LEGG MASON
CAPITAL MANAGEMENT

Mauboussin on STRATEGY

Michael J. Mauboussin

mmauboussin @ lmcm.com

September 7, 2007

Was Harry Potter Inevitable?

Cumulative Advantage, Counterfactuals, and the Halo Effect

The business of imagining . . . counterfactuals is a vital part of the way in which we learn. Because decisions about the future are—usually—based on weighing up the potential consequences of alternative courses of action, it makes sense to compare the actual outcomes of what we did with the conceivable outcomes of what we might have done.

Niall Ferguson
Virtual History [1]

Learning is hard because even seasoned professionals are ill-equipped to cope with the complexity, ambiguity, and dissonance inherent in assessing causation in history.

Philip E. Tetlock
Expert Political Judgment [2]

"The editor who turned down the first Harry Potter book, say hello to the publisher who took a pass on Stephen King."

Source: © The New Yorker Collection 2000 Jack Ziegler from cartoonbank.com. All Rights Reserved.

- **Predictions are difficult in culturally biased realms. Through a novel experiment, researchers showed an average song can become a hit or a clunker based on the principle of cumulative advantage.**
- **Investors must show considerable caution in counterfactual thinking, an exploration of what could have been. Such thinking can lead to suboptimal behavior.**
- **Management tomes are filled with advice derived from reverse-engineering the success of leading companies without awareness of how specious the claims can be.**

Nobody Knows Anything

The new Harry Potter book is great, isn't it? Or is it?

Our society often associates success with quality. In a fiercely competitive market, the thinking goes, only the best products rise to the surface. Once a product is a hit, whether a blockbuster movie or a bestselling book, we readily point to the attributes that make it so appealing. And the stakes are high: studies show a small minority of winners reap the vast majority of the sales. [3]

The link between success and quality is clear and legitimate in many domains. For example, consistent tournament winners in tennis or golf must have the skill to beat a large field of hungry challengers. But what happens if factors other than quality shape success? Might we draw the wrong lessons from the successes and failures we see and make ill-informed decisions as a result?

Three ideas, each individually underappreciated, inform the answers to these questions:

- First is a failure of experts to predict winners in culturally driven products, including books, music, and movies. [4] Notwithstanding this, studios routinely sack their chiefs due to a lack of hits. [5]
- Second is counterfactual thinking, a careful consideration of what could have happened but didn't. "What if" questions are natural, but investors must use them with caution.
- Third is the halo effect, our proclivity to attach attributes to what has succeeded, solely because of the success. The halo effect creates substantial distortion in our thinking. [6]

Taken together, these ideas can help investors think more critically about the past, present, and future and shed light on what is knowable and unknowable in specific domains. Notwithstanding the voices of some critics, chances are Harry Potter is great. [7] But plenty of products, fashions, and ideas have succeeded without being objectively meritorious. For market participants who see ideas come in and out of vogue, this observation is both disconcerting and potentially liberating.

Don't Lock Down on "Lockdown"

Ours is the only world we know. But it is tantalizing to ask whether the outcomes would be different if we went back in time and replayed the tape. [8] While models of how people adopt ideas and innovations certainly suggest a role for serendipity, there is no way to test theories about what could have been. That is, until very recently.

In a landmark study of social influence, a trio of Columbia University sociology researchers conducted a large-scale study of how people behave in a social setting. [9] One of the study's most important features is the creation of what are essentially separate worlds. We may not be able to replay the tape of our world, but these researchers effectively created alternative worlds within their study. The findings give pause to anyone in the prediction business.

Here's what they did. They created a website called Music Lab (see Exhibit 1) and invited subjects to participate in a study of musical tastes. The site invited subjects to listen to 48 songs by unknown bands and to rate the songs. The subjects also had the option to download the songs they liked. Over 14,000 people participated, and most of the subjects resided in the United States and were younger than 25 years old.

