

The Psychology of Underreaction and Overreaction in World Equity Markets

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Abstract

Two key elements of a new psychological theory of stock prices are the notions of 'mental frames' and 'heuristics'. How people seek out, interpret and act upon news depends on their beliefs. Investors' perceptions of value are socially shared. Popular models may be false, however, and yet resist change. We review the international evidence relating to the profitability of contrarian and momentum strategies in equity markets. Securities are sorted into portfolios on the basis of past share price performance or related criteria that proxy for investor sentiment. The data support the behavioral theory of over- and underreaction to news. Investor psychology is an important element in the dynamics of asset prices.

Introduction

Wherever we go these days, people want to discuss the latest twists and turns in world equity markets. Is America a 'bubble economy'? Is the current level of the Dow Jones justified by expected corporate earnings and low inflation, or is it driven by the public's unthinking forecast of perpetual economic bliss? Why are investors so bullish in Germany or Switzerland, even though these nations suffer from low growth and high unemployment? Why did a financial crisis abruptly break off the economic miracle in Asia? Yet, why did Asian stock markets quickly, but not fully, rebound after the initial fall?

Nearly everyone agrees that changes in stock prices, even very impressive changes, elude easy interpretation.¹ However, economists often approach the question differently than other people do. They stress the rationality of markets, whereas journalists, money managers, and even central bankers stress the psychology and (sometimes predictable) foolishness of traders. A centerpiece of modern finance is the efficient markets hypothesis in which prices do not deviate from intrinsic values in any systematic way. The marginal investor, it is believed, updates the probabilities of uncertain future events in rational Bayesian fashion and trades accordingly. Thus, it is not possible to

¹For example, Robert Solow, a Nobel-prize winning economist, recently commented in the *International Herald Tribune* that "it is hard to explain why the Dow went from 6,000 to 9,000" (May 7, 1998).

contrive a trading rule that promises superior profits based on facts to which the public has access at no cost.

Finance theory almost completely ignores the complex cognitive and motivational factors that guide trading decisions. In contrast, this article explores 'why psychology matters' and why a behavioral approach is a productive way of thinking about issues of asset pricing. The central problem that I discuss is how the behavior of traders shapes the dynamics of stock prices—in particular, how investor sentiment sometimes causes price reversals and sometimes causes price momentum. Thus, the broad themes that motivate past research on the psychology of financial markets are reviewed. In addition, I present an overview of the evidence, in world equity markets, that documents the performance of trading rules that are based on contrarian and momentum strategies. Securities may be sorted into portfolios on the basis of past share price performance or related criteria, e.g., past earnings growth or book-to-market value ratios. As I argue, the international evidence largely supports a psychological interpretation of the dynamics of stock prices.

Three perspectives

What are the links between stock prices and new information? Over the decades, people have thought about this question in various ways. Three responses have emerged. The first response defines the efficient markets hypothesis: 'The price is right'. That is, on average, rational market prices correctly reflect all information about the firm (Fama, 1970).² The second response is that the relationship between prices and economic values, if it exists, does not mean very much. The market has a life of its own. In the words of John Maynard Keynes, prices are driven by "animal spirits."³ The third response is the one that receives most support from empirical research in behavioral finance. It resembles Isaac Newton's law of universal gravitation: What goes up must come down. Applied to the stock market, this law means that over time prices tend to revert to value. In the short run, however, systematic disparities predicted by investor psychology may arise between the two.

The three perspectives on asset valuation have different implications for money management. The price-is-right answer suggests that an indexing strategy is best since "you can't beat the market." The animal-spirits view is fascinated by technical analysis and the study of investor sentiment (Pring, 1991, 1993). Newton's law suggests that one should pursue value-based investment strategies and fundamental analysis in the style of Benjamin Gra-

²Thus, predictable valuation errors are excluded but not random errors.

³In his 1998 book, George Soros dwells on this point and on what he calls the "reflexivity of financial markets." According to Soros, financial markets do not tend toward equilibrium but they are "given to excesses and if a boom/bust sequence progresses beyond a certain point [the pendulum] will never revert to where it came from" (p. xvi).

ham and David Dodd (1934). It is interesting that two of the three approaches recommend that investors pay careful attention to human behavior.

The empirical and theoretical challenge

Since the early 1960s, however, modern finance has counseled the opposite, i.e., that the details of investor behavior—i.e., what traders actually do—are not important for market behavior. Standard asset pricing models are based on the twin assumptions of ‘perfect markets’ in equilibrium and a representative agent who behaves like ‘homo economicus’, i.e., he adheres to the axioms of rationality that underlie expected utility theory, Bayesian learning, and rational expectations.⁴

Yet, there is a long list of empirical market anomalies that are inconsistent with the standard models. The theory fails in its predictions. There are various types of anomalies. Some have to do with the failure of dividend discount models. It seems that, for a century, the volatility of market indexes, such as the Standard & Poor’s index, has not been validated by subsequent movements in dividends (Shiller, 1989).⁵ Other anomalies have to do with the risk-return tradeoff. Over the long run, stocks outperform bonds by a surprisingly large margin (Mehra and Prescott, 1985).⁶ The data also con-

⁴For details, see Fama and Miller (1972). Modern finance does not assume that every investor is fully rational. However, with arbitrage, individual irrationality does not have to lead to irrationality at the market level. Shleifer and Vishny (1997) discuss the limits to professional arbitrage. They state that “the efficient markets approach to arbitrage [is] based on a highly implausible assumption of many diversified arbitrageurs. In reality, arbitrage resources are ... concentrated in the hands of a few investors that are ... specialized in trading a few assets, and are far from diversified” (p. 52). Shleifer and Vishny believe that arbitrage may “become ineffective ... when prices diverge far from fundamentals” (p. 35) and that the ineffectiveness can account for the glamour/value anomaly in equity prices (p. 53). In earlier work, Grossman (1989) argues that “the assumptions that all markets, including that for information, are always in equilibrium and always perfectly arbitrated are inconsistent when arbitrage is costly” (p. 91). For discussion of how irrational noise traders may influence asset prices, see Shleifer and Summers (1990), Shefrin and Statman (1994), Palomino (1996), and Odean (1998).

