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The Insider

Josh Wolfe, Editor

This issue is a barrage of brainpower. We start with Phil Sharp, a remarkable scientist and entrepreneur. (Full disclosure: My venture firm invested in his company Magen Biosciences, which was later sold to PPD [PPDI]). Dr. Sharp is a geneticist and molecular biologist who discovered gene splicing, for which he won the Nobel Prize. He earlier had worked under Jim Watson, co-discoverer of DNA. Sharp later went on to found Biogen (now part of Biogen Idec [BIIB]) and Alnylam [ALNY]. He's widely respected as having a first-rate

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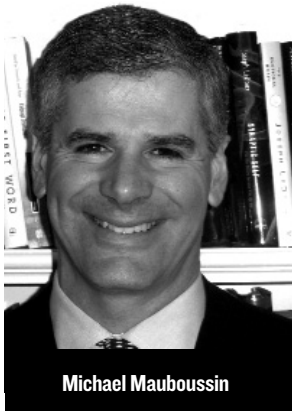
Michael Mauboussin: Seeking Simple Truth From Complex Systems



Michael Mauboussin

Michael J. Mauboussin is chief investment strategist at Legg Mason Capital Management. He was formerly managing director and chief U.S. investment strategist at Credit Suisse. His multidisciplinary approach to investment analysis incorporates 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 *Think Twice: Harnessing the Power of Counterintuition, More Than You Know: Finding Financial Wisdom in Unconventional Places*, and co-author, with Alfred Rappaport, of *Expectations Investing: Reading Stock Prices for Better Returns*. Mauboussin has also authored or co-authored 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 by an Adjunct Faculty Member. 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 A.B. in government from Georgetown University. He lives in Darien, CT with his wife and five children.

Nobody sets out to make bad decisions, but smart people do occasionally make poor choices. Why?

One of the topics we wrote about in *Think Twice* is that when trying to make decisions, our minds often naturally take a stab at a certain path – almost like gravity pulling you in a

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Vitaliy Katsenelson

Vitaliy Katsenelson: Staying Afloat In A Falling Tide

Vitaliy N. Katsenelson is director of research and portfolio manager at Investment Management Associates, a Denver money management firm. He is the author of *Active Value Investing: Making Money in Range-Bound Markets*, published by John Wiley & Sons in 2007. He was also an adjunct faculty member at the University of Colorado at Denver, Graduate School of Business, where he

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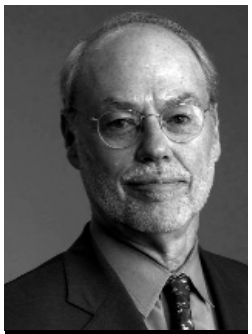

Phillip Sharp

Phillip Sharp: Unraveling RNA And Biotech

Phillip A. Sharp is Institute Professor at the Massachusetts Institute of Technology and member of the Koch Institute at MIT. Dr. Sharp's research interests have centered on the molecular biology of gene expression relevant to cancer and the mechanisms of RNA splicing. This work provided one of the first indications of the startling phenom-

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mind in both the scientific and business communities.

Then we have the Chief Investment Strategist for Legg Mason Capital Management [LM], the multi-disciplinary mind of Michael Mauboussin. If you dare compare Bill Miller to Buffett, Mauboussin is his Munger—an intellectually curious lifelong learner. He synthesizes obscure concepts from technology circles, social psychology, game theory and even physics. If you truly want an edge in investing, you need to have a variant perception and an expansive toolkit of ideas to apply to rapidly changing markets. To the man with a hammer, every problem looks like a nail. But talking to Mauboussin, is a shopping spree through Home Depot [HD].

Finally, we sit-down with value-investor Vitaliy Katsenelson to talk technology, investing and why the markets—historically bull or bear--are likely to be "range-bound" for the next few years. Vitaliy weighs in with some original insights on how you can look at valuing markets and companies, armed with empirical evidence and a large dose of rationality.

