 49-68.
- Gregg A. Jarrell and Annette B. Poulsen, "The Returns to Acquiring Firms in Tender Offers: Evidence from Three Decades," Financial Management, 18, 1989, 12-19.
- Narasimhan Jegadeesh, "Evidence of Predictable Behavior of Security Returns," Journal of Finance, 45, 3, 1990, 881-898.
- Narasimhan Jegadeesh and Sheridan Titman, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," Journal of Finance, 48, 1, 1993, 65-92.
- Michael C. Jensen, "The Performance of Mutual Funds in the Period 1945-1964," Journal of Finance, 23, 1968, 389-416.

- Michael C. Jensen, "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems," Journal of Finance, 48, 3, 1993, 831-880.
- Michael C. Jensen and William Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," Journal of Financial Economics, 3, 1976, 305-360.
- Michael C. Jensen and Richard S. Ruback, "The Market for Corporate Control: The Scientific Evidence," Journal of Financial Economics, 11, 1983, 5-50.
- Daniel Kahneman and Amos Tversky, "Subjective Probability: A Judgment of Representativeness," Cognitive Psychology, 3, 1972, 430-454.
- Daniel Kahneman and Amos Tversky, "On the Psychology of Prediction," Psychological Review, 80, 1973, 237-251.
- Daniel Kahneman, Jack K. Knetsch, and Richard Thaler, "Experimental Tests of the Endowment Effect and the Coase Theorem," Journal of Political Economy, 98, 1990, 1325-1348.
- Daniel Kahneman, Paul Slovic, and Amos Tversky (eds.), Judgment under Uncertainty: Heuristics and Biases. Cambridge: Cambridge University Press, 1982.
- Steven N. Kaplan and Michael S. Weisbach, "The Success of Acquisitions: Evidence from Divestitures," Journal of Financial Economics, 24, 1989, 137-154.
- George Katona, Psychological Analysis of Economic Behavior. New York: McGraw-Hill, 1951.
- Charles Kindleberger, Manias, Panics, and Crashes: A History of Financial Crisis. New York: Basic Books, 1989 (revised edition).
- John Maynard Keynes, The General Theory of Employment, Interest and Money. London: Harcourt Brace Jovanovich, 1936.
- Allen W. Kleidon, "Stock Market Crashes," this volume.
- Frank H. Knight, Risk, Uncertainty, and Profit. Chicago: University of Chicago Press, 1971 (Originally published by Houghton Mifflin Company, 1921).
- David M. Kreps, Game Theory and Economic Modelling. Oxford: Oxford University Press, 1990.
- Thomas S. Kuhn, The Structure of Scientific Revolutions. Chicago: University of Chicago Press, 1970 (2nd edition).
- Josef Lakonishok and Seymour Smidt, "Are Seasonal Anomalies Real? A Ninety-Year Perspective," Review of Financial Studies, 1, 4, 1988, 403-425.
- Josef Lakonishok, Andrei Shleifer, and Robert W. Vishny, "Contrarian Investment, Extrapolation, and Risk," Working paper, University of Illinois at Urbana-Champaign, March 1993.
- Larry H.P. Lang, Rene Stulz, and Ralph A. Walkling, "Managerial Performance, Tobin's q, and the Gains from Successful Tender Offers," Journal of Financial Economics, 24, 1989, 137-154.
- Ronald C. Lease, Wilbur G. Lewellen, and Gary G. Schlarbaum, "Market Segmentation: Evidence on the Individual Investor," Financial Analysts Journal, 32, September/October 1976, 32-40.