⁵It could be, however, that the volatility in equity markets reflects how the returns that investors require to hold stocks vary through time, e.g., with movements in the business cycle. Also, the Shiller volatility tests may be misspecified. For a review of the debate, see LeRoy (1989).

⁶To explain the difference in returns, the representative investor has to be extraordinarily risk-averse—with a coefficient of relative risk aversion over 30. As implausible as it sounds, this level of risk-aversion means that one feels indifferent between (1) a coin flip that either pays \$50,000 (heads) or \$100,000 (tails) or (2) a certain payment of \$51,209. There are other explanations for the equity premium puzzle, e.g., investor may have been rationally concerned with a catastrophe that did not happen, or there is ‘*ex post* selection bias’. The estimates of the equity premium are for the United States. Foreign data may yield less extreme findings. Even for the US, the equity premium is not nearly as large when data for the 19th century are considered (Siegel, 1992, 1994). Real bond returns were much higher at that time than during the period after 1926. Unanticipated inflation and

tradict the notion of beta-risk defined by the capital asset pricing model. In the cross-section of firms, returns on equity move with market capitalization and with the ratio of market value to book value (Fama and French, 1992; Hawawini and Keim, this volume). No one has a good story why this happens, however. Finally, there is a long list of anomalies that relate to the time-series dynamics of asset returns, seasonalities, the reaction of prices to corporate financing decisions, the pricing of initial public offerings of equity (IPOs), the pricing of closed-end mutual funds, and so on.⁷

The standard theory also fails in its assumptions. For many years, psychologists have amassed experimental evidence that "economic man ... is very unlike a real man" (Edwards, 1954, p. 382). The literature abounds with laboratory settings where central axioms of rationality such as frame invariance, dominance, or transitivity are violated. These violations are systematic, robust, and fundamental, i.e., they require new theory. "Reason," psychologists conclude, is not an adequate basis for a descriptive theory of decision-making (Tversky and Kahneman, 1986). Studies of financial decision-making by individuals and households confirm this negative conclusion. De Bondt (1998) lists four classes of anomalies that have to do with investors' perceptions of the time-series process of asset prices, perceptions of asset value, portfolio choices, and trading practices. What is surprising is the failure of many people to infer basic investment principles from years of experience, e.g., the benefits of diversification.

How should we react to this state of affairs? The answer of many financial economists is to question the relevance of experiments. Laboratory research, they emphasize, may lack ecological validity and may not predict actual decision-making when much wealth is at stake. Also, in empirical studies, the quality of the data is sometimes suspect and the findings may be artifacts of research design errors (Ball, 1995; Ball *et al.*, 1995). Fama (1998) calls attention to the fragility of some long-term return anomalies. The apparent findings of price momentum and reversals are sensitive to methodology and, in Fama's view, they may be chance results. In addition, it is often said that, if the data are many, one cannot exclude data mining. But, if the data are few, the rational theory has not been rejected and may still serve as a starting point. Finally, champions of modern finance formulate more complex rational theories that may yet account for the observed anomalies. While

other historical factors may explain the low interest rates after 1926. A final explanation relies on non-standard investor preferences, e.g., habit formation or myopic loss aversion (see, e.g., Benartzi and Thaler, 1995).

⁷Fama (1991, 1998) reviews the evidence. Merton Miller agrees, it appears, with my characterization of the evidence. In a 1994 interview with *The Economist* (April 23), he says that "the blending of psychology and economics ... is becoming popular simply because conventional economics has failed to explain how asset prices are set." Miller adds, however, that he believes that the new mix of psychology and finance "will lead nowhere."

these efforts are provocative, we should avoid false conclusions. It is not so that "if behavior can still be rationalized, it must be rational." Neither, of course, should we accept 'overly flexible' behavioral theories. If we explain everything, chances are that in fact we explain nothing.

Given the shortcomings of modern finance, I believe that the challenge is to develop new and better theories of asset pricing. Studying the psychology of investors is one alternative. Clearly, the behavioral approach that I advocate is quite different from a perspective that emphasizes perfect markets and perfect people. It also stands in contrast to the growing literature on market micro-structure. The institutionalist perspective tries to model market frictions but regards the marginal trader to be fully rational. (The notion of 'noise traders'—if present—is used to close the model, as a *deus ex machina*.) Thus, it is assumed that, if information is asymmetric and some people know more than others, those who know less are aware of this fact and they act strategically in full recognition that they know less. Behavioral finance, on the other hand, assumes that the less-informed or ignorant noise traders are indeed ignorant but do not appreciate that they are ignorant.

The psychology of beliefs

Psychologists have developed a series of new concepts under the general heading of "bounded rationality" (Simon, 1983). Under full rationality, a utility is assigned to each possible state-of-the-world and the economic agent chooses what is best. Under bounded rationality, the individual does not contemplate, in every instant, the whole range of possible actions that lie before him. Task complexity, attention, the cost of thinking, memory, habit, social influences, emotion and visceral responses all contribute to the decisions that are made. As a result, there are systematic differences between 'what people do' and 'what people should do'—from a normative perspective.