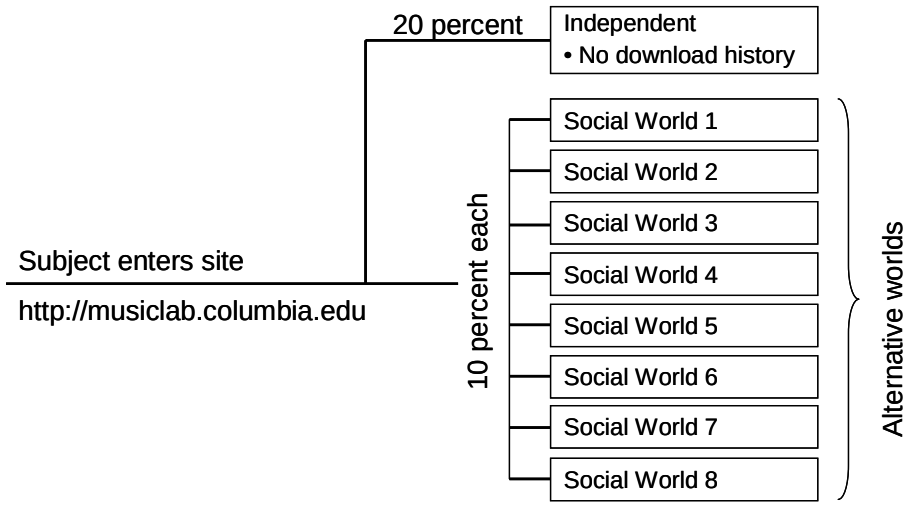
Exhibit 1: Music Lab

Source: http://musiclab.columbia.edu.

Upon entering the site, the researchers assigned 20 percent of the subjects to an independent world and 10 percent each to one of eight social influence worlds (see Exhibit 2). In the independent world, subjects saw and rated the songs and were free to download them, but had no information about download history. In contrast, in the social influence worlds the subjects also saw and rated songs, but had access to each song's download history as well. The researchers ran two variations of the experiment, but in all scenarios the songs started with the same initial condition—zero downloads.

The study's setup allowed for a very explicit test of social influence. The independent group, unswayed by the opinion of others, provided a reasonable indicator of song quality. If social influence is unimportant, you would expect the song rankings—and downloads—to be similar in all nine worlds. On the other hand, if social influence is important, small differences in the initial download pattern in the social worlds would lead to very different rankings. Cumulative advantage triumphs intrinsic quality.

Exhibit 2: How Music Lab Creates Alternative Worlds



Source: Duncan J. Watts, "Is Justin Timberlake a Product of Cumulative Advantage?" *The New York Times Magazine*, April 15, 2007.

What did the study show? Well, song quality did play a role. A top-five song in the independent world had about a 50 percent chance of finishing in the top five for a social influence world. And the worst songs rarely topped the charts. Beyond that, the scientists found social influence played a huge part in success and failure. In the eight social worlds, the songs downloaded early in the experiment affected the songs downloaded later. Since the patterns of download were different in each social world, so were the outcomes.

One song, "Lockdown" by 52metro, illustrates the point. The tune was ranked 26 in quality in the independent world, effectively average. Yet it was the number 1 song in one of the social influence worlds, and number 40 in another. Social influence catapulted an average song to hit status in one world and delegated it to the cellar in another.

The Polya urn process is a simple model that offers insight into how these varied outcomes arise.[10] Imagine a large urn with two balls inside, one red and one blue. You reach in and randomly select a ball. Say you pick the blue one. You then introduce one matching blue ball and return both balls to the urn (the urn now contains one red ball and two blue balls). You repeat the process, randomly selecting a ball, matching, and replacing until the urn is full. You then calculate the ratio of red to blue balls.

The Polya urn process has features that fit nicely with Music Lab's results:

- For any individual trial run, you have no way to know the outcome ahead of time. The ratio can be skewed toward red or blue, and multiple trials will likely yield different ratios.
- In any one trial, the ratio moves toward equilibrium over time. Once the urn is nearly full, adding new balls does not change the ratio much.
- The early selections strongly influence the ultimate outcome. Even though the process is random, the luck of the initial draw is crucial.

The combination of the Music Lab experiment and the Polya urn process offers a few crucial lessons. First, it is really hard to predict winners. While it is true that better quality products have a better probability of success, there is no assured link between commercial success and quality. Further, in the Music Lab experiment the inequality of outcomes was substantially greater in the social worlds than in the independent world, meaning social influence exacerbates product successes and failures.

Second, flexibility decreases over time. While the eventual outcomes were unclear early on in the Music Lab experiment, the results were sticky once established. For the social worlds, the outcomes stabilized after about one-third of the subjects participated.

Finally, there is a memory effect. The set of early downloads influences the pattern of later downloads. Our world represents one of many possible outcomes, and small changes in initial conditions lead to a big difference in outcomes. A scan of the ranking differences in the various social influence worlds attests to this.