- Charles M.C. Lee, Andrei Shleifer, and Richard H. Thaler, "Investor Sentiment and the Closed-end Fund Puzzle," Journal of Finance, 46, 1991, 75-109.
- Bruce N. Lehmann, "Fads, Martingales, and Market Efficiency," Quarterly Journal of Economics, 105, 1, 1990, 1-28.
- Wilbur Lewellen, Claudio Loderer, and Ahron Rosenfeld, "Merger Decisions and Executive Ownership in Acquiring Firms," Journal of Accounting and Economics, 7, 1985, 209-231.
- Sarah Lichtenstein, Baruch Fischhoff, and Lawrence D. Phillips, "Calibration of Probabilities: The State of the Art to 1980," in D. Kahneman et al. (eds.), Judgment Under Uncertainty: Heuristics and Biases. Cambridge: Cambridge University Press, 1982.
- John Lintner, "Distribution of Incomes of Corporations Among Dividends, Retained Earnings and Taxes," American Economic Review, 46, 1956, 97-113.
- Andrew W. Lo and A. Craig MacKinlay, "When Are Contrarian Profits Due to Stock Market Overreaction?" Review of Financial Studies, 3, 2, 1990, 175-205.
- Andrew W. Lo and A. Craig MacKinlay, "Data-Snooping Biases in Tests of Financial Asset Pricing Models," Review of Financial Studies, 3, 3, 1990, 431-468.
- Claudio Loderer and Kenneth Martin, "Corporate Acquisitions by Listed Firms: The Experience of a Comprehensive Sample," Financial Management, 19, 1990, 17-33.
- George Loewenstein and Jon Elster, Choice Over Time. New York: Russell Sage Foundation, 1992.
- Tim Loughran and Jay R. Ritter, "Long-Term Market Overreaction: The Effect of Low-Priced Stocks," Working Paper, University of Iowa, January 1994.
- Louis Lowenstein, What's Wrong with Wall Street. New York: Addison-Wesley, 1988.
- Robert E. Lucas, Jr., "Adaptive Behavior and Economic Theory," in R.M. Hogarth and M.W. Reder (eds.), Rational Choice: The Contrast Between Economics and Psychology. Chicago: University of Chicago Press, 1986.
- Peter Lynch, One Up on Wall Street. New York: Penguin Books, 1990.
- James March and Herbert Simon, Organizations. Cambridge, Massachusetts: Blackwell Publishers, 1993 (first edition: 1958).
- Harry Markowitz, "The Utility of Wealth," Journal of Political Economy, 60, 1952, 151-158.
- R. Mehra and E. Prescott, "The Equity Premium: A Puzzle," Journal of Monetary Economics, 15, 1985, 145-161.
- Robert C. Merton, "The Financial System and Economic Performance," Journal of Financial Services Research, 1990, 263-300.
- Merton H. Miller, "Behavioral Rationality in Finance: The Case of Dividends," in R.M. Hogarth and M.W. Reder (eds.), Rational Choice: The Contrast Between Economics and Psychology. Chicago: University of Chicago Press, 1986a.
- Merton H. Miller, "Financial Innovation: The Last Twenty Years and the Next," Journal of Financial and Quantitative Analysis, 21, 1986b, 459-471.

- Merton H. Miller and Franco Modigliani, "Dividend Policy, Growth, and the Valuation of Shares," Journal of Business, 34, 4, 1961, 411-433.
- Paul Milgrom and Nancy Stokey, "Information, Trade, and Common Knowledge," Journal of Economic Theory, 26, 1982, 17-27.
- Wealey C. Mitchell, "Human Behavior and Economics: A Survey of Recent Literature," Quarterly Journal of Economics, November 1914, 1-47.
- R.A. Morck, Andrei Shleifer, and Robert W. Vishny, "Do Managerial Objectives Drive Bad Acquisitions?" Journal of Finance, 45, 1990, 31-48.
- Humphrey B. Neill, The Art of Contrary Thinking. Caldwell, Idaho: Caxton Printers, Ltd., 1985 (5th edition) (First published in 1954).
- Richard Nisbett and Lee Ross, Human Inference: Strategies and Shortcomings of Social Judgment. Englewood Cliffs, New Jersey: Prentice-Hall, 1980.
- Jay R. Ritter, "The 'Hot Issue' Market of 1980," Journal of Business, 57, 2, 1984, 215-240.
- Jay R. Ritter, "The Long-Term Performance of Initial Public Offerings," Journal of Finance, March 1991, 3-27.
- Richard Roll, "The Hubris Hypothesis of Corporate Takeovers," Journal of Business, 59, 2, 1986, 197-216.
- Richard Roll, "R²," Journal of Finance, 43, 2, 1988, 541-566.
- David Romer, "Rational Asset-Price Movements Without News," American Economic Review, 83, 5, 1993, 1112-1130.
- Thomas Russell and Richard H. Thaler, "The Relevance of Quasi Rationality in Competitive Markets," American Economic Review, 75, 1985, 1071-1082.
- William Samuelson and Richard Zeckhauser, "Status Quo Bias in Decision-Making," Journal of Risk and Uncertainty, 1, 1988, 7-59.
- Katherine Schipper, "Earnings Management," Accounting Horizons, 3, 4, 1989, 91-102.
- Paul J.H. Schoemaker, "The Quest for Optimality: A Positive Heuristic of Science?" Behavioral and Brain Sciences, 14, 2, 1991, 205-245.
- G. William Schwert, "Size and Stock Returns, and Other Empirical Regularities," Journal of Financial Economics, 12, 1983, 3-12.
- Henri Servaes, "Tobin's q, Agency Costs, and Corporate Control," Journal of Finance, 46, 1991, 409-419.
- H. Nejat Seyhun, "Do Bidder Managers Knowingly Pay Too Much for Target Firms?" Journal of Business, 63, 4, 1990, 439-464.
- Herah Shefrin and Meir Statman, "Explaining Investor Preference for Cash Dividends," Journal of Financial Economics, 13, 1984, 253-282.

