Benoit Mandelbrot once said that "failure to explain is caused by failure to describe". The world has experienced one of the most severe financial crises. How should we make sense of what happened? Without a doubt, we should describe the financial crisis in a multidisciplinary fashion. Only through multiple perspectives can we begin to uncover the origins of the "great recession". Today, I'm pleased and honored to have one of the foremost experts in multidisciplinary thinking, Michael Mauboussin.

In this interview we attempt to make sense of the recent crisis by discussing Mr. Mauboussin's latest book, "Think Twice: Harnessing the power of Counterintuition." We also reference his past bestseller "More Than You Know: Finding Financial Wisdom in Unconventional Places."

Background

Michael J. Mauboussin is Chief Investment Strategist at Legg Mason Capital Management. Prior to joining LMCM, he served as managing director and chief U.S. investment strategist at Credit Suisse.

Mauboussin's work focuses on the investment process from both the company's and the investor's standpoint. His multidisciplinary approach draws from fields including finance, competitive strategy, psychology, and complex systems theory. Mauboussin's ideas have been featured in national publications including the *Wall Street* Journal, Fortune, Forbes, and *SmartMoney* .

He is the author of *More Than You Know: Finding Financial Wisdom in Unconventional Places* (Columbia University Press, 2006) and coauthor, with Alfred Rappaport, of *Expectations Investing: Reading Stock Prices for Better Returns* (Harvard Business School Press, 2001). *More Than You Know* was named as one of "The 100 Best Business Books of All Time" by 1-800-CEOREAD. Mauboussin has also authored or coauthored articles for the *Harvard Business Review* , *Journal of Applied Corporate Finance* , *Financial Management* , *Time*, and *Fortune* .

Mauboussin has been an Adjunct Professor of Finance at Columbia Business School since 1993 and is on the faculty of the Heilbrunn Center for Graham and Dodd Investing. In 2009, he received the Dean's Award for Teaching Excellence. Mauboussin is also affiliated with the Santa Fe Institute, the founding institution of complexity science and a global leader in multidisciplinary research.

Mauboussin received an AB in government from Georgetown University. He lives in Darien, Connecticut, with his wife and five children.

Opening Questions

Q: You were a top analyst for many years, can you pinpoint when you first became interested in a multidisciplinary approach to finance/investing?

A: I'd trace my thinking back to the moment I read *Creating Shareholder* Value by Al Rappaport, who I had the honor of working with on *Expectations Investing*. That book encouraged me to approach stock valuation in a way that was—and still is, to a large degree—different than the rest of the financial community. Specifically, he emphasized the importance of long-term cash flows, showed how competitive strategy analysis should be used, and made a persuasive case that expectations are the key to stock prices.

As I was implementing Rappaport's ideas in the early 1990s, I started to read more widely in areas like evolutionary theory and psychology. Around the mid 1990s, Bill Miller, who's now my boss, invited me to visit the Santa Fe Institute. SFI is dedicated to multidisciplinary research in the physical and social sciences. Immersion into the research at SFI really catalyzed my interest in applying multi-disciplinary approaches to the world of investing.

Q: How did this interest and hobby evolve to your current position?

A: I was fortunate to work with some very progressive thinkers at Credit Suisse at that time. One of them is now the CEO of Credit Suisse, Brady Dougan. These folks allowed, and in fact encouraged, me to explore these connections as they applied to investing. For example, I had a bi-weekly piece called "The Consilient Observer", dedicated to new approaches to investing. In fact, "More Than You Know" is basically a collection of those essays.

Let's talk about your new book "Think Twice: Harnessing the Power of Counterintuition"

Q: What motivated you to write this book? How does it differ from your prior best seller?

A: I started my career as a big believer in models and finance theory. And I still think those things are really important. But over time I came to recognize that what makes for great investors—and corporate managers, for that matter—is not their ability to crunch numbers, but rather their ability to make good decisions in the face of uncertainty. Remarkably, decision making is the most important facet of investing and is probably the least taught aspect in business school.