Various new theories of decision-making have been formulated. For example, in the psychology of choice, an alternative to expected utility theory is prospect theory (Kahneman and Tversky, 1979). The theory emphasizes the effects on choice of problem editing, reference points, loss aversion, and small probabilities. In the psychology of judgment, the dual notions of 'mental frames' and 'heuristics' are critical building blocks (Tversky and Kahneman, 1974). The central insight of all behavioral theories is that decision process influences decision outcome.⁸

The effect of judgment on asset prices is a product of the mental frames or beliefs about company value that investors hold. The interpretation of past events and the prediction of future scenarios always happens in a broader

⁸Slovic (1972), Earl (1990), De Bondt and Thaler (1995), Kahneman and Riepe (1998), and Rabin (1998) discuss a selection of psychological findings relevant to finance. For an introduction to cognitive and social psychology, I refer the reader to Nisbett and Ross (1980), Kahneman *et al.* (1982), and Fiske and Taylor (1991).

context. It is also of great importance how traders incorporate new information into the current frame. Because perceptions influence decisions, several attributes of beliefs are important to keep in mind. First, people do not create or use many frames that are uniquely their own. Concepts and frameworks are socially shared, e.g., through stories in the news media, conversation, and tips from friends and advisors. That is why we can speak over dinner about the troubles in Kosovo without ever having been there or even knowing anyone who has.⁹ Second, beliefs differ greatly in sophistication. History teaches the power of flawed ideologies, false beliefs, and superstition (Mackay, 1841). For instance, when California housing prices were skyrocketing during the late 1980s, the man in the street explained what happened by a 'shortage illusion'. The illusion was that price increases and shortages would continue without limit, simply because "California is a good place to live" (Shiller, 1990). As a further illustration, I should mention how once I watched an afternoon television talk show about the savings and loan crisis. One of the people in the audience said, "The taxpayers shouldn't pay for this mess. The government should." Many financial economists surely overestimate the economic sophistication of the public. Finally, beliefs do not change easily—even in the face of conflicting evidence. People have an immense capacity to rationalize facts and fit them into a pre-existing belief system (Edwards, 1968). Confirmatory evidence is taken at face value while disconfirmatory evidence is subjected to skeptical scrutiny.¹⁰ Forecasts of inflation demonstrate how powerful belief perseverance is. One way to interpret the low real returns on bonds in the 1970s is that most people, including experts, never imagined that inflation would rise as much as it did. Similarly, the high real returns during the 1980s may have resulted from the conviction that inflation was here to stay (De Bondt and Bange, 1992).

The psychological literature leaves little doubt that the quality of human inference can be improved (see, e.g., Nisbett and Ross, 1980, or Kahneman *et al.*, 1982). It may be thought that, in view of these shortcomings, people would exhibit appropriate caution concerning their judgmental abilities. However, many studies show that this is false. People are prone to overconfidence. This observation raises questions about the link between learning and experience.

Numerous factors restrict the ability to learn. It is well-known that prior

⁹This is also why people's (average) perceptions of the world differ from the (average) perception of their personal life space. For example, based on weekly data from ABC/*Money Magazine* polls (1986–1996), Mutz (1998) shows that Americans' perceptions of the state of the US economy have been "consistently and without exception" more negative than their views of personal financial conditions (p. 125).

¹⁰Indeed, the experiments of Lord *et al.* (1979) show how it may happen that two opposing parties draw support for their divergent views from the same corpus of findings. For further discussion, see Nisbett and Ross (1980).

expectations of relationships can lead to faulty inference, or 'illusory correlation'. For instance, our initial beliefs influence how we seek out and interpret new information. In addition, because of hindsight bias, outcomes often fail to surprise people as much as they should. People also tend to attribute success to skill and failure to bad luck. Finally, there are 'outcome irrelevant learning structures' which reinforce poor inferences with positive outcome-feedback. As a consequence, their validity is not questioned.

That shared beliefs affect market prices, often the wrong way, is evident from a careful study of business history. A good example is U.S. corporate restructuring. In retrospect, it is surprising that the merger and acquisition wave of the 1960s, when many companies diversified into new activities, was followed by the break-up wave of the 1980s and the 1990s. One wonders whether the initial M&A wave was largely in error. Profit data certainly suggest that it was. The management gurus of the 1960s loved diversification and saw it as a big plus for firm value whereas today, their buzzword is 'focus'. What is striking, however, is that the stock market apparently took the gurus seriously, not once but twice. Studies show that stock prices of bidder firms reacted favorably to acquisition news in the 1960s but unfavorably in the 1980s.¹¹ It is a perilous practice to judge the value of a long-term investment decision by the whim of a short-term price reaction.¹²

Overreaction

How do stock prices react to news? The answer depends in part on how investors' perceptions of company value and future earnings are influenced by new information. There are always two effects. The first effect has to do with the short-term impact of the news in light of the information already impounded in prices. The second effect depends on how the news changes the cognitive frame itself. At times, seemingly minor pieces of news trigger a change in mental frame and cause a big price reaction.

An important question in this context is the quality of financial forecasts. How valid are expert and amateur predictions of share prices, earnings, etc.? How do people go about making these forecasts? What type of information attracts the most attention? A recurring theme in the literature is the disposition to predict the future based on the recent past. People find it difficult

¹¹Matsusaka (1990) reports the results for the 1960s and early 1970s. On average, bidder companies earned positive excess returns upon the public announcement of unrelated acquisitions.

