

April 9, 2001

Comments Welcome

Investor Psychology in Capital Markets: Evidence and Policy Implications

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This survey was written for presentation at the Carnegie/Rochester Conference Series in Public Policy at the University of Rochester, Rochester, NY, April 2001.

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Abstract

We review evidence that investors make systematic errors, and that psychological biases affect market prices. We argue that it is likely that mispricing causes substantial misallocation of resources and inefficient risk sharing. However, imperfect rationality of asset markets is not a free license for government to try to correct market mispricing ex post. There is no reason to think that regulators, politicians or courts are less subject to bias than are market prices. Detecting and responding to market pricing errors is not the government's relative advantage. There is a case for private and public measures to help investors make better choices and to help investors make the market more informationally efficient, such as certain kinds of disclosure and reporting regulations. Especially, the government should avoid actions, such as inflationary or volatile monetary policy, which make investor biases worse.

I Introduction

In 1913, John D. Watson introduced behaviorism, a radical new approach to psychology. He held that the only interesting scientific issues in psychology involved the study of direct observables such as stimuli and responses. He further argued that the environment rather than internal proclivities determine behavior. Behaviorism was later developed by B.F. Skinner (a landmark being “The Behavior of Organisms,” in 1938) in what aimed to be a more rigorous approach to psychology. Skinner and his followers had a highly focused research agenda which excluded notions such as “thought,” “feeling,” “temperament,” and “motivation.” Skinner virtually denied the existence of internal cognitive processes. Based primarily on experiments on rats and pigeons, he argued that all human behavior could be explained in terms of conditioning by means of reinforcement or association (operant instrumental conditioning or classical conditioning).

In retrospect it is astonishing, but for decades (in the 1940’s through the early 60’s) behaviorism was pervasive and dominant in academic psychology in the U.S.. Contrary evidence was downplayed or reinterpreted within the paradigm. Eventually, however, a combination of evidence and common sense led to the “cognitive revolution” in experimental psychology, which reinstated the mind and internal states as objects of scientific inquiry.

This episode exemplifies a common pattern of innovation, overreaching, and long-horizon correction in the soft sciences. Freudian psychology and Keynesian macroeconomics provide other examples. A genuine innovation is interpreted either too dogmatically or too elastically (or both!) by enthusiasts, is extended beyond its realm of validity, yet continues to dominate discourse for decades. Indeed, such patterns seem common in intellectual movements of many sorts.¹

In financial economics, the most salient example is the efficient markets hypothesis. The efficient markets hypothesis reflects the important insight that securities prices are influenced by a powerful corrective force. If prices reflect public information poorly, then

¹According to Kuhn (1970), normal science preserves the existing paradigm until a combination of anomalous evidence and the availability of a competing paradigm combine to create a crisis. The arts are also subject to intellectual fashion. The rise and fall of atonal classical music (for much of the 20th century dominant among U.S. music academics, though not popular with the public) provides another example. This brings to mind Mark Twain’s comment from an earlier period: “Wagner’s music is better than it sounds.”

there is an opportunity for smart investors to trade profitably to exploit the mispricing. But, as vividly described by Lee (2001), just because water likes to find its own level does not mean that the ocean is flat. And just because there are predators in the African veldt does not mean there are no prey.

While pressures toward market efficiency are important, this notion was carried to to extremes by enthusiasts. Michael Jensen (1978) asserted that “there is no other proposition in economics which has more empirical evidence supporting it than the efficient markets hypothesis.” (More than the law of demand?) Another distinguished financial theorist, Mark Rubinstein (2000) places the theory on a methodological pedestal with what he calls “*The Prime Directive*”: “*Explain asset prices by rational models. Only if all attempts fail, resort to irrational investor behavior.*” In this view, the theory is so compelling *ex ante* that it merits a privileged place in our inferences, from which it can scorn the mere preponderance of the evidence. In analogy with English jurisprudence, this could be called the presumption of innocence approach.

The classical economists had a broader view of the rationality of market prices; for example, Adam Smith’s analysis of “overweening conceit” and compensating wage differentials in different professions analyzes how psychology causes mispricing and inefficient resource allocation. In recent years, some researchers have returned to a broader conception of financial economics, and have challenged the presumption of innocence for market efficiency. Along with theoretical arguments that the forces toward efficiency are not omnipotent (see, e.g., DeLong, Shleifer, Summers, and Waldmann (1990a), Shleifer and Vishny (1997), and Daniel, Hirshleifer, and Subrahmanyam (2001)), there has been an accumulation of empirical evidence which has raised doubts about how efficient markets are. Even some of the fans of efficient markets agree that investors frequently make large errors. We review evidence on this issue, and evidence on prices which, we argue, provided fairly definitive proof that markets are, to an important degree, inefficient.

When intellectual movements overreach, there are often practical repercussions. When the error is in economic theory, the scale of the waste can be monumental.² The efficient markets hypothesis is largely an exception. Its emphasis upon the wisdom of market prices encourages a becoming humility on the part of academics in proposing government initiatives. Nevertheless, we think at this point it is appropriate for economists to consider the implications for public policy of imperfect rationality in securities and

²It is fitting that it was the founder of Keynesian macroeconomics who remarked, “Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back.”

asset markets .

Much of the scientific debate over market efficiency has a policy undercurrent. The efficient markets hypothesis is associated with the free market school of thought traditionally championed at the University of Chicago and the University of Rochester. Imperfect rationality approaches are in part associated with East Coast schools that have tended to be much more enthusiastic about activist government.

So, based on intellectual lineages it appears that the scientific hypothesis that markets are highly efficient is linked to the normative position that markets should be allowed to operate freely. We argue that this link is logically weak. The weakness that we wish to emphasize here is that even if investors are imperfectly rational and assets are systematically mispriced, policymakers should still be highly deferential to market prices.³ We do not believe government has any special capabilities in deciding when the stock market is in a bubble to be pricked, or when it is time to administer economic ProzacTM to counteract market pessimism. Courts or government officials are no better than investors at forming informed and unbiased expectations. So the primary effect of government efforts to correct market beliefs is likely to be wasted resources and greater *ex ante* uncertainty. In sum, advocates of laissez faire who rest their case on market efficiency are, we contend, in large part vacating the high ground of the debate unnecessarily.

This is not to say that that market inefficiency is devoid of implications for policy. Mispricing can cause some classes of foolish investors to do worse than a ‘dartboard’ portfolio, wasting money on stale fads or on securities marketed to the ignorant. This suggests a possible role for regulation to protect ignorant investors, and to improve risk sharing. We do suggest that some regulations and policies may have some very favorable effects, ideally at low cost and infringing little on the freedom of individuals to choose. These involve investor education, disclosure rules, and reporting rules designed to make financial reports consistent and easy to process. More controversial may be restrictions on financial advertising and rules that limit investors’ freedom of action. The potential benefits of government policy at its best is that it can help investors make better decisions, and can improve the efficiency of market prices. But much regulation already exists for these purposes. Academic study based on psychological biases may support new regulation, but may also determine that some existing regulations and

³Two other weaknesses are: (1) If liberty is a basic value, then it includes the right to make mistakes; and (2) The political process is subject to manipulation by interest groups, so a global default of laissez-faire is better than a hair-trigger readiness to bring the coercive power of government into play.

activities are counterproductive. Just as much as if markets were perfectly efficient, government can do great good simply by doing no harm.

The remainder of the paper is structured as follows. Section II describes basic psychological findings. Section III describes evidence on the behavior of investors and analysts. Section IV examines whether investor biases affect asset prices. Section V examines evidence regarding whether firms exploit investor biases. Section VI considers basic issues about how public policy should take into account the psychology of investors. Section VII discusses implications for reporting standards, disclosure regulation, and financial advertising. Section VIII considers policies that limit firm and investor freedom of action. Section IX considers other government actions that influence investor misperceptions. Section X concludes.

II Some Notes on Psychological Biases

We do not try to summarize the vast literature on the psychology of judgment and decision here. Some surveys of psychology for economics and finance include Camerer (1995, 1998), DeBondt and Thaler (1995), Rabin (1998), Shiller (1999), and Hirshleifer (2001). Some of these papers offer responses to criticisms that economists often have to psychological experiments. Here we describe in somewhat idiosyncratic fashion a few key psychological forces that are relevant for the discussion in later sections.

A very basic point, emphasized by Simon (1955), is that human information processing capacity is finite. Time, memory and attention are limited, so there is a need for imperfect decisionmaking procedures, or heuristics, that get the job done cheaply. The necessary abbreviation of decision processes can be called heuristic simplification.

In his recent review, Hirshleifer (2001) argues that that many or most familiar psychological biases can be viewed as outgrowths of just two main sources: heuristic simplification, and self-deception. Heuristic simplification can explain many different biases, such as salience and availability effects, some attribution-related biases, framing effects, money illusion, and mental accounting. Self-deception can explain overconfidence, and dynamic processes that support overconfidence such as biased self-attribution, confirmatory bias, hindsight bias, rationalization, and action-induced attitude changes (of the sort that motivate cognitive dissonance theory); see Cooper and Fazio (1984).

In the availability heuristic, people judge the frequency of an object or event based on their ability to recall instances of it. This has been found to affect perceptions of risk (Slovic, Fischhoff and Lichtenstein 1980).

There is evidence from psychological experiments of cue competition, wherein the presence of cues with low relevance diminishes the impact of more informative cues (see, e.g., Kruschke and Johansen (1999)). Owing to limited attention and processing powers, the framing of judgment and decision problems affects people's responses (Tversky and Kahneman (1981)). People judge risk differently in different decision domains (Fischhoff et al (1998)). Loewenstein, Weber, Hsee, and Welch (2001) describe risk judgments as reflecting a combination of cognitive evaluation of risks (based upon the probability distribution of outcomes) and emotional reaction to risk. Slovic, Fischhoff and Lichtenstein (1980), and Slovic (1987) find that there are multiple dimensions of perceived risk, which they describe as the degree to which outcomes are unknown, and the degree to which they are dreaded.⁴ Dread seems to influence judgments of risk holding constant the probability distribution of possible outcomes (Holtgrave and Weber (1993)). Loss aversion (e.g., Kahneman and Tversky (1979)) is an asymmetry with respect even to small risks. For large risks as well there is an emphasis on possible losses (Slovic et al (1980)).

Narrow framing is the tendency to analyze problems in too isolated a fashion (see Kahneman and Lovallo (1993)). This is unavoidable when time and cognitive resources are limited. In consequence, the form of presentation of logically identical decision problems can have large framing effects on choices (Tversky and Kahneman (1981)). Mental accounting is the procedure of tracking gains and losses resulting from a decision in separate mental accounts, and reexamining these accounts only at particular intervals (see Thaler (1985)).

People have asymmetric attitudes toward consequences that result from actions versus results of refraining from taking action. Ritov (1996) offers this omission/commission bias as an explanation for reluctance to vaccinate.

There is evidence that people are subject to money illusion. This is a special case of the general phenomenon that people are influenced by irrelevant features of the description of a decision problem. Shafir, Diamond, and Tversky (1997) offer as an explanation the fact that nominal monetary value is salient and easy to process, that focus on nominal values often works well, and because people are used to quantitative measurements having a fixed meaning.

People tend to be unduly influenced by an initial figure mentioned in the statement of

⁴The unknown basically reflects hazards that are unobservable, unknown, new, or delayed in their manifestation of harm— perhaps corresponds roughly to what decision theorists call ambiguity aversion). The dreaded reflects lack of control, dread, catastrophic potential, fatal consequences, and the inequitable distribution of risks and benefits.

a problem, adjusting insufficiently for corrective information. This is known as anchoring and adjustment (Tversky and Kahneman (1974)).

Overconfidence is a tendency for individuals to think that their skill or knowledge is better than it really is. According to Griffin and Tversky (1992), “The significance of overconfidence to the conduct of human affairs can hardly be overstated. Although overconfidence is not universal, it is prevalent, often massive, and difficult to eliminate...”. Psychological biases such as overconfidence tend to be strongest in open-ended decision problems with ambiguous or slow feedback (e.g., Einhorn (1980)).

III The Behavior of Investors and Security Analysts

We review here the evidence for systematic cognitive errors made by investors and by analysts. Then, in Section IV, we examine the extent to which these biases affect prices.

III.1 Investors

Investors often do not participate in asset and security categories.

In the absence of transaction costs, mean/variance optimization implies participating in all asset and security markets. For many years prior to the rise of mutual funds and defined contribution retirement plans, participation in the U.S. stock market was very incomplete (e.g., Blume and Friend (1975)). Even now, many investors entirely neglect major asset classes (such as commodities, stocks, bonds, real estate), and omit many individual securities within each class. Investors are strongly biased toward investing in stocks based in their own home country.⁵ There is more localized bias within Finland (Grinblatt and Keloharju (2001a)) and within the U.S. (Coval and Moskowitz (1999), Huberman (1999)). Mutual funds tend to invest locally, and earn higher returns on their local investments (Coval and Moskowitz (2001)), which is consistent with either rational processing of private information or with limited ability to process public information. Investors with more social ties are more likely to participate (Hong, Kubik, and Stein (2001)).

Employees tend to invest in their own firm’s stocks and perceive this stock as low risk (Huberman (1999)). The degree to which they invest in their employer’s stock does not predict the stock’s future returns (Benartzi (1997)), suggesting that the investment is not based on superior inside knowledge of their own firm.

⁵Cooper and Kaplanis (1994), Kang and Stulz (1997), Lewis (1999), Tesar and Werner (1995).