To be clear, the Polya urn process is too simple to fully represent the Music Lab experiment and most social processes. [11] For example, the urn process is limited to two choices, while the experiment and real world are vastly more complicated. But the urn process does show how positive feedback leads to lopsided, unpredictable outcomes. Social influence can be the engine for positive feedback.

Imagining the role of social influence in other realms is not difficult. Researchers have demonstrated the importance of cumulative advantage in the success of technologies, behaviors, and ideas. [12] Each realm faces the same lack of predictability and loose correlation between success and quality. In cases where cause and effect are not clear, learning from history is a challenge.

What If . . .

Counterfactual thinking, considering what would have happened if a different action was selected, is of interest to philosophers, [13] historians, [14] and psychologists. [15] For the most part, philosophers and historians have greeted counterfactual thinking with great skepticism. Many historians, for instance, believe that consideration of what could have been is outside their purview.

Psychologists, however, are more open to studying counterfactuals, if for no other reason than we are all natural counterfactual thinkers. If something bad happens to us, we quickly consider how things could have been better had we acted differently. For example, if you go out in the morning without your umbrella and get caught in the rain, you immediately think you would have remained dry had you brought your umbrella.

The main challenge to counterfactual thinking is the issue of causality. In some situations, cause and effect is clear. You are wet because you didn't bring your umbrella. But in many social systems, indeed in all complex adaptive systems, cause and effect are frequently difficult to link.[16] So considering what the world would look like if Kennedy hadn't been assassinated, or if the Soviet Union had won the Cold War, is inherently challenging and potentially nonproductive. [17]

As a result, historians are extremely careful about how they use counterfactuals. They only change one variable at a time, holding others constant to preserve as much of the context as possible; they weigh only plausible actions; and they consider only the knowledge available to decision makers at the time. Most decision makers are not so disciplined.

Psychologists distinguish between upward (things could have been better) and downward (things could have been worse) counterfactuals. Upward counterfactuals are much more common in our day-to-day thoughts. Considering how different decisions would have led to better outcomes often leads to regret (e.g., "If I hadn't been speeding, I wouldn't have gotten the ticket"). Less frequently, we think of downward counterfactuals (e.g., "The wedding was more fun because the rain held off"). Both counterfactual types are important for investors.

Psychologists suggest counterfactual thinking serves two main purposes. The first is preparation for the future. By considering alternatives to past actions and spurred by a feeling of regret, individuals come up with prescriptions for future actions. Second, individuals use counterfactuals to help them feel better about a situation. In weighing a worse outcome, people feel better about themselves. [18]

Close calls and abnormal situations are particularly strong catalysts for counterfactual thinking. [19] In a demonstration of the close-call phenomenon, subjects were asked to consider a case where Mr. A and Mr. B share a taxi to the airport to catch two separate flights leaving at the same time. Caught in traffic, they arrive at the airport 30 minutes late and both miss their flights. The gate agents inform Mr. A that his flight left on time, and tell Mr. B his flight was delayed and he missed it by a few moments. Who is more upset? Subjects nearly unanimously felt Mr. B would be more upset, even though both men suffered the same plight.

Abnormal situations also generate strong counterfactual thoughts. Indeed, abnormality sometimes leads observers to blame crime victims in cases where the victims were doing something outside their routine. In a test of the abnormality concept, researchers described the case of Mr. C, who was involved in an accident while driving home along his normal route. Mr. D got into a similar accident while driving home on an alternative route that offered better scenery. Who is more upset? Four to one, subjects believed Mr. D would be more upset.

Awareness of counterfactual thinking can be very useful for investors, if only to illuminate common biases and errors. Here are some ideas investors may find useful:

Avoid inaction inertia. Inaction inertia arises when an investor initially fails to take advantage of an attractive investment opportunity and subsequently passes over the same, albeit somewhat less attractive, opportunity in the future. [20] For example, an investor who considers but fails to buy a

stock at $15 is less likely to buy the same stock at $30, even if the higher price still represents good value. Experiments confirm this behavior. [21]

Psychologists suggest individuals suffering from inaction inertia consider an upward counterfactual ("if only I had bought the stock at $15") and hence feel regret. Rejecting the second purchase opportunity, perceived as less attractive than the first, may limit or end that regret and allows the investor to avoid thinking about the initial lost opportunity.

While economic theory emphasizes investors should evaluate all investments based on future prospects, inaction inertia demonstrates that we all tend to carry psychological baggage that may prevent proper decisions. Counterfactual thinking helps describe the baggage.

