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# In Praise of Investor Irrationality

Gregory La Blanc

*Haas Finance Group, University of California, Berkeley, [lablanc@haas.berkeley.edu](mailto:lablanc@haas.berkeley.edu)*

Jeffrey J. Rachlinski

*Cornell Law School, [rachlins@law.mail.cornell.edu](mailto:rachlins@law.mail.cornell.edu)*

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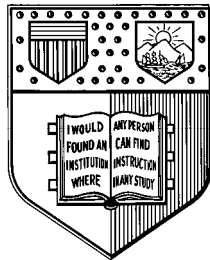
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# CORNELL LAW SCHOOL

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### **In Praise of Investor Irrationality**

**Gregory La Blanc & Jeffrey J. Rachlinski**

Cornell Law School  
Myron Taylor Hall  
Ithaca, NY 14853-4901

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## **In Praise of Investor Irrationality**

Gregory La Blanc  
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### Abstract

How should a market filled with investors who chronically make bad investments, but is nevertheless efficient, be regulated? A growing body of evidence suggests that this is the state of most securities markets; investors rely on cognitive processes that produce systematically bad choices, and yet the market remains largely efficient. In fact, cognitive errors might be essential to their efficient operation. Even investors who make systematic errors also often possess real and unique information that can contribute to accurate pricing of securities. If such investors became mindful of their limited ability to distinguish between real information and erroneous information, they would decline to rely on their beliefs to invest and would thereby withhold private information from the market. Over-confidence on the part of these investors leads them to trade anyway. This over-confidence provides market liquidity, but more importantly, provides the market with the private information that individual investors possess (but should, rationally, withhold). Hence, reforms designed to save investors from the costs of their cognitive errors would reduce market liquidity and deprive the market of valuable information. In short, markets need irrationality.

### I. INTRODUCTION

Thank goodness for the optimism of restauranteurs. It is widely understood that the majority of new restaurants fail, and yet new restaurants open all the time. Often enough the same location houses one new eatery after another, as people repeatedly undertake a venture in the precise location that bankrupted their predecessors. That people devote their energy and savings to new restaurants in the face of such poor odds is remarkable--some might say irrational. Some small number of restaurants do succeed, however, to the benefit of both their owners and their patrons. For the owners, the risks hardly seem worth the rewards, but restaurant patrons experience only the rewards of an interesting parade of new dining opportunities. Without an excess of optimism on the part of potential restauranteurs, this parade would quickly end.

This story is not limited to restaurants. Many business begin with little more than cock-eyed optimism that causes entrepreneurs to undertake foolishly risky ventures. Although undertaking such risk is potentially extremely costly to investors, society benefits greatly from this optimism. Unwarranted optimism underlies many of the successful businesses that generate economic growth.<sup>1</sup> Fear of optimistic entry by newcomers might even discipline existing

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<sup>1</sup> See Donald Langevoort, *Organized Illusions: A Behavioral Theory of Why Corporations Mislead Stock Market Investors (And Cause Other Social Harms)*, 146 U. PENN. L. REV. 101, 152-56 (1997) (discussing the value of excess optimism).

businesses, forcing them to behave as if they exist in an environment that is more competitive than is really the case.<sup>2</sup> Although over-optimism in some cases can lead to wasteful over-investment,<sup>3</sup> it may invigorate competition leading to a substantial reduction in monopoly rents. In a perfectly competitive world with zero long-run profits, the illusory prospect of profit might be a key factor in encouraging a dynamically efficient investment pattern.<sup>4</sup>

Even if an excess of optimism is essential to encouraging new businesses, however, it might be a destructive force in the financial markets. A well-functioning capital market must produce accurate asset pricing, so as to allocate capital efficiently. Mispricing of securities would lead society to invest its productive capital in wasteful ventures that cannot ultimately produce economic growth.<sup>5</sup> The same cognitive process that affect restauranteurs might also affect investors, leading to psychologically irrational beliefs about the true value of securities. If such cognitive processes are widespread then they could affect the value of securities. Thus, in addition to erroneous prices that arise from fraud or bad information, the securities market might suffer from “cognitive mispricing.”

Unlike the broader market for business entrants, however, irrationality might not persist in a fluid capital market. Even though reality and market forces would eventually either teach excessively optimistic entrepreneurs the error of their ways or drive them into bankruptcy, either process would be slow.<sup>6</sup> If a small number of people each engage in one costly business venture in their lifetime, the economy as a whole will witness a great many entrepreneurial ventures.<sup>7</sup> But in a fluid, fast-moving capital market, irrational investors seem like sitting ducks. People

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<sup>2</sup> See Avishalom Tor, *The Fable of Entry: Bounded Rationality and the Efficiency of Competition* (paper on file with authors) (describing how excess optimism encourages entrants into new markets, thereby disciplining existing firms).

<sup>3</sup> See Colin Camerer & Daniel Lovallo, *Overconfidence and Excess Entry: An Experimental Approach*, 89(1) AM. ECON. REV. 306 (1999) (presenting evidence that overconfidence leads to wasteful investments).

<sup>4</sup> See Reuven Brenner, *Why Society Needs “Irrational Exuberance”—And What This Means for Valuations and Monetary Policy*, 13 J. APPLIED CORP. FIN. 112 (2000) (arguing that excess optimism encourages sensible investment patterns).

<sup>5</sup> See Nicholas Barberis & Richard Thaler, *A Survey of Behavioral Finance*, in HANDBOOK OF THE ECONOMICS OF FINANCE (George Constantinides, Milt Harris & Rene Stulz eds., forthcoming).

<sup>6</sup> See Armen Alchian, *Uncertainty, Evolution, and Economic Theory*, 58 J. POLITICAL ECONOMY 211 (1950).

<sup>7</sup> See Langevoort, *supra* note 1, at 149-52.

and institutions who search for arbitrage opportunities will quickly pick them off, driving them out of the market.<sup>8</sup> Thus, even if some investors are irrational, they might quickly lose their money and be driven out of the market. Cognitive mispricing might be a myth.

Therein lie the conventional stories of the role of irrationality in an efficient market. Either irrationality among investors is so chronic and persistent that it causes assets to be mispriced or it induces individual investors to make such bad choices that they are driven out of the market. In either case, irrationality is costly, and should be curbed, if possible. If it affects prices, it is causing capital to be allocated inefficiently. If it does not affect prices, but does consume individual investors, then individuals are hurting themselves--possibly risking their retirement savings as a result of their irrationality. If so, then possibly individuals should be saved from themselves.

Regulations to curb irrational investment could be accomplished in several ways.<sup>9</sup> Incentives to save money for retirement could be structured so as to favor collective pools of investments, rather than individual accounts. Additionally, regulations could encourage individual investors to make investment choices through a professional advisor, rather than on their own. The rise of Internet investing, in which individuals can quickly transfer their investments on an irrational whim might be a disastrous development that should be curtailed.<sup>10</sup> Investor education programs could also reduce the degree of erroneous beliefs about the markets. Finally, advertisements that play into the irrationality of individual investors might get closer scrutiny.<sup>11</sup> Widespread irrationality among investors might be hard to remedy completely, but steps such as these can be taken to curb its adverse effects.

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<sup>8</sup> See Milton Friedman, *The Case for Flexible Exchange Rates*, in *ESSAYS IN POSITIVE ECONOMICS* 157 (1953).

<sup>9</sup> See Peter H. Huang, *Affective Investing and Effective Securities Regulation: Regulating Anxiety and Euphoria in Securities Markets* (draft on file with authors); Donald C. Langevoort, *Taming the Animal Spirits of the Stock Markets: A Behavioral Approach to Securities Regulation*, -- *NW. U. L. REV.* -- (forthcoming, 2003); Robert Prentice, *Wither Securities Regulation? Some Behavioral Observations Regarding Proposals for its Future*, -- *DUKE L.J.* -- (forthcoming, 2003).

<sup>10</sup> See ROBERT SCHILLER, *IRRATIONAL EXUBERANCE* (2000). There is evidence to suggest that access to internet trading leads to a greater volume of trading and has a substantial negative effect on investor's portfolio performance. See Brad M. Barber & Terrance Odean, *Online Investors: Do the Slow Die First?* (unpublished paper, U. Cal., Davis, 1999, on file with authors). The apparently harmful effects of internet trading led the former SEC Chairman to refer to it as a "narcotic." *Quoted in* HERSH SHEFRIN, *BEYOND GREED AND FEAR: UNDERSTANDING BEHAVIORAL FINANCE AND THE PSYCHOLOGY OF INVESTING* (2000).

<sup>11</sup> See Huang, *supra* note 9.

Efforts to reduce the adverse consequences of irrationality should not be adopted without comparing the costs of these regulations with their potential benefits.<sup>12</sup> In addition to the ordinary costs associated with regulating private behavior, steps to reduce the effect of investor irrationality would eliminate *benefits* that investor irrationality creates. Just as irrational optimism creates a positive externality in entrepreneurial activities, it also creates a positive externality in financial markets. Namely, several cognitive errors investors commonly make encourage them to make investment choices in situations in which a rational decision maker would refrain.<sup>13</sup> Cognitive errors common among investors give them an excess of confidence in their knowledge, thereby encouraging investors to allocate their investments based only upon a modicum of private information. Just as most entrepreneurs should probably refrain from sinking their time and fortunes into new business, so too should most investors refrain from trading on their own beliefs. The individual investor can hardly distinguish useful from useless information and well-founded beliefs from foolish ones. And yet, if individual investors consistently refrained from trading on their beliefs, they would, collectively, withhold a great deal of valuable information from the market. Efforts to discourage individual investors from trading on irrational beliefs would deprive the market of valuable pricing information.

Even if individual investment decisions reflect little real private information and are merely noise produced from a reliance on misleading cognitive processes, regulatory efforts to reduce the influence of cognitive errors might be a mistake. Increased regulation of relatively open capital markets would funnel equity investment through institutions and make equity financing more expensive, thereby making debt financing a more attractive option. The sophisticated institutions that make decisions about debt financing might avoid many of the mistakes individual commit, but such institutions are prone to their own set of cognitive errors.<sup>14</sup> Individual decision makers working within institutions are still subject to cognitive errors and institutional structures create new sources of errors.<sup>15</sup> An increased institutional influence on the financial markets thus leaves open the possibility that securities will be mispriced. Furthermore, that cognitive errors among institutional investors in a market dominated by debt will have a bigger effect on securities pricing than cognitive biases by individuals in an open equities market. The cognitive errors ordinary individuals make will often be a somewhat unique product of their own perspective. Consequently, such errors are less likely to affect the overall price of a

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<sup>12</sup> See Paul G. Mahoney, *Is There a Cure for "Excessive" Trading?* 81 VA. L. REV. 713 (1995).

<sup>13</sup> See *infra* notes 49 to 87 and accompanying text.

<sup>14</sup> See Donald C. Langevoort, *Selling Hope, Selling Risk: Some Lessons for Law from Behavioral Economics about Stockbrokers and Sophisticated Customers*, 84 CAL. L. REV. 627 (1996). See also, James A. Fanto, *Braking the Merger Momentum: Reforming Corporate Law Governing Mega-mergers*, 49 BUFF. L. REV. 249, 288-89 (2001) (attributing many merger decisions to a combination of excess optimism and the availability heuristic)

<sup>15</sup> See Langevoort, *supra* note 1.

security than are mistakes made by institutional investors financing through the debt market. Favoring debt over equity thus raises the prospect for less accurate pricing of securities than an open market produces.

Thus, even if cognitive errors cloud individual investor decisions, efforts to save individuals from their erroneous investment decisions should be approached with grave caution, for two reasons. First, the excess confidence investors have in their beliefs leads them to provide private information to the markets. If reforms of the securities markets reduced or eliminated this confidence, then this private information would be lost. Second, the alternative system--institutional financing--could produce even less accurate prices than a fluid securities market fraught with individually erroneous decisions. The multiple perspectives individual investors adopt may be more likely to offset one another and be more easily corrected, whereas institutions may produce errors that lack corrective mechanisms and could have a greater impact on pricing.

This paper defends this thesis. First, we present two competing visions of investor behavior--one that assumes investor rationality and one that assumes cognitive error. Both theories lead to different regulatory approaches and perspective on cognitive error, but both are incomplete. We then present a third approach, that of behavioral finance, which presents a more integrated and complete portrait of investor rationality and what it means for regulation of securities markets. A behavioral finance perspective, we contend, supports our view that the irrationality of individual investors is a valuable component to the capital financing structure upon which our economy depends. We conclude by discussing implications of this perspective to regulatory efforts to manage investor error.

## II. THEORIES OF INVESTOR RATIONALITY

The model of the individual investor among finance theorists has changed dramatically in just the last five years.<sup>16</sup> Decades ago, economists and finance theorists developed a model of market behavior known as the efficient markets hypothesis (“EMH”).<sup>17</sup> These theorists contend that if investors are rational, then the market price for all securities will reflect fundamental values; that is, future cash flows discounted by a rate of return that accounts for risk. Behavioral economists began to attack the EMH by providing examples of circumstances in which people make choices that are inconsistent with rational-choice models of behavior.<sup>18</sup> Behavioral

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<sup>16</sup> See ANDREI SCHLEIFER, *INEFFICIENT MARKETS: AN INTRODUCTION TO BEHAVIORAL FINANCE* (2000)(reviewing the enormous progress in finance theory in the last few years); SHEFRIN, *supra* note 10 (discussing the emergence of a new strain of research in finance).

<sup>17</sup> See Eugene Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FINANCE 383 (1970).

