



May 20, 2005

## Capital Ideas Revisited—Part 2

### Thoughts on Beating a Mostly-Efficient Stock Market

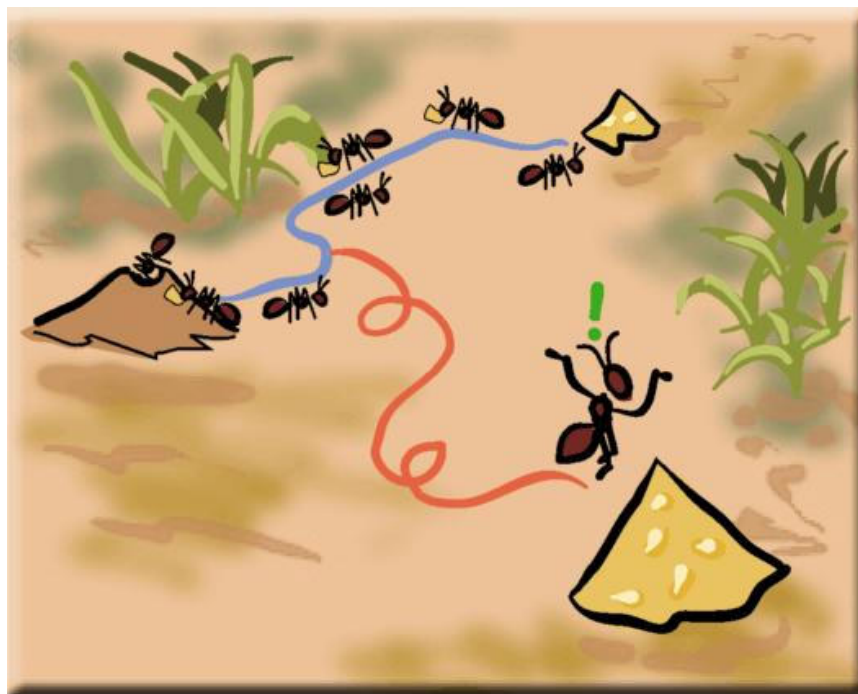


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- The paradox of efficient markets says whenever researchers find meaningful anomalies, practitioners exploit them, thus eliminating them and leaving the market even more efficient than before.
- Informationally efficient markets are highly unlikely because unearthing information is costly and investors expect some benefit to compensate them for their efforts.
- If noise creates a set of expectations that are inconsistent with the long-term signal, there's an opportunity for time arbitrage.
- Slow traveling ideas are a long-term investor's best bet for delivering superior results.

## Introduction

In the first part of this essay (*Capital Ideas Revisited: The Prime Directive, Sharks, and the Wisdom of Crowds*, March 30, 2005) we argue that active investors need to carefully consider market efficiency. We view understanding how and why markets are efficient, or inefficient, essential to providing thoughtful investors with a roadmap to superior results.

Standard theory offers three approaches to explain market efficiency: rational agents, heterogeneous investors with independent errors, and the no-arbitrage assumption. We claim that the two most widely used arguments, rational agents and no-arbitrage, don't have realistic assumptions and—more importantly—offer predictions that do not comport with the empirical facts.

We make the case for viewing markets as a complex adaptive system, where efficient prices emerge from the interaction of heterogeneous investors. This approach doesn't rely on agent rationality and offers stylized predictions that fit well with the empirical record. The wisdom of crowds approach, however, only works under certain conditions; all efficiency bets are off when markets violate those conditions.

We provide a slew of collective problem-solving examples, including social insects, experimental economics, and decision markets. We can't extrapolate these results to assert stock market efficiency—state-estimation and prediction problems are a good deal simpler because they have measurable outcomes and finite time horizons—but they do provide evidence for the prowess of collectives.

Behavioral finance also plays a central role in investor heterogeneity. While researchers often dwell on how individuals behave sub-optimally (Daniel Kahneman and Amos Tversky, 1979), we argue that only analysis at the collective level can unearth inefficiencies. Even if investors deviate from rationality in the same way (e.g., overconfident) they still may err independently.