¹²In April 1991, *The Economist* described the conglomerate merger wave as the "biggest collective error ever made by American business." Baker (1992) questions this assessment. He suggests that "acquirors were buying smaller companies that valued the ... resources that these acquiring firms could offer." The fact that many transactions were reversed later "is not evidence ... of foolishness ... [since] changes in financing technology and managerial sophistication ... can explain these reversals" (p. 1118).

to project anything that is greatly different from the apparent trend—even if over-optimistic forecasts and groundless confidence are the net result. Kahneman and Lavallo (1993) call this practice the “inside” view of forecasting. The inside view directs attention to the unique complexities of the case at hand and formulates specific future scenarios (e.g., obstacles and solutions). The forecasts overreact to facts that appear prominent in a narrow frame. In contrast, the ‘outside’ view directs attention to base-rate information, i.e., statistics for an ensemble of comparable cases. Even if decision-makers have access to base rates, they often ignore them. Non-Bayesian forecasting probably results from the use of the representativeness heuristic. This heuristic rule judges probability by similarity and causes predictable judgment errors (Tversky and Kahneman, 1974).¹³

Security analysts’ earnings forecasts are a good example of non-Bayesian forecasting (De Bondt and Thaler, 1990). The forecasts are persistently wide off the mark. Notwithstanding their large errors, analysts keep offering predictions that are too extreme. In addition, the data show optimism bias as well as serial correlation in forecasts errors.¹⁴ A similar phenomenon applies to stock price forecasts made by individual investors. For several years, the American Association of Individual Investors has asked a random sample of its members for a stock forecast every week. The data show that, just like subjects in controlled experiments, most individuals are upbeat in bull markets and gloomy in bear markets. The forecasts, however, have little or no predictive power (De Bondt, 1993). A further example of how representativeness affects judgment in financial matters has to do with the inferior long-run performance of IPOs and the so-called ‘next’ syndrome. Investment bankers find it attractive to sell IPOs as the ‘next’ Microsoft or the ‘next’ Intel—especially if the start-up company is small and does not have a long historical earnings record. The data agree with the notion that “many firms go public near the peak of industry-specific fads” (Ritter, 1991).¹⁵

¹³One such error is the conjunction fallacy. A well-known experiment that demonstrates this error is the one about ‘Linda’. Linda is described as “31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice and also participated in antinuclear demonstrations.” Subjects are asked what is more likely: (i) Linda is a bank teller; (ii) Linda is a bank teller and is active in the feminist movement. Most people choose the second alternative (since it “looks more like Linda”) even though this answer violates a basic law of probability. The conjunction of two events can never be more likely than the probability of either event alone.

¹⁴De Bondt and Thaler (1990) fail to identify the sources of analyst overreaction. It is not evident, for instance, that analysts extrapolate past earnings growth into the future.

The same issues have also been investigated with data for the United Kingdom. See, Capstaff *et al.* (1995), Forbes and Skerratt (1996), O’Hanlon and Whiddett (1991), and others. Without exception, the results cast doubt on the rationality of earnings forecasts.

¹⁵A different interpretation of the poor performance of IPOs, endorsed by Alan Greenspan, is that investors buy them more or less like they buy lottery tickets. When

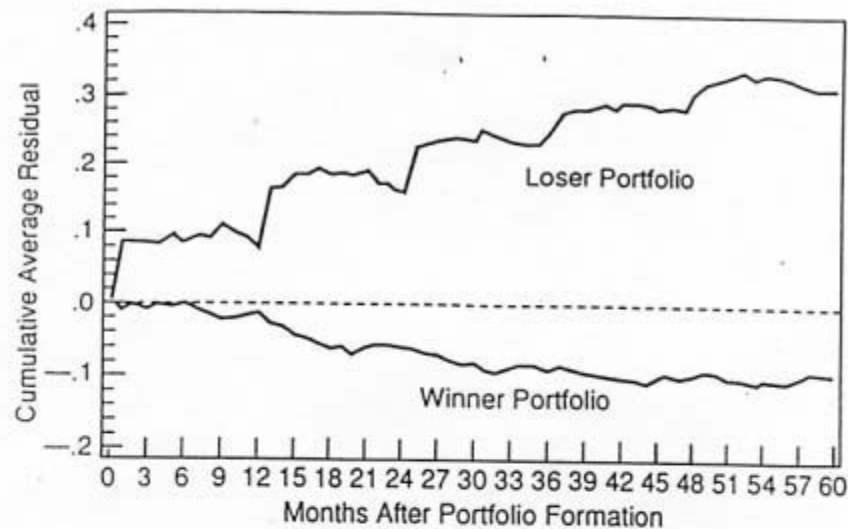


Figure 1. The Winner-Loser Effect in the United States, 1926–1982.

As far as I know, David Dreman (1982) is the originator of the phrase "overreaction". Dreman and others believed that there is exaggerated optimism in the stock market for firms with high price-earnings (PE) ratios and exaggerated pessimism for firms with low PE ratios. De Bondt and Thaler (1985) formulated a series of empirical tests that support the idea that overreaction bias affects stock prices. Figure 1 summarizes the initial, controversial study of the winner-loser effect. All companies listed on the New York Stock Exchange since December 1925 were examined. Thaler and I used past stock returns over a two- to five-year (portfolio rank) period as a proxy for investor sentiment and we predicted systematic price reversals. As Figure 1 shows, the portfolio of 50 NYSE stocks that did the worst over an initial five year period subsequently outperformed the 50 NYSE stocks that did the best. It seems that stock prices 'have a memory' since the difference in performance during the test period is, on average, about 8% per year, controlling for risk and other factors. The winner-loser effect was the first asset pricing anomaly predicted by a behavioral theory. Despite numerous past attempts to refute the winner-loser effect, hardly anyone doubts the statistical results. What continues is the struggle over the interpretation of the data.¹⁶

There is a related literature on 'value' and 'growth' (or glamour) investing they gamble, investors pay a premium for the small chance of a big gain—yet, they know that the expected payoff is negative.