Non-participation may derive from salience bias, or from ‘mere exposure’ (familiarity) effects, e.g., a perception that what is familiar is more attractive and less risky. The puzzle of international non-diversification is more severe when it is recognized that individuals’ human capital is correlated with the home country stock market, so that diversification implies shorting the domestic market and going long in world market (Baxter and Jermann (1997)).

Investors do not always form efficient portfolios

More generally, there is evidence that investors sometimes fail to form efficient portfolios. Several experimental studies examined portfolio allocation when there are two risky assets and a riskfree asset and returns are distributed normally. People often invest in inefficient portfolios that violate two-fund separation, though trained MBA students do better.⁶

Investors are sometimes more eager to realize gains than losses.

Several studies of behavior in field and experimental markets find that investors are more prone to realizing gains than losses—the disposition effect.⁷ However, traders in small-cap stocks seem to exhibit a reverse-disposition effect (Rangelova (2000)). Home sellers also appear to be loss-averse in the way that they set prices. Their reluctance to sell at a loss relative to past purchase price helps explain the strong positive correlation of volume with price movements (Genesove and Mayer (2001)).

Certain classes of investors engage in momentum (or positive feedback) trading and others in contrarian trading.

Evidence of such behavior is provided by (Grinblatt and Keloharju (2000) and Choe, Kho, and Stulz (1999)). In principle, rational utility maximization is consistent with such dynamic strategies, but there remains a suspicion that these patterns result from differences in sophistication of different investor classes.

The trades of some investors are influenced by whether stocks are trading at an historical

⁶Bossaerts, Plott, and Zame (2000), Kroll, Levy and Rapoport (1988b, 1988a), Kroll and Levy (1992)).

⁷Shefrin and Statman (1985), Ferris, Haugen, and Makhija (1988), Odean (1998a), Weber and Camerer (2000), Lipe (2000) and Grinblatt and Keloharju (2001b).

high or low (Grinblatt and Keloharju (2001b)).

Investors seem to trade too aggressively.

It has been argued that the volume of trade in speculative markets is too large, and overconfidence of traders has been advanced as an explanation (e.g., DeBondt and Thaler (1995)). Whether volume is too large is hard to establish without a benchmark rational level of volume. Rational dynamic hedging strategies, in principle, can generate enormous volume with moderate amounts of news.

Stronger support for overconfidence is provided by evidence suggesting that more active investors incur higher transactions costs without higher returns (Odean (1999), Barber and Odean (2000b)). Consistent with psychological evidence of greater overconfidence in males, the tendency to trade excessively is found to be stronger in males than females (Barber and Odean (2000a)). Also consistent with overconfidence, traders in experimental markets do not place enough weight on the information and actions of others (Bloomfield, Libby, and Nelson (1999)). Access to internet trading appears to encourage more active trading (Barber and Odean (1999), Choi, Laibson, and Metrick (2000)). In experimental markets, investors also tend to overreact more to unreliable than to reliable information Bloomfield, Libby, and Nelson (2000).

Investors seem to overextrapolate.

Benartzi (1997) finds that employees allocate 401(k) retirement savings to investment in their own firm's stock based on how well that stock has done over the last 10 years. Later, we review evidence as to whether investors overextrapolate sales and earnings growth.

Investors make blatant errors.

Longstaff, Santa-Clara, and Schwartz (1999) report large errors are made by investors in exercise policy of options. Investors sometimes fail to exercise in-the-money options at expiration, which should affect the pricing of options by rational individuals. Rietz (1998) reports that prevalent and persistent arbitrage opportunities are virtually never exploited by subjects in the Iowa political stock markets.

Investors are subject to the status quo bias in their retirement investment decisions; Madrian and Shea (2000) found that people tend to stick to the default offered by their firm in deciding on 401(K) participation and saving. Many investors diversify in their retirement plans naively, for example by dividing their contributions evenly among the

options offered (Benartzi and Thaler (2001)). Thus, if more stock funds options are available, people overweight equity in their portfolio. Furthermore, people seem to treat investment in their own company in a separate mental account, so that for pension plans that allow this option, people invest substantially in their own firm while still maintaining a proportion between other stocks and bonds similar to the choices of investors in plans that do not allow this option. The stock market boom of the 1990's has been attributed to increased public interest in the stock market coming from the increased offerings of stock choices relative to, say, real estate choices, in 401(k) plans (Shiller (2000a)).

Certain classes of investors and their agents change their behaviors in parallel.

This phenomenon, called herding, is consistent with rational responses to new information, agency problems or conformity bias. Herding behavior has been documented in the trading decisions of institutional investors,⁸ in recommendation decisions of stock analysts (Welch (2000)), and in investment newsletters (Graham (1999); but see also Jaffe and Mahoney (1999)). The tendency of analysts to follow the prevailing consensus is not stronger when that consensus proves to be correct than when it is wrong.

III.2 Security Analysts

Analyst forecasts and recommendations have investment value (see Subsection IV.1). Nevertheless, there is strong evidence that analysts are biased in their forecasts and recommendations. It is likely that agency problems, analyst misperceptions and investor gullibility play a role in generating biases. Stock recommendations are predominantly buys, not sells, even when the firm appears to be doing badly (e.g. Michaely and Womack (1999)). Forecasts are generally optimistic especially at 12-month and longer time horizons, both in the U.S. and other countries (see e.g. Capstaff, Paudyal, and Rees (1998) and (Brown 2000)). More recent evidence indicates that analysts' forecasts have become pessimistic at horizons of 3 months or less before the earnings announcement (Brown (2000), Matsumoto (2001) and Richardson, Teoh, and Wysocki (2000)).

In lone dissent, Keane and Runkle (1998) conclude that there is no bias in analysts' forecasts. However, their GMM approach to control for correlations in forecasts requires a long enough time series to estimate the correlations. This reduces the test power owing to decrease in sample size, and excludes firms for which bias is likely to be most impor-

⁸Foreign investors in Korea (Choe, Kho, and Stulz (1999)); Mutual funds (Grinblatt, Titman, and Wermers (1995), Wermers (1999)); Individuals and institutions (Grinblatt and Keloharju (2000)); Pension funds (Lakonishok, Shleifer, and Vishny (1992), Nofsinger and Sias (1999)).

tant; those with low analyst following, high leverage and greater uncertainty. Although it seems unlikely that bias would vanish in a broader sample, the paper remains a useful critique of previous tests, and suggests that further study will be useful.⁹

Biases may result from agency problems, such as incentives of analysts to ingratiate themselves with management to maintain access to information (e.g. Lim (2000)), to benefit the corporate finance side of the investment bank (Michaely and Womack (1999)), to enhance stocks held in-house by the brokerage firms (Irvine, Nathan, and Basu (1998)), and to stimulate investors to trade (Kim (1998)). While there is some evidence to support the agency explanation,¹⁰ there is also evidence to support a psychological explanation for the forecast bias.

Forecast optimism is also observed for indices, where presumably agency incentives are weaker (Darrough and Russell (2000)). Das, Levine, and Sivaramakrishnan (1998) and Lim (2000) find that forecast bias is higher for firms with greater uncertainty and information asymmetry, and interpret the evidence as supportive of greater analysts' incentives to obtain access to managers for information. However, greater uncertainty and information asymmetry also increases the scope for psychological biases to exert themselves. Eames, Glover, and Kennedy (2000) suggest that forecast optimism is the result of unconscious justification of favorable stock recommendations. Experimental studies suggest that analysts' forecast bias result from unintentional cognitive bias; (Affleck-Graves, Davis, and Mendenhall (1990), Libby and Tan (1999) show that analysts are affected by simultaneous versus sequential processing of the same information signals, and Tan, Libby, and Hunton (2000) show that analysts forecasts are higher for firm's that lowball pre-announcements of earnings.

The presence of systematic bias suggests inefficient forecasts and predictable forecast errors. Abarbanell and Bushee (1997) find that past accounting fundamental ratios predict forecast errors. Teoh and Wong (2001) find that past accounting accruals, the adjustments firms make to cash flows to obtain reported earnings, predict forecast errors for new issue firms and more generally in firms where earnings are upward-biased by

⁹They also raise a data issue, that what is being forecasted is different from the earnings that they are being compared to. I/B/E/S indicates that analysts forecast earnings excluding special items, and so they adjust the actual earnings reported by firms for these items to provide a better indication of analyst error. Bias remains when forecasts are compared with I/B/E/S earnings (e.g. see Richardson, Teoh, and Wysocki (2000)).

¹⁰For example, analysts who do corporate finance work issue recommendations for their clients that are especially optimistic (e.g. Lin and McNichols (1998)). The evidence for forecasts, however, is mixed; some studies find an affiliation effect (A. Dugar (1995), Michaely and Womack (1999)), whereas others do not (Lin and McNichols (1998), Teoh and Wong (2001)).

accruals. Analysts' overoptimism of new issue firms, therefore, contributes to the new issue anomaly.

It is not clear in general whether analysts underreact or overreact to information. Debondt and Thaler (1985, 1987, 1990), LaPorta (1996), and DeChow and Sloan (1997) conclude that analysts overreact to information in long-term forecasts, and Elton, Gruber, and Gultekin (1984) report that analysts are overoptimistic about firms that are doing well. On the other hand, Abarbanell and Bernard (1992), Shane and Brous (2001), and Liu (1999) report that analysts underreact to information. Easterwood and Nutt (1999) find that analysts appear to underreact to unfavorable information but overreact to favorable information. The underreaction to relatively shorter-term forecasts (within a year) is consistent with the post-earnings announcement drift in stock returns and short-term momentum in returns, whereas the overreaction to longer-term forecasts is consistent with long-term reversals in returns. See Subsection IV.1 for further discussion on pricing effects of analyst bias.

IV Do Investor Biases Affect Asset Prices?

We review the evidence of whether errors made by individuals, institutional investors, and analysts affect security prices. We first examine predictability of security returns at the equilibrium level. Next, we discuss the calibration of equity expected returns and interest rates with consumption levels and variability—the equity premium and associated puzzles. Finally, we discuss the efficiency of information aggregation by markets when investors make cognitive errors.

In interpreting the evidence on predictability of returns, some healthy skepticism of the conclusions is recommended because potential sample selection bias may affect the results. Sufficient data dredging can lead to apparent profit opportunities which are, in fact, not robust. This justifies only a degree of skepticism about evidence of return predictability. Both psychological and purely rational theories of asset pricing generally imply that returns are predictable. A consistent pattern confirmed out of sample across different times and in different circumstances lends confidence that there is a robust underlying cause. However, mutable patterns can be authentic as well; no law says that mispricing patterns must be eternal.¹¹

¹¹For brevity, we almost entirely omit evidence on seasonalities in returns; see e.g., the reviews of Hawawini, Keim, and Ziemba (2000) and Hawawini and Keim (1995).

IV.1 Predictability of Asset and Security Returns

Investor misperceptions can induce predictability even after accounting for rational measures of risk. Most of the patterns of return predictability summarized here have alternative (though not equally plausible) explanations based on either risk premia or mispricing.

Empirical papers on predictability often interpret risk-based explanations more narrowly than psychological ones, possibly because the psychological modelling is less fully developed. For example, evidence that a factor model or aggregate conditioning variables capture predictability is sometimes taken as opposing psychological explanations. But the psychological approach is consistent with the existence of factor risk premia – just because investors have psychological biases does not mean that they are neutral toward risk. Also, mispricing effects can seem to be factor premia, but the two possibilities can be distinguished if the apparent premium is not commensurate with the risk. This requires calibration within an asset pricing model (Fama (1970)).

Additionally, the psychological approach predicts mispricing of factors as well as idiosyncratic payoff components. The same conditioning variables which are often interpreted as identifying risk factors (such as book/market, size, market dividend yield, the term premium, and the default premium) have natural interpretations as proxies for factor misvaluation. Thus, studies that apply such aggregate variables can be viewed as using measures of factor mispricing to predict the cross-section of future stock returns.

In the subsections that follow, we begin with direct risk proxies such as CAPM beta, and move on to variables that have alternative interpretations. The last subsection considers mood proxies that are hard to interpret as proxies for risk.

IV.1.1 CAPM Beta

To the extent that the risk measures suggested by purely rational models fail to predict returns as they should, some misspecification is suggested. However, even imperfectly rational settings can imply that investors dislike risk and diversify, so a failure of covariance risk to be priced would be a surprise for either approach. We discuss the pricing of CAPM beta and the risk factors of Fama and French (1993), and do not attempt to review the vast literature on multifactor pricing (see Campbell (2000)).

In some studies CAPM beta is positively related to expected future returns, and in some

it is not.

Most studies that examine the issue report a positive univariate relation of beta with expected returns. There are, however, exceptions, and a wide variety of different applications and methods (for example, domestic versus international, different countries, time periods, return measurement intervals, as well as adjustment for survivorship biases and other aspects of the empirical method; see, e.g., Hirshleifer (2001) for references to this literature. Some studies find an incremental ability of beta to predict future returns after controlling for market value and/or fundamental/price ratios such as book/market, but some do not, depending on time, place, method, whether human capital is included in the market, and whether unconditional or conditional betas are used.

IV.1.2 Other Risk Measures

A number of multifactor models have been proposed to explain the size, book to market, and momentum effects. Perhaps the best known of these is the Fama and French (1993) three-factor model. Fama and French (1996) show that the three factor model does a relatively good job of explaining the returns of many anomalies, but cannot explain the returns to momentum sorted portfolios. Carhart (1997) adds a fourth factor based upon momentum and finds that this model does a fairly good job of explaining momentum-sorted portfolio returns as well.

