

The Science of Winning

Lessons on behavioral finance
from a very alternative market

by Ronald N. Kahn

Special re-release of the 2003 article with new preface from Ronald N. Kahn

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The test of time

In the spring of 2003, I heard an interview with Michael Lewis on the radio while driving to work. He was discussing his new book, *Moneyball: The Art of Winning an Unfair Game*, a description of how Billy Beane, the Oakland A's general manager, exploited inefficiencies in the management of baseball to produce teams that won far more games than their collective salaries would imply. I immediately thought, this isn't a baseball book, it's an investment book.

That initial thought led to:

- ▶ A careful read of *Moneyball*.
- ▶ Billy Beane accepting speaking engagements for our senior executives and clients.
- ▶ This essay, "The Science of Winning," which compares the success of scientific analysis and behavioral finance in baseball to investing.

The release of the new movie, *Moneyball*, gave us an opportunity to review this essay and to distribute it to the larger BlackRock audience.

So how have the concepts in *Moneyball* held up over the past eight years? Baseball has become more efficient along the dimensions Billy Beane exploited the sport in 2002. Many teams have adopted the ideas originally described by Bill James (the baseball writer and statistician who developed the sabermetrics framework) and ignored by almost everyone in professional baseball, with the exception of Billy Beane. The Boston Red Sox failed to hire Billy Beane but then hired Theo Epstein as general manager to implement the same program. They also hired Bill James as advisor. The Red Sox' combination of money and scientific analysis finally broke the Curse of the Bambino, leading to a World Series win in 2004.

As for Billy Beane, he won the playoff of ideas, if not the actual baseball playoffs. The story in baseball played out like many investment opportunities. Someone discovers and exploits an anomaly, until others catch wind of it and join in, ultimately arbitraging away the opportunity.

And how has "The Science of Winning" held up since it was published in 2003? The essay makes two key points regarding investing—that behavioral finance has helped explain known anomalies rather than lead to new investment ideas and that rigorous scientific analysis underpins investment success.

On the first point, behavioral finance has become more prevalent in active management, if not more predictive. A key question all active managers ask is why their investment ideas should work. Why do the opportunities exist? Why does the market get some things wrong? Eight years ago, behavioral finance already helped explain why

opportunities existed: Value investing works because investors (incorrectly) extrapolate from recent experience. Momentum investing works because investors tend to hold on to losers and sell winners, slowing the diffusion of information into prices. But we knew about value and momentum well before behavioral finance became popular.

What behavioral finance wasn't doing back then was identifying new investment opportunities based on understanding behavior (as Billy Beane had done in baseball).

That is still the case. Academics publish ever more behavioral finance papers, but they still aren't identifying exploitable investment opportunities following directly from irrational investor behavior.

As to rigorous scientific analysis, surprisingly there have been attacks on its applicability to investing, at least as practiced by quantitative investors. The quant crisis of August 2007, and the three to four years of subsequent underperformance by quant equity managers, brought into question all the components of quantitative investing. But as I described in "Quantitative Equity Investing: Out-of-Style?," the problem with quant managers was too much money invested in the same opportunities, not rigorous scientific analysis. How could that go out of style? Over the past one to two years, we have seen quant managers come back, after the exit of those excess funds, and as they have used scientific analysis to identify new ideas.

Moneyball the movie is surprisingly good. It has come out eight years after the book appeared, turning a story about statistics and ideas into gripping entertainment. And even if Billy Beane has yet to win the World Series, his ideas have changed the game. "The Science of Winning" discusses behavioral finance and rigorous scientific analysis. These ideas haven't come to dominate investing over the past eight years. But rigorous scientific analysis in particular is only likely to grow in importance to investment success.

We can see parallels between financial markets and baseball, a very alternative market. Participants in both markets exhibit systematic irrational behavior.

The science of winning

Traditional finance assumes that investors are rational. Or, if not rational, the departures from rationality are random and arbitrary, and should wash out on average. But psychologists have demonstrated that investors are irrational in systematic and predictable ways. Understanding these irrationalities—now cataloged by behavioral finance researchers—may lead to exploitable inefficiencies.

Perhaps it's no surprise that psychologists have identified a very long list of consistent human foibles. There exist plausible evolutionary explanations for these. David Hirshleifer, Ohio State University finance professor, has described several categories of these effects, including social interactions, heuristic simplification, and self-deception.¹ Social interaction effects include conforming, follow-the-crowd behavior. Heuristic simplification arises when "limited attention, memory, and processing capabilities force a focus on subsets of available information." Such effects include generalizing from personal experience and extrapolating from recent events. Self-deception includes biased self-attribution: attributing positive outcomes to skill and negative outcomes to bad luck. Self-deception results in overconfidence.

Successful active management requires the existence of market inefficiencies plus the analytical skills to find and exploit them. But successful active management tends to eliminate such anomalies over time, as ever more active managers learn about them.