<sup>18</sup> See Barberis & Thaler, *supra* note 5. See also, Daniel Kahneman & Mark Riepe, *Aspects of Investor Psychology*, 24 J. PORTFOLIO MGT. 52 (1998) (describing how common

economists argue that the market is populated with irrational investors--a theory one might term the deficient markets hypothesis ("DMH").<sup>19</sup> Relying in part on the teachings and the methods of psychologists who study judgment and choice, proponents of the DMH have provided evidence of the disastrous choices individual investors can make.<sup>20</sup> The debate has been fierce. Behavioral economists lambasted finance theorists for their seemingly dogmatic worship of a model that seemed (from their perspective) to be so obviously wrong;<sup>21</sup> finance theorists, for their part, ridiculed the behavioral economists for their lack of rigor, unqualified acceptance of psychology and seeming inability to generate a competing theory.<sup>22</sup> The debate is largely over now, and one can pass judgment: It is a stalemate that has led to a compromise in the birth of a new field--behavioral finance.<sup>23</sup>

Both sides of the debate are right. The market seems, at least across reasonably lengthy periods of time, to be quite rational. Firms that make money have high stock prices; firms that do not eventually lose out.<sup>24</sup> At the same time, the individual investors who produce these historically rational prices are hopelessly disastrous decision makers.<sup>25</sup> They trade too often, trade at the wrong time, buy too many risky investments, save too little, use the wrong vehicles for what they do save, fail to consult experts, retire with too little money, and retire with too much money.<sup>26</sup> Individuals embrace ludicrous theories about the operation of the stock market,

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cognitive errors might affect investors).

<sup>19</sup> See David Hirshleifer, *Investor Psychology and Asset Pricing*, 56 J. FINANCE 1533 (2001).

<sup>20</sup> See GARY BELSKY & THOMAS GILOVICH, *WHY SMART PEOPLE MAKE BIG MONEY MISTAKES—AND HOW TO CORRECT THEM: LESSONS FROM THE NEW SCIENCE OF BEHAVIORAL ECONOMICS* (1999) (arguing that cognitive errors induce people to make serious mistakes in their investment strategies).

<sup>21</sup> See Barberis & Thaler, *supra* note 5.

<sup>22</sup> See Eugene F. Fama, *Efficient Capital Markets II*, 46 J FINAN. 1575 (1991).

<sup>23</sup> See SCHLEIFER, *supra* note 16.

<sup>24</sup> See Michael Jensen, *Some Anomalous Evidence Regarding Market Efficiency*, 6 J. FINAN. ECON. 95 (1978) (reviewing evidence that despite anomalies, the EMH is still empirically accurate).

<sup>25</sup> See Henry T.C. Hu, *Illiteracy and Intervention: Wholesale Derivatives, Retail Mutual Funds, and the Matter of Asset Class*, 84 GEO. L.J. 2319, 2371 (1996) ("many individual investors are virtually beyond redemption with respect to probabilistic and financial illiteracy").

<sup>26</sup> See SCHLEIFER, *supra* note 16; Hirshleifer, *supra* note 19; Barberis & Thaler, *supra* note 5.



retirement plans, and savings vehicles, and even more foolishly, they seem more than willing to act on these theories.<sup>27</sup> Institutional investors seem to avoid some obvious problems, but they hardly seem immune from irrational theories and choices.<sup>28</sup> Reconciling how such chaotic behavior of individuals can produce such a rational system has been the fundamental mission of behavioral finance.

The EMH and DMH each have implications for how markets should (or should not) be regulated. The implications of the synthesis of these models into behavioral finance has its own set of implications that are only beginning to be explored. Determining what behavioral finance says about sensible regulatory policy requires understanding what the implications of each of the two competing theories of the marketplace are and how the two conflicting positions have been reconciled into a unified approach.

#### A. The Efficient Markets Hypothesis

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<sup>27</sup> See Barberis & Thaler, *supra* note 5.

<sup>28</sup> See Barberis & Thaler, *supra* note 5 (reviewing evidence on the errors experienced investors make).

For decades, economists have assumed that rational behavior dominates investment choices in securities markets.<sup>29</sup> Rational investors would base their investment decisions on fundamentals, such as the cash flow a company was expected to produce and the variability associated with that cash flow. The higher the cash flow associated with a given security, the more a rational investor would pay for it. Investors would also insist upon a risk premium for investments that pose greater non-diversifiable risk. Differences in investment strategies among rational investors would depend only upon individual differences in liquidity needs, investment time horizons, and risk preferences. A need for liquidity and a short investment horizon would dictate a risk averse strategy for an individual investor, for example. Otherwise, every investor, being rational, would behave similarly, seeking out a portfolio that offered the highest rate of return at any given risk.

### 1. What is the EMH?

A collection of perfectly rational investors would produce a particular kind of market. Recognizing that unless they have some private information that is known only to them and not to anyone else in the market, rational investors would not attempt to beat the market. Private information would create an arbitrage opportunity, but these opportunities would be scarce or non-existent. Investors would not find opportunities to take advantage of a mispriced security; all securities in a rational market would be priced accurately.<sup>30</sup>

In an efficient market, securities prices would move, of course. Prices would react immediately and efficiently to the dissemination of news that implicates the fundamentals underlying the security.<sup>31</sup> Public events would cause all investors to react immediately and in the same direction, quickly adjusting the value of the security to reflect this new information. Since all information is public, however, information would not create arbitrage opportunities. All investors would know the information and hence the market price of a security would jump quickly to the new value. To be sure, information not known to the general public would create an opportunity to obtain supranormal profits. Advocates of the EMH disagree somewhat on the extent to which such private information exists and creates such opportunities, but most scholars agree that efficient markets contain some limited arbitrage opportunities based on private information.<sup>32</sup>

The value of pursuing private information that creates arbitrage opportunities, however, is elusive. Gathering private information is costly. In a perfectly rational market, investors would recognize that their own efforts to gather information can be matched by other investors'

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<sup>29</sup> See SCHLEIFER, *supra* note 16.

<sup>30</sup> See *id.* at 2-6 (reviewing the EMH and its implications).

<sup>31</sup> See *id.*

<sup>32</sup> See *id.*

efforts to gather the same information. Hence, if it is valuable for one investor to gather private information, it is valuable for others to do the same. Investors who have larger portfolios might be able to take greater advantage of private information, and hence might find the production of private information more valuable. Rational investors can pool their wealth with others, however, in common investment funds. The managers of such funds can then direct the collective resources of many investors in the production of private information to match the efforts of the wealthier investors. Knowing that the competition for private information can be matched, in turn, suggests that such competition is foolish. Rational investors recognize that their efforts to create private information can be so closely matched by others that it can produce no benefit. Only in rare circumstances in which an investor knows that he or she has a superior ability to gather valuable private information is a strategy of collecting private information apt to produce superior rates of return on investments. Rational investors should recognize the futility of trying to beat the market with private information and should purchase an index of the market.

If the EMH accurately describes the operation of the securities markets, then a particular regulatory style is appropriate.<sup>33</sup> Regulatory efforts should be directed at the two particular problems that an efficient market creates: an efficient market is a target of opportunity for fraud and is potentially a market for lemons. In an efficient market, investors are not investing in efforts to create any kind of private information, including information that could reveal fraud. Insiders thus have the opportunity to misleading the public. Even without fraud, insiders would only sell interest in securities in which they have an informational advantage that creates an arbitrage opportunity for them. Rational outside investors, realizing the advantages of the insiders, would resist purchasing any security if they believed that their trade was apt to be with an insider. Such a problem would make it difficult for any firm to use the equities markets to raise capital. Furthermore, no individual firm, acting alone, would solve this problem by disclosure, because their disclosures would not be credible.<sup>34</sup>

The regulatory remedies for the problems that can affect an efficient market thus reflect efforts to combat these problems. EMH theorists support both scrupulous policing against fraud and broad mandatory dissemination of information.<sup>35</sup> Policing against fraud is the necessary remedy to the general unwillingness of rational investors to search for private information that would discredit fraudulent statements. Monitoring the accuracy of financial reports is a public good and will be underprovided in the absence of some governmental role. Centralized enforcement supplemented by governmentally imposed sanctions are necessary to encourage the

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<sup>33</sup> See Ronald J. Gilson & Ranier Kraakman, *The Mechanisms of Market Efficiency*, 70 VA. L. REV. 549 (1984) (reviewing the implications of the EMH for regulation of the securities markets).

<sup>34</sup> See Paul Mahoney, *Mandatory Disclosure as a Solution to Agency Problems*, 62 U. CHI. L. REV. 1047 (1995)

<sup>35</sup> See *id.*

optimum amount of information dissemination.<sup>36</sup>

Similarly, disclosure requirements enable honest firms to provide information without raising suspicion as to the extent or purpose of their disclosure. Creation and enforcement of a uniform, all-encompassing set of disclosure requirements allows firms to credibly disclose information relevant to their fundamental value. It also allows investors to trust the information, knowing that misleading or incomplete disclosures exposes the firm's officials to civil and criminal liability. Mandatory disclosure, by insuring the credibility of corporate financial reporting, benefits the corporate issuers of securities as much as it does the investors in those securities.

## 2. Regulatory Implications of the EMH

Faith that the EMH accurately describes the operation of the securities markets identifies a regulatory approach that emphasizes consistent, uniform disclosure with serious efforts to combat fraud. Firms may be unable to coordinate their disclosure standards and may lack the incentive to reveal adequate amounts of information absent such regulatory interventions. Without these regulations, investors would be reluctant to purchase securities and indeed, the lemons-market problem alone guarantees that investors would be foolish to do so. Likewise, in the absence of prohibitions, fraud could become commonplace, driving investors out of the market. Adherents of the EMH thus see the prospects of fraud and need for uniform disclosures as the prime source of market inefficiency. Hence, they advocate directing all regulatory efforts at remedying these problems.

The presence of some number of clearly irrational investors need not shake faith in the accuracy of the EMH. Irrationality on the part of some investors (so-called "noise traders") will not have much effect on the overall functioning of the market, so long as most of the investors are rational.<sup>37</sup> According to the EMH, one of two things happens to irrational investors, depending upon how many irrational investors there are. If the market includes only a small number of irrational investors, then the presence of these investors will have little effect on the market price.<sup>38</sup> Interestingly, the consequences of irrationality to these investors will be much less than one might expect. In an efficient market, all securities are accurately priced, which prevents irrational investors from over-paying for securities. Erratic and irrational investors might undertake more risk than their investment time horizon would suggest is appropriate, but the irrational investors will be rewarded for undertaking this risk with higher returns.<sup>39</sup>

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<sup>36</sup> See FRANK EASTERBROOK & DANIEL FISCHER, *THE ECONOMIC STRUCTURE OF CORPORATE LAW* (1991)

<sup>37</sup> See Fischer Black, *Noise*, 41 J. FINAN. 529 (1986).

<sup>38</sup> See *id.*

<sup>39</sup> See J. Brad De Long, Andrei Shleifer, Lawrence Summers & Robert Waldmann, *Noise*

Whatever investors' irrational beliefs and preferences might lead them to be willing to pay for securities, the price the market will offer them is an efficient price that reflects the security's true value. The irrational investor simply feels as if she is constantly getting bargains.

For irrational investors, there is no safety in numbers, however. If enough investors adopt erroneous beliefs, then these beliefs *will* affect the market price in the short run, thereby allowing investors to express their costly preferences.<sup>40</sup> The pressures that fundamental forces exert on securities will ultimately be irresistible in the long run. Eventually, enough investors will come to realize their mistake, abandon their beliefs, and the market price will return to the inexorable balance of risk and return. When the market price does stabilize, many of the irrational investors will realize losses. In fact, any imbalance that irrationality creates will likely be corrected quite quickly. The mispricing that the irrational beliefs cause creates an arbitrage opportunity for investors who are not afflicted with the irrationality.<sup>41</sup> Although, arbitrage opportunities might sometimes be hard to realize, the inevitable presence of arbitrageurs hastens the correction process. A true inaccuracy in a stock price will create such a lucrative arbitrage opportunity that it will attract a great deal of capital quickly, thereby making it impossible that the opportunity will persist.

Thus, for adherents of the EMH, irrationality among investors does not present a serious problem. If the number of irrational investors is small, then they cannot affect the market price and cannot create a misallocation of capital. Irrational investors will not even suffer much inasmuch as they essentially are randomly purchasing securities at reasonable prices. If the number of irrational investors is large, then their effect on the market price will be so short lived that it will still not cause capital to be misallocated. Even with irrational investors in the market, firms' ability to raise capital will depend solely on their stream of cash flow and its risk--which is exactly what society as a whole wants it to depend upon. Valuable investment opportunities will attract capital and useless ones will not.

The only worrisome aspect of irrationality under the EMH is its destructive effect on the irrational investors in those cases in which there are enough irrational investors to affect the price of a security. In these cases, the investors can lose a great deal of money as arbitrageurs convert them into money pumps that correct the market price. Adherents of the EMH might sympathize with these investors, but they do not advocate regulation to stop them from losing. Indeed, arguably the existing regulations encourage the creation of such irrationality by allowing

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*Trader Risk in Financial Markets*, 98 J. POL. ECON. 703 (1990).

<sup>40</sup> This point is much debated. See Karim Jamal & Shyam Sunder, *Bayesian Equilibrium in Double Auctions Populated by Biased Traders*, 31 J. ECON. BEHAV. & ORGANIZATIONS 273 (1996).

<sup>41</sup> See Friedman, *supra* note 8.

firms to engage in “puffery” that might take advantage of cognitive biases.<sup>42</sup> For adherents of the EMH, however, this is the price to be paid for efficient capital markets. Arbitrageurs must take money from irrational investors in order to correct market prices. Efficiency demands that the irrational investors be sacrificed. Over time, investors who repeatedly chase mispriced securities either will learn better or will run out of money,

For purposes of the EMH, irrationality is not a justification for regulatory intervention in the markets. Proponents of the EMH believe that most investors are rational and that their efforts produce a highly efficient means of raising capital. Regulations designed to restrain arbitrageurs from taking advantage of the irrational investors would be counter-productive--they would only interfere with the corrective process that arbitrage creates. Regulations that keep investors from making irrational decisions might be useful, but might be extremely difficult to implement, absent some ex ante ability to identify irrationality. Those who believe that the EMH accurately describes the operation of the securities markets therefore believe that regulation should be directed exclusively at producing broad and accurate disclosure of company information.

### 3. Skepticism About the EMH

Naturally, even though a sizeable body of empirical research supports the proposition that market prices reflect fundamentals, the EMH has attracted critics and skeptics. Recent flameouts among Fortune 500 companies like Worldcom, Enron, Tyco, and Adelphia, have made many academics and investors alike suspicious of the market’s inherent rationality. For adherents of the EMH, these recent disasters merely constitute evidence of a greater need for detailed disclosure requirements and greater enforcement of anti-fraud provisions. But for skeptics, the length of time that insolvent or Potemkin companies maintained market capitalizations in the billions of dollars suggests that prices in the markets can substantially deviate from fundamental values.