The first essay also examined the statistical properties of markets, noting that markets deviate from the assumption of normal, bell-shaped price change distributions and prices often exhibit a memory effect. Both observations violate the most basic market theory.

Why do markets fail? Most simply, investor heterogeneity breaks down and everyone acts in unison, leading to excessive optimism (greed) or pessimism (fear). Social psychology teaches us that we like to imitate one another, and we often place greater weight on being part of the group than on our own observations. These diversity breakdowns, albeit rare, provide investors with significant opportunities to earn excess rates of return.

The foremost conclusion from our discussion is that markets are largely efficient, but for different reasons than the standard theory argues. The interaction of diverse investors, not a rational few or many, leads to prices that reasonably reflect expectations. No matter how we arrive at prices, though, a key question remains: *How do you beat the market?*

Here are the areas we cover:

- We start in a logical place—a quick review of the literature on market anomalies. Anomalies are empirical findings that appear to contradict the core principles of the efficient market hypothesis. Naturally, the critical question is whether or not these deviations are sufficiently significant and stable for investors to profit from them.
- We then look at informational efficiency, which basically suggests that today's prices reflect all relevant information. Of course, investors can't believe markets are perfectly informationally efficient; otherwise they would have no incentive to collect information. Many investors, however, delegate their investment decisions to agents. Because the goals of the agents and investors are not always aligned, many professional investors get paid to simply take part in the game. Perhaps the most egregious result of this agency problem is shrinking investment time horizons. When short-term noise creates a set of expectations inconsistent with the long-term signal, an opportunity for time arbitrage arises.

- Next, we look at dramatic diversity breakdowns, where positive feedback causes booms and crashes. Here, the breakdown stems from imitative behavior. We consider some of the signatures of these breakdowns.
- Finally, we turn to a more subtle form of diversity breakdown, investment ideas that Jack Treynor (1975) says, “travel slowly.” These ideas require reflection and judgment, which many investors do not exercise because of incentive-caused biases.

## Anomalies

*These [research] findings raise the possibility that anomalies are more apparent than real. The notoriety associated with the findings of unusual evidence tempts authors to further investigate puzzling anomalies and later try to explain them. But even if the anomalies existed in the sample period in which they were first identified, the activities of practitioners who implement strategies to take advantage of anomalous behavior can cause the anomalies to disappear (as research findings cause the market to become more efficient).*

G. William Schwert  
*Anomalies and Market Efficiency*<sup>1</sup>

Using the word anomaly—deviation from the normal order—to describe market behavior embeds an assumption about what is “normal” for the market. In finance, anomalies are market behavior inconsistent with the predictions of the efficient market hypothesis. In particular, these anomalies appear to violate assumptions of mean-variance efficiency or no-arbitrage. If a complex adaptive system approach better describes markets, the so-called anomalies researchers have identified may not be anomalous after all.

Despite voluminous literature on anomalies, the major findings tend to fall into one of four areas:

1. *Calendar effects.* Donald Keim (1983) and Marc Reinganum (1983) showed that small capitalization stocks tend to do better in January than the capital asset pricing model’s (CAPM) prediction.
2. *Size effects.* Rolf Banz (1981) and Reinganum (1981) found that small companies generate higher returns than what is consistent with the CAPM.
3. *Value effects.* Around the same time researchers identified size effects, Sanjoy Basu (1977 and 1983) established that companies with low price-earnings generate higher-than-expected returns relative to the CAPM. Eugene Fama and Kenneth French (1992) extended the thinking, arguing that size and value effects are risk factors the CAPM does not capture.
4. *Momentum effects.* Werner DeBondt and Richard Thaler (1985) found that past stock price losers have higher average returns than past winners; investors overreact to bad news, creating an opportunity for the contrarian.<sup>2</sup> Narasimhan Jegadeesh and Sheridan Titman (1993) presented contradictory research showing that recent stock price winners outpace recent losers.

Many apparent anomalies can’t deliver excess returns after considering practical constraints like transaction costs and liquidity issues. Ultimately, benefiting from anomalies is difficult because of the paradox of efficient markets: whenever researchers find meaningful anomalies, practitioners immediately try to exploit them, thus eliminating the anomalies and leaving the market even *more* efficient than before. Unlike some other probabilistic fields, when you act on your predictions in markets you can actually change the outcomes of your predictions.