Errors of action versus inaction. Counterfactual thinking often generates regret, which may seem like a bad thing. But the research shows that some regret is good for you because it encourages future changes in behavior. Since most counterfactual thoughts focus on how you could have avoided a problem, they encourage positive measures to sidestep similar problems going forward. When your mind is working well, you feel the sting of regret in the short-term and correct your behavior the next time, and you're better off for the experience.

Lingering regrets, on the other hand, are more troublesome. Psychologists have come to a fascinating finding: most of our short-term regrets relate to actions (commission), while our long-term regrets relate to inaction (omission). When mentally healthy individuals make mistakes in their actions, they regret, change, and move on. In contrast, lingering regrets surround what people failed to do. [22] Studies show the top two regrets of adult Americans are education (either not enough of it or insufficient effort while pursuing it) and career (failure to pursue a passion or working too hard). [23]

Warren Buffett is a good example of the regret associated with inaction. When asked about his main investing mistakes over time, Buffett points to inactions rather than actions. For instance, he often points to the stocks he almost bought and quantifies the profits that have escaped Berkshire Hathaway due to his inaction. [24]

Why do we regret the things we don't do more than the things we do? The answer leads to the next point, which describes how our minds compensate for our poor actions.

Psychological immune system. Mentally healthy people employ a host of tricks to make bad situations seem better. Psychologists have dubbed this the psychological immune system. [25] Just as our immune system fends off disease, the psychological immune system keeps us going by defending against, and removing, negative thoughts. This mental immune system is most likely to kick in when we have an intense experience or find ourselves in inescapable circumstances.

What kind of things does our mind do? First, we tend to explain away situations in a way that makes us feel better. For example, someone who fails to get a job offer after an interview may make up a story to shed a more favorable light on the situation (e.g., "The interviewer didn't appreciate my skills").

Next, we seek facts that support our views and disavow or dismiss facts that don't back us up. This is known as the confirmation bias. The confirmation bias allows us to be consistent in our views and removes the need to think or act as the consequence of reason.

We also exhibit hindsight bias. Once an event has passed, we tend to believe we had better knowledge of the outcome before the event than we actually did. For example, after a game is over, sports fans believe they assigned a higher probability to the game's outcome before the game than they actually did. Hindsight bias is a memory update that makes us look and feel better, and confers an illusory sense of control.

Finally, when we make a prediction or take an action that doesn't work out, we believe we were almost right—the close-call counterfactual. [26] This effect is particularly acute for individuals who

tend to hold strong world views, the so-called hedgehogs. Both hindsight bias and close-call counterfactuals bend reality to make individuals feel better.

Beyond theory, researchers argue that counterfactual thinking can also explain a couple of empirically observed investor behaviors. [27] Importantly, neither behavior benefits investors.

The first is a tendency to repurchase a stock that has declined following a prior sale for a profit. To illustrate, the investor initially buys at $30 per share, sells at $50, and repurchases at $40. In this case, the downward counterfactual is the investor could have held the stock throughout (net gain of $10 per share) versus the reality of a $20 gain and the opportunity to own the stock again. Investors feel good about this counterfactual because no matter what happens, they can cherish the thought that selling made them better off than holding.

Another tendency is for an investor to purchase additional shares of a stock when it goes down following the initial purchase. The downward counterfactual here is buying the whole stake at the higher price. For instance, the investor who buys 100 shares at $50 and an additional 100 shares at $40 is better off than the possible alternative of purchasing all 200 shares at $50.

So what should an investor do with counterfactual thinking? To start, it is crucial to recognize the value of counterfactual thinking diminishes as causality becomes less clear. As we saw with Music Lab, linking cause and effect can be difficult in socially driven processes. As company prospects and stock prices are often the result of these processes, predicting stock price performance is inherently difficult.

Next, be aware of how the mind works and the suboptimal behaviors that may ensue. For instance, inaction inertia may cause an investor to miss a very attractive investment opportunity because of an upward counterfactual.

Finally, be careful not to kid yourself. Hindsight bias and close-call counterfactual thinking may help preserve your belief system, but may not give you a clear view of the world. Research shows that experts who use counterfactuals parsimoniously are better predictors. [28]

If It's Doing Well, It Must Be Good

Every now and then an idea comes along that is simple, powerful, ubiquitous, and yet poorly understood. The halo effect is such an idea.