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<sup>42</sup> See Huang, *supra* note 9; Langevoort, *supra* note 9.

Another reason to be suspicious of the efficient market hypothesis is that it predicts aggregate behavior that is inconsistent with what we observe in practice. If markets were fully efficient and investors entirely rational, there would be no returns to private information. The joke is that an adherent of the EMH who encounters a \$20 bill on the sidewalk should let it be—if it were really a \$20 bill, else someone else would have already picked it up. And yet we observe enormous sums being spent on research and analysis as part of an effort to beat the market. To be sure, much of this seems wasted, as professional investors generally fail to beat the index.<sup>43</sup> But rationality must also be eluding them, as almost all financial academics, whether proponents or critics of the efficient markets hypothesis, advise individuals to avoid individual stocks and invest the equity portion of their portfolio exclusively in some form of index fund.<sup>44</sup>

Opponents of the EMH have also identified other anomalies in the market that are hard for the EMH to explain. The massive run-up in and subsequent crash of tech-sector stocks defies most conventional explanations within the EMH framework.<sup>45</sup> Explanations for several other puzzles are also elusive under the EMH: equity markets have generated excess returns to risk for a great many years—the so-called “equity premium puzzle.”<sup>46</sup> In an efficient market, this could not be so—such gains would quickly be dissipated by other investors who would drive the prices of equities down. Also, closed-end funds typically do not trade at the market value of the securities that they hold, thereby presenting a wealth of unexploited arbitrage opportunities.<sup>47</sup> Finally, some securities hold sub-sets of other securities, and yet do not trade at prices that reflect this ownership structure.<sup>48</sup> These instances create what look like clear arbitrage

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<sup>43</sup> See B. Malkiel, *Returns from Investing in Equity Mutual Funds 1971 to 1991*, 50 J. FINAN. 549 (1995); E. Elton, M. Gruber, S. Dias & M. Hlavka, *Efficiency with Costly Information: A Reinterpretation of Evidence from Managed Portfolios*, 6 REV. FINAN. STUD. 1 (1993); J. Lakonishok, A. Shleifer & R. Vishny, *The Structure and Performance of the Money Management Industry*, Brookings Papers on Economic Activity: Microeconomics 339 (1992).

<sup>44</sup> See Justin Fox, *Is the Market Rational?*, FORTUNE, Dec.2002, at 3.

<sup>45</sup> See SCHLEIFER, *supra* note 16.

<sup>46</sup> See R. Mehra & Edward Prescott, *The Equity Premium Puzzle* 40 J. MONETARY ECON. 145 (1985). *But see*, EUGENE FAMA, *THE EQUITY PREMIUM PUZZLE* (1998) (arguing that the historic equity premium is not really a premium; arguing that models that suggest it is fail to account for investor risk preference accurately).

<sup>47</sup> See Charles Lee, Andrei Shleifer & Richard Thaler, *Investor Sentiment and the Closed End Puzzle*, 46 J. FINAN. 75 (1991).

<sup>48</sup> See Hersh Shefrin, *Behavioral Corporate Finance*, 14 J. Applied Corporate Finance (2001); Owen Lamont & Richard Thaler, *Can the Market Add and Subtract?* (working paper, U. Chicago, 2001).

opportunities and yet they persist. Although proponents of the EMH have attempted to devise explanations for these anomalies, the persistence and ubiquitousness of these anomalies at least raises doubts about the degree of efficiency in the markets.

## B. The Deficient Markets Hypothesis

The EMH is not without competitors who have a different vision of how investors behave. Psychologists, experimental economists, and behavioral finance theories propose that the markets are not populated by a rational investors whose collective efforts produce well-behaved securities prices.<sup>49</sup> Rather, they propose that investors, like all human beings, make choices that are inconsistent with the rational-choice model. Borrowing mostly from psychological research, these scholars argue that people rely on mental shortcuts, known as heuristics, to make choices.<sup>50</sup> These heuristics serve us well in many circumstances, but can lead to systematic errors in judgment, or biases. If in all aspects of our lives, we make good choices, but are also prone to systematic mistakes in judgment, it is hard to believe that the same is not true of our investment decisions. This insight inspires the deficient markets hypothesis.

### 1. What is the DMH

According to the DMH, the market is populated by investors often make systematic errors in their assessments that will affect market prices. Because irrational choices pervade the market, securities prices might fail to reflect fundamentals.<sup>51</sup> Cognitive errors commonly lead to mispriced securities. In turn, cognitive mispricings undermine the proper functioning of securities markets. They cause a misallocation of capital and have adverse consequences to the individual investors.

Although some psychologists and others have dispute the notion that human choice is riddled with errors,<sup>52</sup> investment choices have characteristics that make investors particularly vulnerable to error.<sup>53</sup> Basic human intuition that would otherwise promote sensible choice will

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<sup>49</sup> See Hirshleifer *supra* note 19; Barberis & Thaler, *supra* note 5.

<sup>50</sup> See Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCIENCE 1124 (1974).

<sup>51</sup> See, e.g., Terrance Odean, *Volume, Volatility, Price and Profit When All Traders are Above Average*, 8 J. FINAN. 1887 (1998) (arguing that overconfidence among investors has several effects on the actual price of securities and operation of the market).

<sup>52</sup> See Gerd Gigerenzer, *How to Make Cognitive Illusions Disappear: Beyond "Heuristics and Biases"*, 2 EUR. REV. SOC. PSYCHOL. 83 (1991); Robert E. Scott, *The Limits of Behavioral Theories of Law And Social Norms*, 86 VA. L. REV. 1603 (2000).

<sup>53</sup> See Barberis & Thaler, *supra* note 5.



instead lead investors astray. Assessment of market information requires an attention to statistical information that has, in other contexts eluded people's inferential abilities. As a prominent example, people have difficulty in many contexts with incorporating base rate, or background statistics (such as a firm's historic performance or the historic volatility of a particular industry) with individuating information (such as a firm's most recent quarterly earnings report or the vague puffery contained in its communications with shareholders).<sup>54</sup> An excess of attention to the individuating information would lead people to pay too much attention to the most recent information and not enough to the long-term trends.<sup>55</sup>

Furthermore, accurate assessments of the market value of a security requires that an investor not only understand how the information that he has available relates to a security's value, but also how other investors react to the same information. That is, a belief that a security is undervalued implies that one has information about a security's value that the rest of the market either does not know or has failed to appreciate. If even a small number of other investors share the same belief, then the market will quickly adjust to correct the ostensible mispricing. Indeed, it is likely to have done so long before most investors can react. Identifying situations in which the market has somehow failed to react properly to the available information is an extremely difficult task.

In other contexts, people seem particularly unable to understand how others react to information.<sup>56</sup> It is as the aphorism about how difficult it is to see the world through other people's eyes suggests--the task seems to exceed our cognitive abilities.<sup>57</sup> People tend to assume either that others see the world the exact same way that they do (naive realism) or that their view is completely unique (naive cynicism).<sup>58</sup> Although naïve realism and naïve cynicism make opposite predictions, researchers have observed both phenomena, and attributed them to the

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<sup>54</sup> See Jonathan J. Koehler, *The Base Rate Fallacy Reconsidered: Descriptive, Normative, and Methodological Challenges*, 19 BEHAVIORAL & BRAIN SCI. 1 (1996) (discussing the problems people have with Bayesian reasoning).

<sup>55</sup> See SCHLEIFER, *supra* note 16.

<sup>56</sup> See Lee Ross & Andrew Ward, *Psychological Barriers to Dispute Resolution*, in ADVANCES IN EXPERIMENTAL SOCIAL PSYCHOLOGY, VOL. 27 255 (Mark Zanna, ed., 1995) (reviewing research on how people misunderstand others' perspectives).

<sup>57</sup> See LEE ROSS & RICHARD E. NISBETT, THE PERSON AND THE SITUATION: PERSPECTIVES OF SOCIAL PSYCHOLOGY 11-13 (1991)(discussing the limited ability to see the world as others see it).

<sup>58</sup> See Justin Kruger & Thomas Gilovich, "Naïve Cynicism" in *Everyday Theories of Responsibility Assessment: On Biased Assumption of Bias*, 76 J. PERSONALITY & SOC. PSYCHOL. 742 (1999).

same basic cognitive failure to understand how others process similar events.<sup>59</sup>

The difficulty people experience with understanding others' perspectives produces a strong self-serving bias. In many studies, upward of 80-90 percent of people rate themselves as being better than 50 percent of their peers at some desirable ability.<sup>60</sup> Couples about to get married demonstrate this tendency to a staggering degree--99% of these couples rate themselves as less likely than the average couple to get divorced.<sup>61</sup> Results like this demonstrate a profound inability to understand how other people react to the same.<sup>62</sup> A couple about to get married might rate themselves as less likely than the average couple to get divorced in part because they would see themselves as being "really in love" or "willing to work out problem" while at the same time couples fail to recognize that other couples will see themselves in the same way.<sup>63</sup> To answer a question about relative ability, a couple must know how the strength of their own devotion compares to all of the other couples, who also feel themselves to be "really in love." Likewise, couples fail to appreciate that all of the other couples they compare themselves to also feel that they are willing to work out their problems, and again, the issue the couples need to understand is whether they are more willing (or able) to work out their problems than other couples. Even a couple who knows its own proclivities well does not necessarily know the relationship of their own proclivities to those of other couples.

With regard to valuing securities, this gap in cognitive abilities makes it difficult for individuals to appreciate what, if any, private information they have.<sup>64</sup> Knowing when to trade on information that one possesses requires that one both understand how this information relates to the security's value and also how many other investors also have that information and how

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<sup>59</sup> *See id.*

<sup>60</sup> *See* Colin Camerer, *Individual Decision-Making*, in HANDBOOK OF EXPERIMENTAL ECONOMICS 59 (John H. Kagel & Alan E. Roth, eds., 1995)

<sup>61</sup> Lynn A. Baker & Robert E. Emery, *When Every Relationship is Above Average: Perceptions and Expectations of Divorce at the Time of Marriage*, 17 LAW & HUM. BEHAV. 439 (1993).

<sup>62</sup> *See* Camerer, *supra* note 60.

<sup>63</sup> *See* Thomas Gilovich, Justin Kruger & Kenneth Savitsky, *Everyday Egocentrism and Everyday Interpersonal Problems*, in THE SOCIAL PSYCHOLOGY OF EMOTIONAL AND BEHAVIORAL PROBLEMS: INTERFACES OF SOCIAL AND CLINICAL PSYCHOLOGY 69 (Robin M. & Mark R. Leary, eds., 1999).

<sup>64</sup> *See* Hersh Shefrin & Meir Statman, *Behavioral Capital Asset Pricing Theory*, 29 J. FINAN. & QUANTITATIVE ANALYSIS 323 (1994); Kent Daniel et al., *Investor Psychology and Security Market Under- and Overreaction*, (working paper, 1998).

others will react to it. Just as couples about to get married feel themselves to be deeply in love, investors fail to appreciate that a large number of other investors know what they know. For example, an investor who makes investment decisions based on corporate cash flow forecasts seen on CNN fails to appreciate that by the time such information makes it to CNN, it has almost certainly already been incorporated into the market price. The EMH's notion that all information is immediately incorporated into the share price seems to be a particularly elusive concept for individual investors. Investors are apt to treat the information that they possess as more unique than is actually the case.<sup>65</sup>

This naive overconfidence in one's information might, despite its costs, seem to be prevalent and widespread among investors.<sup>66</sup> Evidence suggests that investors are indeed overconfident about many aspects of their investment strategies. They overestimate the value of their private information and their abilities to beat the market.<sup>67</sup> Indeed, even after investors lose money, they adopt an attribution strategy that protects their overconfidence in their abilities; they attribute success to themselves and failure to unforeseeable market shifts.<sup>68</sup> In a portfolio of investments in which some do well and some do poorly, this biased attributional style will invariably lead to overconfidence in abilities. Small wonder then that investors also underestimate the riskiness of their portfolios.<sup>69</sup>

Overconfidence is not the only problem that afflicts the individual investor. Investors also seem to be particularly sensitive to whether their investment is creating gains or losses-- which psychologists term framing effects.<sup>70</sup> A rational investor would look for overall return on a portfolio, looking to maximize total wealth within a certain risk perspective related to their investment goals. This means ignoring arbitrary reference points such as whether a security has

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<sup>65</sup> See Barberis & Thaler, *supra* note 5.

<sup>66</sup> See *id.*

<sup>67</sup> See *id.*; Angela Hung & Charles Plott, *Information Cascades: Replication and an Extension to Majority Rule and Conformity Rewarding Institutions*, 91 AM. ECON. REV. 1508 (2001) (demonstrating with an experimental market that people over-estimate the value of their private information); Steffen Huck & Joerg Oechssler, *Information Cascades in the Laboratory: Do They Occur for the Right Reasons?* 21 J. POL. ECON. 661 (2000) (showing that people rely too heavily on their private information).

<sup>68</sup> See Kent Daniel, David Hirshleifer & Avanidhar Subramanyam, *A Theory of Overconfidence, Self-Attribution, and Security Market Under- and Over-Reactions*, 53 J. FINAN. 1839 (1998).

<sup>69</sup> See Barberis & Thaler, *supra* note 5.

<sup>70</sup> See Daniel Kahneman & Amos Tversky, *Choices, Values, and Frames*, 39 AM. PSYCHOLOGIST 341 (1984).

risen or fallen from a purchase price, or from any other reference point. It is the total package and total wealth that matters to the rational investor.

In many contexts, however, psychologists have found that people are sensitive to deviations from the status quo and somewhat insensitive to the total wealth at stake. People seem to weigh losses more heavily than gains and their risk preferences vary with whether a choice involves a loss or a gain.<sup>71</sup> People make risk-averse choices when facing potential gains and risk-seeking when facing potential losses.<sup>72</sup> Overall, this package of risk preferences supports taking gambles that produce returns that lead to a slow but steady increase in portfolio value. Although that seems a sensible enough policy, its emphasis uniformly positive returns can lead to costly decisions. In particular, people seem so value avoiding any negative outcomes that they will risk sizeable losses for the prospect of avoiding small losses.<sup>73</sup> The risk-seeking choices that this attitude produces can be extremely costly and is inconsistent with a sensible approach to investing, which necessarily incurs the risk of some small losses.