My "a-ha" moment came at an investment and behavioral finance conference a few years back. Like they do at most of these conferences, the professors ran little experiments to demonstrate various decision making principles, and offered small prizes for the attendees who did best. The first contest was about overconfidence and calibration, and I won. I got a t-shirt. The second one was about thinking about the decisions of others, and I won that one, too. Now with about 70 attendees, it would be fair to say that it was unlikely I would win both contests out of sheer luck.

But I have a confession to make: I had seen variations of these exercises before, and when I first tried them I did really poorly. Embarrassingly poorly. But then I learned the principles, and how to deal with those types of decisions. So even though I didn't know the answers to those exact exercises, I knew how to think about them.

When Dick Thaler, a foremost behavioral economist, tossed me the t-shirt after I won the contest, he grumbled, "You don't deserve this, you knew what was going on." And I thought: "That's right, *and that's the point!*"

Q: Within the first couple of pages you provide a three step outline for becoming a better decision maker- 1 prepare, 2 recognize, and 3 apply. The failure of Bear Stearns, Lehman Brothers, Fannie & Freddie, and many others represent a failure of following your three steps. Can you share your thoughts with us?

A: Those situations all have different circumstances, so it's hard to comment about all of them with generalizations.

That said, there are a few high-level concepts that would seem to be worth considering in the context of the financial crisis.

First, it's really important to think about probabilities and to recognize that the unexpected happens from time to time. That some organizations didn't even consider lower house prices a possibility, for example, is a mistake from not thinking this way.

Second, it's really important to understand incentives. Many, if not most, of the parties involved in the mortgage meltdown were doing what makes sense for them—even if it wasn't good for the system overall. Homeowners got to live in fancier homes, mortgage brokers earned fees on the mortgages they originated without having to worry about the quality of the loans, investment banks earned tidy fees buying, packaging, and selling these loans, rating agencies made money, and investors earned extra yield on so-called AAA securities. So it's a big deal to watch and unpack incentives.

Finally is what I refer to as the "grand ah-whoom"—basically tipping points in the system. A run on the bank is a good example. The financial company can swear up and down that it is in fine shape, but if customers lose faith and pull out their money, it's over really fast.

Q: You mention the mistake of favoring the inside view over the outside view. An inside view meaning only focusing on specific tasks and using information close at hand to make predictions. An outside view on the other hand asks if there are similar situations to provide a basis for decision making. In hindsight, do you think key financial decision makers (i.e. heads of large corporations) fell for the inside view?

A: Almost everyone embraces the inside view from time-to-time. It's a funny dynamic with executives,. On the one hand, you want them to be optimistic so that they will work hard and take prudent risks. On the other hand, you want them to avoid being too optimistic.

Q: It does seem like several thinkers used an outside view to avoid the crisis. Two that come to mind are, Jeremy Grantham and Robert Shiller, each of whom found data supporting mean reversion in real estate prices.

A: Right. There were some others as well. The challenge is to be right consistently.

Q: You write "a mental model is an internal representation of external reality…it trades detail for speed". Which mental models do you use most often? Where do you limit the use of mental models?

A: I'm not sure I can point to particular models I use most often. The real goal is to match the model with the problem you're faced with.

That said, I'll mention two broad areas. The first is understanding the nature of complex adaptive systems. These systems are everywhere in nature and society, with the stock market being a classic example. Some understanding of how these systems work will carry a lot of intellectual freight.

The second is the core ideas behind prospect theory, developed by Danny Kahneman and Amos Tversky. We tend to use certain heuristics—rules of thumb—which have associated biases. Every decision maker should learn about these heuristics and biases, and the younger you are when you internalize the lessons, the better.

Q: How do you think criminals like Bernie Madoff manage to minimize cognitive dissonance and use the confirmation bias to their advantage (that is to focus their partners on their consistent returns/ upside)?