First noted by psychologist Edward Thorndike over 80 years ago, the halo effect is the human proclivity to make specific inferences based on general impressions. [29] Thorndike found when superiors in the military were asked to rate their subordinate officers on specific qualities (e.g., intelligence, physique, leadership), the correlations between the qualities were impossibly high. In effect, the overall impression the officer made on his superior overwhelmed the details.

Phil Rosenzweig's must-read book, *The Halo Effect*, shows this idea is alive and well in the business world. Rosenzweig's basic point is simple: we tend to observe success, attach attributes to that success, and recommend others embrace these attributes to achieve their own success. Management researchers frequently use substantial data to support their argument, which is all for naught if they fall into the halo effect trap.

For example, Rosenzweig suggests a company doing well will be praised for having "a sound strategy, a visionary leader, motivated employees, and excellent customer orientation, a vibrant culture, and so on." [30] But if the company's performance subsequently suffers, onlookers will conclude all of those features went wrong, when in reality nothing of the sort happened. Company performance shapes perception.

The halo effect is important for investors for a couple of reasons. First, Rosenzweig shows in devastating fashion that most of the thinking from best-selling business books falls prey to the halo effect. These books are commercially successful, he suggests, because they tell managers

a story they want to hear: here are the steps to success any company can achieve with effort. The fact is no simple formula will assure success in a rapidly changing business environment. Accordingly, investors can't rely on most management literature for insight.

Second, we have to recognize that products are often not successful because of their attributes; they are endowed with attributes because they are successful. This idea is clearly operative in socially influenced realms—think of 52metro's "Lockdown"—but also applies in markets. As in counterfactual thinking, distinguishing cause and effect is paramount and often muffed.

Conclusion

Here are some conclusions from the discussion:

- Predictions are difficult in culturally biased realms, including media and investment ideas. Through a novel experiment, researchers showed an average song can become a hit or a clunker based on the principle of cumulative advantage.
- Investors should think probabilistically. However, they must show considerable caution in counterfactual thinking, an exploration of what could have been. Further, counterfactual thinking can lead to some suboptimal behavior.
- We often make up causes for the effects we see. Management tomes are filled with advice derived from reverse-engineering the success of leading companies without awareness of how specious the claims are. As theories become more robust, they often rely more on circumstances than attributes.

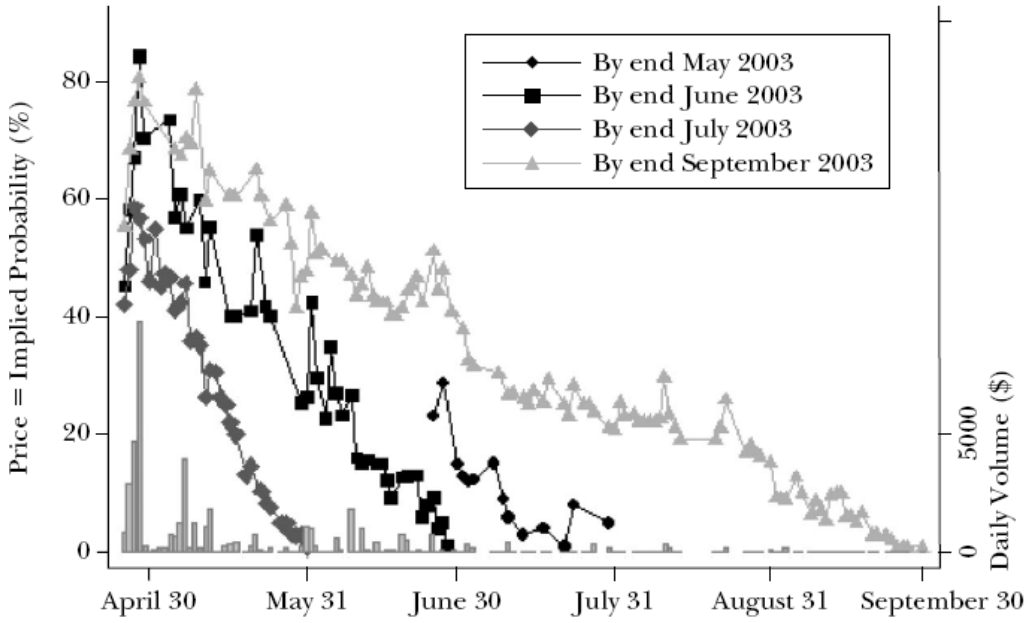
Appendix A: Motivations for the War in Iraq

Many politicians and citizens have criticized the current administration's decision to invade Iraq in 2003. One frequently cited complaint is the administration's faulty belief that Iraq had weapons of mass destruction (WMD). Naturally, the thought of avoiding the war generates an upward counterfactual.