In the context of investing, investors face several natural frames that might affect their choices.<sup>74</sup> Perhaps most powerfully, investors know whether they have gained or lost from their purchase price on a security. If they have gained, then they might adopt a risk-averse perspective, being too willing to sell and cash out, rather than incur the risks of holding it longer.<sup>75</sup>

Of course, in an efficient market, the risks of holding a security that has increased in value are not necessarily any greater than the risks associated with holding a security that has recently declined in value. The market price reflects all information at all times, and hence cannot be affected by recent gains or losses. Yet, if investors see a sale of stock as involving gains, they will likely act in a risk averse fashion with respect to that stock and be more likely to sell. Conversely, for a stock that has declined in value, investors might be apt to see a sale as incurring a loss. Of course, once the security has declined, the loss has already been incurred--

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<sup>71</sup> See *id.*; Richard Thaler & Eric Johnson, *Gambling with House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice*, in *QUASI-RATIONAL ECONOMICS* 48 (Richard H. Thaler ed., 1991)

<sup>72</sup> See *id.*

<sup>73</sup> See SCHLEIFER, *supra* note 16.

<sup>74</sup> See Barberis & Thaler, *supra* note 5.

<sup>75</sup> See SCHLEIFER, *supra* note 16; Barberis & Thaler, *supra* note 5. See also, Hersh Shefrin & Meir Statman, *The Disposition to Sell Winners Too Soon and Ride Losers Too Long: Theory and Evidence*, 40 *J. FINAN.* 777 (1985); Peter R. Locke & Steven C. Mann, *House Money and Overconfidence on the Trading Floor* (Draft 2001); Peter R. Locke & Steven C. Mann, *Professional Traders Exhibit Loss Realization Aversion* (draft 2000).

the sale of the stock after a decline has no affect on value (holding aside tax implications, for the moment). Once again, in an efficient market, the decline in value implicates nothing for the future of a security because any bad news that caused it to decline has already occurred. But, if selling means incurring a loss, then investors are apt to adopt a risk-seeking approach. That is, they are more apt to hold on to a security until it can be sold without incurring a loss.

The data support this theory.<sup>76</sup> Investors are more apt to sell securities that are trading for an amount greater than what they paid, and are less apt to sell a security trading at an amount less than they paid. This result is particularly surprising in light of the tax treatment of sales of securities. Investors incur no tax gains or losses from fluctuations in the value of securities until they trade them. Attention to tax treatment would, therefore, produce the opposite effect.<sup>77</sup> That is, investors should hang on to winners, because a sale will result in a taxable event. A loss is also a taxable event, but a beneficial one for the taxpayer. Taxpayers will be able to charge the loss against their income, thereby reducing their tax liability. These incentives make the effect even more difficult to reconcile with the position that the market is filled with rational investors. Other irrational beliefs might also feed into this tendency. A misplaced reliance on the representativeness heuristic would have similar consequences to framing effects.<sup>78</sup> Many investors believe that recent increases in the price of a security indicates a tendency for the security to increase more in the future.

Some investors seem to use a more nuanced version of the representativeness heuristic in which they believe that recent revenue reports will accurately predict future revenue forecasts.<sup>79</sup> While this belief might sometimes be correct, it is nevertheless a mistake to trade on the basis of recent revenue reports alone. The reason is simple--in an efficient market, a recent revenue report is old news. Its projected effect on a company's future revenue stream is already incorporated into the market price of the security. An individual who trades on such information must be trading on the belief that she or he has a better ability to assess the meaning of the future revenue stream than the market. As noted above, this is a kind of naive cynicism, in which the investor fails to appreciate that the entire market has already seen and already reacted to the information that she is seeing and to which she is reacting. It is also similar to the notion of the mistaken belief in the hot hand--that is, the belief that recent success predicts future success, even in the face of good evidence to the contrary.<sup>80</sup>

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<sup>76</sup> See Barberis & Thaler, *supra* note 5.

<sup>77</sup> See SCHLEIFER, *supra* note 16.

<sup>78</sup> See *id.*

<sup>79</sup> See Barberis & Thaler, *supra* note 5.

<sup>80</sup> See Thomas Gilovich, Robert Valone & Amos Tversky, *The Hot Hand in Basketball: On the Misperception of Random Sequences*, 17 COGNITIVE PSYCHOL. 295 (1985).

Many investors also hold erroneous beliefs that are directly opposite to the hot-hand phenomenon. They believe in what has been called the gambler's fallacy--which is the tendency to believe in quick correction to long-term statistical trends.<sup>81</sup> Even though proponents of the EMH have documented that the daily price of a stock is unrelated to recent performance, some investors have interpreted this information to mean that after a few days of increases (or decreases), the price of a security will likely decrease (or increase). Even though the hot hand and the gambler's fallacies contradict each other, investors seem to pursue both, with slightly different time frames.<sup>82</sup> Investors believe in the hot hand after a single day (meaning they believe that a positive performance on one day will likely be followed by another), but believe in the gambler's fallacy after several days (after several positive days, a downturn will occur).<sup>83</sup>

Individual investors also engage in somewhat irrational thinking about how to allocate their money. They tend to segregate their money, even if only mentally, into different accounts.<sup>84</sup> They have some money that they set aside for safe investing and some for risky investment strategies. While that might seem to make sense as a diversification strategy, it is actually somewhat foolish. Given their investment time horizon, investors should adopt a particular attitude towards risk for all of their wealth. It makes little sense to have separate accounts for which people adopt different risk preferences unless this combination perfectly creates a portfolio with the appropriate level of risk. As a result of this mental accounting investors undertake an excess of risk. Mental accounting does restrict the excess of risk to a segregated portion of an investors' assets, but the error is no less a mistake just because it is confined to a fraction of an investor's wealth.

Similarly, investors seem to make choices about when to buy and when to sell that reflect an asymmetry in the regret people feel in choice.<sup>85</sup> People tend to regret actions more than inaction.<sup>86</sup> This tendency might make investors more be reluctant to sell a security than to purchase a security. Although this might be an adaptive response both to the temptation to trade too much and the efforts of brokers to induce people to trade too much, it can also lead to an unwillingness to update a portfolio to reflect changes in one's investment time horizon, or changes in the risk that the securities present.

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<sup>81</sup> See Hirshleifer, *supra* note 19.

<sup>82</sup> See *id.*

<sup>83</sup> See SCHLEIFER, *supra* note 16.

<sup>84</sup> See SHEFRIN *supra* note 10.

<sup>85</sup> See SCHLEIFER, *supra* note 16; Barberis & Thaler, *supra* note 5.

<sup>86</sup> See Thomas Gilovich & Victoria H. Medvec *The Experience of Regret: What, When, and Why* 102 PSYCHOLOGICAL REVIEW 379 (1995).

People also adopt naive diversification strategies.<sup>87</sup> That is, when offered a menu of securities, perhaps through a pension plan, they tend to allocate their securities equally among the options offered. Increasing the number of options increases the number that people choose. Although this might sound like a sensible diversification plan, its wisdom depends upon the options offered. Selecting uniformly from a number, range, and type of options that an employer or broker creates might not present sensible investment strategy. An investor who allocates equally among eight equities funds and one bond fund, for example, might, if he is approaching retirement, be incurring an excess of risk. Furthermore, if the eight equities funds invest in similar collections of stocks, then spreading one's wealth across them will create only the illusion of diversification.

As a general matter, most of the cognitive errors individual investors commit seem to encourage them to trade. In general, overconfidence among investors as to the value of their private information would lead them to trade. Misplaced reliance on the importance of trends and recent news about a company can also lead individual investors to trade when they should not. Among the cognitive processes, only regret aversion seems to deter trading. Because investors are vulnerable to excess trading, brokers and other entities have incentives to engage in advertising campaigns that play into the cognitive processes that encourage trade. Thus, under the DMH view, the market is filled with investors who adopt overconfident investment strategies that lead them to trade excessively.

## 2. Regulatory Implications of the DMH

Unlike the EMH, the DMH suggests that irrationality is a serious concern. Proponents of the DMH worry that individual investors will constantly lose significant sums by following unwise investment strategies. For adherents of the DMH, the prevalence of irrationality raises the specter of individual investors losing their life savings in the securities markets. Furthermore, if securities are as chronically mispriced as the DMH suggests, then cognitive errors could be creating a serious misallocation of capital. If cognitive mispricing is the norm in the equities markets, then firms have incentives to engage in business strategies that play into investors' cognitive errors rather than engaging in strategies designed to improve the firm's fundamentals.

Despite the potential individual and social costs of mispricing, the regulatory implications of the DMH are somewhat murky. If investors make bad choices, then the sensible option would seem to be to keep them from making these choices.<sup>88</sup> Overt and extensive

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<sup>87</sup> See Shlomo Benartzi & Richard Thaler, *Naïve Diversification Strategies in Retirement Savings Plans*, 91 AM. ECON. REV. 79 (2001). See also, J. Patel, R. Zeckhauser & D. Hendricks, *The Rationality Struggle: Illustrations from Financial Markets*, 81 AM. ECON. REV. 232 (1991). (People move in and out of mutual funds irrationally; they are subject to status quo bias, past performance effect, framing and data packaging effect).

<sup>88</sup> Langevoort, *supra* note 9.

paternalism that would prevent individual investors from entering the market is unappealing, however. Less intrusive reforms might be more constructive. Incentives for individual investors to rely more on institutional intermediaries in investments might reduce the prevalence and costs of irrationality. That is, if investors gained some obvious and compelling advantage to investing through an institution, rather than on their own, they would be more likely to use professionals and collective mechanisms that might reduce the likelihood that they would make a naive mistake.

Other minimally intrusive efforts to save individual investors from irrational beliefs are also feasible.<sup>89</sup> Investor education programs could correct some problems. Many of the deficiencies that the DMH identifies in investors arise because people rely on their intuition as a source of beliefs about the likely functioning of the market. An educated investor need not rely on her intuition for a sense of how the market functions, thereby reducing the role that the misleading heuristics would play. Some undesirable phenomena might persist, however, even among educated investors. For example, framing effects, regret aversion, and the artificial segregation of accounts might depend on emotional reactions, rather than cognitive misunderstanding.<sup>90</sup> Likewise, overconfidence effects might arise from motivated inference processes, rather than from the cold cognitive process described above.

Reforms designed to remedy cognitive errors might also target the behavior of brokers and firms who sell securities to individual investors. Even if these entities refrain from disclosures and statements that fall short of fraud, they might still present assertions that appeal to the mistaken cognitive processes.<sup>91</sup> Companies might rely on assertions that leave the impression that they will do well in the future, even as they make honest statements. They might describe their firm's immediate future in graphic terms that sound like puffery, but appeal to an emotional side of investors. Similarly, brokerages run advertisements to the general public designed to imbue individual investors with a misplaced sense of confidence.<sup>92</sup> For example, at the height of the stock-market boom, the on-line investment company e-trade ran advertisements indicating that ordinary people could become fabulously wealthy by engaging in on-line trading.<sup>93</sup> These advertisements were clearly designed to get people to invest through the Internet, and tapped into the over-confidence that individual investors possess. Through these efforts, the advertisements might also have encouraged the over-confidence.

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<sup>89</sup> *Id.*

<sup>90</sup> *See* Huang, *supra* note 9.

<sup>91</sup> *See id.*; Langevoort, *supra* note 9.

<sup>92</sup> *See Office of the State of New York Attorney General Elliot Spitzer: From Wall Street to Web Street: A Report on the Problems and Promise of the On-line Brokerage Industry Prepared by Investor Internet Bureau and Securities Bureau, 1189 PLI/Corp. 355 (1999).*

<sup>93</sup> *See* Huang, *supra* note 9.



The DMH also points regulators towards greater attention to the format in which information is presented. In other contexts, for example, banking regulations require specific formats for disclosure of interest rates, so as to make them more comprehensible.<sup>94</sup> Presumably securities regulations could also restrict advertising and dictate the disclosure format of investment information. More aggressive regulations might restrict the use of investment devices that feed directly into cognitive errors like over-confidence. In particular, the instant access to investments on the Internet, unmediated by a broker, might be troublesome. The Internet has made it essentially costless for brokers to communicate seemingly benign information to trades that might induce an excess of trading. Constant reminders of account balances might encourage investors to trade more than they should.<sup>95</sup>

As a general matter, all of the reforms that this cognitive error story suggests would reduce the influence of the individual investor on market prices.<sup>96</sup> Obviously, extreme reforms that limit individual access to the markets would reduce individual presence, but the more plausible reforms would also reduce their influence on market prices. Some of the reforms would reduce individual access to the markets, by requiring or strongly encouraging the reliance on intermediaries. Intermediaries provide expertise, but at a price, thereby increasing the cost of investment. Even investor education is designed to curtail individual investors' effect on market prices. Education would inevitably be designed to school individual investors in the EMH, which, in turn, teaches individuals to buy the index and not individual securities. The more individuals followed such advice the more they would be taken out of the pricing structure of securities.

It follows logically from the DMH that individual investors should be constrained in a way that restricts their ability to affect market prices. This is because the source of the deficiency is individual judgment. The only way to rid the market of its influence and protect individuals is either to keep them out or get them to buy index funds.

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<sup>94</sup> The Fair Credit Reporting Act, 15 U.S.C. Sec. 1681-1681(u) (2002).

<sup>95</sup> See Barberis & Thaler, *supra* note 5.

<sup>96</sup> See Langevoort, *supra* note 1.

### III. BEHAVIORAL FINANCE: A NEW SYNTHESIS

The DMH is, in many ways, as unsatisfying as the EMH. Even as the EMH seems to fail to incorporate the cognitive and judgmental limitations of individual investors, the DMH fails to address basic objections that EMH proponents argue about.<sup>97</sup> First, much of the cognitive error story is static; it does not assess the role that arbitrage might have in moderating the impact of cognitive errors on prices. Second, it is unclear what the policy implications of the DMH are. Given the costs of regulation, does it really make sense to adopt any of the regulations that its insights seem to support? In addition to the obvious costs of creating and implementing a regulatory regime, the effect of driving out the influence of individual investors might not be beneficial. If individual investors truly followed the EMH, market liquidity might suffer. Also, by investing only in index funds, individual investors would deprive the market of any private information that they had been providing. The new synthesis of the EMH and the DMH into the field of behavioral finance addresses many of these concerns. The implications of behavioral finance for regulation of the securities markets, however, have yet to be fully addressed.