¹⁶I will not review this debate here. See, however, two surveys by De Bondt and Thaler (1989, 1995) for a behavioral perspective. Over the years, it has been suggested that the winner-loser effect is due to tax effects, return seasonality, firm size, time-varying beta-risk, biases in computed returns, and other factors (see, e.g., Ball *et al.*, 1995). Recent studies by Chopra *et al.* (1992), De Bondt (1992), Dreman and Berry (1995), Lakonishok *et al.* (1994), Loughran and Ritter (1996), and Shefrin and Statman (1997) have, on balance, strengthened the case for overreaction.

that can be traced back to Graham and Dodd (1934). Here, the universe of securities is sorted into portfolios on the basis of measures that compare intrinsic value with market price. Companies are ranked on their price-earnings ratios, book-to-market value of equity ratios, cash flow to price ratios, and so on. It is well-established that value stocks earn higher returns than growth stocks but it is not obvious that value stocks are more risky. See, e.g., Basu (1977), De Bondt and Thaler (1987), Fama and French (1992), Lakonishok *et al.* (1994), and many other studies.

Over time, the seeming profitability of contrarian strategies has been established for numerous countries and time periods. Table 1 summarizes the methods and results of thirteen different overreaction studies for ten world equity markets outside the US. An arbitrage portfolio that finances its purchases of past losers by selling past winners short earns positive returns in almost every case. The long-run predictability of returns even applies to country indexes. Vriezen (1996), Asness *et al.* (1997), De Bondt *et al.* (1998), and Richards (1998) sort the countries included in the *Morgan Stanley Capital International* indexes on the basis of past returns, capitalization measures, and so on. Countries that lag the world index over periods of three to five years tend to outperform the index during later years. Finally, Table 2 summarizes the results of three studies that look for international evidence on the relative performance of value and growth strategies (Brouwer *et al.*, 1996; Capaul *et al.*, 1993; Fama and French, 1997). The studies cover thirteen countries. The findings are unambiguous. On average, the value portfolio strongly outperforms the growth portfolio.¹⁷ Hawawini and Keim, in this volume, also provide extensive international evidence on the relative merits of value vs. growth investing.

What causes the winner-loser effect? My favorite explanation is a theory of 'generalized overreaction'. At the center of this theory are mental frames that confuse attractive companies with attractive investments. The popular models are validated and reinforced by expert opinion, peer group consensus, and possibly the price action of securities—since traders detect imaginary trends. As it becomes public, news about the firm is blended into these mental frames and it causes further overreaction. Lastly, many investors simply-mindedly extrapolate past earnings trends into the future—even if, eventually, unusual runs in earnings growth, up or down, must end.¹⁸

¹⁷In a study of the Japanese market (1971–1988), Chan *et al.* (1991) also find that the book-to-market ratio has a reliably positive impact on expected returns.

¹⁸There are at least two more behavioral theories of the winner-loser effect. Both theories do not emphasize expectations of future cash flows. The first theory stresses how traders want to be paid for changing perceptions of risk. It may be, for instance, that investors require a 'regret' premium to purchase past loser companies because these firms 'look' more risky even if they are not.

The second theory is based on notions of herding and conformity. Perhaps investors

Table 1

| CONTRARIAN STRATEGIES: EVIDENCE FOR 10 COUNTRIES | | | |
|---|---|--|---|
| Country | Period Sample | Length of Rank and Test Period Size of Extreme Portfolios | Arbitrage Portfolio Losers Minus Winners Annualized Returns |
| Australia (Brailsford, 1992) | 1958-1987 330 Stocks | 3 Years, Quintiles 3 Years, Deciles | 3.6%* 5.6%* |
| Brazil (da Costa, 1994) | 1970-1988 121 Stocks | 2 Years, Quintiles | 18.9%* |
| Canada (Kryzanowski/ Zhang, 1992) | 1950-1988 From 137 (1950) to 1581 (1988) Stocks | 3 Years, Deciles 5 Years, Deciles | 4.9%* 6.4%* |
| Germany (Schierreck/De Bondt/ Weber, 1999) (Meyer, 1994) | 1961-1991 ~210 Stocks 1961-1990 ~220 Stocks | 5 Years, 20 Stocks 2 Years, Deciles 3 Years, Deciles 5 Years, Deciles | 4.4%** 1.3%** 2.9%** 6.0%** |
| Malaysia (Ahmed/ Hussain, 1997) | 1986-1996 166 Stocks | 3 Years, Deciles | 13.2%* |
| The Netherlands (Bos, 1991) | 1985-1990 34 Major Stocks | 2 Years, 5 Stocks | 4.4%* |
| Spain (Alonso/Rubio, 1990) | 1967-1984 ~80 Stocks | 3 Years, 5 Stocks | 12.3%*** |
| Sweden (Karlsson/ Thoren, 1997) | 1983-1996 ~90 Stocks | 3 Years, 10 Stocks | -1.8% (1983-89)* 3.2% (1990-96)* |
| Switzerland (Dressendorfer, 1997) | 1973-1996 197 Stocks | 3 Years, Quintiles 5 Years, Quintiles | 0.2%** 3.4%** |
| United Kingdom (Clare/Thomas, 1995) (Dissanaike, 1996) | 1955-1990 1000 Stocks 1975-1991 500 Major Stocks | 3 Years, Quintiles 4 Years, Deciles | 1.6%* 24.7%** 10.8%*** |
| (Forbes/ Kyciades, 1996) | 1975-1993 1000 Stocks | 3 Years, Deciles 5 Years, Deciles | 2.3%* 17.5%** 6.2%* 7.6%** |
| *Rebalanced Raw Returns: **Buy-and-Hold Raw Returns: ***Beta-Adjusted Returns | | | |