A: I'm not a psychologist, and I'm sure there are plenty of people working on analyzing Madoff. But on the surface, he used a few tools of persuasion to his advantage. First, his early investors *did* get good returns, even if they were concocted. That created evidence that he knew what he was doing. He also created a sense of exclusivity. When people perceive something that's both good and exclusive, it increases its attractiveness.

Q: Besides the subprime crisis give us another example where what may be optimal for the individual agents in a complex system maybe suboptimal for the system as a whole.

A: The main point is that it's really difficult to manage a complex adaptive system, because you can't see the connections between the agents. In the book I give the example of the bungled attempt to "manage" Yellowstone National Park. The intentions were good, but enhancing the population of one species led to unanticipated cascades of events.

Q: From your own experiences when has your intuition served you versus when has it lead you astray?

A: That's an interesting question. For me, the answer is playing sports. I've played sports all of my life (and still do), and after enough practice you learn what to do in certain situations. There's no need to think much—it's almost pure pattern recognition.

Q: You mention that over time it is much more important to be a fox rather than a hedgehog. That is to stitch together diver sources of information rather than make few key predictions. How can an investor

systematically build mental model diversity and improve his/her ability to stitch diverse sources of information?

A: I wish I could take credit for the fox versus hedgehog distinction in decision making, but I can't. That came out of the excellent work of Phil Tetlock, a psychologist at Cal, Berkeley. Tetlock's work on experts, I believe, should be taught to every businessperson—really, to every citizen. Through an extraordinary piece of scholarship, Tetlock shows how poor experts do in making predictions in complex realms including political and economic outcomes.

But his work also shows that some experts do better than others. The so-called foxes, who know a little about a lot of things and don't get wedded to a particular view, predict better than hedgehogs, the folks who know a lot about one big thing.

It may be that you are to some degree born to be a fox or a hedgehog, but to become a fox, or work on foxiness, you have to read a lot and be willing to change your view. Reading and evolving are really hard work.

Q: How do you view the crisis through the lens of conformity? How did homebuyers and lenders distort judgment, action, and perception?

A: There has been a lot of work on this topic over the years. Markets tend to operate efficiently when there is sufficient diversity of the underlying investors. However, we know that investors periodically coordinate their behavior—what I like to call a "diversity breakdown." How this occurs is probably best expressed through a diffusion model.

Work in experimental economics shows that bubbles appear when there is upside price momentum and easy credit. This is a very good description of the real estate market in the middle part of this decade—in part, fueled by the Federal Reserve's low interest rate policy.

One of the striking findings from the conformity research is that it is the *perception* of people that change when they conform. They're not going along only because they want to fit in; what other people believe shapes what they believe. I'd call this finding tentative at this point, but it's certainly fascinating and somewhat disturbing.

Q: In this book you have stressed the importance of understanding both behavioral finance and complex adaptive systems. While behavioral finance helps the individual investor complexity theory provides the outside view. Is this your take?

A: I would say that understanding the nature of complex adaptive systems is useful in many realms, including markets. Understanding behavioral finance can help you minimize your own mistakes.

But I want to make clear one distinction that I think slips by many people. That is, the theory of complex systems teaches us it's possible for people to be individually not very smart but for the market to be smart. The

whole is greater than the sum of the parts. So it doesn't follow that just because you and I make mistakes that the market will be inefficient.

Q: A section of your book is dedicated to indentifying the situations that allow for individual excellence. "A stars performance relies on the people, structure, and norms around him- the system" Can individual investors apply this model to select investment managers who will outperform markets?

A: Yes and no. It's useful to think of investment performance as a combination of skill and luck. I think you can make the case that many investors with excellent long-term records, like Warren Buffett, are undoubtedly skillful.

So investors need to be diligent about two things. First, part of an investor's skill is the system in which he or she operates. If you remove them from their system, they may not be able to operate at the same level. You can see this all the time in business and sports. Second, you need to take luck into consideration. Extraordinarily good, or bad, results almost always reflect a lot good or bad luck. And extreme luck tends to be transitory.