#### A. Combining the EMH and the DMH

The phenomena underlying the DMH are interesting by themselves, but somewhat trivial if they represent only transient quirks among investors. After all, economics is notoriously bad at predicting short-term movements and individual choice; the field's most robust claims arise from describing equilibrium tendencies. The recent work on behavioral finance has made efforts to use the best of both the EMH and the DMH. Behavioral finance attempts to determine how it is that empirical evidence shows both that investors are often irrational while at the same time the basic tenets of the EMH attract widespread empirical support.

Rather than reject one of the two lines of empirical research as methodologically inappropriate or misleading, behavioral finance takes both seriously. Behavioral finance theorists start with the empirically supported premise that many investors rely on cognitive processes that will lead them to assign mistaken values to securities. They also believe that in many circumstances, a significant number of investors will rely on the same cognitive processes, such that they put pressure on a security to be mispriced. In effect, they do not assume that cognitive errors simply cancel each other out. At the same time, behavioral finance theorists worry about how arbitrage in a dynamic market will interact with misleading cognitive processes. They acknowledge that arbitrage places pressure on securities prices back towards fundamental values and try to incorporate such pressure into their models. At the same time, behavioral finance theorists recognize that arbitrage is a limited tool for correcting cognitive mispricing. Behavioral finance is thus an effort to describe how the fundamental tension between cognitive mispricing documented by the DMH and arbitrage pressures on securities prices documented by the EMH produces securities prices.

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<sup>97</sup> See Eugene Fama, *Efficiency, Long-Term Returns and Behavioral Finance*, 49 J. FINAN. ECON. 283 (1998).

This fundamental insight is perhaps best illustrated by so-called “beauty contest” studies. In one such study, a group of subjects (investors) were asked to pick a number from 0 to 100.<sup>98</sup> They are told that the winner will be the person who chooses a number that is 2/3 of the mean of all the guesses. If all of the subjects are rational, and know that all the subjects are rational, they will all choose 0, and then they all win (and either share a prize or get a 1/n chance of getting the prize if it is not split). This result is analogous to the EMH’s description of the market, in which all investors select the index. But the efficient result is never observed in such studies, and 0 is never a winning answer. Subjects adopt all manner of theories as to how to approach the problem, all of which incorporate some simple belief or heuristic about how to win the contest.<sup>99</sup> As Keynes noted long ago, knowing what a rational market would produce is far less useful than knowing what others’ reactions will be.<sup>100</sup> Doing well in the securities markets thus requires knowing not what the fundamentals are, but from knowing how others will invest.

Even with an understanding of the cognitive processes investors rely upon, identifying how investors think can be extraordinarily difficult. Behavioral finance researchers have documented both overreaction and underreaction to news, in somewhat different contexts, and have been able to attribute both to reliance on misleading cognitive heuristics by investors.<sup>101</sup> Cognitive processes that cause large numbers of investors to overreact or underreact to news can thus produce market pressure to misprice securities. Given the contextual nature of how people think about risk, it is not surprising that psychological processes produce conflicting phenomena. Consequently, in order to exploit arbitrage opportunities that arise from perceived cognitive mis-

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<sup>98</sup> See Teck Ho, Colin Camerer & Keith Weigelt, *Iterated Dominance and Iterated Best Response in Experimental ‘p-Beauty Contests,’* 88 AM. ECON. REV. 947 (1998). A recent demonstration of this result was obtained by a contest, run by the Financial Times and open to all readers. At stake were two round trip transatlantic business class tickets. The winning number turned out to be 13. R. Thaler, *Giving Markets a Human Dimension, Mastering Finance in Financial Times*, 6,4, (1998)

<sup>99</sup> For this reason, irrational trades might still affect the market price, even if they are weeded out. See Leonid Kogan et al., *The Price Impact and Survival of Irrational Traders* (draft 2002).

<sup>100</sup> Keynes’ observations about the fallibility of an arbitrage pricing strategy based on fundamental valuations were illustrated by actual examples of beauty contests. In his account, a newspaper ran a survey asking its readers to guess which of a number of faces would be considered most beautiful by the largest numbers of its readers. In the contest, however, no one was asked to provide their own individual assessment of the faces’ beauty, but rather only their guesses about the other reader’s guesses. It is easy to see how a winning strategy can become divorced from any independent criteria of beauty.

<sup>101</sup> Werner de Bondt & Richard Thaler, *Does the Market Overreact?*, 40 J. FINAN. 793 (1986); Padma Kadiyala & R. Raghenvendra Rau, *Investor Reaction to Corporate Event Announcements: Under-Reaction or Over-reaction?* --J. BUS. -- (forthcoming, 2003).

pricing, an arbitrageur has to be able to predict whether the market is overreacting or underreacting. A would-be arbitrageur who misidentifies a cognitive trend risks extreme losses.

Several factors limit the ability of arbitrageurs to take advantage of cognitive mispricing of securities, even among would-be arbitrageurs who know how a security is mispriced. Because not all investors in the market are perfectly rational and not all investors are investing as if all investors are rational, an investment strategy based on superior information about fundamentals may turn out to be costly. This is particularly true when the investment strategy involves selling a security short. If an investor knows that the ultimate valuation of a security will be zero, he can still lose his entire stake by selling short if the security increases in value, even briefly, on its way to being worthless.<sup>102</sup> This risk is especially great when stock is difficult to borrow due to a limited float.<sup>103</sup> Arbitrage opportunities arising from cognitive mispricing are effectively limited by the investor's wealth and investment time horizon.

Investors who hold irrational beliefs might be rewarded in the short run by taking on riskier investments<sup>104</sup> or because professionals who trade "against" investor irrationality are net losers in the short run.<sup>105</sup> Either of these events would provide positive feedback to irrational investment strategies, reinforcing any divergence in price from what would be the long-run equilibrium. In effect, the essential arbitrage strategy—betting that securities will return to fundamental values—might lead to such dramatic short-run losses among would-be arbitrageurs that cognitive mispricing can persist.

Dynamic modeling techniques have demonstrated the limits of arbitrage against irrationality. In one famous computer modeling experiment, researchers at the Santa Fe Institute created a simulated market that included intelligent agents with various investment strategies.<sup>106</sup> After an initial distribution of random strategies, some market conditions led to the rapid diffusion of momentum trading strategies in which many agents simply bought into winners and

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<sup>102</sup> See Andrei Shleifer & Lawrence Summers, *The Noise Trader Approach to Finance*, 4 J. ECON. PERSP. 19 (1990).

<sup>103</sup> See E. Ofek & M. Richardson, *Dot-Com Mania: Market Inefficiency in the Internet Sector*. (Working paper, NYU, 2001).

<sup>104</sup> See B. Barber & Terrance Odean, *Trading is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors*, 55 J. FINAN. 773 (2000).

<sup>105</sup> See De Long, et al., *supra* note 39.

<sup>106</sup> See W. Brian Arthur, et. al., *Asset Pricing Under Endogenous Expectations in an Artificial Stock Market*, in, *THE ECONOMY AS A COMPLEX ADAPTIVE SYSTEM II* (W.B. Arthur, S.N. Durlauf, & D.A. Lane, eds.,1997).

bailed out of losers. The presence of these momentum traders exaggerates perturbances in prices. For their part momentum traders tended to dominate the market for substantial periods until their ranks were ultimately decimated in some kind of correction. The experiment demonstrated that fluid markets can tolerate, and even reward, irrational traders for long periods of time and that the presence of these irrational traders will substantially affect prices.

The results of this simulation are consistent with findings about irrationality among real investors. In a study of day traders, researchers found that individuals who traded most often had higher mean returns, but only because they took on more risk.<sup>107</sup> Although this suggests that the traders were behaving perfectly rationally, they continually misattributed their success to trading skill, underestimating the risk that they were assuming. Eventually, traders who exhibit this profile are destined to be wiped out. So long as overconfident investors misattribute their investment success to their skill at evaluating and trading on private information, they will fail to recognize this ultimate risk. In the meantime, they can remain in the market for substantial periods of time because the market rewards them for bearing risk.<sup>108</sup>

Understanding the timing of how a cognitive mispricing will play out is thus critical to arbitraging against cognitive mispricing. Investors who trade solely on momentum aggravate this problem further. Thus, one observes situations in which the market begins reacting to news, tends to over-react because of cognitive errors, and the trend is exaggerated by those investors who believe in the hot hand. Even if an arbitrageur understood the extent of the overreaction due to the initial news, he might fail to appreciate the influence of momentum traders. Indeed, some arbitrageurs become momentum traders themselves, riding the wave of sentiment, and exacerbating the overreaction. The general unpredictability of the strength of market reactions and of the power of momentum traders converts seemingly riskless arbitrage opportunities into incredibly risky ventures.

Instead of arbitrage opportunities that arise from betting against market trends, the influence of investor irrationality makes it possible for momentum traders who bet on market trends to be successful, at least some of the time.<sup>109</sup> Contrary to both the EMH and the DMH, cognitive errors in the market can create an opportunity for people who fall prey to other cognitive errors to make supernormal profits. Consider the following example to see this. Suppose a firm announces some bit of unexpected good news. Suppose further that, owing to some cognitive error, the market overreacts to the good news, driving the stock price well up

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<sup>107</sup> See Werner F.M. DeBondt & Richard M. Thaler, *Financial Decision-Making in Markets and Firms: A Behavioral Perspective*, in Finance, HANDBOOKS IN OPERATIONS RESEARCH AND MANAGEMENT SCIENCE 385 (Robert A. Jarrow, Vojislav Maksimovic & William T. Ziemba eds., 1995).

<sup>108</sup> See Barber & Odean, *supra* note 104.

<sup>109</sup> See De Long, et al., *supra* note 39.

beyond the point that could be rationally justified by the news early in a trading session. Two investors react differently to this event: an arbitrageur sells the stock short (and hedges with the purchase of a comparable security that has not experienced the good news); a momentum trader buys the security, even at seemingly inflated prices (and hedges with a short position on a comparable security); a third, more naive momentum trader just buys the stock, even at inflated prices (with no hedge position to guard against industry-wide risks unrelated to the individual stock). The market might then react either with the gambler's fallacy or the hot hand. If the market adopts a gambler's fallacy approach to the recent run up in share price, then the price will fall, and the arbitrageur will do well. If the market adopts a hot hand approach, then the price will run up further, and both momentum traders will do well. If the market relies on some misguided version of the representativeness heuristic or halo effect that inspires a buying spree for both the firm and the industry, then only the naive momentum trader will do well.<sup>110</sup>

For cognitive mispricing to create an arbitrage opportunity, the arbitrageur must also be able to identify the magnitude of the cognitive phenomena creating the mispricing. For example, closed-end funds would appear to create arbitrage opportunities that arise from cognitive error. Closed-end funds arguably recast investment decisions for individual investors. When choosing whether to purchase a closed-end fund, investors look at the underlying information in a different way, which might inspire different mental shortcuts, and hence different valuations. Many psychologists have found that gambles can be presented in different ways that create a different way of thinking and thereby produce different choices. For example, consider the following three gambles:

- A. \$500 for sure, then a gamble involving a 50% chance to win either \$100 or \$0 or \$50 for sure
- B. \$600 for sure, then a gamble involving a 50% chance of losing either \$100 or \$0 or a \$50 loss for sure

Even though these three gambles are economically identical, people value them differently. The choice in option A involves gambles among gains, suggesting people will tend to make risk-averse choices. Most people would prefer the sure \$50, and knowing this, would value option A at \$550. By contrast, the choice in option B involves losses, suggesting people will make risk-seeking choices. They will prefer the gamble, and will value the security at something greater than \$550 (discounting somewhat the likelihood of losing). Likewise, a bundle of securities will produce a different set of gambles than the individual securities will. Indeed, just as the psychological research suggests, closed-end funds rarely trade at the combined market value of their underlying securities.<sup>111</sup>

An arbitrageur hoping to cash in on misvaluation in a closed-end fund, however, faces a

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<sup>110</sup> *See id.*

<sup>111</sup> *See Barberis & Thaler, supra note 5.*

considerable challenge. Even if the arbitrageur recognizes a cognitive mispricing, unless the arbitrageur also understands when the market will correct itself, the mere fact of the misevaluation does not create a clear arbitrage opportunity. For example, suppose an arbitrageur recognizes that two separate securities create the equivalent of option B when bundled together. Separately, the securities are worth \$550, but together, investors value them bundled at slightly greater than \$550, say \$560. This discrepancy suggests that the arbitrageur can purchase the combined securities separately, and sell the bundled security short (assuming that position is available) at \$560. Indeed, the EMH suggests that an arbitrageur should put all of his money into this combined position to maximize the benefits of the arbitrage opportunity. Although this arbitrageur seems sure to earn \$10 per share, he may not. If the cognitive mispricing persists beyond the settlement period for the short sale, then he will earn nothing. Worse, if the mispricing intensifies before his short position closes, then he may face liquidity constraints that bankrupt him before he can realize the benefits of his position. Only an investor with infinite wealth could be certain to profit from this opportunity. For everyone else, the inability to predict how the erroneous belief will unfold will make such opportunities risky. Successful arbitrage of a cognitive mispricing requires not only that the arbitrageur identify the mispricing, but also that the arbitrageur understand the magnitude of the anticipated mispricing. Otherwise, the would-be arbitrageur risks bankruptcy.

Finally, cognitive mispricing might arise from such widespread and fundamental process among investors that the market will never correct itself. For example, some behavioral economists believe that an analysis of cognitive errors in investment can solve the equity premium puzzle.<sup>112</sup> Behavioral finance theorists argue that individual investors risk are myopically focused on averting losses from individual investments within their portfolio.<sup>113</sup> Investors who frequently examine their portfolio (and hence commonly observe downturns) view their securities as more risk than those who infrequently examine their portfolios (and hence rarely observe downturns). In order to be induced to hold securities that seem so risky, individual investors consistently insist on higher rates of return. Arguably, this premium shows that there is little overall confidence in the securities markets.<sup>114</sup> This belief is so chronic that it cannot be arbitrated away.<sup>115</sup> Arbitrageurs only cash in when the markets correct, which never really happens when beliefs are so fundamental that the correction never occurs. Potential arbitrageurs would long ago have gone bankrupt waiting for the market to correct itself against the equity premium.