Table 2

| VALUE VERSUS GROWTH STRATEGIES: EVIDENCE FOR 13 COUNTRIES | | | |
|---|--|---|--|
| Study | Period Countries | Criterion Variable Fraction of Sample in each Portfolio | Annualized Return of Value Minus Growth Stock Portfolio |
| Capaul/Rowley/ Sharpe (1993) | 1981-1992 | | |
| | Europe ¹ | B/M | 2.8% ¹ |
| | World ² | 50% | 3.4% ² |
| Brouwer/van der Put/Veld (1996) | 1982-1993 F, G, NL, UK | E/P | 5.0% |
| | | C/P | 20.8% |
| | | B/M | 10.0% |
| | | D/P | 5.2% |
| Fama/French (1997) | 1975-1995 A, B, CH, F, G, HK, I, J, NL, S, Si, UK, US | 20% | |
| | | E/P | 4.1% |
| | | C/P | 6.6% |
| | | B/M | 5.6% |
| | | D/P | 2.8% |
| | | 30% | |
| The countries are: A: Australia; B: Belgium; CH: Switzerland; F: France, G: Germany, HK: Hong Kong; I: Italy; J: Japan; NL: The Netherlands; S: Sweden; Si: Singapore; UK: United Kingdom, US: United States. Criterion Variable: B/M: Book/Market Ratio. E/P: Earnings-Price Ratio. C/P: Cash-flow-Price Ratio. D/P: Dividend-Price Ratio. | | | |
| The value (growth) portfolio is the portfolio with companies that have high (low) E/P ratios, high (low) C/P ratios, high (low) B/M ratios, high (low) D/P ratios. | | | |
| ¹ Value-weighted portfolio of CH, F, G, and UK. ² Value-weighted portfolio of CH, F, G, J, UK and US. | | | |

In a 1992 study, I first tested the overreaction-to-earnings growth hypothesis. I asked whether analysts' earnings forecasts could be used to earn abnormal profits. The period was 1976-1984 and I employed over 100,000 forecasts. Firms were ranked on the basis of analyst predicted earnings growth, over one-, two-, and five-year horizons. Apparently, an arbitrage strategy that buys the 20% of companies for which analysts are most pessimistic and finances the purchases by short-selling the 20% of companies for which analysts

spend most of their time observing and imitating the behavior of other traders (rather than gathering fundamental news). It seems that, *ceteris paribus*, investors are willing to pay more for what is familiar and comfortable. Many people keep large equity holdings in local firms (Huberman, 1997). Also, their portfolios lack international diversification (French and Poterba, 1991). Teh and De Bondt (1997) find that US equity returns depend on shareholder trading practices and identity. In the cross-section of companies, conventional stocks earn lower returns.

are most optimistic earns substantial profits. As predicted by the representativeness heuristic, the excess returns grow with the forecast horizon.¹⁹

Other aspects of the data are consistent with naive earnings extrapolation. For example, De Bondt and Thaler (1987) find that the earnings of winner (loser) firms, on average, show the same up and down (down and up) time-series pattern that is observed in stock returns.²⁰ Additionally, much of the differential price movement between winner and loser (or value and growth) stocks takes place within a window surrounding quarterly earnings announcements during the test period (Chopra *et al.*, 1992; La Porta, *et al.*, 1997). More evidence is gathered by Dreman and Berry (1995). These authors identify two types of earnings surprises: (i) 'trigger events' that go against prior expectations, and (ii) 'reinforcing events' that affirm prior expectations. For twenty years (1973–1993), Dreman and Berry rank companies by PE ratios—a proxy for market enthusiasm. They find that trigger events (good news for low PE stocks and bad news for high PE stocks) have a much larger absolute impact on prices than reinforcing events. Thus, bad earnings news damages stock prices but tends to be 'taken in stride' when expectations are low. Conversely, good news pushes prices up but less so for high PE companies.²¹ Finally, Lakonishok *et al.* (1994) use the Gordon growth model to compare the growth forecasts for earnings and cash flow implied by market prices to the growth rates subsequently realized. The predictions of superior growth for glamour firms are borne out but only in the very short run. Beyond the first couple years, the growth rates of value and growth stocks are essentially identical.²²

To repeat, many people equate a well-run firm with a good investment. The behavior of investors suggests stock market overreaction—more or less in the same way that voters approve or disapprove of politicians depending

¹⁹La Porta (1995) and Dechow and Sloan (1997) report similar findings based on similar data (i.e., analyst forecasts of five-year earnings growth provided by IBES Inc.) for the period 1981–1993. Contrarian investing is profitable because asset prices reflect analysts' long-term forecasts even though these predictions are systematically too extreme and too optimistic. Related findings appear in Abarbanell and Bernard (1992) and Bulkley and Harris (1997). In *The Intelligent Investor*, Benjamin Graham (1959) states that "no one really knows anything about what will happen in the distant future, but analysts and investors have strong views on the subject just the same" (p. 133). This comment agrees with the overreaction bias in earnings forecasts and stock returns.

²⁰Tests for German firms listed on the Frankfurt Stock Exchange (1960–1991) yield similar results (Schierbeck *et al.*, 1999).

²¹See also Basu (1978) and Dreman (1998). Bauman and Miller (1997) create portfolios of value and growth stocks for 1980–1993. They rank firms by PE-ratios, 5-year past growth rates in earnings, and other measures. On average, value stocks outperform growth stocks. Most earnings surprises are negative because of analyst optimism bias. Interestingly, however, the (standardized) earnings surprises are, on average, significantly less negative for value than for growth stocks.