As always, here's to thinking big about thinking small...and to the emerging inventors and investors who seek to profit from the unexpected and the unseen....

Michael Mauboussin: Seeking Simple Truth From Complex Systems

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particular direction. But when facing certain types of decisions, we're often better off going down a different way. What I try to do in the book is identify those seven or eight areas where you're in that decision-making problem zone, and figure out ways to improve the outcome. The other thing I'll mention is that a lot of the decision-making books out there are sort of focused on why you're sub-optimal (you're overconfident, you anchor, etc.) But they don't tell you what to do about it. So, for me, this is really a book about opportunity, and that opportunity comes in two forms: improving your own decision making, and trying to take advantage of other folks when they make decisions. It's almost like playing tennis –less unforced errors for you and perhaps more unforced errors for the other player.

Let's talk about some of these decision-making biases.

One of the ones I like a lot is called the inside-outside view. I relay this point through a story about a horse named Big Brown, which in 2008 won the first two legs of the Triple Crown, and his trainer was just gushing about him. He won the Kentucky Derby and the Preakness in pretty good form, and in fact he went off on the tote boards with 3/10 odds to win the Belmont Stakes – so a 77% probability that he would win the Triple Crown. It was almost a foregone conclusion that he would win! When you look at that collection of facts, it really gets you pretty excited about Big Brown. That's called the inside view – taking your perspective from the information you have. The day of the Belmont was sweltering, and a crowd twice the size of normal had gathered to watch the third leg of the Triple Crown. Of course, Big Brown did make history that day, but it wasn't the history that everyone expected. He was the first Triple Crown contender to ever come in *last* in the final race!

Now what's interesting about this story is that there's a totally different way of looking at the facts – and this is called the outside view – by asking a simple question. How many horses that were contenders for the Triple Crown actually ended up winning? It turns out that if you go back 120 years, there were 29 horses in that same situation, and only 11 of them succeeded. But it's really an interesting dichotomy, because before 1950, 8 of 9 succeeded, but since 1950 only 3 of 20 won – a 15% success rate! Additionally, if you looked at Big Brown's actual speed figures, he was reality quite a bit slower than all of those other horses. So when you stack all of those facts up, the outside view would say the probabilities are vastly lower than what the tote boards suggested. You could apply those same kinds of ideas to markets when you're trying to compare the difference between expectations and actual fundamentals.

In the scenario you just described, you're talking about a situation where you have a lot of historical, empirical evidence that you can apply to the decision at-hand. What about situations where people are thinking about the future, and they turn to experts for advice?

I actually think experts are getting squeezed from two different sides. On the first side is the growing use of algorithms, as increasingly we're able to use computers to take on the tasks where experts formerly used to apply. Where you want to use those algorithms are in environments that are very stable and predictable. One of my favorite examples is at Harrah's, the casino in Las Vegas. Prior to any computer analysis, they thought the best customers for them were the high rollers. So they were rolling out the red carpet and giving away complimentary everything for these customers. When they actually analyzed the data, it was the middle-aged, senior, nicely wealthy and consistent customers that actually created the most value. So they reoriented all of their marketing programs around this new information and came up with a much more valuable strategy for the company.

While algorithms are happening on the one side, the wisdom of crowds is taking over on the other. The Internet and our modern communication infrastructure allow us to easily tap collectives of people, often inside of organizations, to come up with better predictions or forecasts. The example I give here is from **Best Buy** [BBY], the large electronics retailer. For many years they've been using expert forecasters as well as running programs in parallel to create their own little prediction markets. As it turns out, that crowd has been doing better than the actual forecasters. So to me, the future of the expert is becoming more in question due to computer algorithms and the wisdom of crowds, and the key enabler in both of these realms is technology. We're now able to tap technology to gather and analyze data in ways we couldn't possibly accomplish a generation ago.

I know you've also written about tunnel vision. Could you give some examples of that?