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<sup>112</sup> See Shlomo Benartzi & Richard Thaler, *Myopic Loss Aversion and the Equity Premium Puzzle*, 110 Q.J. ECON. 73 (1995)

<sup>113</sup> *See id.*

<sup>114</sup> Arguably, this thesis is inconsistent with the overall view that investors are overconfident. It must be noted, however, that the finding is that investors are overconfident in their judgment and investment abilities, not overconfident that the market will produce high returns.

<sup>115</sup> *See De Long, et al., supra note 39.*

Thus, absent a complete theory of how irrationality works, a partial theory can only lead to disaster. Inasmuch as arbitrageurs either learn this or go bankrupt, then irrationality does not create arbitrage opportunities. Because irrationality does not create arbitrage opportunities, it will persist. While it is an interesting theoretical exercise to construct apparently riskless arbitrage strategies, arbitrage in the real world is fraught with dangers. In the absence of an unlimited credit line and infinite patience, arbitrageurs lead very risky lives, as illustrated by the collapse of Long Term Capital Management and efforts to arbitrage against the recent runup in technology stocks. LTCM may have had a deep reservoir of Nobel-prize-winning brain power, but it lacked a correspondingly deep reserve of credit.<sup>116</sup> Although their bets turned out to be correct for the most part in the long run, to paraphrase Keynes, in the long run we are all dead, and so too was the patience of LTCM's lenders. Likewise, several efforts to hedge against a perceived bubble in the technology sector also went bankrupt before the bubble burst.<sup>117</sup>

Behavioral finance is thus a combination of two theories. It has rational components and borrows heavily from the dynamic models of the EMH. The behavioral finance approach recognizes that investors can adopt irrational beliefs, but at the same time that these irrationalities affect prices. Behavioral finance suggests that arbitrage pressures will generally push markets towards efficiency, but that assessing when efficiency obtains is a function of the depth and timing of the cognitive process of investors.

#### B. The Value of Irrationality in a Largely Efficient Market

Concluding that because irrational beliefs can affect market prices, they are an undesirable presence in the market would be a mistake. Behavioral finance reveals hidden benefits of irrationality. Efficient markets persist in spite of individual investor irrationality, and

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<sup>116</sup> See SCHLEIFER, *supra* note 16 (describing the turmoil of LTVC); ROGER LOWENSTEIN, *WHEN GENIUS FAILED* (2000)(giving a full account of LTVC).

<sup>117</sup> See Markus Brunnermeier & Stefan Nagel, *Arbitrage at Its Limits: Hedge Funds and the Technology Bubble* (working paper, Princeton University, 2002) (rather than betting against the boom, most hedge funds rode the trend and bailed out right before the peak. Hedge funds that bet against the boom, such as Julian Robertson's Tiger Management, went belly up while waiting for the bubble to burst).



indeed may even be served by investor irrationality. We make three observations that support this thesis: first, that investor irrationality might be critical for liquidity; second, that investor over-confidence encourages investors to provide information to the market that would otherwise be withheld; and third, that the collective set of errors that individuals bring to the market lead to a more efficient price than a market run by institutional investors.

#### 1. “Noise Traders” Provide Liquidity

In a fully efficient market filled with rational traders, all trading would be motivated solely by liquidity needs. That is, purchases would be made by investors who were accumulating wealth and sales would be made by those drawing down their wealth, whether for major purposes or for life cycle reasons. In this world, there would be no way to acquire an informational advantage and so all investment in the acquisition of such information would dry up. The EMH in its most extreme form runs up against this problem: if markets are efficient because of the pervasiveness of information, where does the information come from if no one is digging it up? It presupposes that information is costlessly, if not magically created and disseminated.<sup>118</sup>

Of course, this vision of the market exists only as a theoretical exercise.<sup>119</sup> We know that there are professional investors who spend a great deal of time and money accumulating information and expertise about companies, so as to trade on their informational advantage. Thousands of investment professionals pore over financial reports; interview managers, clients, and employees of companies; draft sophisticated discounted cash flow models; and attempt to predict the effect of different economic variables on corporate performance. This value-added research has a positive economic payoff and has been the basis for quite a few modern fortunes. Even efficient markets theorists have gotten into the game, starting funds on the basis of what they believe to be superior access to information, or at least a superior ability to analyze this information.

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<sup>118</sup> See Peter Bernstein, *Why the Efficient Market Offers Hope to Active Management*, 12 J. APPLIED CORP. FINAN. 129 (1999).

<sup>119</sup> See S. Grossman & J. Stiglitz, *On the Impossibility of Informationally Efficient Markets*, 70 AM. ECON. REV. 393 (1980).

If the acquisition of superior information about assets is to lead to positive returns, it must come at the expense of those with inferior information. If investors followed the advice of financial academics, they would purchase the index and avoid losing out in trades against those with superior information. In some sense, it is hard to see how individuals fail to miss this point. As George Akerloff points out, anyone who knows himself to be in possession of inferior information will be wary of trading with the professionals.<sup>120</sup> Any price that the professional is willing to ask must be too high and any price he is willing to bid is too low. When information is unevenly distributed, trading (except for liquidity purposes) should dry up. Thus, a robust efficient market with could not exist regardless of the distribution of information. If information is uniformly distributed, there is no way to make money trading because there will be no predictable price movements and if it is unequally distributed, there is no way to make money trading, because there will be no one willing to trade.

Since we do observe active trading, and since investment professionals are here to stay, there must be some investors who are systematic losers. It is these “noise traders,” as Fisher Black calls them, who create market liquidity.<sup>121</sup> In the simplest version of this model, all investors can be divided into two camps: those who trade on genuine information and those who trade on bogus information, or noise. Investors are continually bombarded with signals that may have relevance to asset valuation. Investment professionals can filter out the noise and use what remains as the basis for their investment decisions. Non-professionals are unable to filter out the noise and so use it as the basis for their investment decisions. The existence of these uninformed investors is what allows the investment professionals to earn a return on their superior information processing. In order for this model to work, it must be the case that the noise traders do not view themselves as such. They honestly believe that they are trading on relevant information.

Noise traders, then are nothing more than overconfident investors. Each of them believes himself to be possession of some private information which is relevant to the future price of the security, but this belief is erroneous.<sup>122</sup> On average, noise traders will do worse than the market while professional investors will beat it. If the only effect of noise trading in the market was to

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<sup>120</sup> See George Akerlof, *The Market for “Lemons”*: *Qualitative Uncertainty and the Market Mechanism*, 97 Q. J. ECON. 488 (1970).

<sup>121</sup> See Black, *supra* note 37.

<sup>122</sup> See Giles Hilary & Lior Menzly, *Does Past Success Lead Analysts to Become Overconfident* (draft, 2001).

furnish a money pump, channeling savings away from these naive, overconfident investors into the hands of the more rational professionals, it would be hard to argue with paternalistic regulations which put a stop to this flow. But by providing professionals with a return on their information acquisition, noise traders effectively subsidize the process by which asset prices approach their appropriate value. Noise traders are essential to the price setting which leads to the efficient allocation of capital. Any policies which curtailed their willingness to continue with their subsidies might jeopardize the functioning of the capital market.

This is, admittedly a fairly weak argument in opposition to protecting irrational investors. If investment professionals need to be subsidized, surely there are more equitable ways to do this. In the basic noise trader model, those individual investors who are the most risk seeking and the most overconfident, e.g. the most irrational, will be disproportionately hurt by this process. Why not have the government subsidize the financial markets directly? Perhaps the government could actively trade stocks at random. This would provide the market with adequate liquidity without imposing the cost exclusively on the more irrational members of the investing public. This policy would provide adequate liquidity while providing paternalistic protection against the worst consequences of poor judgment.

## 2. Overconfident Investing Strategies Promote Accurate Pricing of Securities

If overconfident noise traders did nothing more than serve as the gullible counterparts to informed investors, providing the necessary lubrication to a well functioning capital market, it would be difficult to justify a policy that sacrificed their financial well being. Irrational investors, however, are valuable in other ways. Random trading by the government would be no substitute for noise traders, because the liquidity that it would provide would come with no corresponding informational content—it would be pure noise to create liquidity. By contrast, most private investors probably trade on both information and noise. Even those who are professional investors may be trading on information which turns out *ex post* to be irrelevant or misguided. In other words, all traders are noise traders, to a degree. As a corollary, almost all investors also inject some relevant information into the market.

A standard demonstration, used in most introductory classes in decision theory or finance, illustrates the point. Students are asked to estimate the total value of a large number of coins in a jar and to provide a 50% confidence interval around their guesses.<sup>123</sup> While individual guesses can be wildly off the mark and the true value is more often than not outside of individual confidence intervals, it is almost always the case that the average guess lies somewhere close to the underlying value. This serves as an instructive analogy to the process by which securities are traded on a liquid market. In spite of the limited knowledge and overconfidence of those making the guesses, the larger the number of guesses, the more accurate is the average guess.

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<sup>123</sup> Average guesses have been shown to have superior results in weather forecasting. See J.S. ARMSTRONG, *LONG RANGE FORECASTING* (1985); C.A. Stael von Holstein, *An Experiment in Probabilistic Weather Forecasting*, 10 *J. APPLIED METEOROLOGY* 635 (1971).

Nevertheless, most investors would be well-advised to avoid betting on their guesses. If those submitting guesses were cured of their overconfidence and discouraged from submitting guesses, the quality of the average would suffer. A securities market that is open to all comers, which solicits investment decisions from a wide range of people, may do a much better job of pricing securities than one that relies on a small number of trained individuals.

Rational investors would, in most cases, likely refrain from betting on their beliefs. Risk-aversion makes the easily available alternative of investing in a market index too attractive. As proponents of the DMH note, investors rely on cognitive processes that make trading on their beliefs seem like a good idea. Although the DMH suggests this is a disastrous strategy that should be curbed, if possible, curbing the strategy potentially eliminates a great deal of information from the market.

To see this, consider the phenomenon known as the “home bias”—which is the tendency to over-invest in familiar securities.<sup>124</sup> For example, after the break up of ATT into the regional bell operating companies (“RBOCs”), ATT stock holders received pro rata shares in all of the RBOCs. If investors were perfectly rational, subsequent trades in RBOC stocks should be unrelated to geographic location. Nevertheless, investors exhibit a correlation between an individual’s RBOC stock holdings and his telecom service provider. Similarly, investors tend to accumulate shares in other companies with whom they do business, or whose products they admire.<sup>125</sup> Home bias can explain why investors are wary of foreign company stocks.<sup>126</sup> Investors systematically underestimate the rates of return on foreign stocks relative to domestic ones. Home bias can also explain why employees tend to invest a disproportionate amount of their wealth in the retirement savings plans sponsored by their companies.<sup>127</sup> The bias arguably keeps investors from adequately diversifying; in other words, investors buy familiar stocks instead of just an index.

At the same time, the home bias might be an example of the “quick and dirty” familiarity heuristic that can produce superior decisions.<sup>128</sup> “Invest in what you know” might be a rough

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<sup>124</sup> See Gur Huberman, *Familiarity Breeds Investment*, 14 REV. FINAN. STUD. 659 (2001). See also, Terrence R. Chorvat, *Ambiguity and Income Taxation*, 23 CARDOZO L. REV. 617 (2002) (reviewing evidence of the home bias in investing).

<sup>125</sup> See Karen K. Lewis, *Trying to Explain Home Bias in Equities and Consumption*, 37 J. ECON. LITERATURE 571 (1999).

<sup>126</sup> See Kenneth French & James Poterba, *Investor Diversification and International Equity Markets*, 81 AM. ECON. REV. 222 (1991).

<sup>127</sup> See Shlomo Benartzi, *Why Do Employees Invest their Retirement Savings in Company Stock?*, (working paper, U.C.L.A. 1999).

<sup>128</sup> See Bernhard Borges, Daniel G. Goldstein, Andreas Ortmann & Gerd Gigerenzer,

proxy for having some superior information.<sup>129</sup> Employees, for example, are often in a superior position to evaluate firm performance even without access to illegal insider information. Telephone customers might have more insight into the performance of their local RBOC than distant RBOCs, through personal contacts with employees or personal experience with the local RBOC's business practices. Home bias generally encourages investors to act on even the appearance of superior information. Whether it is sensible for them to do so or not, by acting on this rough heuristics, investors feed their information into the market.

Acknowledging the benefits of the home bias creates a different perspective on the role that many public financial advisors play in the markets. If most investors are foolishly pursuing erroneous beliefs, then investment advisors seem to encourage over-confidence in investment by pandering to cognitive errors. For example, consider Peter Lynch, who made his name as a manager of the Fidelity Magellan Fund, which sustained supernormal returns during his tenure.<sup>130</sup> He became well known also as a financial guru to the investing public, by arguing that individual investors could outperform the market by investing in what they knew. He argued that ordinary individuals possess information that is relevant to the value of securities long before it becomes common knowledge among investment professionals. If an individual enjoys a product or finds that a company provides exceptional service, or if he observes himself or others switching their loyalty from one company to another, this may say something about the future value of the company. In other words, anecdotal evidence may be relevant. Peter Lynch's advice might sell well in part because it plays into strategies that investors are prone to follow. Even though Lynch's arguments appeal to investors' cognitive vulnerabilities and encourages the kind of over-confident investment strategies that inspire calls for regulatory intervention,<sup>131</sup> Lynch also encourages investors to provide information to the markets.

Also consider the problem that individual investors also seem to treat stocks they way that they would other commodities. That is, investors sometimes buy and sell based on feeling and anecdote.<sup>132</sup> In part this is why advertising campaigns by brokerages and electronic trading companies relies so heavily on emotional and anecdotal appeals. Such appeals might well be effective in getting people to invest when they perhaps should not. Once again, the potential

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*Can Ignorance Beat the Stock Market?* in., SIMPLE HEURISTICS THAT MAKE US SMART (Gerd Gigerenzer & Peter Todd eds., 1999).