A pair of studies on technical trading rules provides one example of the efficient markets paradox. In the first paper, William Brock, Josef Lakonishok and Blake LeBaron (1992) showed that certain simple technical rules, applied to 100 years of daily data for the Dow Jones Industrial Average, generated returns that outperformed appropriate benchmarks. (This conclusion violates the weak form of market efficiency.) In a follow up paper, Ryan Sullivan, Allan Timmerman and Halbert White (1997) tested the findings, and discovered “that the best technical trading rule does not provide superior performance when used to trade in the subsequent 10-year post-sample period.”<sup>3</sup> In other words, the best trading rule worked until the professors published their findings.

In his detailed survey of anomalies, William Schwert (2003) tracked the performance of two funds explicitly created to exploit size and value effects. They met limited success. Schwert noted, “the small-firm anomaly has disappeared since the initial publication of the papers that discovered it,” and added, “the apparent [value] anomaly that motivated the fund’s creation seems to have disappeared, or at least attenuated.”<sup>4</sup> Once again, the strategy practitioners used to capitalize on the anomaly failed.

Richard Roll, a leading finance researcher and money manager, is one of the best-positioned individuals to judge the merit of anomalies. His view is unambiguous:

I have personally tried to invest money, my client’s and my own, in every single anomaly and predictive result that academics have dreamed up. That includes the strategy of DeBondt and Thaler (that is, sell short individual stocks immediately after one-day increases of more than 5%), the reverse of DeBondt and Thaler which is Jegadeesh and Titman (buy individual stocks after they have decreased by 5%), etc. I have attempted to exploit the so-called year-end anomalies and a whole variety of strategies supposedly documented by academic research. *And I have yet to make a nickel on any of these supposed market inefficiencies.* (Emphasis original.)

Roll goes on to underscore the importance of finding systematic opportunities. He also offers a nod to the complex adaptive systems approach:

. . . A true market *inefficiency* ought to be an exploitable opportunity. If there’s nothing investors can exploit in a systematic way, time in and time out, then it’s very hard to say that information is not being properly incorporated into stock prices. In fact, information is being incorporated into the price through the filters of the millions of people evaluating that information. (Emphasis original.)

He ends with a clear-cut verdict:

Real money investment strategies don’t produce the results that academic papers say they should.<sup>5</sup>

Naturally, markets evolve. This suggests that anomalies will come and go, and the chase to exploit anomalies will continue. Consistent anomalies, should they exist, likely find root in psychology (and perhaps evidence of a diversity breakdown). Practitioners are likely to quickly compete away any anomaly that can be exploited with an algorithm.

Notwithstanding Roll’s comments some investment firms—most notably LSV Asset Management and Fuller & Thaler Asset Management—have enjoyed success employing behavioral-finance-based investment processes. These results add balance to the poor fund performance Schwert found.

## Informational Efficiency

*When a price system is a perfect aggregator of information it removes private incentives to collect information. If information is costly, there must be noise in the price system so that traders can earn a return on information gathering . . . When many individuals attempt to earn a return on information collection, the equilibrium price is affected and it perfectly aggregates information. This provides an incentive for individuals to stop collecting information.*

Sanford Grossman  
*On the Efficiency of Competitive Stock Markets Where Traders Have Diverse Information*<sup>6</sup>

When academics discuss efficient markets, they almost always mean informational efficiency—the idea that today’s stock prices fully reflect all relevant information. In such a market, investors cannot use available information to earn excess risk-adjusted returns. The paucity of investment managers who have generated above-market returns over time supports this view.

Informational efficiency has some noteworthy ancillaries. First, researchers often connect informational efficiency to the random walk theory, which says stock price changes are random. The idea is since prices reflect all available information, price changes result only from *new* information, which comes randomly by definition.<sup>7</sup> While the link between the random walk theory and the efficient market hypothesis is technically incorrect, many financial economists still implicitly associate the two.<sup>8</sup>

Second, informational efficiency does not say that prices are fundamentally correct. The theory’s main claim is there are no achievable excess returns. Informational efficiency offers no assurance that an economy allocates resources in an efficient manner, only that asset prices are not mispriced relative to one another.