Tunnel vision occurs when we face certain kinds of situations where our minds want to turn off all alternatives. There's a great example I give in my class at Columbia Business School. I first ask the students what the last

four digits of their phone numbers are. They all know that these are effectively random numbers. Then, I ask them to write down how many doctors are in the borough of Manhattan. When we tabulate the results, what we find is that the people with low phone numbers tend to think that there are 16,000 doctors in Manhattan, whereas the people with high phone numbers think that there are 29,000 doctors! What's happening here is that the students start to shut off options because they've been anchored, or pulled in, by what they know is a random number. Of course, the most interesting thing is that when I reverse the order of the questions, I can be pretty much sure I'll get a different answer set. Our minds typically want to get to the solution as fast as possible, and often we don't consider things that are outside of our purview. That's one example where anchoring can compel that type of poor decision.

What can people do to defend themselves against tunnel vision and other decision making traps?

Each chapter in my book has a very similar structure. I lay out a particular decision making problem and then try to tell a story about it to animate the idea. I focus a lot on the science, so in almost every example there's also a specific scientific explanation. And after explaining how people mess these things up, I then move on to the applied part, where I list the 3 or 4 things people can do to improve their decision making.

There are a couple of things people can do right away that can be pretty helpful. First, if you have a task that's pretty straightforward and similar every time, create a checklist. Make sure that the checklist is not overly onerous, but a couple of pages or enough that it captures the key components of the task at hand – similar to a pilot's checklist. What people have found when they've applied checklists in different settings (for example, in medicine) is that they've greatly improved results and lowered costs. For a doctor, this makes a lot of sense.

Another thing you can do is buy a really simple notebook and start making a decision making journal. When you find yourself making consequential decisions, write down why you made that decision, including your rationale behind it. And perhaps, if you feel so inclined, write down how you feel. Were you in a good mood or a bad mood when you woke up? What was going on in your mind or life? Keep track of that. This combats something called hindsight bias, where once something has happened we tend to recreate the environment, and often in a way that's favorable for us. So whether your decisions turn out well or they turn out poorly, if you've already got that record in your hand, it can be a great way to get feedback and put yourself on that path of truth to improve your decision making. Over time, if you review those decisions and how you were thinking, perhaps you'll be able to identify certain patterns (for instance, being overly optimistic when you're in a good mood) to help yourself be a better decision maker consistently.

All sorts of bad decisions led to the economic problems we're now experiencing. Are there certain steps you suggest taking in this current environment?

The challenge with these types of situations is that we're almost always fighting yesterday's battles. Not to say that some regulation doesn't make sense, but you don't want regulation to be solving yesterday's problems. Not to say you don't want to manage your risk or leverage levels, but you don't want to be correcting yesterday's mistakes.

One of the things I would be thinking about looking forward (and again, we don't know what's going to happen in the future) is to think about all of the alternatives. For example, one scenario that not many people are thinking about today is what's the upside to the markets? Everyone's worried that we've come too far, too fast. Maybe it's true, but how many people are giving some probabilities to some upside? That would be one simple way of saying: don't shut down alternatives. Keep thinking about a whole full future and assigning relevant probabilities.

You're a big proponent of distinguishing between process and outcome. Tell me why.

This is a really big deal, and it's a very relevant concept in anything that has components of both skill and luck. Many of the things we've mentioned, including sports and investing, have large luck components involved. It makes sense for people to look at outcomes. They're objective and quantifiable, and sometimes they're audited, but of course, if it's probabilistic, you can see cases where a good decision making process is going to lead to a bad outcome simply because of the role of bad chance. And likewise, and I think more difficultly, you can have a bad process that leads to a good outcome. What we do know is that over long periods of time, people who make good decisions process-wise end up doing well, ultimately, in outcomes. So the point is: don't dwell too much on the outcomes because you may be looking at noise or luck. Rather, focus a lot on the process, because you can be assured in the long haul that people with those good processes are ultimately going to do well. This is a really big lesson that you see across so many different domains.

One of the stories I love about you is the one involving Benoît Mandelbrot – the famous mathematician most well known for his work with fractal geometry. Can you tell us that story?