However, the fact that these returns can be explained by characteristic-based factors does not imply consistency with a rational model. As Daniel and Titman (1997) point out in the context of book/market, such factors can pick up mispricing as well as risk. Indeed, Daniel and Titman show that the Fama and French (1993) tests cannot discriminate between an ad-hoc characteristics based model and a model in which the constructed factors are true risk factors.

For the factors in these models to represent risk factors, it would have to be the case that the factor realizations have a strong covariance with investors' marginal utility across states. For example, the empirical evidence shows that growth (low book to market) stocks have had consistently low returns given their CAPM beta. For these low returns to be consistent with a rational asset pricing model, the distribution of returns provided by a portfolio of growth stocks must be viewed by investors as 'insurance'; it must provide high returns in bad (high marginal utility) states and low returns in good (low marginal utility) states.

Lakonishok, Shleifer, and Vishny (1994) present evidence that, if anything, the re-

turns of growth stocks are lower than those of value stocks in recessions. Liew and Vassalou (2000) find that the realized return on a portfolio based on book/market (and based upon size) helps predict GDP growth (beyond domestic market return) in most of a set of 10 countries (though the evidence is weak for the U.S. and Japan). They also show that for the U.S. this effect is not consistent across specification. Over a longer 41 year U.S. sample these variables have no significant ability to predict GDP growth.¹² They find little evidence to support the idea that momentum is a risk factor.

More specifically, the high Sharpe ratios apparently achievable by strategies based on size, book to market, and momentum seem inconsistent with a frictionless purely rational explanation with reasonable risk aversion. MacKinlay (1995) and Brennan, Chordia, and Subrahmanyam (1998) show that strategies based on these characteristics have extremely large Sharpe ratios. Also, the returns on these portfolios do not appear to have high correlations with macroeconomic variables that might proxy for marginal utility. Chen (2000) finds that book/market and momentum-based portfolios do not contain enough information about future market returns to be strongly priced as state variables in his specification of the Merton ICAPM, and therefore concludes that the ICAPM cannot explain the high mean returns on these portfolios (though it potentially can for a size portfolio). Hawawini and Keim (1995) find that the returns from size and value strategies have very low correlations across international stock markets. Thus, the Sharpe-ratio achievable with a globally diversified portfolio is considerably higher than for a domestic strategy. Taken together, this evidence seems to imply that any rational model which would explain this evidence would have to have unusual preferences to accommodate very large variability in marginal utility across states.

IV.1.3 Price and Comparison Measures

A strategy for identifying asset mispricing is to look for a mismatch between its market price and a related value measure. The better our benchmark measure of the security's true value, the stronger the indication of a mispricing. Such mismatches are often large. In many cases the size of the mismatch strongly predicts future returns, which suggests either that the mismatch has identified mispricing, or that it proxies for risk.

Firms are sometimes valued by the market as worth less than one division

The fact that apparent mispricing is in many studies stronger among small or thinly

¹²Several studies have found the book/market effect in Japan is extremely strong. Liew and Vassalou find that book/market does not predict GDP growth in Japan.

traded firms makes some researchers very skeptical of such findings (Fama (1998)). Apparent mispricing is also stronger among firms that do not have close substitutes (Wurgler and Zhuravskaya (2000)). However, it is to be expected that mispricing will often be stronger where it is harder to verify. If a mispricing is very easy to identify, investors will either price the stock correctly in the first place, or else smart and foolish investors will trade heavily against each other causing large flows of wealth away from the investors who were inducing the mispricing. Thus, a loose analog to Heisenberg's uncertainty principle applies to identifying and testing for mispricing. However, evidence of mispricing is not limited to very fuzzy cases. As just one interesting example, in the Palm/3-Com case discussed below, imperfect rationality on the part of many investors led to mispricing among close substitutes. Constraints on short-selling are what allowed such a blatant mispricing to persist, but it is suggestive that less blatant mispricing may be common.

Cornell and Liu (2000), Lamont and Thaler (2001), Mitchell, Pulvino, and Stafford (2001) and Schill and Zhou (1999) describe several cases of parent firms valued by the market as being worth much less than one of its parts. Corporate transactions such as equity carveouts seem well-suited as a means to exploit mispricing of divisions. In the case of Palm and 3-Com, the market value of the carved-out division (Palm) was greater than the entire firm (3-Com); the market's implicit valuation of 3-Com (without Palm) was -\$23 billion. This implies a dramatic overvaluation of Palm in blatant form, violation of the law of one price. Investors in Palm stock in effect paid more for a claim on Palm than they would have paid for the same claim via a purchase of 3-Com shares. Why did investors buy Palm shares instead of 3-Com? Perhaps, at that time, some of the 5 million enthusiastic users of Palm devices and software chose to purchase Palm and did not notice the better deal available through the purchase of 3-Com. Lamont and Thaler (2001) and particularly Mitchell, Pulvino, and Stafford (2001) discuss in some detail why market frictions, *etc.* prevented arbitragers from eliminating the mispricing

by shorting Palm and buying 3-Com.

Closed-end fund discounts and premia predict future returns on small firms.

Swaminathan (1996) and Neal and Wheatley (1998) provide evidence of this.¹³

Virtually perfect substitutes trade at different prices.

Rosenthal and Young (1990) and Froot and Dabora (1999) document that shares of Royal Dutch and of Shell are claims to proportional cash flows, but trade primarily in different countries and fluctuate widely in relative price. Each security acts as a value benchmark for the other.

Long-term bond returns are positively predicted by the difference between long-term interest rates and the short-term rate, or based on the difference between the forward rate and the short term spot rate.

This pattern has been confirmed in several studies.¹⁴ In a rational world, long-term interest rates should reflect expectations of future short term rates with adjustment for risk premia. But if long-term bonds can be mispriced, the discrepancy between the price of a long-term bond (or a forward rate) and a safer short-term bond (which has less room for mispricing) is a possible measure of mispricing.

Increases in a country's bond yield relative to the yield of another country's bond yield forecasts future appreciation of that country's currency.

This is the forward discount puzzle. This conflicts with the presumption that interest rate differentials reflect differences in expected inflation, and has proven hard to explain in terms of risk premia (see the surveys of Lewis (1995)) and Engel (1996).

If instead the interest rate differential is viewed as a proxy for the relative mispricing of the two bonds, then a relative rise in one country's bond yield indicates excessively high expectations of inflation. In this account, when the error is corrected, the currency rises.

Cross-sectionally, small market value and high fundamental/price ratios predict high

¹³Bodurtha, Kim, and Lee (1995) provide evidence consistent with irrational trading by U.S. investors inducing mispricing and latter correction in U.S. small stocks, including country fund stocks. They find that U.S.-traded closed-end country fund premia and discounts are often large. Their comovement derives primarily from their common sensitivity to the U.S. market. Country fund stock returns and returns on U.S. size-ranked portfolios are predictable based upon country fund discounts and premia.

¹⁴Mankiw and Summers (1984), Mankiw (1986), Shiller, Campbell, and Schoenholtz (1983), Fama and Bliss (1987), Campbell and Shiller (1991), and Bekaert, Hodrick, and Marshall (1997).

stock returns in many countries, even after controlling for beta.

Size and fundamental/price ratio (book/market, earnings/price, cash-flow/price, and debt/equity) anomalies have been documented in numerous papers, beginning with Banz (1981), Basu (1983), and Rosenberg, Reid, and Lanstein (1985). Fama and French (1996) report that the book-to-market effect subsumes the earnings/price effect. However, Raedy (2000) report that cash-flow/price anomaly is not subsumed by the book/market and size effects when a comprehensive set of predictive variables are evaluated simultaneously. Price-containing measures also reflect a risk discount. Both misvaluation and risk premia imply that stocks with low prices should earn high future returns. If risk is rationally priced the price-containing variable will help predict returns unless risk is controlled for perfectly (see, e.g., Ball (1978), Keim (1988), and Berk (1995)). Size has no predictive power when it is measured by book value or other non-market measures (see Berk (2000)).

For the stock market as a whole, high fundamental/price ratios (dividend yield or book/market) seem to predict high long-horizon stock returns.

For the stock market as a whole, the ability of high fundamental/price ratios (dividend yield or book/market) to predict future index returns in the U.S. and internationally is mixed. Since fundamental/price are persistent, the effective amount of modern data to test these relationships is limited, and full agreement as to statistical issues has not been reached.¹⁵

Lewellen and Shanken (2000) provide a model in which rational learning brings about a non-exploitable association between high market dividend yield and high subsequent market returns. This is not a predictive relation, because it is only in the light of ex post data that individuals can determine whether an early dividend yield was high or low.¹⁶ It is not obvious how strong such learning effects should be in the long run.

There is also evidence that stock market returns are predictable based on term

¹⁵Some recent studies include Bossaerts and Hillion (1999), Kothari and Shanken (1997), Goetzmann, Ibbotson, and Peng (2001), and Goyal and Welch (1999).

¹⁶This, along with the general analysis of rational learning of Bossaerts (1996), emphasizes the importance of using rolling estimation methods. Lewellen and Shanken also show that learning can induce a cross-sectional association between value measures and subsequent returns, and that if priors about dividend growth are diffuse, the direction of prediction is consistent with the evidence. Intuitively, with diffuse priors, when people observe high dividends on a stock, they attribute this to very high growth rate on the stock, so yield falls. Eventually the high price must be corrected downward, so low yield is associated with low subsequent return. Presumably priors that are too precise instead of diffuse would lead to the opposite implication.

spreads and default spreads (Keim and Stambaugh (1986), Campbell (1987), Fama and French (1989)), which also can be interpreted as mispricing proxies based on the deviation between a market price and another value benchmark, and based upon interest rate shifts (Campbell (1987), Hodrick (1992)). There are other documented market predictors as well (see, e.g., Lettau and Ludvigson (2000)).

There is a risk factor associated with book/market, but there is no clear evidence as to whether this factor earns a risk premium.

Fama and French (1993) find that size and value portfolios are imperfectly correlated with the market, and therefore reflect a common factor or factors distinct from the market factor (see also Fama and French (1995)). In a fully rational model (such as the static CAPM), this need not imply that the book/market factor receives a risk premium distinct from the market premium. However, such a factor or factors may represent hedges against shifts in the investment opportunity set, or hedges of non-tradable assets that are omitted from our market portfolio proxy. The loadings on three factor portfolios based on size, value and the market predict the returns on portfolios sorted on size, value measures and long-term past returns, but not short-term momentum (Fama and French (1996)). Fama and French (1993) extend their model to include maturity and default-related factors, and find that their five risk factors help to explain the returns on bonds as well as stock. Fama and French (1998) use a two factor model based on the world market portfolio and book/market to predict portfolio returns on global book/market and other portfolios, and country portfolios. Hodrick, Ng, and Sengmueller (2000) extend the dynamic asset pricing model of Campbell (1996) and find that it does not explain the high returns on high book-to-market portfolios across countries.

A popular interpretation of why rational investors would price the Fama/French size and book/market factors is that they are correlated with non-marketable risks of individuals who will be harmed when firms go into financial distress. Chan and Chen (1991) report evidence that highly leveraged and inefficient firms are responsible for the U.S. small firm effect. Leverage, dividend cuts, and earnings uncertainty help explain size and book/market effects in several countries (Chen and Zhang (1998)). On the other hand, in the U.S., Dichev (1998) reports that measures of bankruptcy risk are not positively associated with subsequent returns. Shumway (1996) finds that small size and low past returns forecast default, but that book/market is only weakly related to default risk. Griffin and Lemon (2001) report that after controlling for distress, the book/market effect remains strong. Piotroski (2000) find that the returns to a

book/market investment strategy can be greatly increased by investing more heavily in financially *strong* high book/market firms.¹⁷ A significant fraction of the stock return gains from this strategy are obtained at the dates of subsequent earnings announcements.

The tendency of firm employees to invest their retirement funds voluntarily in shares of their own firms (Benartzi (1997)) is puzzling from the perspective of standard portfolio theory, and for the distress hypothesis in particular. For example, Benartzi (1997) report high that Coca Cola employees allocate 76% of their *discretionary* 401(k) retirement investment to Coca Cola shares.

Several studies have examined whether characteristics (size, book/market) or factor loadings do a better job predicting returns. Different authors have drawn different conclusions.¹⁸ Hawawini and Keim (2000) find evidence of size and value premia within most of the 16 countries. However, the HML and SMB returns are uncorrelated across most countries.

Investors are surprised by the good subsequent performance of value stocks and the poor performance of growth stocks.

A possible indication that value effects are a result of expectational errors is that, after portfolios are formed, stock prices on average react more positively for value stocks than for growth stocks at the dates of earnings announcements over a 5-year period (La Porta, Lakonishok, Shleifer, and Vishny (1997)).¹⁹

Accounting-based measures provide additional power to predict returns.

Earnings and book value are crude measures of firm value. Even better performance in predicting cross-sectional, aggregate, and international returns are achieved using indicators derived from accounting numbers. Many investors use such strategies, which fall into three main classes: fundamental ratio analysis, accruals analysis, and fundamental value analysis.

The trading strategy based on fundamental ratio analysis uses composite scores computed from accounting financial ratios to form portfolios (Ou and Penman (1989), Holthausen and Larcker (1992), Lev and Thiagarajan (1993), and Abarbanell and Bushee

¹⁷The benefits are greatest in small and medium sized firms with no analyst following, but does not depend on buying firms with low share prices.