Finally, markets become more efficient as investors face falling costs to access, and act on, information. The advance of technology, regulations assuring all investors receive material information simultaneously, and ever-declining transaction costs likely contribute to greater efficiency.

Still, informational efficiency is an ideal. In fact, Sanford Grossman (1976) and Grossman and Joseph Stiglitz (1980) argue that informationally efficient markets are *impossible*. Since unearthing information is costly, investors expect some benefit to compensate them for their efforts. Without the promise of some excess returns, investors would have no incentive to gather information in the first place.

Even giving full weight to the Grossman and Stiglitz argument, the number of investors trying to beat the market dwarfs the number trying who actually will. Alfred Rappaport (2005) addresses this puzzle, noting the Grossman and Stiglitz case holds only in a world of investors acting on their own behalf. Principals, however, increasingly defer to agents for their investment decisions.

In most cases, agents get paid whether or not the principals do well. John Bogle estimates hedge fund fees, direct mutual fund costs, and pension management fees amounted to a combined \$110 billion in 2004.<sup>9</sup> Despite the good intentions and hard work of most professional money managers, in reality they get paid to play, not necessarily to win.

Current incentives encourage agent behavior that is not always consistent with maximizing long-term shareholder returns (Bradford Cornell and Roll, 2005). In recent decades many large investment firms have emphasized marketing (often at the expense of the investment process), increased the number of funds they offer (selling what’s hot), and boosted the number of stocks they hold in order to minimize tracking error versus the benchmark.

But perhaps the most significant incentive-caused behavior, and most relevant for a discussion of how to beat the market, is the reduction in investment time horizons. According to Bogle (2005), average equity portfolio turnover rose from 20% in the mid-1960s to 112% in 2004. And fund managers aren’t the only ones with shorter time horizons; Bogle documents that mutual fund owners redeem shares at a rate four times higher than a few decades ago.



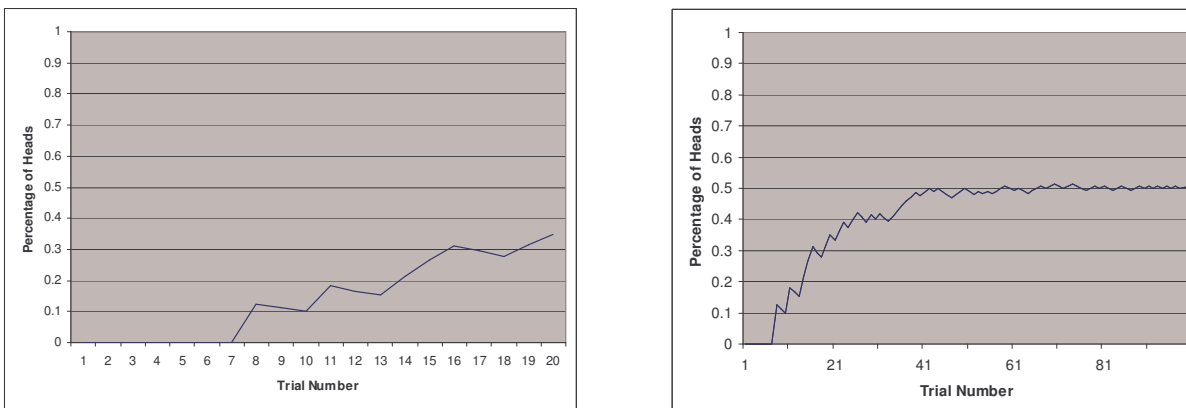
Time horizon is a crucial consideration in any probabilistic field.<sup>10</sup> In these systems, short-term results show mostly noise—the noise-to-signal ratio is very high. But over time, the signal reveals itself, and the noise-to-signal ratio drops. Short-term investors dwell mostly in the world of noise.<sup>11</sup>

A very simple coin-tossing example demonstrates this point. Exhibit 1's left panel is the result of a 20-toss trial, and shows that 35% of the tosses came up heads. (Simulated with a random number generator). The panel on the right continues with the next 80 tosses in the series, and shows that the ratio settles very close to 50% over 100 flips. Even though we know the long-term signal is 50%, short-term noise can deviate substantially from long-term signal.