The first thing I'll say about Dr. Mandelbrot is that he wrote a paper close to 50 years ago describing the distribution of price changes, and he pretty much nailed it. It created a little flurry of activity in the early 1960s, but had been pretty much dismissed for a long time since. One of the reasons it was dismissed is this idea of reduction bias – in other words, when you ask people a complicated question, they'll give you an answer about a simpler system. He understood this nearly half a century ago.

A number of years back at a risk seminar we were lucky enough to have Dr. Mandelbrot as one of our speakers. I was invited to the dinner the night before, and due to a series of events, I ended up having to give him a ride home that night. Fretting about what to talk about for an hour with a brilliant mathematician in my car, I asked him about this reductive bias. I wanted to hear a little history of finance and why it is that people consistently and naturally go to a simpler system. In financial markets, we tend to have power-law distributions with rare but extreme events that are obviously very consequential. Most of the models out there are based on bell-shaped, normal distributions. So, if you're modeling a world that has fat tails with normal distributions, most of the time nothing happens, but episodically you get these really big extreme events that shock people – the so-called "Black Swans." So to me, that was the great lesson from him. Not only his incredible contribution to the world of finance, but also his underscoring of this idea of reductive bias – that we tend to make complex problems simpler than they should be. **ET**

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enon of "discontinuous genes" in mammalian cells. This discovery earned Dr. Sharp the 1993 Nobel Prize in Physiology or Medicine. His lab has now turned its attention to understanding how RNA molecules act as switches to turn genes on and off (RNA interference). His work has earned him numerous cancer research awards and presidential and national scientific board appointments. He is an elected member of the National Academy of Sciences and is the recipient of the National Medal of Science. A native of Kentucky, Dr. Sharp obtained his Ph.D. in chemistry from the University of Illinois in 1969. In 1978 he co-founded Biogen (now **Biogen Idec** [BIIB]) and served as chair of its Scientific Advisory Board (1984-2002) and was a member of its board of Directors (1988-2009). In 2002, Dr. Sharp co-founded **Alnylam Pharmaceuticals** [ALNY], an early-stage therapeutics company and is currently chair of its Scientific Advisory Board and a member of its Board of Directors.

You recently joined the Advisory Board of the USA Science & Engineering Festival. Why did you join and why is this an important cause?

The science festivals that have been held around the country (such as the Cambridge Science Festival, held here near MIT) have been very important in bringing recent developments, ideas and thoughts in science to the general public. That helps in motivating students and young people to get engaged in science and engineering, and lets them see why they should be taking science and math courses to do things that are interesting. It also helps in strengthening public support for engagement in scientific research and engineering. The USA Science & Engineering Festival promises to be in the environment of a lot of very important key opinion makers, and I think reinforcing the value of science within that community could potentially have a large impact that would be important to our country.

This year's Nobel Prize in Chemistry was awarded for an understanding of the atomic structure of the ribosome, a key component of DNA translation. How does that discovery relate to your prized work with RNA?

My initial discovery of RNA splicing in 1977, and continuing work leading to the understanding of discontinuous genes, has several interesting relationships with the recent Nobel Prize work on the structure of the ribosome. The most general and conceptually broadest way to think about it is by the hypothesis that all of the earliest forms of life on earth were in the "RNA world," as we call it. In that world, the genetic material in cells was RNA, and RNA played a major role in all of the catalytic functions of cells. (In modern cells, most of the catalytic functions are carried out by proteins, which took a long time to become so elaborate and highly evolved). The ribosome is the oldest cellular machinery that we know of, and this understanding of the structure of the ribosome has shown us that at the heart of the ribosome, the reaction that takes genetic code and turns it into protein code is RNA-catalyzed. This discovery is well aligned with the concept that the earliest cells were highly dependent upon RNA processes and genetic material. And the same process that splices or edits that RNA from the discontinuous genes is also likely to be, at least in a historical sense, RNA-catalyzed. So this most recent work on the ribosome is closely related to the concept of the RNA world and how biological systems evolved. In a more practical sense, the ribosome structure gives us insight into how to design antibiotics and other inhibitors of the ribosome to be more effective.