¹⁸See Daniel and Titman (1997), Jagannathan, Kubota, and Takehara (1998), Lewellen (1999), Davis, Fama, and French (2000), and Daniel, Titman, and Wei (2001).

¹⁹The negative response to adverse subsequent earnings surprises is especially strong for growth stocks (Skinner and Sloan (2000)). Bernard, Thomas and Whalen (1997) report some contrary evidence, but report mispricing based on earnings momentum.

(1998)). Large abnormal returns in the year subsequent to portfolio formation year can be achieved. For example, Abarbanell and Bushee (1998) find that returns can be predicted using portfolios formed based on growth rates in inventories, accounts receivables, gross margins, selling expenses, capital expenditures, effective tax rates, inventory methods, audit qualifications, and labor force sales productivity. A substantial part of the abnormal returns occur around subsequent earnings announcement dates.

Earnings reported on firms' financial statements differ from cash flows by accounting adjustments known as accruals. These are designed, in principle, to reflect better the economic circumstances of the firm. These accruals are found to have strong predictive power for stock returns; high accruals predict negative long-run future returns (Sloan (1996), Teoh, Welch and Wong (1998b, 1998a), Rangan (1998), Collins and Hribar (2000), Houge and Loughran (2000), and Chan, Jegadeesh, and Lakonishok (2000)). These effects are independent of the book/market and size effects, are strongest for discretionary working capital accruals, and are present during issuance of new equity (both IPOs and SEOs); see e.g. Teoh, Welch and Wong (1998b, 1998a). One interpretation is that investors are fixated on earnings numbers, and so underestimate the transitory nature of accruals and the degree that the accruals have been managed to bias reported earnings upwards. Analysts similarly fail to discount appropriately for the level of accruals (Teoh and Wong (2001)), suggesting that they are either fooled or choose to act as if they are fooled by earnings management.

Another approach relies on deviations of stock prices from an imputed value based on a fundamental value model. Ohlson (1995) provides a residual income model which values stock as the sum of book value and the discounted value of expected future residual earnings, where residual earnings are defined as earnings in excess of the normal return on capital employed in future years. In practice earnings forecasts are used as proxies for expected earnings. Using the Ohlson model, Frankel and Lee (1998) find that the ratio to price of a value index that uses analyst consensus earnings forecasts has incremental power to predict returns beyond book/market. Frankel and Lee (1999) find that such an index applied internationally produces abnormal returns in a cross-country investment strategy. Chang, Chen, and Dong (1999), DeChow, Hutton, and Sloan (1999), Lee, Myers, and Swaminathan (1999), and Piotroski (2000) also describe profitable trading strategies based on comparing stock prices to predicted stock prices based upon the residual income model.

An interesting aspect of this approach is that the fundamental measure is based on analyst forecasts, a measure of expectations. If analysts and investors share similar

misperceptions, this should tend to wash part or all of the mispricing from the residual income measure of misvaluation. In the extreme, the discrepancy between the market price and the fundamental measure would not capture any mispricing. This suggests that the potential predictability of returns is even greater than these studies would indicate.

The mispricing measure, therefore, is capturing either: (1) errors that investors make which analysts do not make, (2) similar errors made by both investors and analysts, but which are more extreme for investors, or (3) that investors extrapolate very long-term earnings in an extreme fashion, more extreme than is assumed in the implementation of residual income valuation models.

IV.1.4 Momentum and Long-Run Reversal

There are positive short-lag autocorrelations and negative long-lag autocorrelations in many asset and security markets.

The value effects described earlier reflect long lag reversal. Cutler, Poterba, and Summers (1991) report significant positive short-lag autocorrelations for gold, bonds, and foreign exchange at lags of several weeks or months, with negative autocorrelations at horizons of a few years. They find positive monthly autocorrelations in the 13 stock markets they examined. Short-run momentum profits across 23 stock market indices is reported by Chan, Hameed, and Tong (2000). Long-run aggregate stock market reversals have been documented in both the U.S. and in foreign stock markets.²⁰

Cross-sectionally there is strong short-run momentum and long run reversal. The Sharpe ratios achievable through U.S. momentum strategies appear to be too large to be consistent with a rational frictionless model.

Cross-sectionally, U.S. stocks that have done very well relative to the market in the past tend to do so in the future as well, based on the past 3-12 month holding period (Jegadeesh and Titman (1993)). Momentum is strongest in the performance extremes. The abnormal performance tends to reverse after about 4-5 years (Lee and Swaminathan (2000b), Jegadeesh and Titman (2001)). Momentum effects are present in both European countries (Rouwenhorst (1998)) and emerging markets (Rouwenhorst (1999)). While there is evidence of a strong book/market effect in Japan, there is little or no evidence of a momentum effect (Haugen and Baker (1996), Daniel, Titman, and Wei (2001)). Reversals in the cross-section were documented by DeBondt and Thaler

²⁰See, e.g., Fama and French (1988), Poterba and Summers (1988) and Richards (1997); although methodological issues have been raised, the results seem to be fairly robust.

(1985); although methodological issues have been raised (e.g., Ball and Kothari (1989), Ball, Kothari, and Shanken (1995), Chan (1988)), the effect seems to be real (Chopra, Lakonishok, and Ritter (1992)). Momentum seems to be in the non-market component of returns; certain portfolios of stocks exhibit negative autocorrelations at the relevant lags (Lewellen (2000)).

The momentum effect is strongest in small firms.

Momentum is stronger in small than in large firms (Jegadeesh and Titman (1993), Grinblatt and Moskowitz (1999)), in growth than in value firms (Daniel and Titman (1999)), and in firms with low rather than high analyst following (Hong, Lim, and Stein (2000)). Both industry and non-industry components of momentum help to predict future returns (Grundy and Martin (2001), Moskowitz and Grinblatt (1999)). Moskowitz and Grinblatt find that the profitability of industry momentum comes mainly from winners, but the profitability of individual stock momentum strategies is stronger for losers. At long horizons momentum reverses. Grundy and Martin (2001) examine industry and other factors and find stronger momentum in the security-specific (non-market) component of stock returns than in the total return. They further find that the profitability of momentum strategies is not a mere consequence of their picking long positions in stocks with high, constant, expected returns. Chordia and Shivakumar (2000) find that momentum strategies become unprofitable during recession periods, and that momentum profits can be captured based on security sensitivities to a few aggregate variables (dividend yield, default spread, a short term interest rate, and a term spread) rather than security-specific past return (see also Ahn, Conrad, and Dittmar (2000)).

Momentum is stronger after negative than after positive returns.

This difference has been reported, for example, in Lee and Swaminathan (2000b) and Chordia et al (2001).

Momentum is associated with subsequent abnormal performance at earnings announcement dates.

It is hard to reconcile the strength of the momentum effect with full rationality, especially since momentum seems to be at least partly caused by biased investor forecasts of earnings. Past winners earn higher returns than do past losers at the dates of quarterly earnings announcements occurring in the 7 months following portfolio formation (Jegadeesh and Titman (1993)); see also Chan, Jegadeesh, and Lakonishok (1996). The

returns on these few dates account for about a quarter of the gains from the momentum strategy over this holding period. Firms with extremely low returns over the preceding 12-18 months tend to be having difficulty. In contrast with the distress factor interpretation of book/market effects, such negative momentum firms earn low instead of high future returns.

Lee and Swaminathan (2000b) find that volume interacts with momentum and reversal in a fashion consistent with a cycle of overreaction and correction. Lewellen (2000) provides evidence of *negative* autocorrelation in industry and size portfolios. This suggests that the stock market was negatively autocorrelated at the relevant lags during the time period he examined. Using the decomposition of Lo and MacKinlay (1990), he ascribes momentum profits to a lead-lag relationship between returns on different securities.

Serial correlations in returns are subject to alternative psychological interpretations. Lo and MacKinlay (1990) offer a decomposition, also applied by Brennan, Jegadeesh, and Swaminathan (1993) and Lewellen (2000), which shows that the expected profit from a contrarian or momentum trading strategy is related to the cross-serial covariances of security returns. This 'lead-lag' term can be interpreted as measuring whether some stocks react to information more quickly than others. On the other hand, a factor such as the market that misreacts to information and then corrects also induces cross-serial correlations even if all stocks react to information equally quickly. If the market overreacts and then corrects, and if all stocks have a beta of 1, then today's return on a stock will be negatively correlated with the past returns on other stocks. Thus, a given cross-serial covariance structure is potentially subject to very different causal interpretations. Jegadeesh and Titman (1995) provide a decomposition that distinguishes factors from residuals, and therefore lends itself to factor-based interpretation.

Several papers report that commercial and residential real estate price movements are predictable based on past price movements in real estate or stock markets (Barkham and Geltner (1995, 1996), Case and Shiller (1990), Gyourko and Keim (1992), Meese and Wallace (1994), Mei and Liu (1994), Ng and Fu (2000)). Credit constraints provide a possible explanation in residential markets (Spiegel and Strange (1992), Lamont and Stein (1999)).

IV.1.5 Private Signals and Public News Events

A typical finding in modern event studies is that significant abnormal returns occur conditional upon corporate events. From a misvaluation perspective, this could have

two very different explanations. The first possibility, event selection (modelled in Daniel, Hirshleifer, and Subrahmanyam (1998)), is that a firm's decision whether and when to engage in the event depends on whether there is market misvaluation. (This is often called 'timing.') The second possibility is manipulation: near the time of the corporate action the firm alters the other information it reports publicly in order to *induce* misvaluation. The common use of the term 'timing' is potentially misleading, because event selection may be a matter of *whether* rather than *when* to take the action. More importantly, the possibility of manipulation is often ignored. There is evidence supportive of both selection and manipulation.

Stock returns after discretionary corporate events exhibit post-event continuation.

The average abnormal stock returns in the 3-5 years following a corporate event have the same sign as the event-date stock price reaction. This post-event return continuation hypothesis is confirmed for many corporate events (see references in Hirshleifer (2001)),²¹ and was proposed by Daniel, Hirshleifer, and Subrahmanyam (1998) as resulting from investor over-confidence.²² A common theme of these events is that they are taken at the discretion of management.

Private placements, on the other hand, are the exception that proves the rule in that they involve a discretionary choice not just by management, but also by the private purchaser. The purchaser has the opposite incentive, to buy when the stock is *undervalued*. There is little literature on post-event performance for events that are not taken at the discretion of management (or other individuals with incentives to react to mispricing). Cornett, Mehran, and Tehranian (1998) find that there is post-event continuation when bank stocks issue equity, *except* when equity issuance is forced by reserve requirements.

Fama (1998) argues that anomalous post-event return patterns are likely to be artifacts of faulty methodology. Several recent studies of the new issues puzzle have used alternative methods that have led to qualified conclusions, or even to rejection of the hypothesis that new issue firms underperform.²³ However, Loughran and Ritter (2000)

²¹These include equity carveouts, spinoffs, tender offers, open market repurchases, stock splits, dividend omissions, dividend initiations, seasoned equity and debt offerings, public announcements of insider trades, venture capital distributions, and accounting write-offs. There is evidence suggesting that abnormal performance differs after private information arrival versus after public information events (Chan (2000))

²²The post-event continuation hypothesis should not be confused with the hypothesis discussed by Fama (1998) that *pre-event* returns be of the same sign as post-event returns, which is not an implication of Daniel, Hirshleifer, and Subrahmanyam (1998) and which, as he points out, is not supported by the data.

²³See Brav, Geczy, and Gompers (2000), Eckbo and Norli (2000), Eckbo, Masulis, and Norli (2000),

argue that the methods used by some recent studies minimize the power to detect possible misvaluation effects.²⁴ For example, abnormal returns calculated relative to a Fama/French factor benchmark capture only the residual misvaluation effect beyond that captured by market value and book/market. The risk factors selected are motivated by their return-predicting power established in previous literature. Most importantly, the factor loadings often have dual risk and mispricing interpretations (Daniel, Hirshleifer, and Subrahmanyam (2000)). Thus, the alternative methods cannot exclude misvaluation effects, but can test only whether there is misvaluation above and beyond the misvaluation already implicit in the factors selected.

Loughran and Ritter (2000) further argue that the alternative methods weight observations by market value, which dilutes the importance of small firms which are arguably more subject to misvaluation. Using a benchmark contaminated with sample firms also biases results toward zero. Jegadeesh (2000) reports economically substantial underperformance relative to several alternative benchmarks, and for both large and small firms, indicating that SEO's may be misvalued above and beyond any misvaluation reflected in their book/market or market value. Furthermore, he documents misspecification in the three- and four-factor models used in recent papers. Finally, with many studies trying a variety of different factors, there is a further concern that unintentional factor-dredging can lead to spurious results. Thus, it is not obvious whether benchmark differences explains the different conclusions of these studies.

The magnitude of the abnormal returns may provide a feel for whether risk factors can explain the return differential. The argument that post-IPO underperformance is eliminated by an appropriate benchmark seems counterintuitive, because it amounts to saying that IPO firms have unusually *low* risk. For SEOs, the unadjusted post-SEO returns found by Eckbo, Masulis, and Norli (2000) are larger than those found by Loughran and Ritter (1995) and Jegadeesh (2000). It would be surprising that factor risk pricing would explain such a high differential in expected returns (8% per year). Eckbo, Masulis, and Norli (2000) point out that equity issuance reduces risk and the benchmark return; their six-factor model eliminates abnormal performance. But risk-reduction does not explain why there is poor stock return performance following seasoned *debt* issues (Spiess and Affleck-Graves (1999)), or after bond rating downgrades (Dichev and Piotroski (2001)). (These findings are also puzzling for the distress-risk-factor theory Gompers and Lerner (2000), and Mitchell and Stafford (2000).