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### Exhibit 1: Noise versus Signal

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Source: LCMC analysis.

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Asset prices reflect a set of expectations. If investors chasing noise create a set of expectations inconsistent with the long-term signal, an opportunity for time arbitrage arises. This arbitrage works only if the short-term focus creates a diversity breakdown—too few investors focused on the signal—and the signal becomes clear over time.

Still, benefiting from time arbitrage is difficult for a couple of reasons. First, even when we *know* what the underlying system looks like, we see patterns where none exist. The reason is we're wired to expect that the characteristics of chance show up not just in a total sequence, but also in small parts of the sequence. Psychologists Tversky and Kahneman (1971) call this the "belief in the law of small numbers."<sup>12</sup> Guillermo Baquero and Marno Verbeek (2005) show that even sophisticated investors fall into this trap when evaluating portfolio managers.

Second, the incentives for important constituencies, including brokers, investors, and plan sponsors, increasingly encourage a short-term approach. For example, more trading means higher commissions for a sell-side broker. Innumeracy and rising impatience create meaningful institutional barriers to exploiting time arbitrage.

Recent research documents the importance of time horizon. Using experimental economics, Shinichi Hirota and Shyam Sunder (2004) find that prices converge to fundamental values when set by long-term investors but become indeterminate with short-term investors. They note that long-term investors can use backward induction based on future dividends, while short-term investors use forward induction using trend processes. Because short-term investors don't focus on a dividend anchor, markets dominated by short-term investors will more likely see booms and crashes.

Taking a different tack, Brian Bushee (2001) classifies investors based on their time horizon and shows that investors with the shortest time horizons prefer near-term earnings to long-term value. This preference leads to "significant misvaluations", or a time arbitrage opportunity.

Bushee's findings are consistent with what Shlomo Benartzi and Thaler (1995) call myopic loss aversion. This concept combines loss aversion—the human tendency to weigh losses more heavily than gains—and

myopia, a form of mental accounting, which shows investors are more sensitive when they evaluate their portfolios frequently. Myopic loss aversion suggests that long-term investors will pay more than short-term investors for the same risky asset because they can largely sidestep loss aversion.

## **Dramatic Diversity Breakdowns**

*Information cascades, during which individuals in a population exhibit herd-like behavior because they are making decisions based on the actions of other individuals rather than relying on their own information about the problem . . . display two striking qualitative features: they occur rarely, but by definition are large when they do.*

Duncan J. Watts  
*A simple model of global cascades on random networks*<sup>13</sup>

Inefficiency most likely occurs in one of two ways, which share a common root: diversity breakdowns. The first, a dramatic breakdown, is typically accompanied by an abrupt stock price movement.

A dramatic diversity breakdown occurs when positive feedback launches sentiment about a particular stock (or the market) to extreme optimism or pessimism, increasing the likelihood of a significant and sharp reversal. In most cases, the positive feedback emanates from a kernel of legitimately good or bad fundamentals. The breakdown occurs when the fundamental view is overstretched, creating a set of expectations substantially out of sync with the fundamentals. If most everyone is bullish, demand dries up and the market's most likely path is down.

How can you recognize a dramatic diversity breakdown? There are various measures to consider, including sentiment indicators, funds flow data, and valuation levels.<sup>14</sup> Other possible signatures of dramatic diversity breakdowns include large price changes, stocks or industries at 52-week highs or lows, and statistically expensive or cheap valuations.

One broad indicator is what appears on magazine covers: by the time an investment sentiment makes the cover of a national periodical, it's almost always time to take the opposite side of the trade. Among the most famous examples is the "The Death of Equities" cover story in the August 13, 1979 issue of *BusinessWeek* that proclaimed, "the death of equities looks like an almost permanent condition." In the twenty-five years following 1979, the stock market has generated a 12.9% compounded annual return in contrast to the negative real return the market offered in the ten years ended 1979.<sup>15</sup>

In contrast, the cover of the September 1999 issue of *The Atlantic Monthly* featured a story called "Dow 36,000: The Right Price for Stocks," within months of the market's high. The Nasdaq Composite Index, emblematic of the heady times, is still 60% below its March 2000 peak.