<sup>129</sup> See also Azriel Levy & Miles Livingston, *The Gains from Diversification Reconsidered: Transaction Costs and Superior Information*, 4 FINAN. MARKETS, INSTITUTIONS & INSTRUMENTS 1 (1995) (surprisingly small amounts of superior information provide a strong incentive to concentrate a portfolio).

<sup>130</sup> PETER LYNCH, ONE UP ON WALL STREET (1989)

<sup>131</sup> See Huang, *supra* note 9.

<sup>132</sup> See *id.*

effectiveness of these appeals has triggered alarms and concern for regulatory intervention to save individual investors.<sup>133</sup> Investing on a story, however, might have effects similar to the home bias. People tend to base most of their decisions on stories and anecdotal support and yet organize their lives pretty well.<sup>134</sup> Perhaps these appeals induce people to overcome a natural risk-aversion and interject their understanding of a firm's economic future into the market. Individually, such a strategy might cause an investor to undertake too much risk, but it might also produce a collectively accurate estimate of firm value.

Investing on the basis of anecdote or personal experience might well be characterized as falling prey to a misleading heuristic. At the same time, most of the heuristics that produce overconfident investment strategies are driven by some kernel of reality. The only way to get these kernels of truth into the market is to induce investors to act on them. Open securities markets allows overconfident investors to contribute their kernel to the market price. While it is true that all bets placed by those with limited information will inject noise into the pricing process, embedded in that noise is some important information of relevance. The noise is a necessary cost of information revelation. A noisy signal is better than no signal at all.<sup>135</sup>

In a world of overconfident investors who rely on heuristics and stories than can be misleading, Peter Lynch's advice is most likely misguided. So too are advertising campaigns designed to encourage excessive trading misguided. The actual amount of relevant private information that any individual investor possesses is undoubtedly of less importance than the investor takes it for. But by encouraging the individual investor to put his trust in his own observations, market cheerleaders like Peter Lynch and eTrade induce investors to perform a public service.

### 3. Individual Versus Institutional Investors

Corporate finance abhors a vacuum; any effort to drive the choice of individual investors out of the market implicitly replaces open-market equities funding with institutional debt-based finance. Even if the DMH were compelling enough to inspire policy changes that would

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<sup>133</sup> *See id.*

<sup>134</sup> *See* Derek Koehler & Amos Tversky, *Support Theory: A Nonextensional Representation of Subjective Probability*, 101 PSYCHOL. REV. 547 (1994)(describing how reasoning and explanation affects probability judgments and choice); Nancy Pennington & Reid Hastie, *A Theory of Explanation-Based Decision Making*, in DECISION MAKING IN ACTION: MODELS AND METHODS 188 (Gary A. Klein & Judith Orasanu eds., 1993)(describing how explanations and stories play a central role in choice).

<sup>135</sup> *See* Shyam Sunder, *Market as Artifact: Aggregate Efficiency from Zero Intelligence traders* (working paper, 2002) (demonstrating how a market filled with agents who trade on biased and erroneous beliefs can nevertheless create an efficient market).

diminish the role of individual investors, capital would then be allocated either by investment professionals, large institutional investors, or within large conglomerates. Individuals would continue to be the source of investment capital, but they would delegate to others the major investment decisions. They would hold shares in mutual funds, bank deposits, insurance policies, and claims on pension assets, but the actual allocation of those funds to companies or investment projects would be done by employees of those institutions. Unless institutional choice is somehow free of cognitive error, such a move would replace the cognitive errors of individual investors with those produced by professionals within institutions.

It would seem to be the case that institutions have a major advantage over individuals when it comes to rationality. The decisions of an institution can be rational without any of the individuals that make up the institutions being rational.<sup>136</sup> Institutions can design decision processes whereby individual preferences are aggregated and individual biases canceled out. Of course this is also true of a market, which is also an institution in the broad sense. In the finance literature, however, institution typically means a large investment entity like an investment bank.

Financial institutions are not free from cognitive error. Their perspective is different than individual investors, they see investment choices through a different lens, but they still rely on the same kinds of cognitive processes that affect individuals. This means that financial institutions will produce different choices about capital allocation than an open securities market, but that these choices will not necessarily be more accurate ones.

One of the principal differences between individual and institutional investors is the greater reliance of the former on experts to make choices. Expert decisions differ in several ways from lay decisions. First experts might be better calibrated in their confidence than ordinary people.<sup>137</sup> For example, weather forecasters seem to be aware of the limited value of their predictions about the weather. But this is not always the case. Experts frequently exhibit overconfidence in their area of expertise precisely because they are experts. It is said that experts are “often wrong, but rarely in doubt.”<sup>138</sup> The manner in which expertise affects overconfidence has to do with the difficulty of the task and the predictability of the subject matter. When they are both relatively high, experts are better calibrated than ordinary people. Bookmakers and professional card-players tend to be well calibrated. When dealing with subject

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<sup>136</sup> See Chip Heath, Richard P. Larrick & Joshua Klayman, *Cognitive Repairs: How Organizational Practices Can Compensate for Individual Shortcomings*, 20 RESEARCH IN ORGANIZATIONAL BEHAVIOR 1 (1998).

<sup>137</sup> See Baruch Fischhoff, Paul Slovic & Sarah Liechtenstein, *Knowing with Uncertainty: The Appropriateness of Extreme Confidence*, 3 J. EXPERIMENTAL PSYCHOL.: HUM. PERCEPTION & PERFORMANCE 522 (1977).

<sup>138</sup> See Dale Griffin & Amos Tversky, *The Weighing of Evidence and the Determinants of Confidence*, 24 COGNITIVE PSYCHOL. 411, 412 (1992).

matter that is inherently more complicated, such as psychological diagnoses and financial markets, experts may be more susceptible to overconfidence. Weather forecasters may be the exception to this rule. The more complicated the expert's model, the more faith they have in it.<sup>139</sup> Holding probabilities constant, they will overestimate their competence and be willing to bet on vague beliefs concerning subjects of relevance to their skill.<sup>140</sup>

In financial markets, the overconfidence that the individual investor has about his private informational signals and about recent news items seems to be matched by the institutional investor's overconfidence in his model.<sup>141</sup> In other words, when a new piece of information is released, individual investors immediately rush to trade on it, while institutional investors will discount its relevance. Individual investors tend to overreact to news while institutional investors underreact to news.<sup>142</sup> Investment professionals are too conservative: they are reluctant to revise their models and so are frequently surprised.<sup>143</sup> Neither bias can be evaluated in terms of its impact on capital allocation in isolation. Elimination of one bias may allow the other free reign. If these biases offset one another, any policy that is designed to minimize the impact of the one would need to account for its impact on the other.

Expertise itself can not only produce overconfidence, but produce a biased way of evaluating choice. Experts tend to pay greater attention to things that may allow them to make use of their expertise. In the financial community, sell-side analysts tend to always be bullish about companies in their industry, consistently overestimating the future earnings of companies that they follow.<sup>144</sup> At the same time short sellers tend to be far more skeptical.<sup>145</sup> Even within a

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<sup>139</sup> See J. F. YATES, *JUDGMENT AND DECISION MAKING* (1990).

<sup>140</sup> See Chip Heath & Amos Tversky, *Preference and Belief: Ambiguity and Competence in Choice Under Uncertainty*, 4 *J. RISK & UNCERTAINTY* 5 (1991).

<sup>141</sup> See Simon Gervais & Terrance Odean, *Learning to be Overconfident*, 14 *REV. FINAN. STUD.* 1 (2001); Mark W. Nelson, Susan D. Krusche & Robert J Bloomfield, *Confidence and Investors' Reliance on Disciplined Trading Strategies* (draft, 2000); Hilary & Menzly, *supra* note 122.

<sup>142</sup> See M. Grinblatt, S. Titman & R. Wermers, *Momentum Investment Strategies, Portfolio Performance and Herding: A Study of Mutual Fund Behavior*, 85 *Am. Econ. Rev.* 1088 (1995) (find managers herd, distrusting their own information); Brett Trueman, *Analyst Forecasts and Herding Behavior*, 7 *REV. FINAN. STUD.* 97 (1994) (showing that securities analysts tend to make forecasts that are too conservative and underweigh private information).

<sup>143</sup> See SHEFRIN, *supra* note 10.

<sup>144</sup> See SHEFRIN, *supra* note 10. This seems to be an example of wishful thinking. In other studies, supporters of soccer teams and political candidates were shown to overestimate the probability of their team or candidate winning games or elections. See E. Bahad, *Wishful*



single investment firm, an equity analyst may be bullish about a stock, while the debt analyst on another floor is advising his clients to bail out of the bonds. This is puzzling, because presumably all of these people were trained in the same kinds of valuation techniques. Using those techniques to analyze discounted cash flow, a company's assets should be expected to have a single value, which is either above or below the current market price. Whether you are in the business of buying shares long or selling them short should not influence your valuation. Here too, these biases may serve as necessary correctives of one another. Policies aimed at making markets work better might do better to focus not on the elimination of these biases, but rather on making sure that there is an optimal mix.

Although much of the evidence for this phenomenon is still anecdotal, it seems to illustrate the effect of "enrichment". When subjects are asked to evaluate job candidates, their evaluations will depend in part on whether they are asked to find reasons to accept candidates or reject candidates.<sup>146</sup> Frequently, the same candidates who are selected to be accepted in one case are selected to be rejected in the other. When experts develop a skill, which is based on continually looking for reasons to carry out some action, they will tend to find more cases in which to do so. In other words, these experts overestimate the legitimate scope of application of their skill.<sup>147</sup>

Another reason to be skeptical about the ability of financial market professionals to calibrate their overconfidence is that overconfidence frequently increases with exposure to more information.<sup>148</sup> While there is some evidence that more information makes a decision maker discount the relevance of any one piece of information, it tends to lead to greater confidence about the whole package of information, even if the increase is a product of totally irrelevant information.<sup>149</sup>

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*Thinking and Objectivity Among Sport Fans*, 4 SOC. BEHAV. 231 (1987); C. Uhlaner & B. Grofman, *The Race May Be Close but My Horse is Going to Win: Wish Fulfillment in the 1980 Presidential Election*, 8 J. POL. BEHAV. 101 (1986)

<sup>145</sup> See SHEFRIN, *supra* note 10.

<sup>146</sup> See Eldar Shafir, Itamar Simonson & Amos Tversky, *Reason-Based Choice*, 49 COGNITION 11 (1993).

<sup>147</sup> *See id.*

<sup>148</sup> See Heath & Tversky, *supra* note 140; J.W. Lee & J.F. Yates, *How Quantity Judgment Changes as the Number of Cues Increases: An analytical Framework and Review*, 112 PSYCHOL. BULL. 363 (1992); Thomas Stewart & Cynthia Lusk, *Seven Components of Judgmental Forecasting Skill: Implications for Research and the Improvement of Forecasts*, 13 J. FORECASTING 579 (1994).

<sup>149</sup> See S. Oskamp, *Overconfidence in Case Study Judgments*, 29 J. CONSULTING PSYCHOL., 261 (1965); Baruch Fischhoff & Paul Slovic, *A Little Learning . . . Confidence in*

Another key difference between individual investors and institutions is the widespread reliance on group decision making in institutions. Although groups have several advantages over individuals (they know more, they can aggregate different views, etc.) a group setting can exacerbate some biases and create new ones. Groups are subject to their own dynamics that lead to systematic biases.<sup>150</sup> Just as within a jury, certain biases are amplified. While in many cases the biases of each of the individuals in the group are mutually offset, there are other cases when they are not. For instance, in a competitive auction setting, high bidders in the group frequently drive the outcome.<sup>151</sup> Communication at close quarters can lead to a rapid dissemination of information, but can also lead to rapid dissemination of sentiment.<sup>152</sup> Enthusiasm can be infectious at close proximity.

In an financial system organized around institutions, the increased communication and frequent interaction between the corporate managers receiving funding and the agents of the institutions making investment decisions can lead to reinforcing beliefs. While it might be thought that proximity allows one to see the warts, it also allows one to catch the fevers. The more time an investor spends with over-optimistic entrepreneurs, the more likely he is to “drink the Kool-Aid.”<sup>153</sup>

Furthermore, small groups exhibit a conformity bias.<sup>154</sup> While initial impressions may differ, once impressions are disclosed, individual group members tend to coalesce in their impressions, frequently around the most charismatic or authoritative individual. Japanese culture is frequently seen as more conformist than American culture and this is seen by some as the cause of their investment institutions, but it may well be the case that it is the structure of the

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*Multicue Judgment*, in ATTENTION AND PERFORMANCE VIII (R. Nickerson ed., 1980).

<sup>150</sup> For a survey, see D. Gigone & R. Hastie, *The Impact of Information on Small Group Choice*, 72 J. PERSONALITY & SOC. PSYCHOL. 132 (1997); N. Kerr, R. MacCoun & G. Kramer, *Bias in Judgment: Comparing Individuals and Groups*, 103 PSYCHOL. REV. 687 (1996).

<sup>151</sup> See James Cox & Stephen Hayne, *Barking Up the Right Tree: Are Small Groups Rational Agents?*, (working paper, University of Arizona, 2002).

<sup>152</sup> See A. Banerjee & D. Fudenberg, *Word of Mouth Communication and Social Learning* (working paper, Harvard University, 1999).

<sup>153</sup> See P. Schultz & M. Zirman, *Do the Individuals Closest to Internet Firms Believe They are Overvalued?*, 59 J. FINAN. ECON. 347 (2001).

<sup>154</sup> See Solomon Asch, *Studies of Independence and Submission to Group Pressure*, 70 PSYCHOL. MONOGRAPHS 1 (1956); Serge Moscovici, *Social Influence and Conformity*, in, THE HANDBOOK OF SOCIAL PSYCHOLOGY (Gardner Lindzey & Elliott Aronson, eds.1985). See also, IRVING JANIS, *GROUPTHINK* (1982)(reviewing conformity pressures in groups).

institutions that drives this cultural bias.<sup>155</sup>

Small groups tend to take on more risk in their collective decisions than each of the individuals would if left to their own devices.<sup>156</sup> In part, this is an agency problem. If a risk averse individual is held accountable for the outcome of his decisions, he will tend to play it safe. When blame can be diffused within a group, risky choices look more attractive. But it is also a cognitive process. When others seem comfortable with taking a risk, individual inhibitions are weakened. This “risky shift” would suggest that overconfidence and the possibility of irrational exuberance might be greater in small groups. Of course, individual investors in a liquid market will frequently be subject to the same effects, especially when they frequently discuss their investment decisions with co-workers and friends.