Q: The crisis has left many talking about "tightly coupled systems" can you share your thoughts on the coupling of credit and equity markets.

A: Tightly coupled systems, one of the features of normal accident theory developed by Charles Perrow, exist when the break down in one part of the system roils through the system and cannot be stopped. So this theory probably isn't necessary to think about credit and equity markets.

That said, I do believe it's very valuable for equity investors to pay attention to the fixed income markets. For example, if you believe you can earn equity-like returns in the fixed income markets, which was the case late in 2008 and in early 2009, and those returns satisfy your needs, then you should invest in fixed income instead of equity. The reasoning is pretty straightforward: you're meeting your objectives while sitting in a more senior position in the capital structure.

Q: When dealing with complex systems you recommend "setting system level goals". How do you look at President Obama's goals? Has he set system level goals?

A: I don't know enough about the workings of the administration to answer that. But one thing that has been interesting is that the new administration has worked with a number of very thoughtful people in behavioral economics, and it appears some of the ideas are finding their way into policy.

An interesting person to watch is Cass Sunstein, a law professor at Harvard, who is now in charge of regulation. He, along with Dick Thaler, wrote the book "Nudge." The book has lots of good ideas. One that I like is the concept of "choice architecture." Basically, by changing how you offer choices to people, you can influence how they decide. If you made the defaults from those decisions consistent with worthy goals, you can really change

behavior for the better. Examples of successes from choice architecture include increasing people's savings rates and encouraging organ donation.

Q: You admonish "there is no best practice in domains with multiple dimensions" given this warning it seems even more important to focus on what Buffett calls the "circle of competence". What's your take?

A: I would separate those two ideas. The first relates to the Colonel Blotto game, part of the game theory literature. The Colonel Blotto game has two players who each get a set of resources—say, soldiers. The players then allocate their soldiers over a range of battlefields, or dimensions. The player who has the most soldiers in each battle wins that battle, and the player who wins the most battles is the victor.

Simple versions of the game don't reveal much; it's basically rock, paper, scissors. That's why I mention there's no best practice. You can show that strategy A beats B, B beats C, but that C beats A. So there's no best strategy.

But if you adjust the two parameters, the number of soldiers and number of battlefields, the game gets more interesting. In fact, it has some good lessons in realms like war, sports, and business.

Buffett's concept of circle of competence is extremely important. The basic idea is that it's a really complicated world out there, and you're unlikely to be able to gain an investment edge everywhere. So you should focus on the areas where you can get an edge and be satisfied to leave alone the areas outside your circle of competence.

Q: If we look at financial markets as complex systems can we explain a breakdown of diversity as an agent for illiquidity?

A: Diversity breakdowns and illiquidity are intimately linked, yes. But the breakdown also sows the seeds of its own correction. For example, when everyone becomes fearful, there are no buyers, all sellers. So liquidity dries up, because no one wants to be on the other side of the trade. But eventually, the selling gets exhausted.

I would also add a thought that I attribute to Warren Buffett, which is that fear tends to spread very rapidly, but confidence is restored more slowly. We're in the rebuilding phase now.

Let's talk about your prior book "More Than You Know".

In this book you provide a toolbox of mental models –aggregating research and presenting it with an investment backdrop. If you don't mind let's revisit some of the concepts and apply them to our current financial circumstances.

Q: In More Than You Know, you introduced the topic of fitness landscapes to explain Tiger Woods' success. Let's apply this concept to the recent financial crisis, clearly many managers underperformed. Do you see any managers who have used the crisis as a means of improving their "decision making"? How do you think top investment managers are taking advantage of the changing landscape?

A: I don't think any thoughtful manager goes through a tough performance period and doesn't try to learn from it, and certainly the recent crisis is no different. But I have to say, it's really important to be careful of hindsight bias. People tend to recreate the past in a way that makes them look favorable. And the fact is the outcome we witnessed was only one of many possible outcomes—some better, some worse.