## **Slow Traveling Ideas**

*I see nothing in the arguments of Professor Eugene Fama or the other efficient market advocates to suggest that large groups of investors may not make the same error in appraising the kind of abstract ideas that take special expertise to understand and evaluate, and that consequently travel relatively slowly.*

Jack L. Treynor  
Long-Term Investing<sup>16</sup>

The second type of diversity breakdown, articulated by Jack Treynor nearly 30 years ago, is less dramatic and only requires an investor to interpret the same investment information differently than the consensus of other investors. Treynor distinguishes "between two kinds of investment ideas: (a) those whose implications are straightforward and obvious, take relatively little special expertise to evaluate, and consequently travel quickly (e.g., 'hot stocks'); and (b) those that require reflection, judgment, special expertise, etc., for their evaluation, and consequently travel slowly." He adds, "Pursuit of the second kind of idea . . . is, of course, the only meaningful definition of 'long-term investing'."<sup>17</sup>

Treynor, who uses a wisdom-of-crowds-type argument, suggests that if investors differ in their assessments of a security value when they have the same information, their differences stem from errors in their analysis

of the second idea type. If their errors are independent (satisfying the diversity condition), “the error implicit in the consensus will be small.”

Treynor continues:

As the key to the averaging process underlying an accurate consensus is the assumption of independence, if all—or even a substantial fraction—of these investors make the same error, the independence assumption is violated and the consensus can diverge significantly from true value. The market then ceases to be efficient in the sense of pricing available information correctly.

To explain why this type of diversity breakdown can occur, Treynor turns to John Maynard Keynes, who adds two crucial elements to the case. First, he argues that most investors:

. . . are in fact largely concerned not with most superior long term forecasts of the probable yield of an investment over its whole life, but with foreseeing changes in the *conventional basis of evaluation* a short time ahead of the general public. They are concerned . . . with what the market will evaluate it at under the influence of mass psychology three months or a year hence. (Emphasis original.)

Keynes goes on to underscore how hard it is to be a long-term investor:

It is the long term investor, he who promotes the public interest, who will in practice come in for the most criticism . . . For it is the essence of his behavior that he should be eccentric, unconventional and rash in the eyes of the average opinion. If he is successful, that will only confirm the general belief in his rashness; and if in the short run he is unsuccessful, which is very likely, he will not receive much mercy. Worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally.<sup>18</sup>

In effect, the Treynor-Keynes commentary adds up to time arbitrage: long-term investors are in a much better position to assess and act on the non-obvious investment opportunities, although at a psychological toll. Evidence suggests that investors and companies remain very focused on the short term, in large part reflecting significant agency costs.<sup>19</sup>

An expectations approach offers a viable way to distinguish between fundamentals and the expectations an asset price reflects. The process has three steps: understand market-embedded expectations for future financial performance; assess the likelihood of expectations revisions using strategic and financial analysis; and make an investment decision. Rather than asking investors to forecast explicitly, the expectations approach instead asks investors to seek gaps between likely outcomes and the market’s collective forecast. This approach complements Treynor’s idea and addresses the main concern investors have about forecasts.<sup>20</sup>

## Conclusion

The efficient market hypothesis offers a practically sound prescription: most investors are best served investing in low cost, passive index funds. Overwhelming evidence, accumulated over many decades, shows a consistent inability of most active investment managers to add value.

Active investment managers seeking to earn excess returns should have a thoughtful investment process that logically starts with a view on how and why market mispricings can occur. Of the three approaches to explain market efficiency, only the complex adaptive systems perspective comfortably accommodates what we see in the real world: heterogeneous investors create markets that are efficient most of the time but that periodically go to excesses. The rational agent and no-arbitrage approaches, while valuable constructs, are not true mechanisms and fail to explain real market behavior in many important respects.