"From Alzheimer's and Parkinson's to schizophrenia and manic depression, we're now beginning to see new insights from human genetics."

You started Biogen more than 30 years ago, and more recently you were a founder of Alnylam Pharmaceuticals. How has the biotech industry changed over the last several decades?

From a business, scientific and investor standpoint, the biotech industry has become much more sophisticated! Thirty years ago, when Biogen was founded in 1978, biotech was still basically just a concept. Business leaders knew very little about the space, and it was difficult to find people with a broad enough conceptual understanding to come into a young, entrepreneurial life sciences company and take a new technology to market. Bob Swanson and Herb Boyer (the co-founders of Genentech) were exceptions to that rule, and were wonderfully creative at doing that. Biogen found it difficult to find a CEO who could lead those efforts, and we went through a number of CEOs.

From a scientific perspective, in the early days of biotech we were transporting scientists out of academic labs and into biotech companies and having to educate them about business and the interface between technology and business. Now, there is a whole cadre of very sophisticated and talented people who can easily visualize how new science and technologies can be used in translation to new products.

On the financial side, in the investor world the early days of biotech were mostly a dream. Luckily there was reality in the promise and the entrepreneurs who took the most risk were paid off nicely. Now, we have a very sophisticated investor community, weighing checks and balances on their returns.

Speaking of investors, are there areas today that you think may be underinvested but are potentially deserving of the kind of risk-taking that occurred in the early days of biotech?

I think there are some areas of science and technology that are underinvested now. I would particularly note that we still have very large societal problems with chronic middle disease states, ranking from Alzheimer's and Parkinson's to problems that afflict young people such as schizophrenia and manic depression. All of these diseases are crying out for new ways of controlling them. In many of these cases we're now beginning to see new insights from human genetics. We've got some working concepts and some early indications from drugs that things can be done. So I think that is an area that will continue to warrant focus, and the needs are so large that new effective products will gain large financial support.

Is there a structural reason you believe that more attention has not been given to these diseases? Is there something about the nature of discovery or developing products in this area that has prevented investors and companies from more aggressively pursuing the space?

I think the central nervous system diseases have been disappointing in many ways for investments because the system is so complicated. The neuronal structure of the brain is highly complex—tens of billions of cells interconnected with thousands and thousands of connections. Just looking at that organ and doing conventional drug development on it has been difficult because we haven't been able to produce those same cellular interactions in a test tube to allow for study, manipulation and targeting with drugs. This has been waiting for advances in our understanding of human genetics, disease processes and the complex nervous system. All of that has been filled in, more or less, over the past decades. There are still things to be discovered and there are still major challenges, but I think given the need and the development of science in this area, it's an area of pharmaceutical opportunity that just cant be ignored.

Outside of central nervous system diseases, are there other areas that warrant similar attention?

The interface between the engineering and biomedical sciences, particularly engineering at the cellular and nano-levels, where the science advances we've made over the last 30 years can be incorporated into engineering procedures and devices to advance new treatments.

How is nanotech expected to impact the biotech world? Where do you see some of the important applications?

Nanotech is the fabrication of materials at sizes that are much smaller than cells. These materials are small enough to pass from the bloodstream into the environments around cells, or may bind to cell surfaces or pass into cells. I think there's an increasing opportunity to target drugs to different specific cells where they can be more effective. For instance, targeting a drug to a cancer cell or delivering materials to cells in the immune system to control subsets of immune cells. There's also another part of nanotechnology, which is the fabrication of devices at the nanoscale. This will allow people to perform large numbers of assays, or readings, on small amounts of fluid. I think that will be an advance that will have important implications for how people do diagnostic work in the future. I see the fabrication of devices and materials at the nanoscale as being a frontier that's rich with opportunity.

Conversely, are there any areas that, from a scientific perspective, you just scratch your head at and wonder why investors are pursuing?