²⁴Other papers that discuss and analyze methodological issues for the measurement of long-horizon abnormal performance in event studies include Barber and Lyon (1997), Fama (1998), S.P. Kothari (1997), and Lyon, Barber, and Tsai (1999).

of return predictability.) It is also interesting that the equity share in total new issues predicts poor future performance of the U.S stock market (Baker and Wurgler (2000)).

The most compelling reason to believe that post-SEO abnormal performance is a real phenomenon is some fairly direct evidence that investor expectations are systematically mistaken. New issue firms perform especially badly at subsequent earnings announcement dates relative to a control group (Jegadeesh (2000), Denis and Sarin (2000)). As this evidence is concentrated at a few dates, it is unlikely to be as benchmark sensitive, and it is also unlikely that these firms are bearing unusually low risk. There is also evidence that analysts' forecasts are systematically wrong for new issue firms (Teoh and Wong (2001)). In a related vein, positive post-split abnormal performance is also unlikely to be a result of return benchmark error, because earnings forecasts near the time of the split are too low (in contrast with the usual optimism of analyst forecasts) and on average correct upward in the months after the split (Ikenberry and Ramnath (2000)).

IV.1.6 Mutual Fund Performance

Some mutual funds have done very well with strategies related to return predictor variables such as momentum (see, e.g., Grinblatt and Titman (1993)). A datum traditionally adduced in support of market efficiency is that the average mutual fund does not make money; actively managed funds underperform, net of fees and trading costs (see Jensen (1969) and a subsequent body of research). Rubinstein (2000) says of this evidence, "the behavioralists have nothing in their arsenal to match it; it is a nuclear bomb against their puny rifles."

In our view, using this fact in support of market efficiency is analogous to arguing that Americans cannot be overweight because if they were, the average restaurant would be doing a roaring business in diet food. Under free choice the funds that attract investors will be those that appeal to investors' emotions and beliefs, however biased. For example, if at some point investors are thrilled about the tech sector, cash will flow to funds heavy in tech portfolios. 'Diet' portfolios that are light on tech will on average earn high subsequent returns, but at the relevant moment will be unpopular with investors— that's the very source of the mispricing.

The fact that vast amounts of invested wealth are placed in funds that appear to be wasting resources on active management does not support the view that investors are good at choosing funds, nor that funds make good choices on behalf of investors.²⁵ There

²⁵Rubinstein (2000) offers overconfidence as an explanation for the empirical findings; overconfidence plays a pivotal role in his brief *in support* of efficient markets! He argues that overconfidence causes

is some dissonance between the views that investors trade foolishly to create potential inefficiencies, and that they are smart enough to invest in mutual funds designed to exploit these inefficiencies.²⁶

IV.1.7 Analyst Forecasts and Recommendations

Given analysts' bias observed in Subsection (III.2), we examine evidence about effects of analysts' errors on security prices.

Analyst forecast revisions and recommendations are associated with subsequent abnormal returns.

After analysts recommend or revises forecast favorably about a stock, there are positive abnormal returns (see e.g. Chan, Jegadeesh, and Lakonishok (1996), Lin (2000a, 2000b), Barber, Lehavy, McNichols, and Trueman (2001), Stickel (1995), Womack (1996), Michaely and Womack (1999), and Krische and Lee (2000)).²⁷ Krische and Lee (2000) report that the predictive power of analysts' stock recommendations is independent of other known predictors of future returns.

Firms in which analyst forecasts of earnings are relatively high do poorly in the long run.

Analysts' annual earnings and growth forecasts are too extreme, so that higher forecasts are associated with lower long-run future returns (LaPorta (1996), Rajan and Servaes (1997), DeChow and Sloan (1997), DeChow, Hutton, and Sloan (2000), and Teoh and Wong (2001)). Forecast errors explain more than half of the returns to contrarian investment strategies and a significant portion of the abnormal returns after new issues.

managers and investors to work too hard to eliminate profit opportunities, making the market in a sense too efficient. This is a plausible argument that overconfidence will cause individuals to generate more information. But it does not address the possibility that overconfident investors and portfolio managers may take actions that *generate* rather than correct mispricing, as implied by several models (e.g., Odean (1998b), and Daniel, Hirshleifer and Subrahmanyam (1998, 2001).

²⁶It is true that investors' observation of historical performance should push them toward better funds. This is just an instance of the general argument that when there is a profit opportunity, smart investors ought to exploit it. The general obstacle is that investors may be biased in their assessments. Such bias, in the context of mutual funds, can be hard to eliminate because of inattention, noise, sample size, post-selection/reporting biases, and fund manager turnover.

²⁷The abnormal returns in Barber, Lehavy, McNichols, and Trueman (2001) are substantially reduced by transactions costs. Their approach is based on changes in consensus recommendations in calendar time, and so requires considerable transactions costs to rebalance portfolios frequently. Higher abnormal returns are possible for those who receive advance notice of recommendation changes and those who already intend to place trades regardless.

The predictability of returns from forecast errors is possible if investors rely too heavily on the forecasts, or investors and analysts are subject to similar cognitive biases, or both rely too heavily on some other information. Partly contrasting evidence is provided by Easterwood and Nutt (1999), who find that analysts underreact to adverse information about earnings, but overreact to positive information.

IV.1.8 Reactions to Shifts in Accounting Value Measures

Cash or earnings surprises are followed by positive abnormal returns in the short run, and by negative abnormal returns in the long run.

Several studies find post-earnings announcement drift, i.e., that at short lags earnings surprises are positively correlated with future returns (e.g., Ball and Brown (1968), Jones and Litzenberger (1970), Olsen and Shevlin (1984), Bernard and Thomas (1989, 1990)), especially for firms with low institutional shareholdings (a possible proxy for investor sophistication; Bartov, Krinsky, and Radhakrishnan (2000)).

A substantial portion of the drift is attributable to subsequent earnings announcement dates (e.g., Bernard and Thomas (1989, 1990)), Freeman and Tse (1989), Rendle- men, Jones and Latane (1987)). These studies provide evidence suggesting that the market perceives quarterly earnings to follow a seasonal random walk, when in fact the true process is more complex (see Brown and Rozeff (1979)).

Ball and Bartov (1996) find that prices partially reflect the time series properties of quarterly earnings, whereas Soffer and Lys (1999), using a different method, conclude that prices do not reflect these properties. In an experimental study, Maines and Hand (1996) find that investors do not fully reflect the time series properties of quarterly earnings. Burghstahler, Jiambalvo and Shevlin (1999) find that prices do not fully reflect the transitory effect of special items on earnings.

There is also evidence suggesting that the market's failures in reflecting the time-series of earnings is paralleled by failures of analysts to do so (see Ali, Klein and Rosenfeld (1991), Abarbanell (1991), Abarbanell and Bernard (1992), Klein (1990), Lys and Sohn (1990), and Shane and Brous (2001)). Analysts' underreaction to quarterly earnings announcements is one explanation suggested for the post-announcement drift (Abarbanell and Bernard (1991, 1992), Mendenhall (1991), Shane and Brous (2001)). It is thus plausible to conclude that investors naively rely on analyst forecasts. However, the possibility must be considered that analysts and investors commonly but independently make similar errors. Indeed, Liu (1999) finds that analysts' underreact more than the

market, taking as much as two quarters to catch-up with the market.

At long lags, there is evidence that trends of earnings and sales growth are negatively correlated with subsequent returns (DeBondt and Thaler (1987), Lakonishok, Shleifer, and Vishny (1994), Lee and Swaminathan (2000a), but see also DeChow and Sloan (1997)). However, Chan, Jegadeesh, and Lakonishok (1996) do not detect a significant negative relation, perhaps owing to a lack of power in detecting long-run return effects. Lee and Swaminathan (2000a) find that stock return momentum and reversal is associated with the short-lag positive and long-lag negative correlation of earning changes with future returns.

In contrast, Daniel and Titman (2000) decompose 5-year past returns into the component explained by growth in fundamentals such as book value, sales, cash-flow and earnings growth (the response to tangible information), and the residual component that is not (the response to intangible information or to noise). While they find that the long-horizon overreaction to the intangible component is strong, they find no evidence of overreaction to tangible (fundamental) information. They interpret this evidence as consistent with overconfidence, based upon psychological studies showing that investors exhibit more overconfidence about vague or intangible information. Daniel and Titman reconcile their findings with those of Lakonishok, Shleifer, and Vishny (1994). LSV examine *total* sales growth, which will be larger when the firm does a new issue. DT, consistent with the earlier findings of (DeChow and Sloan 1997), show that the LSV measures can be broken down into a component which is due to increased fundamental profitability, and a component which is due to share issuance. They find that there is overreaction to the share insurance component, but not to increased fundamental profitability.

Avery and Chevalier (1999) find that prices in football markets are influenced by investors' mistaken belief in 'hot hands'—a kind of extrapolation. They test for 3 sources of mispricing: (1) overweighting meaningless 'expert opinions'; (2) mistaken belief in 'hot hands'; and (3) bias toward prestigious teams (well-known and visible in media). Poteshman (2000) provides evidence that prices are influenced by investors overextrapolating sequences of news related to volatility in options markets.

IV.1.9 Short-Sales

Short-sellers make abnormal profits through value strategies.

Short sellers may be informed traders. They may be rational arbitrageurs betting

on the correction of mispricing. They may also be irrational traders betting against what they wrongly perceive to be mispricing. Some recent papers report that short sellers profit, and that they use value strategies, which suggests bets against mispricing (Asquith and Meulbroek (1996), DeChow, Hutton, Meulbroek, and Sloan (2001)).

IV.1.10 Feelings and Securities Prices

There is evidence that determinants of mood affect stock market prices. Kamstra, Kramer, and Levi (2000a) find that changes to and from daylight savings time, which disrupts sleep, affects stock returns.²⁸ Cloud cover in New York is associated with low daily US stock market returns (Saunders (1993)). A similar pattern applies in a study of 26 national exchanges and stock indexes (Hirshleifer and Shumway (2001)). Furthermore, stock returns can also be predicted using the pre-opening morning weather. The U.S. effect has persisted in the years subsequent to the Saunders study.

IV.2 The Ability of Markets to Disentangle Relevant and Irrelevant Signals

Salient news carries greater weight in market prices.

There is evidence that the publication of irrelevant, redundant or old news affects security prices.²⁹ Curiously, Fama (1991) refers to a “morbid fear of recession,” a stray phrase which appeals to us enough to take it out of context. Salience bias suggests that investors will focus excessively on salient risks. The media likes to report on what is new, and to paint what is new as important. The intense attention the media devotes upon

²⁸Kamstra, Kramer, and Levi (2000b) examine the relation of deterministic seasonal shifts in length of day to seasonality in national stock returns.

²⁹Klibanoff, Lamont, and Wizman (1999) find that reinforcement of changes in net asset value by reporting of the source of the change in a salient outlet, the *New York Times*, causes larger movements in the share prices of closed end country funds. Several cases have been documented of huge stock price fluctuations because of confusion by investors over the ticker symbol (see Cooper, Dimitrov, and Rau (2000), Rashes (2001)). Firms that have changed their names to include ‘dot.com’ have experienced enormous returns, regardless of whether the announcement is associated with reorientation of the business to the web (Cooper, Dimitrov, and Rau (2000)). Avery and Chevalier (1999) find that in football betting markets prices are influenced by team prestige (fame and media visibility), and by meaningless ‘expert opinions.’ Stock prices react to the republication of news that is already publicly available to the market (Ho and Michaely (1988), Huberman and Regev (2001)). Huberman and Regev (2001) report on a stock’s huge price response to a news report that had already appeared widely in the public press five months earlier. Ho and Michaely (1988) provides a larger sample of evidence of stock price responses to information that is already publicly available.

transitory phenomena such as recessions and actions by the Fed can induce investors (and economists) to pay too much attention to them.

Both experimental and capital markets literature in accounting considers the hypothesis that market prices are influenced by the form by which information is presented. A key issue is whether the market makes mechanical use of reported earnings in forming valuations without adjusting appropriately for the accounting method. Such behavior is referred to as 'functional fixation.' In some contexts it appears that the form of presentation is important, especially when institutional shareholdings are low (e.g., Ashton (1976), Hopkins (1996), Andrade (1999), Hand (1990, 1991), Rau and Vermaelen (1998), Maines and McDaniel (2000), and Hopkins, Houston, and Peters (2000)). For example, performance information is valued more when it appears as a line item on the income statement than on other financial statements (e.g. statement of changes in shareholders' equity), classified as an ongoing operating expenses than as a one-time charge, and recognized on the face of the financial statement versus disclosed within a footnote. Furthermore, perceptions also depend on whether securities from new financing are classified as debt, equity, or mezzanine financing on the balance sheet.

There is evidence that investors do make at least some adjustment for accounting method. For example, price/earnings ratios are on average higher for firms that use accelerated depreciation than those that use straight-line depreciation, and there is no indication this is associated with differences in risk. The difference in price/earnings ratios essentially disappears when researchers notionally restate earnings to match the methods (Beaver and Dukes (1973)). The market values R&D expenditures as generating an asset even though they are reported as an expense (see Dukes 1976, Lev and Sougiannis (1996), Aboody and Lev (1998)). Stock prices react more strongly to earnings that are attested to by a major auditor than by a less-well-known auditor (Teoh and Wong (1993)).