- Herash Shefrin and Meir Statman, "Behavioral Aspects of the Design and Marketing of Financial Products," Financial Management, 22, 2, 1993(a), 123-234.
- Herash Shefrin and Meir Statman, "A Behavioral Framework for Expectations About Stock Returns," Working paper, Leavey School of Business, Santa Clara University, December 1993(b).
- Robert J. Shiller, "Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?" American Economic Review, 71, 3, 1981, 421-436.
- Robert J. Shiller, Market Volatility. Cambridge, Massachusetts: MIT Press, 1989.
- Robert J. Shiller, "Speculative Prices and Popular Models," Journal of Economic Perspectives, 4, 2, 1990, 55-65.
- Andrei Shleifer and Lawrence H. Summers, "The Noise Trader Approach to Finance," Journal of Economic Perspectives, 4, 2, 1990, 19-33.
- Herbert A. Simon. Reason in Human Affairs. Stanford, California: Stanford University Press, 1983.
- Paul Slovic, "Psychological Study of Human Judgment: Implications for Investment Decision Making," Journal of Finance, 27, 1972, 779-799.
- Paul Slovic, "Information Processing, Situation Specificity, and the Generality of Risk-Taking Behavior," Journal of Personality and Social Psychology, 22, 1, 128-134.
- Barry M. Staw, "Knee-Deep in the Big Muddy: A Study of Escalating Commitment to a Chosen Course of Action," Organizational Behavior and Human Performance, 16, 1976, 27-44.
- Jeremy Stein, "Overreactions in the Options Market," Journal of Finance, 44, 4, September 1989, 1011-1023.
- Lawrence H. Summers, "The Scientific Illusion in Empirical Macroeconomics," in S. Hylleberg and M. Paldam (eds.), New Approaches to Empirical Macroeconomics. Ebertoft, Denmark, 1990.
- O. Svenson, "Are We All Less Risky and More Skillful Than Our Fellow Drivers?" Acta Psychologica, 47, 1981, 143-148.
- Richard H. Thaler, "Toward a Positive Theory of Consumer Choice," Journal of Economic Behavior and Organization, 1, 1980, 39-60.
- Richard H. Thaler, "Mental Accounting and Consumer Choice," Marketing Science, 4, Summer 1985, 199-214.
- Richard H. Thaler, "The Psychology of Choice and the Assumptions of Economics," in Alvin E. Roth (ed.), Laboratory Experimentation in Economics: Six Points of View, Cambridge: Cambridge University Press, 1987.
- Richard H. Thaler (ed.), Advances in Behavioral Finance. New York: Russell Sage Foundation, 1993.
- Richard H. Thaler and Herash Shefrin, "An Economic Theory of Self-Control," Journal of Political Economy, 89, 1981, 392-410.
- Nickolaos G. Travlos, "Corporate Takeover Bids, Methods of Payment, and Bidding Firms' Stock Returns," Journal of Finance, 42, 1987, 943-964.

Amos Tversky and Daniel Kahneman, "Judgment under Uncertainty: Heuristics and Biases," Science, 185, 1974, 1124-1131.

Amos Tversky and Daniel Kahneman, "The Framing of Decisions and the Psychology of Choice," Science, 211, 1981, 453-458.

William T. Ziemba, "World Wide Security Market Regularities," European Journal of Operational Research, 1993, forthcoming.