An area in which I think there's a lot of attention right now, but I still see major challenges before there are therapies on the market, is in stem cell biology. This is a fascinating science subject and there are some impressive innovations happening in that arena. However, the implications of taking that science through the laboratory and through the medical establishment to a patient I think remains a major challenge. Now, I could be totally wrong (and it wouldn't be the first time), but I think this is still an area with major hurdles in front of it.

How have advances in computation enhanced or changed the nature of scientific research in your lab and the broader biotech community?

I would say that the ability to analyze large databases--whether those databases contain DNA or RNA sequences or the results from mass spectrometry of cell materials--is now a major tool in labs around the world pursuing scientific advances. It's also becoming an increasingly important part of health care delivery. The tools to analyze and extract knowledge from databases and subsequently present that knowledge to a student in the laboratory, a reader of a manuscript, or a patient, are advancing on multiple fronts. There is a large opportunity for new algorithms, programs and processes to extract and share knowledge. It's an interface between the software, communication, and science worlds that is becoming more and more important--but it still has a long way to go.

"There's an increasing opportunity to target drugs to different specific cells where they can be more effective. For instance, targeting a drug to a cancer cell."

Turning towards some of the demographic trends among scientists, many believe that the U.S. may be losing its edge vis-à-vis other countries. Is the population of your own lab reflective of that? How has this changed over time?

There are outstanding people from across this country in my lab and in other labs across MIT, both in the life sciences and other disciplines, doing superb research. But the population of these laboratories has evolved to the point where yes, there are also a significant number of students from around the world doing this research. These are students who have been selected to be outstanding and are contributing enormously to the progress of science in this country. Many of them stay in this country to continue their careers, but we're now seeing the forefront of science appearing in many other countries. Historically, the European countries have been very strong in science. Then Japan came on with strong science, and now we're seeing strong science emerging in India and various countries in Asia. There is a worldwide democratization of advances in science, and we do not stand as far above the mean now as we did in the '50s and '60s as we emerged from World War II. There was a lot of chaos in countries that forced their academic and research structures to be reorganized.

We are now at a stage where technology and new knowledge is the driver of the economy. We need to motivate our students to understand this and to understand the excitement of being involved in this new world of technology and knowledge, and to be motivated to go through school and get as much training as they can to engage with it. That's the economy of the future, and that's the currency that's going to create the standard of living in this country in the decades ahead. Raising the visibility of those opportunities to young people and making those paths in life exciting to young people is really very important. **ET**

Vitaliy Katsenelson: Staying Afloat In A Falling Tide

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taught Practical Equity Analysis and Portfolio Management classes. Katsenelson has been a regular contributor to the *Financial Times* and *Forbes*. He is a CFA charter holder, member of the CFA Institute and has served on the board of the CFA Society of Colorado. Katsenelson received both his bachelor of science and his master of science in finance from the University of Colorado at Denver, where he graduated *cum laude*. Katsenelson was born and raised in Murmansk, Russia (home of Russia's northern navy fleet) and immigrated to the U.S. in 1991.

You've written a lot about range-bound markets. What are range-bound markets and what causes them?

A range-bound market is a market environment where the economy is growing and company earnings are growing, but price-to-earnings (P/E) ratios in the stock market are contracting – going from above average to below average. This typically occurs during periods of time following secular bull markets. Where the P/E ratio was your best friend, it becomes your worst enemy. Even if earnings were to grow, the benefits an investor would see from that growth would be offset by declining P/E ratios.

So buy-and-hold investing becomes fruitless in this environment?

I don't think buy and hold is dead, but it's in a coma, waiting for the next secular bull market. Stockholders typically get compensated in three ways: P/E ratios rising, earnings growth and dividends. This is what happens during a secular bull market. You can buy a stock and hold it for 20 or 30 years, and not only will you get earnings growth, but you'll have P/E expansion (when P/E ratios go from very low levels to very high levels), which will supersize your returns on top of the earnings growth.