From the perspective of an active manager, the promise of behavioral finance is that an understanding of behavior will lead to new exploitable inefficiencies. Behavioral finance has not delivered on that promise. It has helped explain known market anomalies; it has not led to the discovery of new market anomalies.

Putting a positive spin on this, Richard Thaler, behavioral finance professor and principal at Fuller Thaler Asset Management, asserts, "While behaviorists think it is

theoretically possible to beat the market, individual investors do not have the time or training to do that on their own." So behavioral finance does predict new investment ideas, but only skilled professionals can discern and apply these ideas. In a more measured assessment, Princeton professor and Vanguard Group director Burton Malkiel says, "There are lots of good lessons to be taken from behavioral finance, but what it doesn't do is provide any kind of clear road map for cool sharp-penciled professionals to beat the market."² Maybe this doesn't even work for professionals. Beyond these two professors, finance academics generally are currently debating the practical value of behavioral finance.³

So the predictive triumphs of behavioral finance in the financial markets are arguable, at best. But there does exist a market whose participants are characterized by:

- ▶ Social interactions leading to follow-the-crowd behavior,
- ▶ Heuristic simplification, including generalizing personal experience and extrapolating from recent events, and
- ▶ Self-deception and overconfidence.

These characteristics are pronounced. The participant who first understood them realized that they should lead to significant, exploitable and previously unrecognized anomalies, which he has subsequently exploited. The market is professional baseball. The "investor" is Billy Beane, the general manager of the Oakland A's.

In his wonderful new book, *Moneyball: The Art of Winning an Unfair Game*, Michael Lewis describes a fascinating investment story.⁴ How does one of the poorest teams in baseball consistently outperform much wealthier teams, when the prevailing belief is that money buys baseball success? In fact, in 2000, the Commissioner's Blue Ribbon Panel on Baseball Economics concluded that "large and growing revenue disparities exist and are causing problems of chronic competitive imbalance."⁵

The answer lies in behavioral finance and in a rigorous and scientific approach to investing. Human irrationalities

1 David Hirshleifer, "Investor Psychology and Asset Pricing." Paper presented at the American Finance Association, New Orleans, January 2001.

2 Thaler and Malkiel are both quoted in *The New York Times Magazine* (June 8, 2003): 34.

3 For another example, see Mark Rubenstein. "Rational Markets: Yes or No? The Affirmative Case," *Financial Analysts Journal* (May/June 2001): 15-29.

4 Michael Lewis, *Moneyball: The Art of Winning an Unfair Game*, New York: W.W. Norton & Company (2003).

5 The Commissioner's Blue Ribbon Panel on Baseball Economics, July 2000.

impact investing and baseball. As John Henry (hedge fund manager and Boston Red Sox owner) put it, “People in both fields operate with beliefs and biases. To the extent you can eliminate both and replace them with data, you gain a clear advantage.”⁶

Baseball, as described by Lewis, presents a very interesting example of an investment market. It is inefficient, due to the behavior of market participants. And, over the past 25 years, observers outside the baseball mainstream have developed and applied rigorous scientific analyses to identify these irrational behaviors. Bill James was the pioneer here, in a field now known as sabermetrics.⁷ Early on, he was joined by a number of trained statisticians and scientists attracted by a love of the game and an interest in applying their training to understand it better. This sounds like the investment business, which has long attracted scientists—quants—eager to analyze markets scientifically.

Billy Beane was the first baseball insider to pay attention to these results, realize they led to market inefficiencies, and apply that understanding to running a team.

The irrational behaviors in baseball concerned what was important to winning games. Follow-the-crowd behavior dominated thinking about baseball, especially among professionals. At one point, Billy Beane’s assistant, Harvard-trained statistician Paul DePodesta showed (through quantitative modeling) that:

*An extra point of on-base percentage was worth three times an extra point of slugging percentage.... In major league baseball, Paul’s argument was practically heresy.... Billy Beane thought heresy was good: heresy meant opportunity. A player’s ability to get on base especially when he got on base in unspectacular ways—tended to be dramatically underpriced in relation to other abilities.*⁸

Quantitative analysis identified the misunderstanding. Billy Beane connected that to a market inefficiency.

Heuristic simplification includes generalizing personal experience and extrapolating from recent events. Baseball is rife with such behavior, from former players extrapolating from their own experience to being overly influenced by recent performance. One ploy of Billy Beane was to acquire players right after apparent career-threatening injuries. Not only were these often not career threatening, their recent nature further impaired seller judgment.