But in order to use counterfactual thinking properly, you must consider not what you know today, but rather the information the decision makers had at their disposal at the time. While there is no way to get a complete sense of the information the specific policy makers had, we have a tool that can provide some insight: a prediction market.

Exhibit 3 takes data from www.tradesports.com that show the probability of finding WMD in Iraq. Of course, all of the contracts settled at zero as the WMD didn't turn up. But what probability did the market assign in April 2003 as the country entered into war? The answer is close to 80 percent.

Exhibit 3: Tradesports Contract of WMD (April – September, 2003)



Source: Justin Wolfers and Eric Zitzewitz, "Prediction Markets," *Journal of Economic Perspectives*, Vol. 18, 2, Spring 2004, 107-126.

No political commentary is necessary to see the lesson from psychology, called hindsight bias and the curse of knowledge. Once information has been revealed, we impose our knowledge as we evaluate past decisions. So we think we assigned higher probabilities to certain outcomes than we really did, and we criticize decisions based on the outcomes we see versus the quality of the decision process.

To properly evaluate past decisions, be mindful to recreate the available information as it existed, avoiding polluting the decision audit with after-the-fact disclosure.

Endnotes

[1] Niall Ferguson, ed., *Virtual History* (New York: Basic Books, 1999), 2.
[2] Philip E. Tetlock, *Expert Political Judgment: How Good is It? How Can We Know?* (Princeton, N.J.: Princeton University Press, 2005), 146.
[3] Arthur DeVany, *Hollywood Economics: How Extreme Uncertainty Shapes the Film Industry* (New York: Routledge, 2004); also Chris Anderson, *The Long Tail: Why the Future of Business Is Selling Less of More* (New York: Hyperion, 2006), 121.
[4] James Surowiecki, "The Science of Success," *The New Yorker*, July 9, 2007.
[5] Brooks Barnes, "NBC Programming Chief Kevin Reilly to Leave as Ratings Slide," *The Wall Street Journal*, May 29, 2007, B4.
[6] Phil Rosenzweig, *The Halo Effect . . . and the Eight Other Business Delusions That Deceive Managers* (New York: Free Press, 2007).
[7] Harold Bloom, "Can 35 Million Book Buyers Be Wrong? Yes." *The Wall Street Journal*, July 11, 2000, A26.
[8] Stephen Jay Gould, *Wonderful Life: The Burgess Shale and the Nature of History* (New York: W.W. Norton & Company, 1989), 292-323.
[9] Matthew J. Salganik, Peter Sheridan Dodds, and Duncan J. Watts, "Experimental Study of Inequality and Unpredictability in an Artificial Cultural Market," *Science*, Vol. 311, February 10, 2006, 854-856. For a treatment in the popular press, see Duncan J. Watts, "Is Justin Timberlake a Product of Cumulative Advantage?" *The New York Times Magazine*, April 15, 2007.
[10] Paul Pierson, *Politics in Time: History, Institutions, and Social Analysis* (Princeton, N.J.: Princeton University Press, 2004); W. Brian Arthur, *Increasing Returns and Path Dependence in the Economy* (Ann Arbor, MI: University of Michigan Press, 1994).
[11] Scott E. Page, "Path Dependence," *Quarterly Journal of Political Science*, vol. 1, 2006, 87-115.
[12] Arthur; Malcolm Gladwell, *The Tipping Point: How Little Things Can Make a Big Difference* (New York: Little, Brown and Company, 2000); Richard Brodie, *Virus of the Mind: The New Science of the Meme* (Seattle, WA: Integral Press, 1996).
[13] David Lewis, *Counterfactuals* (Cambridge, MA: Harvard University Press, 1973). Also, see http://plato.stanford.edu/entries/causation-counterfactual/.
[14] Ferguson; John Lewis Gaddis, *The Landscape of History: How Historians Map the Past* (Oxford: Oxford University Press, 2002).
[15] Neal J. Roese and James M. Olsen, eds., *What Might Have Been: The Social Psychology of Counterfactual Thinking* (Hillsdale, NJ: Erlbaum, 1995); Tetlock, *Expert Political Judgment*.
[16] Gaddis, 91-109.
[17] Philip E. Tetlock, Richard Ned Lebow, and Geoffrey Parker, eds., *Unmaking the West: "What-If?" Scenarios That Rewrite World History* (Ann Arbor, MI: University of Michigan Press, 2006).
[18] Neal J. Roese and James M. Olsen, "Functions of Counterfactual Thinking," in Neal J. Roese and James M. Olsen, eds., *What Might Have Been: The Social Psychology of Counterfactual Thinking* (Hillsdale, NJ: Erlbaum, 1995), 169-197.
[19] Daniel Kahneman and Dale T. Miller, "Norm Theory: Comparing Reality to Its Alternatives," *Psychological Review*, vol. 93, 1986, 136-153.
[20] Orit E. Tykocinski and Thane S. Pittman, "The Consequences of Doing Nothing: Inaction Inertia as Avoidance of Anticipated Counterfactual Regret," *Journal of Personality and Social Psychology*, vol. 75, 1998, 607-616.
[21] Orit Tykocinski, Roni Israel, and Thane S. Pittman, "Inaction Inertia in the Stock Market," *Journal of Applied Social Psychology*, vol. 34, 2004, 1166-1175.
[22] Thomas Gilovich and Victoria Husted Medvec, "The Experience of Regret: What, When, and Why," *Psychological Review*, vol. 102, 1995, 379-395.
[23] Neal Roese, *If Only: How to Turn Regret into Opportunity* (New York: Broadway Books, 2005), 40-44.
[24] Whitney Tilson, "Notes from the 2004 Berkshire Hathaway Annual Meeting," May 1, 2004. http://www.tilsonfunds.com/brkmtg04notes.doc.
[25] Daniel Gilbert, *Stumbling on Happiness* (New York: Alfred A. Knopf, 2006).
[26] Philip E. Tetlock, "Close-call Counterfactuals and Belief System Defenses: I Was Not Almost Wrong but I Was Almost Right," *Journal of Personality and Social Psychology*, vol. 75, 1998, 639-652.