What drives P/E ratio contraction or expansion?

I think the answer is psychology. Once investors start making money in the stock market, it becomes like a game that everyone wants to be playing, and more investors flood into stocks. This drives P/E ratios even higher, to the point where they become too high. It's very hard to determine at what point that game is going to end, but it does end, every time. At that point, even though earnings are still growing, P/E ratios stop expanding, and investors get lower returns. Investors, now disappointed, start diversifying away from stocks and P/E ratios begin to contract.

You say we're in an era of P/E ratio contraction, so should investors hold stocks at all?

In a secular bull market, performance of stocks as an asset class is far superior to bonds and T-bills by a significant margin. It barely matters what stocks you own. However, during range-bound markets, historically stocks haven't significantly outperformed bonds and T-bills. So, if an investor decides to own stocks, they want to own the best stocks possible, and therefore stock selection becomes paramount.

> **"Once investors start making money in the stock market, it becomes a game everyone wants to be playing. This drives P/E ratios higher, to the point where they become too high."**

Say you could find a company that you are sure will be growing earnings at 15% per year for the next 15 years. You should buy that stock and never sell it, because that company's earnings growth will overcome any P/E compression that will be thrown at it. The only problem is that for every stock like that, there are thousands that won't perform. The only stocks to own in this environment are companies with high growth and high certainty into the future.

What are your thoughts on the dollar?

Well, it's very easy to say that whatever is happening in our economy will drive the dollar lower. But whenever we're dealing with currencies, you always have to ask the follow-up question, which is, "compared to what?" What currency will the dollar decline or gain against? The Japanese yen? Japan has its own crisis, maybe even greater than our own. The euro? The euro comes from a collection of 20+ countries with very different interests, so I'm not sure it will be a stronger currency going forward. Against the Chinese yuan? The People's Republic of China is neither a republic nor governed by its people – it's still really a communist government and totalitarian regime with limited property rights, so I'm not sure the world will entrust its money with the Chinese. Maybe Russia? Unfortunately, Russia is a bit of a one-trick petrochemical pony. The natural resources for Russia are more of a curse than a blessing. Overall, I understand that what's happening in the U.S. isn't good for the dollar, but I'm not sure if the rest of the world is in a better position than we are. I'm prepared for the dollar to decline, but I don't think it's highly likely that it will.

I know you've written about gold in the past, and recently we've seen prices hit record levels. Is the current demand over gold crazy?

Whenever I write something negative about gold I get a huge number of emails telling me how crazy *I am*! Gold, to some degree, is a religion. If somebody is a true believer in gold – a "gold bug" – there is nothing I can say to convince him or her otherwise! When I say something negative about gold, I'm simply trying to instill a sense of soberness in people as they consider allocating a portion of their portfolios to gold. I have to compete against people on TV, advertising how great gold is. If gold were a security or a stock, the SEC would never let those people say some of the things that they do. I'm just trying to prevent people from putting their whole net worth into that one commodity.

What are the risks to owning gold?

There are three major risks. First, historically gold has had a monopoly on a fear trade. If an investor was concerned about high inflation or currency debasement, they only had one option – go out and buy gold. Today, you have competition from securities that didn't exist 20 years ago. For example, if you are concerned about inflation you can buy TIPS (Treasury Inflation-Protected Securities). Or, if you are concerned about currency debasement, you can buy an exchange-traded-fund (ETF) that is short currency. So the monopoly gold used to have on the fear trade has been undermined.

The second risk is the emergence of the

gold ETF—**SPDR Gold Trust** [GLD]. It's now the biggest holder of physical gold in the world, and it did not exist five years ago. The ease in which people can buy gold from the ETF may actually help gold prices, as gold can be purchased in an instant. However, if there are hedge fund liquidations or other events that could trigger redemptions from that ETF and it's forced to sell gold, there just aren't enough buyers to purchase in such bulk. That could drive gold prices into the ground overnight, and I think it's a meaningful risk.