²²More than three decades ago, Rayner and Little (1966) made the same observation.

on the current state of the economy, or that other social fashions change. Thus, firms that enjoy rapid earnings growth or that somehow are glamorous enough to appear on the cover of major business magazines are seen as excellent investments. In contrast, companies that report losses or lose market share are ill-favored. Shefrin and Statman (1997) analyze the annual surveys of firm reputation published by *Fortune Magazine*. They find that, in the cross-section, reputation is inversely correlated with the ratio of book value to market value of equity, a statistic that is known to predict returns. In other words, on average, highly-reputed companies seem overpriced since they become poor stock market performers afterwards. Conversely, companies that look bad in the court of public opinion are bargains from an investment standpoint.²³

Overreaction and underreaction

Once in place, popular models resist change. Studies of earnings announcements suggest market underreaction rather than overreaction. Bernard (1993) presents a comprehensive survey of the anomalous post-earnings-announcement drift in stock returns. If companies are ranked on the basis of standardized earnings surprises or of the returns that surround the earnings announcement window, companies with good earnings news are much better subsequent investments than are companies that report bad news (Bernard and Thomas, 1989; Foster *et al.*, 1984). The effect lasts for several months. Surprisingly, the strategy has consistently paid off for over a quarter of a century. The market behaves as if it discounts the earnings news—particularly at turning points. Around later announcements, prices react as if the market believes that earnings should mirror what they were for the corresponding quarter from the previous year (Bernard and Thomas, 1990).

The slow reaction to earnings announcements ('earnings momentum') is related to other evidence of stock price momentum reported by De Bondt and Thaler (1985), Jegadeesh and Titman (1993), and others. De Bondt and Thaler find that, for the 1926–1982 period, one-year past winners outperform one-year past losers by 7.6% per year. For 1965–1989, Jegadeesh and Titman find that a strategy which selects stocks based on their past six-month returns

²³Two related papers are Clayman (1987) and Antunovich and Laster (1998). Clayman (1987) tracks the performance of the companies that were featured by Thomas Peters and Robert Waterman in their 1982 bestseller *In Search of Excellence*. Prior to 1980, so-called excellent companies scored high in return on sales, return on assets, asset growth, and other accounting measures of financial strength. However, these measures quickly reverted toward the mean during 1981–1985. The stock market performance of these companies was similarly disappointing. Antunovic and Laster (1998) analyze the same data as Shefrin and Statman (1997) but they reach opposite conclusions. They believe that "admired companies" outperform other companies and that the evidence agrees with market underreaction.

and holds them for six months, earns an average annualized return of 12.0%.²⁴ Again, as with the contrarian studies, the findings appear robust. Table 3 summarizes the methods and results of six momentum studies for thirteen world markets outside the US. Rouwenhorst (1998) examines twelve well-established equity markets. He finds that the returns to buying winners and selling losers are positive in each case. Nevertheless, the results of the momentum studies should be interpreted cautiously since the strategies are trading intensive.²⁵

How do we square the overreaction results with the underreaction results? Are they contradictory? Logically, can both be true? The answer is yes. To repeat, large disparities between price and value may result from the wrong mental frame. Investors freely talk about 'growth firms' and 'declining industries' even though there is no evidence of any reliable time-series patterns in annual earnings changes (except in the tails of the distribution). All too often, the life-cycle metaphor proves persuasive. No wonder then that, when an earnings surprise hits, many investors refuse to believe it. A substantial part of the momentum effects in prices is concentrated around earnings announcements (Chan *et al.*, 1996). Thus, mental frames take time to adjust and the market responds only gradually to new information. Analysts seem to be particularly slow in adjusting their earnings forecasts.²⁶ Consistent with this interpretation of the data, it is found that, past stock market losers often experience positive earnings surprises. Similarly, past market winners report an unusual frequency of negative surprises (Chopra *et al.*, 1992). Another piece of evidence is that value strategies generally work well, except among very strong recent performers (Asness, 1997). The process is one of initial market mispricing and slow error correction. The market is slow to overreact.²⁷

In recent years, alternative parsimonious models of the underreaction/

²⁴It should be noted, however, that for short horizons (say, one day to one month) the evidence favors price reversals over momentum (De Bondt and Thaler, 1989). Internationally, there are similar results for Japan (Chang *et al.* 1995) and New Zealand (Bowman and Iverson, 1996). Market micro-structure effects (e.g., relating to the bid-ask spread or lead-lag effects between stocks) are the likely explanation.

²⁵Chan *et al.* (1997) report momentum in stock price indexes for 23 countries. The study includes several emerging markets such as Thailand, Taiwan, or South Africa.

²⁶Hong *et al.* (1998) find that the profitability of momentum strategies declines with firm size and that, holding size fixed, the strategies work well among stocks with low analyst coverage, particularly, past losers. These results agree with the slow diffusion of information. In addition, Lee and Swaninathan (1998) find that past trading volume predicts both the magnitude and persistence of price momentum. Moskowitz and Grinblatt (1998) observe that momentum has a strong industry component.

²⁷I owe this insightful phrase to Robert Haugen (1999). Poteshman (1999) presents evidence from the option markets that agrees with the results for equity markets. It looks as if 'investors underreact to news that is preceded by a short period of similar news and overreact to news that is preceded by a long period of similar news'.