[27] Brad M. Barber, Terrance Odean, and Michal Strahilevitz, "Once Burned, Twice Shy: Naïve Learning, Counterfactuals, and the Repurchase of Shares Previously Sold," *SSRN Working Paper*, September 2004.
[28] Tetlock, *Expert Political Judgment*. Also Shankar Vedantam, "Bush and Counterfactual Confidence," *The Washington Post*, July 30, 2007, A3.
[29] Rosenzweig and Edward L. Thorndike, "A Constant Error in Psychological Ratings," *Journal of Applied Psychology*, Vol. 4, 1920, 469-77.
[30] Phil Rosenzweig "The Halo Effect and Other Managerial Delusions," *The McKinsey Quarterly*, 1, 2007, 77-85.

Resources

Books

Anderson, Chris, *The Long Tail: Why the Future of Business Is Selling Less of More* (New York: Hyperion, 2006).

Arthur, W. Brian, *Increasing Returns and Path Dependence in the Economy* (Ann Arbor, MI: University of Michigan Press, 1994).

Brodie, Richard, *Virus of the Mind: The New Science of the Meme* (Seattle, WA: Integral Press, 1996).

DeVany, Arthur, *Hollywood Economics: How Extreme Uncertainty Shapes the Film Industry* (New York: Routledge, 2004).

Ferguson, Niall, ed., *Virtual History* (New York: Basic Books, 1999).

Gaddis, John Lewis, *The Landscape of History: How Historians Map the Past* (Oxford: Oxford University Press, 2002).

Gilbert, Daniel, *Stumbling on Happiness* (New York: Alfred A. Knopf, 2006).

Gladwell, Malcolm, *The Tipping Point: How Little Things Can Make a Big Difference* (New York: Little, Brown and Company, 2000).

Gould, Stephen Jay, *Wonderful Life: The Burgess Shale and the Nature of History* (New York: W.W. Norton & Company, 1989).

Lewis, David, *Counterfactuals* (Cambridge, MA: Harvard University Press, 1973).

Pierson, Paul, *Politics in Time: History, Institutions, and Social Analysis* (Princeton, N.J: Princeton University Press, 2004).

Roese, Neal, *If Only: How to Turn Regret into Opportunity* (New York: Broadway Books, 2005).

Roese, Neal J., and James M. Olsen, eds., *What Might Have Been: The Social Psychology of Counterfactual Thinking* (Hillsdale, NJ: Erlbaum, 1995).

Rosenzweig, Phil, *The Halo Effect . . . and the Eight Other Business Delusions That Deceive Managers* (New York: Free Press, 2007).