However, there is also evidence suggesting that adjustment for reporting differences is imperfect; in the context of adjustment for tax law changes, see Chen and Schoderbek (2000). It is commonly asserted in the business press that the stock market values more highly mergers involving the pooling-of-interests rather than purchase accounting method because this allows reporting of higher earnings.

Ayers, Lefanowicz and Robinson (1999), Lys and Vincent (1995), Nathan (1988) and Robinson and Shane (1990) provide evidence that bidders pay substantially higher purchase premia in order to use the pooling-of-interests method. Jennings, Robinson, Thompson and Duvall (1966) and Vincent (1997) provide evidence consistent with the

stock market valuing pooling-of-interest firms more highly for a given level of earnings (notionally restated to be accounted for identically). Hopkins, Houston, and Peters (2000) find that analysts' stock-price valuations are lower when the purchase method of accounting is used. Andrade (1999) provides evidence of a significant but small relation between announcement date merger returns and the effect of the choice of merger accounting on earnings.

Numerous studies starting from the early 1970's have examined the stock market reactions to changes in accounting methods. Such reactions do not necessarily represent an inefficiency, since the accounting change may potentially be selected as a function of information possessed by managers.

All of the footnote 29 findings are consistent with limited attention and memory capacity. These examples also illustrate that cognitive errors by individuals need not cancel out at the level of market equilibrium, because people are prone to similar errors.

In everyday life this is a commonplace. "First impressions count the most." "Put your best foot forward." "Never judge a book by its cover." Large amounts of resources are dedicated to marketing products. Academics search for catchy titles for papers, and try to highlight what is important or favorable to the case and downplay other information.

The form of investor error in each of these cases is specific, but such examples are extremely revealing. The fact that blatant investor misperceptions demonstrably occur and cause price overreaction suggests that less blatant errors frequently occur, but are simply harder to document beyond a reasonable doubt.

IV.3 Equity Premium, Riskfree Rate and Predictability Puzzles

The expected return on equity is high relative to consumption variability.

There are, however, several alternative explanations for high average equity returns (though some that are based upon non-traditional preferences can potentially be interpreted as reflecting imperfect rationality; see, e.g., Constantinides (1990), Epstein and Zin ((1989, 1991))). The equity premium puzzle (Mehra and Prescott (1985)) is that U.S. equity market returns are so high relative to risk (covariation with consumption growth) as to imply very high levels of risk aversion. These levels of risk aversion imply a very low elasticity of intertemporal substitution in consumption. This in turn implies (unless people have extreme preference for deferring consumption) very high real

interest rates to induce individuals to accept lower consumption now than in the future (consistent with historical growth in consumption). This reasoning yields a combined equity premium/riskfree-rate puzzle (Weil (1989)). However, it is possible that the U.S. was just lucky (Fama and French (2000)), and there may be selection bias in the focus of academic attention based on strong past U.S. performance (Brown, Goetzmann, and Ross (1995)).³⁰

Another important facet of the equity premium puzzle is the “predictability puzzle:” expected returns in business cycle troughs are historically much higher than at the peak of expansions. However, there is almost no corresponding variability in dividend growth rates or interest rates. Also, while market return volatility is perhaps a little higher in recessions, the relative movements in volatility appear to be small relative to movements in the equity premium, resulting in strong variability in the market Sharpe ratio across the business cycle (Campbell and Cochrane (1999) provide an excellent summary of this evidence and for relevant citations).

There are now several proposed explanations for this empirical phenomenon. Campbell and Cochrane (1999) propose a model in which a representative investor has a slow-moving habit level. In recessions, the representative agent’s consumption is close to his habit level, and consequently he behaves in an extremely risk averse manner. At the peak of expansions, and consumption is far from the habit level, the representative agent is considerably less risk averse. Moreover, Campbell and Cochrane show that a particular specification of the habit level can result in a constant risk-free rate.

While these preferences seem to explain the facts, the plausibility of such preferences is still an issue. The coefficient of relative risk aversion of the representative agent varies from 60, at business cycle peaks, to a level in the hundreds at business cycle troughs. An alternative explanation of these data is provided by Barberis, Huang, and Santos (2001). BHS use a prospect theory-based model to explain both the high equity premium and the variability of the premium.

Yet another potential explanation for these data would be that, for whatever reason, investors were overly pessimistic about the return on equity is at business cycle troughs, and overly optimistic at business cycle peaks. This interpretation suggests a disturbing possibility. Cochrane (1991) shows that movements in production across the business cycle are consistent with the variability in returns that we see. A reasonable interpre-

³⁰There are also explanations based on borrowing constraints (see, e.g., Constantinides, Donaldson, and Mehra (2000)) and non-stock-market income shocks (see, e.g., Constantinides and Duffie (1996)) and Heaton and Lucas (1996)).

tation of this is that firms are responding to large movements in the price of equity by varying their investment and production levels. This reasonable degree of rationality by firms is encouraging. The problem is that firms may be responding rationally to irrational shifts in market expected returns. If so, psychological biases may be causing large resource misallocations.

There is also a literature on whether stock returns are excessively volatile relative to dividends variability (see, e.g., Campbell and Shiller (1988)). This is essentially the same issue as the question of whether there is excessive long-run reversal, since any overreaction and reversal is bound to increase volatility. In a consumption/investment model, shifts in expected consumption growth should be partially offset by shifts in discount rates. This equilibrium effect tends to mute stock return volatility. Thus, the high volatility of stock prices presents a puzzle for rational asset pricing. Whether it is concluded from the empirical literature that volatility is excessive depends on what is regarded as a plausible amount of time-variation in risk premia. In an interesting comparison, Pontiff (1997) found that the volatility of closed end fund shares was substantially higher than that of the underlying assets held by the fund. Camerer and Weigelt (1991) find that prices overreact to uninformative trades in experimental asset markets, creating informational mirages.

IV.4 Efficiency of Market Information Aggregation

It is statistically hard to explain much of the variation in stock market or orange juice futures returns in terms of public news events.

Only a small fraction of stock price or orange juice futures price variability has been explained by the arrival of relevant public news (Roll (1984, 1988), Cutler, Poterba, and Summers (1989), Fair (2000)). Roll (1984) found that the volatility of orange juice futures prices was hard to explain by news about the weather. Roll (1988) found similarly that it was hard to explain much of the variability of individual stock returns using public news events. Fair (2000) examines the largest five minute movements in the S&P 500 futures contract from 1982-1999, and find that many of them have no obvious associated public news arrival. Easton, Harris, and Ohlson (1992) found that even with a time horizon as long as 10 years accounting measures can explain only about 60% of the variability of stock returns.

Franklin Allen, in his presidential address to the American Finance Association, emphasizes the magnitude and economic importance of asset bubbles. He cites the

example of the ‘lost decade’ in Japan³¹ The bursting of the Tokyo real estate bubble has seen high priced real estate fall to about a quarter of its peak so far, with devastating effect on Japanese banks and the financial system, and the U.S. Internet stock bubble.³²

Anecdotally, there have often been allegations that prices are poorly associated with fundamental news in historical episodes of stock market boom and bust, and in famous speculations such as the Dutch Tulip Bulb boom (which Garber (1989) suggests may have been mainly rational). For example, it is not obvious what fundamental news explains the October 28, 1929 or October 19, 1987 stock market crashes and other large stock price movements (see, e.g., Cutler, Poterba, and Summers (1991), Shiller (2000a) ch. 4). Consistent with overreaction, Seyhun (1990) found that insiders purchased heavily after the crash, especially the stocks that fell the most. Shiller (2000b) describes a number of other ‘new eras’ and bubbles around the world.

Early classic experimental work on securities market efficiency found that experimental markets were surprisingly effective at aggregating the information of participants. However, as discussed by Bloomfield (1996), in a complicated environment, the problem of inferring why others made the trades they did can be very difficult. In the late 1980s and 1990s a body of experimental market research (see, e.g., Plott and Sunder (1988), and O’Brien and Srivastava (1991)) considered somewhat more complicated information environments. In these settings, information was generally not aggregated efficiently (as discussed in the surveys of Sunder (1995) and Libby, Bloomfield, and Nelson (2001)).

V Do Firms Exploit Investor Biases?

We consider evidence as to whether firms take actions to exploit the investors biases. If this occurs, then the case for policy to protect investors is strengthened. This includes evidence of actions taken to *create* mispricing and *in response* to mispricing.³³

³¹The Tokyo Palace grounds at end of 1989, a few hundred acres worth the same as the whole of Canada, or the whole of California (Zimeba and Schwartz (1992, p. 109).

³²He describes how at the end of March 2000, the CBOE Internet index peaked at over seven times the level at end of 1998, but by end of 2000 was down to 1 1/2 times that level.

³³Investors may also take actions in response to mispricing. This is distinct from actions taken by insiders in response to mispricing; which would cause predictable returns. This is covered in Subsection IV.1.5 on event-related predictability. We omit the literature on actions by outsiders such as mutual funds to make abnormal profits based on public information (Grinblatt and Titman (1993)), because the potential for such trading strategies is at least partly covered by Subsection IV.1. We also do not consider actions taken by investors to create mispricing (manipulation).

V.1 Possible Responses to Mispricing

Firms seem to trade to exploit market misvaluation of their shares.

There is evidence consistent with the hypothesis that firms repurchase or issue shares to profit from market misvaluation (see, e.g., Jindra (2000), D'Mello and Shroff (2000), Dittmar (2000)). More generally, important aspects of corporate payout and financing patterns seem potentially related to mispricing. Closed-end funds are started in those years when seasoned funds trade at premia or modest discounts relative to net asset value (Lee, Shleifer, and Thaler (1991)). New funds tend to be issued at a premium (and investors pay a substantial commission), but tend to be traded at a discount in the aftermarket (Peavy (1990)), suggesting that early buyers are too optimistic. Firms tend to issue equity (instead of rebalancing their capital structure) after rises in value,³⁴ as well as when the firm or its industry's book/market ratio is low. The amount of financing and repurchase, and equity-financed merger bids varies widely over time in an industry-specific way.

V.2 Do Firms Mislead Investors?

Firms manipulate market perceptions to create market misvaluation. Measures of earnings management predict future stock returns.

Earnings reported on firms' financial statements differ from cash flows by accounting adjustments known as accruals. These are designed, in principle, to better reflect the economic circumstances of the firm. However, there is evidence that firms sometimes use accruals to improve investor perceptions artificially. Subsequent to abnormally high accruals, stocks on average experience abnormally poor return performance (Sloan (1996), Teoh, Welch and Wong (1998a, 1998b), Chan, Jegadeesh, and Lakonishok (2000)). Part of this effect seems to come from accruals taken after changes in inventories (Thomas and Zhang (2001)).

The incentive to favorably influence investor perceptions should be particularly strong when the firm is selling equity. Accruals are abnormally high at the time of new IPO and seasoned equity issues (Teoh, Welch and Wong (1998a, 1998b)). Greater earnings management is associated with more optimistic errors in analyst earnings forecasts both in new issue firms and in the general sample (Teoh and Wong (2001)), suggesting that analysts are credulous about reported earnings. Furthermore, auditors in their audit

³⁴Korajczyk, Lucas, and McDonald (1991) provide a rational explanation for this phenomenon.

opinions do not seem to take into account the level of unusual accruals (Bradshaw, Richardson and Sloan (1999)).

Greater earnings management at the time of new issue is also associated with more adverse subsequent long-run abnormal stock returns (Teoh, Welch, and Wong (1998b), Teoh, Welch, and Wong (1998a); see also Rangan (1998)). This suggests that investors, possibly under the influence of analysts, do not adequately discount for earnings manipulation.³⁵

Managers adjust earnings to meet threshold levels such as zero, past levels, and levels forecast by analysts (DeGeorge, Patel, and Zeckhauser (1999)). Possibly under the influence of management, stock analysts on average ‘walk down’ their forecasts from overly optimistic levels to pessimistic forecasts that firms are likely to beat by year-end (Richardson, Teoh, and Wysocki (2000)). Consistent with this, Bartov, Givoly, and Hayn (2000) report that the stock return associated with an earnings surprise relative to forecast does not depend on how the forecast got there, i.e., the return depends only on the final month forecast.

The accruals/return relation does not seem to depend on the extent of analyst following or of institutional ownership (Ali, Hwang and Trombley (2000)). There is evidence that some firms smooth earnings, presumably to create the impression that the business follows a stable growth trend. Barton (2001) found that hedging by means of financial derivatives (which can genuinely stabilize cash flows) tends to substitute for earnings management by means of accruals. The use of high abnormal accruals to increase earnings is positively associated with subsequent lawsuits against the firm’s auditor (Heninger (2001)).

VI Psychology and Policy: Basic Issues

As summarized in the preceding sections, the evidence is now persuasive that psychological biases of investors have important effects on security prices. Thus, academics should study the implications of imperfect rationality for policy. Policymakers already have instituted many rules at least nominally designed to protect consumers and investors.

³⁵It has been suggested that survivorship issues may create inference problems for studies involving long-horizon returns (see, e.g., Kothari, Sabino and Zach (1999) and the discussion of Kothari (2001)), because much of the initial sample of firms have left the sample after several post-event years, and because long-horizon returns are highly right skewed. However, Teoh, Welch and Wong consider monthly cross-sectional regressions, not long-horizon returns, which should minimize the effects of survivorship and skewness.