The ultimate goal of an active investor is to buy securities in anticipation of an expectations revision. Abrupt diversity breakdowns offer potential investment opportunity, but at a significant psychological cost. Slow traveling ideas provide a long-term investor’s best bet for delivering superior results.



## Endnotes

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- <sup>2</sup> Richard H. Thaler, *The Winner's Curse: Paradoxes and Anomalies of Economic Life* (Princeton, NJ: Princeton University Press, 1992), 157-158.
- <sup>3</sup> Ryan Sullivan, Allan Timmerman, and Halbert White, "Data-Snooping, Technical Trading Rule Performance, and the Bootstrap," *UCSD Working Paper*, December 8, 1997.
- <sup>4</sup> Schwert, 944-948.
- <sup>5</sup> Comments by Richard Roll in "Volatility in U.S. and Japanese Stock Markets", selections from the First Annual Symposium on Global Financial Markets, *Journal of Applied Corporate Finance*, Vol. 5, 1, Summer 1992.
- <sup>6</sup> Sanford J. Grossman, "On the Efficiency of Competitive Stock Markets Where Traders Have Diverse Information," *The Journal of Finance*, Vol. 31, 2, May 1976.
- <sup>7</sup> Paul Samuelson, "Proof that Properly Anticipated Prices Fluctuate Randomly," *Industrial Management Review*, Vol. 6, 1965, 41-49.
- <sup>8</sup> Andrew W. Lo and A. Craig MacKinlay, *A Non-Random Walk Down Wall Street* (Princeton, NJ: Princeton University Press, 1999), 4-5. Lo and MacKinlay's research rejects the random walk hypothesis.
- <sup>9</sup> See [http://www.vanguard.com/bogle\\_site/sp20050210.htm](http://www.vanguard.com/bogle_site/sp20050210.htm).
- <sup>10</sup> Michael J. Mauboussin, "Decision Making for Investors," *Mauboussin on Strategy, Legg Mason Capital Management*, May 24, 2004.
- <sup>11</sup> See Nassim Nicholas Taleb, *Fooled by Randomness*, 2<sup>nd</sup> ed. (New York: Thomson Texere, 2004), 64-68.
- <sup>12</sup> One recent example comes from Yankee's owner George Steinbrenner following the team's lackluster 4-8 start in 2005: "It is unbelievable to me that the highest-paid team in baseball would start the season in such a deep funk. They are not playing like true Yankees. They have the talent to win and they are not winning. I expect Joe Torre, his complete coaching staff and the team to turn this around." Not surprisingly, the Yankees had a similar streak (and one worse one) in their World-Series-winning 2000 season. See David Ginsburg, "Steinbrenner Lashes Out at Stumbling Yankees," *Associated Press*, April 18, 2005.
- <sup>13</sup> Duncan J. Watts, "A simple model of global cascades on random networks," *Proceedings of the National Academy of the Sciences*, April 30, 2002.
- <sup>14</sup> "An Asset Allocation Strategy for the Intelligent Investor," *Evergreen Capital Management, LLC*. See [http://www.gold-eagle.com/editorials\\_05/mauldin040505.html](http://www.gold-eagle.com/editorials_05/mauldin040505.html).
- <sup>15</sup> Ned Davis, *The Triumph of Contrarian Investing* (New York: McGraw Hill, 2004). See <http://www.tilsonfunds.com/DeathofEquities.pdf>.
- <sup>16</sup> Jack L. Treynor, "Long-Term Investing," *Financial Analysts Journal*, May/June 1976, 56-59.
- <sup>17</sup> Ibid.
- <sup>18</sup> John Maynard Keynes, *The General Theory of Employment, Interest and Money* (New York: Harcourt Brace Jovanovich, Inc., 1936), 154-158.
- <sup>19</sup> Alfred Rappaport, "The Economics of Short-term Performance Obsession," *Financial Analysts Journal*, May/June 2005.
- <sup>20</sup> Alfred Rappaport and Michael J. Mauboussin, *Expectations Investing* (Boston, MA: Harvard Business School Press, 2001).

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