Adding to these baseball prejudices were the rampant effects of overconfidence. People were constantly fooled by what they thought they observed. For example, baseball hitting is possibly the most difficult standard task in all of professional sports: the most skilled participants succeed only one-third of the time. But while baseball professionals insist they can observe the difference between hitters, Bill James points out, “One absolutely cannot tell, by watching, the difference between a .300 hitter and a .275 hitter. The difference is one hit every two weeks.”⁹

One effect of overconfidence was the strong tendency of baseball scouts to judge players on appearance rather than statistics. The book includes several examples of players available at bargain rates simply because scouts identified them as “bad body” in spite of impressive performance statistics.

We can see parallels between financial markets and baseball, a very alternative market. Participants in both markets exhibit systematic irrational behavior. This behavior leads to market anomalies. As more participants understand and exploit these anomalies, they diminish. (Other general managers are increasingly wary of trading with Billy Beane.¹⁰)

But there is one distinct difference in how these ideas have played out in financial markets and baseball, and this difference plays a central role in the book. In contrast to financial markets, Billy Beane first understood the irrational behavior, through sabermetrics, and this then led him to the market anomalies.

6 Lewis, *Moneyball*, 90-91.

7 Named for the Society for American Baseball Research.

8 Lewis, *Moneyball*, 128-129.

9 *Ibid.*, 68.

10 That said, Billy Beane showed no concern that this book would jeopardize his edge, according to Michael Lewis. Beane believes the behavioral irrationalities are so ingrained that they will never disappear.

In fact, Billy Beane was almost uniquely qualified to understand and implement these ideas. He was a high school superstar, the dream of every baseball scout, based on excelling along every dimension they monitored (running, throwing, fielding, hitting, hitting with power). These scouts convinced him to skip college and go directly to the pros. There he floundered for many years. He lacked important skills that scouts couldn't easily measure (basically, he choked much of the time). He was a personal failure of the scouting system. So he was open to heretical ideas. But as an insider—a former player turned general manager—he could also act on heretical ideas.

His exploitation of market anomalies rivaled that of any investor. Not only did he find bargains, he used his understanding of baseball anomalies to turn cheap players into expensive players, which he then sold.

You could take a slightly above average pitcher and drop him into the closer's role, let him accumulate some gaudy number of saves, and then sell him off. You could, in essence, buy a stock, pump it up with false publicity, and sell it off for much more than you'd paid for it. Billy Beane had already done it twice, and assumed he could do so over and over again.”¹¹

What are the investment analogies to the story in *Moneyball*? Baseball market participants appear to incorrectly understand what produces runs and wins games. Hence they improperly price baseball player characteristics. The investment analogy would be if investors didn't understand what produced earnings and, hence, incorrectly priced stock characteristics.

In neither case are we talking about certainties. Baseball and investing are not exact sciences. The concern is about bias. Even if we knew characteristics to help us forecast future earnings, we wouldn't forecast those earnings exactly. But if we used the wrong characteristics, and other participants used better characteristics, we would on average lose in trading with them. This is particularly true when market prices closely track earnings. Over time, the forces for market efficiency eliminate participants with the wrong approach. Uncertainty delays when this happens, but a lucky streak can last for only so many trades.

In investing, thousands of different stocks trade every minute, helping the market eliminate biased approaches to forecasting.¹² The forces imposing efficiency in baseball operate much more slowly, due to the relatively few players, games, teams, and trades. Still, we may at some point see a fairly sudden (for baseball) correction in that market.

Since investment markets can often impose efficiency (or at least eliminate large inefficiencies) quickly, we expect fewer biases for behavioral finance to identify and help exploit. But the challenge is clear. Does systematic and irrational behavior lead most market participants to identify wrong characteristics for forecasting future earnings? And, can behavioral finance identify and exploit such a situation, *ex ante*?

We have experienced bubbles that behavioral finance did not stand out in exploiting. We also know of anomalies, such as value investing, that may arise through irrational behavior in the forecasting of future earnings. But an anomaly may also arise as a premium for higher risk. For the most unambiguous validation, behavioral finance researchers must predict and exploit new anomalies *ex ante*. Given the economics involved, we may never hear of the successful *ex ante* predictions of behavioral finance.

Finally, if irrational behavior provided the opportunity in baseball, clear and rational analysis of market data—science—identified that opportunity. And, if exploiting the very large behavioral anomalies in baseball required rigorous scientific analysis, imagine how much more important these are for investment management, where anomalies are more subtle and fleeting.

Scientific analysis has, of course, another important advantage. It can identify opportunities whether they arise from irrational behavior, institutional constraints, as compensation for risk, or even if they are true temporary anomalies.

The clearest lesson from baseball for us is exactly this importance of rigorous scientific analysis to successful investing.

¹¹ Lewis, *Moneyball*, 125.

¹² The recent technology bubble demonstrates that markets do not always quickly eliminate biased approaches to forecasting. Technology stock prices during that time depended mainly on earnings far into the future. Biases in forecasts of such distant earnings do not show up quickly, even with huge trading volumes.

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