The main lesson from studying fitness landscapes is that as you are improving it can be the case that your short-term performance may suffer even as your long-term prospects are brightening. So focus on getting better every day, and don't worry too much about the short-term blips.

Q: You're a big believer in process over outcome. Do you think large financial firms pursued short term goals at the expense of developing proper risk management techniques (particularly for the more advanced financial products)? Where did their process break down?

A: I think many firms suffered from the problem of induction. The basic idea is that you try to infer the nature of the system by observing instances. For an extended stretch, the results were satisfactory. Take the mortgage market—home prices were rising, default rates were low, the demand for mortgage-backed products was enormous. All the signals were flashing positively.

The problem is you can't learn too much about a system by a fraction of the instances. This is where the idea of the "black swan" comes from. Seeing lots of white swans doesn't prove that all swans are white, but seeing one black swan does *disprove* it.

So the lesson is to always be diligent about what you are *not* observing, not just what you *are* observing.

Q: We've looked at the financial crisis through the lens of process over outcome. Let's shift focus and talk about the tension between the investment profession and business. Can you share your thoughts about this "balance" in the context of the crisis?

A: The idea is that when you run an investment firm, you are trying to manage to multiple goals. The first, which Charley Ellis calls the "profession", is to deliver excess returns for your investors over time. To be successful with the profession, you have to be patient, a contrarian, and highly aware of your circle of competence.

The second goal is to make money, what Ellis calls the "business." If you run a mutual fund company, there's a pretty close correlation between revenues and assets under management. So there can be a temptation to grow assets.

Now having a healthy business is consistent with a successful focus on profession. The problem comes when the pendulum swings too far toward the business and the profession suffers as a consequence. A number of people, most notablely Jack Bogle, have argued that a number of investment organizations have become too business focused. It's hard to argue with the analysis and conclusions.

One thread you find with a lot of great investors, folks like Seth Klarman and Eddie Lampert, is they tend to be picky about investors they work with. They want folks who understand what they are doing. In essence, these investors give up the upside of more assets in order to attend to the profession properly.

Q: Many financial models and stock screens are "attribute" driven. How can we build more circumstance (context) driven models? Can you give us any examples?

A: The simplest example is the widespread use of multiples, for example, the multiple of price/earnings. If you ask whether a low P/E is good or bad, it should be apparent that the right answer is "it depends." Sometimes stocks with low multiples are overvalued, and high multiple stocks are cheap. What does it depend on? It'd be conditions like growth prospects, returns on invested capital, and the strength of the company's competitive position.

The fact of the matter is that the right answer to most questions in investing is "it depends." And figuring out what it depends *on* is one of the main jobs for an investor.

Q: You once said "Investing is interactive, probabilistic, and noisy" how do you remove the noise from your research and decision making.

A: Here's how I think about it. Stock prices reflect expectations that combine some signal and some noise. You can think of the signal as the true growth prospects and economic returns, and noise as deviations from those figures. The metaphor I often use is that of a coin toss. If I have a fair coin, you know that the signal is that heads comes up 50% of the time. But if I flipped 10 times, you may not be shocked to see 7 tails and 3 heads. That ratio would be the combination of skill and noise.

How do you take advantage of this? The simplest answer is something we call time arbitrage. If the market sees the 7 tails and starts to price the coin as tails biased, then you can buy those faulty expectations and make money. The key is that you get the signal right and the signal reveals itself over time.

Another way to cope with noise is to think probabilistically. The basic idea is to intelligently consider value outcomes and their associated probabilities. These probabilities and outcomes allow you to determine an expected value, and you want to buy at a substantial discount to that value. That discount is what Ben Graham would call "margin of safety." His message about margin of safety is just one of Graham's enduring lessons.

Q: Tells us one or two things investors can do to focus on the long term given complex environments?

A: Let me first say there's nothing sacred about focusing on the long term. There are some investment strategies that are short term oriented, and that's ok. In fact, it's probably the case that we need all types of investors to ensure a healthy market. A problem does arise, however, when people claim to be long-term oriented but employ practices that are inconsistent with their time horizon.