Tetlock, Philip E., *Expert Political Judgment: How Good is It? How Can We Know?* (Princeton, N.J.: Princeton University Press, 2005).

Tetlock, Philip E., Richard Ned Lebow, and Geoffrey Parker, eds., *Unmaking the West: "What-If?" Scenarios That Rewrite World History* (Ann Arbor, MI: University of Michigan Press, 2006).

Watts, Duncan J., *Six Degrees: The Science of the Connected Age* (New York: W.W. Norton, 2003).

Articles and Papers

Barber, Brad M., Terrance Odean, and Michal Strahilevitz, "Once Burned, Twice Shy: Naïve Learning, Counterfactuals, and the Repurchase of Shares Previously Sold," *SSRN Working Paper*, September 2004.

Barnes, Brooks, "NBC Programming Chief Kevin Reilly to Leave as Ratings Slide," *The Wall Street Journal*, May 29, 2007, B4.

Bloom, Harold, "Can 35 Million Book Buyers Be Wrong? Yes." *The Wall Street Journal*, July 11, 2000, A26.

Gilovich, Thomas and Victoria Husted Medvec, "The Experience of Regret: What, When, and Why," *Psychological Review*, vol. 102, 1995, 379-395.

Kahneman, Daniel and Dale T. Miller, "Norm Theory: Comparing Reality to Its Alternatives," *Psychological Review*, vol. 93, 1986, 136-153.

Page, Scott E., "Path Dependence," *Quarterly Journal of Political Science*, vol. 1, 2006, 87-115.

Salganik, Matthew J., Peter Sheridan Dodds, and Duncan J. Watts, "Experimental Study of Inequality and Unpredictability in an Artificial Cultural Market," *Science*, vol. 311, February 10, 2006, 854-856.

Surowiecki, James, "The Science of Success," *The New Yorker*, July 9, 2007.

Tetlock, Philip E., "Close-call Counterfactuals and Belief System Defenses: I Was Not Almost Wrong but I Was Almost Right," *Journal of Personality and Social Psychology*, vol. 75, 1998, 639-652.

Thorndike, Edward L., "A Constant Error in Psychological Ratings," *Journal of Applied Psychology*, vol. 4, 1920, 469-77.

Tilson, Whitney, "Notes from the 2004 Berkshire Hathaway Annual Meeting," May 1, 2004.

Tykocinski, Orit E., and Thane S. Pittman, "The Consequences of Doing Nothing: Inaction Inertia as Avoidance of Anticipated Counterfactual Regret," *Journal of Personality and Social Psychology*, vol. 75, 1998, 607-616.

Tykocinski, Orit, Roni Israel, and Thane S. Pittman, "Inaction Inertia in the Stock Market," *Journal of Applied Social Psychology*, vol. 34, 2004, 1166-1175.

Vedantam, Shankar, "Bush and Counterfactual Confidence," *The Washington Post*, July 30, 2007, A3.

Watts, Duncan J., "Is Justin Timberlake a Product of Cumulative Advantage?" *The New York Times Magazine*, April 15, 2007.

Wolfers, Justin, and Eric Zitzewitz, "Prediction Markets," *Journal of Economic Perspectives*, vol. 18, 2, Spring 2004, 107-126.

The views expressed in this commentary reflect those of Legg Mason Capital Management (LMCM) as of the date of this commentary. These views are subject to change at any time based on market or other conditions, and LMCM disclaims any responsibility to update such views. These views may not be relied upon as investment advice and, because investment decisions for clients of LMCM are based on numerous factors, may not be relied upon as an indication of trading intent on behalf of the firm. The information provided in this commentary should not be considered a recommendation by LMCM or any of its affiliates to purchase or sell any security. To the extent specific securities are mentioned in the commentary, they have been selected by the author on an objective basis to illustrate views expressed in the commentary. If specific securities are mentioned, they do not represent all of the securities purchased, sold or recommended for clients of LMCM and it should not be assumed that investments in such securities have been or will be profitable. There is no assurance that any security mentioned in the commentary has ever been, or will in the future be, recommended to clients of LMCM. Employees of LMCM and its affiliates may own securities referenced herein. Predictions are inherently limited and should not be relied upon as an indication of actual or future performance.

LMCM is a registered investment adviser. LMCM and LMIS are Legg Mason, Inc. affiliated companies.

© 2007 Legg Mason Investor Services, LLC

07-905