Table 3

| MOMENTUM STRATEGIES: EVIDENCE FOR 13 COUNTRIES | | | |
|--|--|---|---|
| Country | Period Sample | Length of Rank and Test Period Size of Extreme Portfolios | Arbitrage Portfolios Winners Minus Losers Annualized Returns |
| Austria (Rouwenhorst, 1998) | 1980-1995 60 Stocks | 6 Months, Quintiles | 11.2%** |
| Belgium (Rouwenhorst, 1998) | 1980-1995 127 stocks | 6 Months, Deciles | 13.2%** |
| Canada (Kryzanowski/Zhang, 1992) | 1950-1988 From 137 (1950) to 1581 (1988) Stocks | 1 Year, Deciles | 17.5%* 1.4%*** |
| Denmark (Rouwenhorst, 1998) | 1980-1995 60 Stocks | 6 Months, Quintiles | 13.1%** |
| France (Rouwenhorst, 1998) | 1980-1995 427 Stocks | 6 Months, Deciles | 11.6%** |
| Germany (Bromann/Schiereck/ Weber, 1997) (Meyer, 1994) | 1961-1991 ~210 Stocks 1961-1990 ~220 Stocks | 1 Year, 10 Stocks 1 Year, 40 stocks 1 Year, Deciles | 7.9%** 3.2%** 9.2%** |
| Italy (Rouwenhorst, 1998) | 1980-1995 223 Stocks | 6 Months, Deciles | 8.6%** |
| The Netherlands (Rouwenhorst, 1998) | 1980-1995 101 Stocks | 6 Months, Deciles | 11.2%** |
| Norway (Rouwenhorst, 1998) | 1980-1995 71 Stocks | 6 Months, Deciles | 15.1%** |
| Spain (Rouwenhorst, 1998) | 1980-1995 111 Stocks | 6 Months, Quintiles | 11.9%** |
| Sweden (Rouwenhorst, 1998) | 1980-1995 134 Stocks | 6 Months, Deciles | 15.8%** |
| Switzerland (Dressendorfer, 1997) (Rouwenhorst, 1998) | 1973-1997 197 Stocks 1980-1995 154 Stocks | 6 Months, Deciles 1 Year, Deciles 1 Year Quintiles 6 Months, Deciles | 1.9%** 8.2%** 6.0%** 7.7%** |
| United Kingdom (Forbes/Kyciades, 1996) (Rouwenhorst, 1998) | 1975-1993 1000 Stocks 1980-1995 154 Stocks | 1 Year, Deciles 6 Months, Deciles | 8.4%* 10.4%** 10.7%** |
| *Rebalanced Raw Returns; ** Buy-and-Hold Returns | | | |

overreaction findings and the dynamics of security prices have appeared. In bold theoretical papers, Odean (1998) and Daniel *et al.* (1998) start from the observation that investors are overconfident about their own ability. Daniel *et al.* believe that investors overreact to private information but underreact to public information. If it is assumed that public signals on average confirm private signals, a continuing overreaction may cause momentum in stock prices that is eventually corrected. Barberis *et al.* (1997) model how investors learn the stochastic process of earnings. They assume that earnings follow a random walk but that investors either believe that earnings are mean reverting or that earnings show trends. They update their beliefs in Bayesian fashion—even though their model of earnings is incorrect. This theory rationalizes some features of the data, e.g., that negative earnings surprises hit growth stocks more than other stocks but still insufficiently. Finally, Bloomfield *et al.* (1998) use experimental markets to test a model based on Griffin and Tversky (1992). Consistent with prior behavioral research, Bloomfield *et al.* find that people with evidence that is favorable but unreliable tend to overreact to information, whereas people with evidence that is somewhat favorable but reliable underreact. In particular, as it is assumed in Barberis *et al.* (1997) or De Bondt and Thaler (1985), investors overestimate what can be learned from a short sequence of earnings changes about the underlying earnings process.

Conclusions

In his classic 1970 paper, Fama stated that “research [on efficient markets] ... did not begin with the development of a theory of price formation ... rather the impetus came from the accumulation of evidence ... that the behavior ... of speculative prices could be well approximated by a random walk. Faced with the evidence, economists felt compelled to offer some rationalization. ... In short, there existed a large body of empirical results in search of a rigorous theory.” In many ways, thirty years later, we face the same search for rigor.

I have argued that “people are human” and that psychology plays a major role in the behavior of world financial markets. Modern finance, built on the logic of rational choice, helps our understanding of market behavior the most when the forces of arbitrage are strong. Consider, e.g., the explanatory power of the Black-Scholes option pricing formula. Yet, while we take pride in the progress of financial economics as a *science*, we should not forget that it is a *social science*. With costly arbitrage, behavioral factors are relevant. It would be unsound to model market behavior based on the assumption of common knowledge of rationality. “... The [stock] market is not a weighing machine, on which the value of each issue is recorded by an exact and impersonal mechanism,” say Graham and Dodd. “Rather [it] is a voting machine, whereon countless individuals register choices which are the product partly

of reason and partly of emotion" (1934, p. 23).

Hopefully, future research will throw more light on the inner workings of the 'voting machine' and on the links between market and decision-making anomalies. I agree with Fama (1998) that "any alternative model [to market efficiency] has a daunting task" and that "it must specify biases in information processing that cause the same investors to underreact to some types of events and overreact to others" (p. 284).²⁸

Yet, I also believe that "a full understanding of human limitations will ultimately benefit the decision-maker more than will naive faith in the infallibility of his intellect" (Slovic, 1972). Much is learned by studying how people process data and solve problems. The behavioral approach reaffirms that good judgment is critical, in money management as well as in every other aspect of life. In the financial arena, there are usually no short-cuts, no simple ways to get rich quick, except with privileged inside information. Whether the techniques of fundamental (intrinsic value) analysis can yield abnormal profits is still somewhat unclear. Chances are that, for those who do not want to index their portfolios, the best advice is to live by Newton's Law. Nearly all the evidence that I know warns against buying glamour, i.e., against companies with high price-to-earnings ratios, highfliers in the stock market, and so forth. Similarly, most research finds wealth – if not virtue—in contrarian investing, and in going against the crowd.

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²⁸Every model has its own purpose, however. How much rationality we may reasonably assume will vary by context. Conlisk (1996) lists conditions such as deliberation costs, complexity, incentives, and market discipline.

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