Groups also seem to exacerbate some biases, notably the sunk cost fallacy. Just as individual investors are reluctant to realize their losses, so too will professional investors and managers making investment decisions. Instead of terminating a loss-making project, managers will pour more money into it, thereby escalating their commitment.<sup>157</sup> In one study, identical descriptions of two projects were presented to individuals and to groups. Both were unattractive projects, but one project was described as having a sunk cost. In both cases, the existence of the sunk cost increased the number of subjects who recommended further investment, but the increase was significantly greater with group subjects.<sup>158</sup>

If institutions are subject to biases as well as individuals, then the case for reducing the impact of biases by expanding the role of institutions is less than overwhelming. If cognitive biases are a problem and lead to systematic mispricings, a thorough examination of the effect and magnitude of the different biases would be in order. In either case, whatever system we chose would be second best—a world without biases is impossible. It may well be the case that some of the biases offset one another, if this is the case, then a case could be made for making sure that we had an appropriate mix of the two. While both institutions and individuals may be subject to overconfidence, the sources of their overconfidence are different.

### C. Comparing Financial Systems from a Behavioral Finance Perspective

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<sup>155</sup> See Raghuram Rajan & Luigi Zingales, *Which Capitalism: Lessons from the East Asian Crisis*, 11 J. APPLIED CORP. FINAN. 40 (1998).

<sup>156</sup> Actually, they tend to be more extreme, not just more risky. See Cass R. Sunstein, *The Law of Group Polarization*, 10 J. POL. PHIL. 175 (2002).

<sup>157</sup> See Barry Staw, *The Escalation of Commitment: An Update and Appraisal*, in ORGANIZATIONAL DECISION MAKING 191 (Z. Shapira ed., 1997).

<sup>158</sup> See Glen Whyte, *Escalating Commitment in Individuals and Group Decision Making: A Prospect Theory Approach*, 54 ORG. BEHAV. & HUMAN DECISION PROCESSES 430 (1993).

The role that the behavioral finance perspective should play in the regulation of securities thus reduces to a choice between finance methods: institutional investors versus open markets. In assessing the merits, it is worth noting that a comparative literature on this choice already exists. The individual investor is, in fact, largely a creature of the Anglo-American financial markets. Although other countries have made strides toward expanding the scope of their shareholding public in recent years, in most countries financial institutions play a much greater role in capital allocation. In Germany and Japan, financial institutions play a much larger role than individual investors.<sup>159</sup> In these countries, commercial banks, merchant banks, insurance companies, and pension funds provide capital through debt financing or through large stock holdings. Rather than engaging in frequent short-term transactions, they tend to develop long-term relationships with their clients. As a result the equity markets are less important and there is less active trading of securities. In an extreme form, all capital allocation decisions are made administratively within a large enterprise, such as a Japanese keiretsu.<sup>160</sup>

A large literature has developed on the relative merits of each system.<sup>161</sup> On the one hand, institutional investors accumulate large stocks of company-specific expertise, and have an active say in management. This would seem to overcome any asymmetric information: the institutions are in constant contact with active management, frequently holding board memberships, and so it is less likely that the managers will be able to deceive their investors.<sup>162</sup> This close contact also comes with a great deal of control. The problems of opportunistic managers, who engage in empire building and who hoard free cash flow are substantially reduced.<sup>163</sup>

The drawback to this institutional finance system is a lack of liquidity. Buyers and sellers of these large holdings can be difficult to find. This difficulty arises not just because of

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<sup>159</sup> See Rafael La Porta et.al., *Corporate Ownership Around the World*, 54 J. FINAN. 471 (1999).

<sup>160</sup> See M. Aoki, *Toward an Economic Model of the Japanese Firm*, 28 J. ECON. LITERATURE 2 (1990).

<sup>161</sup> See FRANKLIN ALLEN & DOUGLAS GALE, *COMPARING FINANCIAL SYSTEMS*, (2000); DONALD CHEW, *STUDIES IN INTERNATIONAL CORPORATE FINANCE AND GOVERNANCE SYSTEMS: A COMPARISON OF THE U.S., JAPAN, AND EUROPE* (1997); COLUMBIA LAW SCHOOL, *CORPORATE GOVERNANCE TODAY* (1996).

<sup>162</sup> See D. Diamond, *Financial Intermediation and Delegated Monitoring*, 51 REV. ECON. STUD. 393 (1984); T. Hoshi, A. Kashyap & D. Scharfstein, *Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups*, 106 Q.J. ECON. 33 (1991).

<sup>163</sup> See Michael Jensen, *Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers*, 76 AM. ECON. REV. 323 (1986).

the small number of potential investors, but also because of the uneven distribution of information about the company and expertise necessary to evaluate it. Highly concentrated ownership may reduce the information asymmetry between the company and its current investors, but it exacerbates the asymmetries among current and prospective investors in that company.<sup>164</sup> Any current investor is thus essentially an insider and any decision to sell is a signal of the investor's lack of confidence. It is less likely in such a system for the ownership in the company to make its way into the hands of the investor who might value it the most and be able to maximize its value.

Because ownership is relatively stagnant, there is relatively little feedback about major business decisions. While the institutional investors may have superior expertise in many cases about how to run the enterprise, it is often the case that they do not possess all of the necessary information. It is difficult to extract that information from outsiders without some way to reward them, by for example, allowing them to trade on that information, by betting on it in a liquid market. This suggests that there may be some companies that stand to benefit more from the accumulated wisdom of their small group of long term investors than they could from the aggregate wisdom of a large number of small investors. These companies may be in industries that are relatively non-dynamic: where there is little relevant information provided by outsiders that would need to be quickly incorporated. But if a company is in a dynamic industry, where continual feedback is necessary, a lack of liquidity in claims on the company could be crippling.<sup>165</sup>

Proponents of the DMH point to the propensity toward bubbles in liquid securities markets as one of its major weaknesses. Markets dominated by professionals, however, might be equally vulnerable.<sup>166</sup> Japan has yet to recover from the bubble that it experienced in the 1980's, a bubble that arose in a system largely devoid of individual investors.<sup>167</sup> The continued existence of "zombie firms" in Japan is testimony to the lack of resilience of such a system.<sup>168</sup> It

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<sup>164</sup> See Amar Bhidé, *The Hidden Costs of Stock Market Liquidity*, 34 J. FINAN. ECON. 31 (1993).

<sup>165</sup> See Franklin Allen, *Strategic Management and Financial Markets*, 14 J. STRATEGIC MGMT. 11 (1993).

<sup>166</sup> See Robert Shiller & John Pound, *Survey Evidence of Diffusion of Interest among Institutional Investors*, 12 J. ECON. BEHAV. & ORG. 47 (1989).

<sup>167</sup> See Anil Kashyap, *Sorting Out Japan's Financial Crisis*, (working paper, University of Chicago, 2002).

<sup>168</sup> See Paul Krugman & Its Baaack, *Japan's Slump and the Return of the Liquidity Trap*, 1998 BROOKINGS PAPERS ON ECONOMIC ACTIVITY, 137 (discussing Japan's long economic slump).

is arguable that the Internet bubble in the United States in the late 1990's left behind far more of value in the form of physical and human capital than was left behind by the Japanese bubble.<sup>169</sup> Japan's lack of liquidity lengthens the time necessary before feedback is received by investors, resulting in a perpetuation of overconfidence in underlying trends.

Although the behavioral finance perspective on finance choice is only a part of the picture, it raises a clear red flag against efforts to regulate the open-access securities markets in an effort to reduce cognitive errors among individual investors. Such efforts would inevitably increase the role of institutional players—and indeed, this is the purpose of such regulation. This change would magnify the impact of erroneous investment choices, concentrating these choices in institutions responsible for large amounts of money. Also, this change would reduce the arbitrage pressures that discipline some of the cognitive errors in the open market.

#### IV. CONCLUSION AND COMMENTS

The regulatory implications of behavioral finance are somewhat uncertain. On the one hand, efforts to reduce the irrational beliefs investors adopt will have much more effect on the operation of the market than the EMH might predict. Recall that according to the EMH, irrationality is an ephemeral phenomena that has little real impact on the market, and therefore should not inspire regulatory intervention. Research in behavioral finance shows how cognitive errors can lead to the persistent mispricing of securities. This result suggests that the case for regulation is strong; cognitive mispricing could lead to misallocation of capital. On the other hand, unlike the DMH, behavioral finance emphasizes the dynamic interaction of cognitive processes and economic pressures towards efficiency. Regulatory interference with this complex system might have unintended deleterious effects on the markets' struggle towards efficiency.

Irrespective of its actual merits as an explanatory tool, the belief in efficient markets is a two edged sword. George Soros recently blamed the efficient markets hypothesis for the recent, prolonged irrational exuberance in the equities market.<sup>170</sup> His reasoning was this: Even if you believed that a company's stock price was completely divorced from its fundamentals, a rational investor would also be skeptical of his own private evaluation. After all, how could so many people be wrong? If information is instantaneously incorporated in stock prices, then any private

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<sup>169</sup> See Bradford De Long, *The Boom is not Doomed*, Worldlink (2001) (On the residual benefits of the recent U.S. boom ). Alan Blinder, former governor of the Federal Reserve, and author of *ALAN BLINDER, THE FABULOUS DECADE* (2000), continues to believe that irrational exuberance was a small price to pay for the productivity increases that went along with it. Alan Blinder, *The Bubble has burst, but Strength Remains*, N.Y. TIMES, Sept. 22, 2002.

<sup>170</sup> George Soros, *Why the Markets Can't Fix Themselves*, NEW REPUBLIC (Sept 2, 2002). See also, GEORGE SOROS, *ALCHEMY OF FINANCE: READING THE MIND OF THE MARKET* (1994).

valuation that differs must be incorrect, and so there is no point in trading.<sup>171</sup> On the other hand, if information were highly asymmetric, there would be no way to justify trading, because of the danger that you are in possession of inferior information. Faith in the securities market requires that its participants believe that markets are moderately efficient. That is, there are no severe asymmetries of information, but there is enough asymmetry to allow for advantageous trading. Since we can't all be winners in the latter world, we must all believe ourselves to be the ones in possession of the relevant information. Our collective delusion must be that of a Lake Woebegone market, where we are all above average. The policy implication is that the purpose of the SEC may have less to do with ensuring the allocation of information and more to do with promoting beliefs about the allocation of information. The (relatively) efficient markets hypothesis may be the Noble Lie of a successful securities market.

A corollary to the Noble Lie of efficient markets is the Noble Lie of fundamental valuation. There is no reason to believe that the value of a security must always regress to its underlying fundamental valuation in term of discounted cash flow or dividends. Rational investors may forego research into fundamental values, if they believe that the costs of this investigation exceed the benefits. This is most famously illustrated in models of rational bubbles. If all investors have access to some private signals that are uncorrelated in their errors but of equal reliability, and if all investors can observe the trading behavior of other investors, then it is perfectly rational in many cases to weight more heavily the observed trading behavior of others than to rely on a private signal that may be in conflict. If these signals are relatively accurate on the whole, the equilibrium price will become accurate after just a few trades. If signals are costly, then it would be sub optimal to have subsequent traders invest in the acquisition of information that they would ignore in any case. In a minority of cases, however, there may arise an equilibrium price that diverges from the underlying value, even if the signals are relatively accurate on the whole. This is because the actions of the first few traders will dictate the outcome. If those first few traders receive inaccurate signals, there would be no rational reason for subsequent investors to solicit additional signals, even if the majority of them would point toward a different price. This reduces the informational value of subsequent trades. In this model, prices can be divorced from fundamental valuations indefinitely, until some new round of signaling occurs, leading to an information “cascade.”<sup>172</sup> Availability of Information about the trading activity of others can lead to a lower amount of information overall.

If investors in this model overweigh the relevance of their private signals, they will continue to solicit them, even after their expected value is negative. If investors believe that prices divorced from fundamental valuation cannot persist, then they will attach a greater weight to their private valuations based on fundamentals and less to the trading behavior of others.

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<sup>171</sup> See Bernstein, *supra* note 118.

<sup>172</sup> See Sushil Bikhchandani, David Hirshleifer & Ivo Welch, *Learning from the Behavior of Others: Conformity, Fads, and Information Cascades*, 12 J. ECON. PERSP. 151 (1998).

In the words of Thomas Schelling, the belief in fundamental valuation may serve as “convergence equilibrium.”<sup>173</sup> In Schelling’s famous model, travelers know that they are to meet in New York, but have no other information about the location of their meeting. Rather than going to the place that seems most sensible individually, each traveler will try to infer what the other would believe would be most sensible and so on. A common meeting place will be arrived at only if there is some convergence about perceptions of sensibility. Schelling, conducting his experiments in the 1950s, suggested Grand Central Terminal. Even if one traveler thinks that the ice rink at Rockefeller center or the roof of the Empire Trade center is a more sensible or convenient place to meet, he would be foolish to act on it, if he thought the other traveler might have different ideas.

If investors were to pay greater attention to the insights of behavioral economists, and to downplay the importance of fundamental valuation in their investment decisions, this could have a destabilizing effect. If investors were to pay more attention to the trading behavior of others and to speculate about the psychological factors that underlie them, we might see a world where there is no convergence equilibrium. Thus the empirical accuracy of both the EMH and the DMH may depend to some extent on the degree to which they are accepted by the investing public. Beliefs about how the market operates influence the way it actually operates. Investors behave differently over time, not necessarily because they have access to different kinds of information or because of changes to their underlying cognitive mechanisms, but also because they incorporate different theories about how the market works. It is unclear how developments in behavioral finance will ultimately influence the behavior of arbitrageurs, investment professionals, and individual investors. Any attempts to incorporate the insights of behavioral economics into regulatory policy will also need to consider the ways in which those same insights have been incorporated by market participants.

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<sup>173</sup> THOMAS SCHELLING, *THE STRATEGY OF CONFLICT*, (1960).