I like to think of markets as complex adaptive systems. But Ben Graham's idea of "Mr. Market" captures many of the salient lessons from this approach, and does it in a way that's very approachable. Graham said you should think of prices as coming from a fellow named Mr. Market, who is very accommodating in that he shows up every day and offers a price to buy your business and a price at which you can sell it. However, Mr. Market undergoes wild mood swings. Sometimes he only sees the upside and is willing to buy at a high price. Other times he's despondent and willing to sell at a depressed price.

The key, said Graham, is to recognize that Mr. Market is there to serve you, not inform you. The key is to think about the long-term, and to realize that when things are bad they're likely to get better, and when they're good they're likely to get worse.

Q: Thomas Friedman once quoted Bill Gates on the Tech Bubble and the consequences of over investing in technological infrastructure. As normative economists we tend to think of bubbles as an inefficient allocation of capital. Given your ideas about pruning it seems that although wasteful, entrepreneurial pruning (that is to say investing in many different endeavors) and letting markets decide is the only way to drive innovation. What's your take? Can inefficient capital allocations benefit society?

A: First, let me note that my thinking here has been influenced strongly by a couple of economists, Carlota Perez and Brian Arthur. It's important to distinguish between product markets and financial markets. Perez and Arthur have shown that there's a consistent pattern. First, product markets start to change—often driven by a general purpose technology like trains, electricity, or more recently the Internet. Next, financial markets get wind of the change, and a bubble forms as they race ahead of the product market. Next, the bubble bursts. But then—and this is important—the hard work gets done. The new technology gets woven into the fabric of business. This pattern has played out repeatedly in history—look at railroads and canals in the 1800s as examples.

So, one of the roles of the bubble phase is to explore options. While many, if not most, of the businesses will fail, the bubble phase assures that you try out lots of approaches.

So whether this is inefficient, I don't know. But this is a pattern that has played out time and time again.

Q: You have often explained the benefits of input diversity can you tell us about your own sources of information. What periodicals, books, and journals do you read?

A: I am a big believer in reading. I am not sure I'm a good model, but I do try to keep up with the major newspapers and I consistently read business periodicals including the *Economist* and *Fortune.* I also try to keep track of a handful of blogs, not all of which are dedicated to investing. I keep tabs on the academic work, including the *Financial Analysts Journal*, the *Journal of Finance*, and the *Journal of Financial Economics*. But most of my time is dedicated to reading books. And I read about just about everything. But I'd guess that I spend more time on science than any other topic.

Q: Charlie Munger often talks about the importance of killing your best ideas? Through the years have you applied this concept? If so, which ideas have you killed and how have you evolved?

A: I'm a big Charlie Munger fan. I think that idea has been around for a long time, and probably the best known advocate for it was Charles Darwin. I think he'd say something more like you should be open to killing your most cherished ideas. This is an admirable goal but really hard to do.

I'd point to a couple of areas where my thinking has evolved a lot. The first is my understanding of markets. I started as a pretty strong believer in efficient markets, for classical reasons. I then backpedaled to the idea that arbitrage ensures efficiency. Learning about complex adaptive systems made be abandon a lot of those ideas. That was not easy.

The second is one I'm struggling with now. I have always believed that the strategies a company chooses is crucial in defining their competitive advantage. And of course, on some level that's true. But I now realize there's a lot more randomness in the outcomes than most of us realize. Saying it differently, a random process generates outcomes that are not much different than what we see in the world. So I'm thinking about the relative contributions of skill and luck, and it's not clear how to best think about the issue.

Q: Michael thank you for interviewing with us, we wish you the best of heath and fortune.

A: The pleasure was mine.

For more information on Michael J. Mauboussin visit the following:

Home Page: http://www.michaelmauboussin.com/

Books:

1. Think Twice: Harnessing The Power Of Counterintuition
2. More Than You Know
3. Expectations Investing

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