Finance and accounting academics who adhere to the efficient markets theory tend to oppose regulation of financial markets, and tend to be reluctant to analyze the pros and cons of different policies.

We have argued that there is no reason to think that courts or government are better than capital markets at avoiding psychological biases, so that government should defer to market prices. Furthermore, market prices are still likely to be the best guide to estimating value in legal damages. In this respect, we think that arguments for laissez-faire are robust to, and on the whole strengthened by, recognition of imperfectly rational psychology. Furthermore, as the discussion of academic fashions at the start of the introduction indicates, academics are also subject to misperceptions. This further supports the laissez-faire view—in the spirit of the Hippocratic oath, economists should first, do no harm.

Friedrich Hayek emphasized that there is a spontaneous order in human affairs, that markets aggregate information and direct resources effectively by means of prices, and that a social planner lacks adequate information to do better. We think that a broad version of the Hayekian viewpoint applies even if investors and prices are subject to psychological biases. Central planners will have a lot of trouble doing as well as the market at pricing securities, because (1) government does not have access to the multifarious information signals possessed by numerous investors, (2) people in government are just as subject to psychological bias as other people, and (3) the profit motive encourages private investors to be as rational as they can; government officials have a different mixture of motives.

Although the government cannot beat market prices *ex post*, perhaps it can help investors *ex ante*. Two potentially feasible goals for public policy are: (1) to help investors avoid errors, and (2) to promote the efficiency of the market. (Obviously these goals are closely related.) Even if our conclusion that market prices are imperfectly rational be denied, the evidence discussed in Section III.1 that investors are prone to blatant errors is very strong. So public policies to protect investors merit consideration.

Financial reporting rules and mandated disclosure can protect investors and advance market efficiency. Government may also have a useful role in limiting misleading (even if literally truthful) advertising, and by promoting investor education. Under full rationality, education would consist solely in obtaining new information signals about fundamentals. The government is unlikely to be superior at generating such signals.

In addition to having incentives to gather information signals, individuals have private incentives to overcome their own judgment and decision biases. However, such

efforts are bound to be imperfect. Ideally the free market will supply good education to investors. The problem is that someone who is irrational in his direct investment decisions is, alas, also likely to be irrational in his decision to seek out investment advice, and in his choice of intermediaries. Time and again people obtain guidance from shallow or misleading sources (the financial press and financial ‘gurus’). Indeed, the effort to obtain advice may make the market less efficient by promoting investment fads.

Government action may be helpful in making investors aware of their psychological biases, so that they can consciously compensate for them; and in ensuring disclosure in formats that minimize or counteract known biases. And especially, government can be helpful by avoiding activities, such as inflationary and volatile monetary policy, that make decision biases worse.

More controversial than disclosure and reporting regulations are restrictions on trading behavior designed to prevent sharks from preying on the foolish, or to prevent the foolish from hurting themselves. Fortunately, recent research on psychology and securities markets suggests that some changes that involve minimal invasions upon individual liberty may have large effects, as discussed in Section VIII.

VII Reporting Standards, Disclosure Regulation, and Advertising

Beresford (1994) has commented that academic accountants are often hesitant to draw policy conclusions from their scientific research, limiting the influence of their research on standard setting. Schipper (1993) suggests that the relative advantage of academics is in studying scientific issues, whereas standard setters have a relative advantage in making value judgments and setting policy. However, it often seems that practitioners, regulators and the public have in mind a different scientific paradigm from the dominant academic one. Many practitioners think that investors and markets often make poor use of accounting information, and that the form as well as the content of financial disclosure are important. Faith in the purely rational paradigm among academics, on the other hand, often limits what academic accountants have to say about this topic.

We argue here that the non-academics have a good point; the form of disclosure and reporting matters. Thus, academics potentially have a more important role to play by offering careful analysis of the economic implications of the psychology biases of accounting users. Such analysis gives regulators more to go on than just gut feelings and prejudice.

The fact that practitioners and interest groups passionately debate reporting formats, even when they are apparently informationally equivalent, is puzzling from the efficient markets perspective. There are several debates in which firms argue vehemently in favor of the approach that allows them to report higher earnings, even though investors ought to understand that such higher earnings are purely cosmetic. Possible examples are purchase versus pooling of interests in mergers, and the LIFO/FIFO choice. These choices have real tax consequences; it is striking that firms sometimes choose the high-tax high-earnings option (see, e.g., Biddle (1980)). Such choices could be expensive signals in a rational setting (see, e.g., Hughes and Schwartz (1988)). However, given the evidence from Section V.2 that firms are able to manipulate market perceptions, these choices may reflect an effort to fool investors.

Some debates concern whether a given type of information should be *recognized* as an integral part of the financial statement or merely *disclosed* as a footnote. A possible example is the inclusion or exclusion of comprehensive income items (special items of income which can either be recognized in the income statement or in the statement of changes of equity). Several experimental studies show that recognition versus disclosure of these items, and whether an item is called a one-time charge or an operating expense, affects both investor and analyst perceptions of firm value. Similarly, whether a hybrid security is labeled as equity or debt on the balance sheet affects perceptions of analysts and investors in experimental markets (see, e.g., the review of Libby, Bloomfield, and Nelson (2001)).³⁶ From a psychological perspective, the framing of a problem of judgment and decision can make a big difference, and with limited attention more salient information crowds out material presented less saliently.

A similar puzzle involves firms' dislike for requirements of substantive disclosures that do directly convey more information (rather than just affecting mere format of presentation). Examples include required disclosure of pension liabilities and post-retirement employee benefits. One would expect investor skepticism to force voluntary revelation. Indeed, the very fact that a firm or industry organization would campaign for secrecy would seem to give away the fact that the amount of hidden compensation is large. When rules were changed to force disclosure of these liabilities, stock prices did plunge sharply.

If investors have limited attention, the explanation is clear. If an investor happens

³⁶From a rational perspective, the empirical finding that labeling matters could, in principle, result from investors expecting self-selection by firms in how they report as a function of other non-disclosed private information they possess. Such an account, however, does not explain why the firm with less favorable information does not costlessly mimic the firm with more favorable information.

to focus attention on pension liabilities, he may discount for them skeptically and appropriately. But when he is focused on other considerations, he may implicitly treat the firm as typical rather than discounting skeptically for non-disclosure. This behavior is constrained-optimal (subject to limited attention).³⁷ On average this will lead to underdiscounting, which most firms like.

In simple fully rational settings, if disclosure is costless, all information is disclosed.³⁸ There are some qualifications to this conclusion.³⁹ However, it provides a useful first approximation and benchmark for comparison.

We do not yet have equilibrium models of disclosure policy when investors are imperfectly rational. But for two reasons limited attention should make investors less skeptical. First, as mentioned above, investors sometimes may simply not notice that a potential disclosure did not occur. Second, if studying disclosures is costly for investors, there is an innocent reason for the firm to withhold a datum— so that it can focus investor attention on more relevant data. When attention is limited, disclosing everything is disclosing nothing; the forest is lost for the trees. This suggests that mandating full disclosure may be excessive even if there are no proprietary reasons to keep secrets.

As a consequence of this *moderated skepticism*, it is plausible that an equilibrium analogous to that of the Verrecchia model will obtain. Firms with more favorable information disclose. But firms with sufficiently adverse information (below some cutoff) withhold information and delay revelation. Though full disclosure is probably suboptimal, it would appear that disclosure regulation can serve the useful purpose of restoring a greater amount of disclosure.

A possible sign of moderated skepticism is that firms recently have been trying to

³⁷It would not be constrained-optimal to be tougher in those cases where the investor notices the non-disclosure to make up for the cases where he does not notice. Making an additional error under one possible mental condition does not offset a different error made under a different possible mental condition.

³⁸In the most basic possible setting, there is rationally extreme skepticism of failure to disclose— the ‘unravelling’ results of Grossman (1981) and Milgrom (1981)).

³⁹If there are costs of disclosure (for example, if the information that can be disclosed has value for competitors) the unravelling may be limited; there remains a pool of low-quality types that do not disclose (Verrecchia (1983)). When there is a non-verifiable information signal as well as a verifiable one, it can be an equilibrium for the firm to withhold (fail to disclose) favorable verifiable information as a ‘macho’ signal that it has favorable unverifiable information (Teoh and Hwang (1991)).

Apart from the problem of proprietary costs, there is another reason that disclosure may be undesirable. This is that disclosure can reduce average contributions in public goods games (Teoh (1997)). In the context of financial distress, this means that disclosure can trigger collapse and can, on average, exacerbate the free-rider problem among creditors when concessions are needed for profitable investment (see Hirshleifer and Teoh (2001)).

promote favorable investor perceptions by disclosing conspicuously *pro forma* earnings (instead of the bottom line number reported to the SEC on Form 10K), taking out what they don't like such as one-time charges; see, e.g., *Wall Street Journal*, 3/29/01, "Hazy Releases for Earnings Prompt Move for Standards," by Jonathan Weil. This allows firms to say that they have beaten analysts forecast. There is no standard for these disclosures; firms do not have to adhere over time to a consistent definition of one-time charge. With encouragement from the SEC, there are signs that the industry may be moving voluntarily to standards on such announcements.

There is some evidence that individuals are not entirely skeptical when a firm fails to disclose information. Mathios (2000) examined the effect of the Nutrition Labeling and Education Act on purchases of salad dressing, which made mandatory the labelling of information about fat content. He found that even though there was voluntary labelling (mostly of low-fat brands) prior to the regulation, mandatory disclosure caused the fattiest dressings to lose market share.

There is also evidence that firms like to release good news early and bad news late (McNichols (1988), Haw, Qi, and Wu (2000)). This is consistent with a fully rational equilibrium with proprietary disclosure costs (e.g., Darrough and Stoughton (1990)). However, limited attention strengthens the incentive to behave in this fashion. Furthermore, limited attention suggests that such a pattern will tend to bias investor and analyst perceptions.

Limited attention can also explain the walkdown to beatable analyst forecasts in recent years documented by Richardson, Teoh, and Wysocki (2000). Consider a compliant analyst who relies on managers for information. On the one hand, firms want analysts at long time horizons to forecast high, to favorably influence investor perceptions. On the other hand, as the evidence described earlier indicates, at the day of reckoning missing a forecast is a salient indicator of bad news; missing a forecast even slightly leads to a strong price reaction. So the firm encourages analysts to walk down the forecast to avoid this.

Richardson, Teoh and Wysocki suggest that the appearance of this walkdown pattern in the last decade may be related to insider trading and disclosure regulations. These regulations have encouraged firms to limit trading by insiders to a short window of time after earnings announcements, all other times being part of a voluntary 'blackout period'. This increases the incentive for managers to ensure favorable market perceptions right after the earnings announcement. The increase in option compensation during the 1990s should have further increased the incentive for managers to make sure that forecasts

are beatable. This illustrates the complexity of regulating markets when rationality is imperfect; the law of unintended consequences operates in full force.

Academics have often hailed the rise of stock option compensation as providing stronger incentives to managers. A less favorable side of option compensation arises from the fact that if the grant of an option is at the money, the firm does not have to show it as an expense (until later exercised). This allows firms to boost earnings in the short run by paying managers in options rather than salary. If investors with limited attention incorrectly presume that a firm with a high non-saliently-disclosed compensation burden is similar to that of more typical firms, they overvalue the firm. An alternative reporting scheme would be to expense options when granted at their Black-Scholes values. This would still be imperfect because of model misspecification and the need to estimate inputs. However, it could hardly do worse than implicitly estimating the value of the option to be zero!

Psychology can provide some further insights about reporting rules. As discussed above, recognition of information rather than footnoting is important when attention is limited. This point is reinforced by the phenomenon of anchoring and adjustment. This also suggests that reported earnings will carry too much weight relative to footnotes.

A similar argument could support the SEC policy of requiring non-US firms to reconcile their accounting statements with US-GAAP in order to be listed on U.S. exchanges and to issue shares in the U.S. If U.S. investors first look at earnings, and only after try to adjust for differences in accounting, anchoring suggests they will underadjust. More generally, harmonization of accounting standards internationally is advantageous in reducing the cognitive burdens put on investors who wish to diversify internationally, and will tend to reduce the problem of inappropriate anchoring. This does not say, however, whether tough US GAAP standards be followed by other countries.

It has been proposed that firms be permitted to capitalize R&D expenditures (Lev and Sougiannis (1996)). However, since judgments about the value of R&D tend to be relatively open-ended, and often involve ambiguous or slow feedback. So an accounting system that allows firms to capitalize instead of expensing R&D may make it easier for firms to exploit investor misperceptions.

The evidence described in Subsection V.2 that managers are successful in manipulating earnings through choice of accruals is consistent with limited attention and insufficient skepticism. If some investors, part of the time, focus their attention on earnings rather than its components, then accrual manipulation will affect prices. Of course, other smart investors will trade against accrual manipulation, but if risk bearing

capacity is limited a mispricing effect will still exist.

However, discretion is allowed in accruals for a reason: to reflect the economic condition of the firm in ways not yet reflected in current cash flow. Accruals do contain incremental information for future cash flow above and beyond current cash flow (e.g., Rayburn (1986), Dechow (1994)). The evidence of successful manipulation, especially at the time of new issue, does suggest that the discretion in accruals could be controlled more tightly. However, it is not obvious how to quantify the tradeoff.

Even in a fully rational setting earnings management can occur. In a rational setting, firms may boost earnings because firms cannot directly observe whether a high accrual is justified. Analogous to the model of cash flow timing of Stein (1988), investors will foresee and discount for such manipulation. If the equilibrium amount of manipulation is understood by investors, then investors can perfectly invert from reported earnings to ‘true’ earnings. They then end up with the same information set that they would have if manipulation were impossible. In contrast, if investors have limited attention, they may fail to discount for the full amount of manipulation. Specifically, if there are times when the firm’s incentive to manage earnings upward is particularly large, but if investors discount only for the ordinary level of manipulation, then investors will be fooled just when it counts. This is consistent with the evidence that earnings management occurs around the time of new issues, and that this earnings management affects investor perceptions.

The SEC requires disclosure of risks relating to derivative securities (1997 release). Hodder, Koonce, and McAnally (2001) discuss psychological issues in disclosure of risks. The SEC allows disclosure of quantitative information about risk by means of VaR (Value at Risk), sensitivity analysis, or in tabular form.⁴⁰ The asymmetric emphasis on large possible losses (rather than on overall variability) implicit in the VaR approach is in harmony with the psychological tendency to perceive risk in terms of the possibility of large possible losses (‘dread’).

Fishman and Hagerty (1990) have shown that in a fully rational setting, allowing discretion in reporting can improve informativeness of disclosures (if there is a constraint on how many items can be disclosed). A different conclusion arises when investors are subject to framing biases. Hodder, Koonce, and McAnally (2001) point out that allowing

⁴⁰The Value at Risk methodology involves estimation of the maximum possible loss, where generally the probability of a greater loss must be less than 5%. There is discretion about whether the loss is in terms of cash flows, earnings, or value. A sensitivity analysis describes the consequences for earnings, cash flows or value resulting from different possible realizations of an underlying security’s price. The tabular format presents information about the values of different assets and liabilities.

flexibility in reporting of risks can cause investors to make mistakes such as judging identical risks differently.

Hodder, Koonce, and McAnally (2001) further point out that the biased publication of news about large derivatives losses (as with Orange County and Barings) rather than gains is dread-inducing. Thus, they suggest that the use of derivatives to speculate is more likely than hedging to induce dread. Presumably this is because of the general aversion to active rather than passive blunders (ommission versus commision bias). Even an *ex ante* reasonable hedge will frequently produce large losses ex post, and the omission/comission bias suggests that people will tend to be very concerned about losses from the hedge position (the active addition to the initial business risk). The focus of VaR on possible losses from the derivative position rather than offsetting gains caters to rather than combats dread. Potentially this could cause people to view a firm as riskier when it undertakes a risk-reducing hedge than when it does not. Risk disclosures that focus on total positions rather than just possible derivative losses may be superior.

In theoretical models disclosure is often presented as revealing a single number that summarizes value. But an interesting question, when information is multidimensional, is how much detail should be required in disclosure. This relates to the issue of the proper degree of aggregation in related accounting information. On the one hand disaggregation provides more information, and there are benefits to being able to break down complex decision problems into component parts. On the other hand, too much information can be hard to process— people find it easier to process the bottom line than all the details. Furthermore, greater aggregation affects mental accounting for better or worse.

VIII Limiting Freedom of Action

If investors are imperfectly rational, actions may be regulated to prevent financial sharks from preying on the ignorant, to prevent the ignorant from burdening other traders with noise trader risk (DeLong, Shleifer, Summers, and Waldmann (1990b)), or to prevent the ignorant from damaging themselves. The latter concern is part of the debate over privatization of social security in the U.S..

A further reason for regulation is to prevent misallocation of resources. For example, the overpricing of internet shares surely directed real resources (especially human resources) toward internet-related firms during the internet boom of the late 1990s.⁴¹

⁴¹It is true that the costs of the resource misallocation were borne by the enthusiasts themselves. However, avoiding resource misallocation is still a conceptually distinct issue from protection of the

Some respected and influential economists (Larry Summers and Joseph Stiglitz) have proposed transactions taxes on short-term securities trading to reduce short-term speculation. It is not clear that such restraints on trade would make markets more efficient. Illiquidity will deter intelligent, informed, corrective speculation, not just foolish noise trading.⁴²

Should banks and S&L's be permitted to market mutual funds, IPOs, or junk bonds to depositors? These institutions are viewed as sober and safe, and deposits are insured. Some investors could be confused about the safety and downside protection of speculative investments if offered by these institutions. At a minimum, conspicuous disclosure that these investments are not insured would seem appropriate.

Some issues arise in regulation of advertising similar to those that arise for financial disclosure and reporting. In the law of fraud, half-truths (true statements that are misleading because of the omission of other material facts) are actionable (Langevoort (1999)). Highly rational individuals are unlikely to be harmed by half-truths in financial advertising, because the incentive of the seller of the financial service to mislead is often fairly clear. For example, it is fairly obvious why a mutual fund would advertise performance based upon a reporting period chosen *ex post* to maximize its reported return, and would selectively report benchmark indices for comparison.⁴³ Such selective reporting is potentially misleading to investors with limited attention.

It is not obvious, in a fully rational world, that the SEC should prosecute internet chat-room manipulators who play the 'pump and dump' game. Rational investors should understand that anonymous internet chat comments are cheap talk, and are likely to have the purpose of moving prices. Consistent with earlier discussion, episodes of successful manipulation of this sort suggest insufficient skepticism by investors. In one recent case a 14-year-old spread favorable rumors about thinly trading stocks using numerous fictitious names, and immediately dumped the stocks (Bloomberg, 9/21/00). The SEC alleges he made \$272,826 in profits on stocks he touted and sold. More broadly, each year investors are defrauded by get-rich-quick scams, so at a minimum the extreme tail of gullibility is severe.

foolish.

⁴²Indeed, rational speculation can be criticized as making the market too efficient, since the private gain to speculating can be disproportionate to the social value that speculators generate; see Hirshleifer (1971).

⁴³Elton, Gruber, and Rentzler (1989) describe misleading marketing and press coverage of commodity mutual funds, and the presentation of such funds as conservative hedges against inflation. Barber and Odean (1999) discuss advertising of online trading aimed at investor's biases, such as overconfidence and the illusion of control.

There is a grey area between fraud and legitimate self-promotion. Advertising standards (for example, requiring that fund that advertise past performance use comparable return calculations) can help dissipate the fog. In principle the market can fix upon such standards on its own, and rating services such as Morningstar can provide investors with objective comparisons. There are, however, coordination problems in getting a standard started, and some investors do not check the ratings.

Most finance academics have come across several howlers offered by investment advisers. An advertisement in *Futures Magazine* entitled “Put the power of the universe behind your trades” touted an astrology-based investing system. Shefrin and Statman (1993) quote a “Personal Money Guide” advising “An investment strategy that can make you money is writing calls on the securities you already own. Think of these premiums as extra income.”

More generally, silvery-tongued brokers and personal advisors are able to influence individual investors unduly. Fraudulent schemes are just the extreme case along a continuum. The marketing by brokers of overpriced closed-end-fund IPOs is another example (Lee, Shleifer, and Thaler (1990)). Brennan and Hughes (1991) offer an explanation for why individuals investors disproportionately hold small stocks based on the higher brokerage fees obtained by brokers in the U.S. for small stocks.⁴⁴

Brennan (1995) discusses how intermediaries profit from a good reputation, and therefore individual investors who lack expert knowledge can gain from investing with intermediaries. But what if investors don’t know enough to judge good and bad reputations? For example, it is hard for most investors to determine whether whole life policies offered by major insurance companies have been and will be good investments.

The biases in choices in retirement investments described in Section III (naive diversification, price-trend-chasing, non-diversification, procrastination/inertia, and status quo bias) are very disturbing. These findings suggest that serious errors are likely to have momentous effects on many investors’ lifetime wealths and quality of life. Given the severity and gravity of the problem, it is tempting to endorse paternalistic solutions. Indeed most developed countries have done so, as with Social Security in the U.S.. However, less heroic measures may largely suffice to do the job.

For example, in defined contribution retirement plans default options can be designed careful to encourage wise choices. To protect investors from procrastination/inertia and

⁴⁴The ironic thing is that (for a period) small stocks earned *superior* returns. One hypothesis is that availability cascades work in favor of large firms, which are more available and familiar. The system of having analysts tout low-priced stocks may act a rough corrective to this.

the *status quo* bias, the default can be a mixture of stocks, bond and other assets in reasonable proportions. Investors who want to decide for themselves will do so, so the loss of freedom is nil. It may also be helpful to require companies to give warnings to their employees about the risk of investing retirement funds in their own company's stock instead of diversifying.

To address naive diversification, requiring the completion of a structured worksheet may help. People can be asked first to allocate contributions between stocks, bonds, and other assets. Only after they have done so are they permitted to subdivide each account among different stock funds, bond funds, and so on. We conjecture this would weaken the tendency for people to allocate far more to stocks when more stock funds are on the menu (in accordance with naive diversification). A more drastic solution (which we do not prefer) entailing greater loss of freedom would be to limit sharply the number of funds of different kinds available in the retirement plan. Further experimental research can help determine what approaches are likely to be most effective.

IX Other Government Activity

In the popular press, inflation is a villain. On the whole this probably arises from confusion; a steady state inflation is, to a first approximation, just a trivial change of units. Of course there are important tax implications of inflation, but this does not seem to be the main reason people dislike it. For most people, the aversion seems more direct—a sense that inflation drains the value from their savings and investments.⁴⁵

The evidence of money illusion described in Section II suggests that inflation is a likely source of faulty perceptions about investment performance and prospects. Siegel (1998) discusses how high inflation biases earnings upward as an indicator of firms' profitability. During the high-inflation 1970s, in some regions the folk theory that real estate is an investment that can't lose was popular. Shiller (2000b), p. 48 suggests that nominal growth in stock market and housing values tends to wipe out drops, creating a perception of low risk. Ritter and Warr (2001) provide evidence suggesting that inflation illusion contributed to the 1982-99 bull market. Probably one of the cheapest and most important things government can do to improve the quality of consumer and investor perceptions is to control long-run money growth to maintain an approximately zero rate of inflation.

⁴⁵This concern is valid when applied to non-interest-bearing cash balances, but the deadweight cost of forcing people to go to the ATM more often must be fairly minor.

More generally, there are many indicators of value whose meaning evolves over time. Given limited attention, we expect people to tend to adjust too slowly to these shifts. Shiller (2000a) discusses how there were vastly more stock analyst Buy than Sell recommendations in 1998, in contrast with a nearly even division in mid-1983. He suggests that this has tended to make investors too optimistic.

X Conclusion

We have argued that there is now very persuasive evidence that investors make major systematic errors. We further argue, though it is not absolutely a prerequisite for most of our policy conclusions, that the evidence is persuasive that psychological biases affect market prices substantially. Furthermore, there are indications that as result of mispricing there is substantial misallocation of resources in the economy. Thus, we suggest that economists should study how regulatory and legal policies can limit the damage caused by imperfect rationality.

But don't hand the car keys to junior just yet. Obviously, interest group politics distorts (or dominates) government activity, with perverse results. Even if officials sought solely to serve a broad public interest, there is no reason to think that regulators, politicians or courts are less subject to bias than are market prices— far from it. Detecting and responding to market pricing errors is not the government's relative advantage.

The social process by which public attitudes toward regulation are formed can also work perversely. Kuran and Sunstein (1999) analyze how biases in public discourse can lead to what they call *availability cascades*, and the perverse effects this can have on regulation of risks arising from pollution or disaster. The very fact that a viewpoint is widely disseminated and visible to people makes them conclude that it is probably true. Imitative adoption of actions or judgments can be rational (see, e.g., Banerjee (1992), Bikhchandani, Hirshleifer, and Welch (1992)), but such effects are intensified by overapplication of the availability heuristic (Tversky and Kahneman (1973)) and by preference for the familiar.

Kuran and Sunstein consider the tendency of individuals to avoid expressing viewpoints that deviate from the dominant position. They also describe how self-interested individuals such as politicians and 'availability entrepreneurs' are selective in what viewpoints they express, and how this can contribute to misperceptions. If attention is limited, people may fail to discount sufficiently for the conformism of others and for the selective behavior of availability entrepreneurs. Kuran and Sunstein describe and

give examples of how “mass delusions... may produce wasteful or even harmful laws and policies.” For all these reasons, the political process is likely to be more heavily influenced than the market by irrational biases in judgment. Thus, on the whole imperfect rationality *strengthens* the case for restraint in government intervention. This is particularly the case when it comes to policies designed to correct alleged mispricing ex post.

We do think that there is a potential case for measures to help investors make better choices and to help investors make the market more efficient. These involve disclosure regulation, financial reporting regulations, investment education, and perhaps some efforts to standardize mutual fund advertising.

More controversially, a case can be made for regulations that to protect foolish investors by restricting their freedom of action or the freedom of those that may prey upon them. Rather than leaping into the fray, we stress that some government or regulatory action can be taken to promote better decisions and greater efficiency that have relatively low cost, and place little restriction on freedom of action. Maintaining zero average inflation would eliminate money illusion problems, including problems in remembering and comparing prices of goods and problems in assessing past investment returns; there is little or no offsetting cost. There is very little cost to requiring companies to provide a standard warning, analogous to cigarette warning labels, to workers of the risks of plunging retirement money in their own company’s stock. Regulating the way in which retirement investment options are presented to individuals (e.g., the status quo choice, and how choices are categorized) may be almost costless yet may greatly affect lifetime outcomes.

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