The final risk is that when people expect gold to perform, it usually doesn't. Gold is one of those assets that's only worth something if people think it's worth something. There is no fundamental value to it. It has limited utility, and unlike a common stock or bond, it has no cash flows to discount. Gold is not the riskless asset that many perceive it to be, and I'm worried about those people who sink their retirements into it.

They say there are lies, damn lies, and statistics. Then there are state statistics put out by countries like China. Many are bullish on China —why do you think they might be mistaken?

In the fourth quarter of 2008 and the first quarter of 2009, the global economy was in a decline. Meanwhile, the Chinese economy showed it was still growing at 7 or 8% (albeit slower than the 10 or 12% from before). Regardless, this was still a respectable rate by any standard. This kind of troubled me – how could you have an economy that's largely driven by exports to the United States be growing when its biggest customers are consuming far fewer of its products? Another set of statistics also came out at the time, which contradicted the Chinese reports. The numbers showed that Chinese electricity consumption declined by 3 or 4%. Now, China is not famous for its intellectual capital – it's famous because it produces stuff. And to make stuff, you need electricity, so that electricity consumption figure was probably a lot more difficult to fiddle with and was telling the story that China was not growing.

Later, through an article published by the American Enterprise Institute, we learned how China likely computes its GDP growth. They basically add numbers to their sales – almost like fixing their sales. The government decides to do something, and just the allocation of capital to that project produces instant GDP growth. So a lot of that reported growth may have been fictional. However, in the second and third quarter of 2009, China started to have actual growth. Again, that growth was taking place when the rest of the world was contracting, but this time around it was real growth because the Chinese government instituted tremendous stimulus projects that forced banks to lend.

China is a not a touchy-feely democracy. Our Federal Reserve can throw a lot of money at banks but it can't force banks to lend or companies to borrow. But China isn't a democracy so it doesn't suffer those problems, and therefore banks were forced to lend and companies were forced to borrow, and so China grew. The problem is that the quality of this growth was horrible, and there is always a price to pay for that. A lot of the demand that came for commodities that supported industrial companies was driven by debt in the form of the Chinese stimulus. The Chinese government is now actually trying to ratchet down their lending, and as the Chinese growth slows down, the demand for commodities will decline dramatically. In 2000, China was responsible for 3/4 of incremental demand for oil. If their economy slows down, incremental demand will decline, and demand for oil will drop off a cliff, as will demand for other commodities.

"We like to own tech companies in their mature stage where the competitive advantages are clear. In their adolescent stage it is hard to determine the survivors."

What role do technology companies play in the market, and how have technology companies impacted markets and economies over time?

Technology companies had a significant impact on our economy as they were responsible for the bulk of the increase in productivity over the years. In other words, they allowed companies and consumers to do more with less. Increased productivity allowed companies to increase margins, but those increases for the most part (in general) were temporary. Since the same technological improvements were available to everyone the benefits of higher productivity were competed away. **Wal-Mart** [WMT]may have been the most technologically advanced retailer in 1980s and even 1990s, now Wal-Mart-like technology is available to a very small retailer who is willing to write a million dollar check to **SAP** [SAP] or **Oracle** [ORCL]. At the end of the day consumers were the main beneficiary of the technology as it was the main driver of lower prices. Companies of course also benefitted from becoming more efficient and flexible with their cost structure, which was evident over the last several quarters - companies were able to cut costs fast and significantly when their sales were falling without dismantling their core businesses.

How are technology companies valued differently than other companies?

Technology companies should not be valued differently from other companies because the principles are not different - the value of any company, or asset, is the present value of its future cash flows. It is banal and it is extremely boring but it is true. We usually like to own tech companies in their mature stage where the competitive advantages are clear to us. We rarely own tech companies in their adolescent stage as it is hard for us to determine the survivors. Plus, in most cases (I am generalizing here), this is the time when the growth is the highest and thus they are priced for perfection. Not even a small failure will be tolerated by investors.

What kind of analytical questions do investors need to ask and think about when analyzing technology companies?

We'd like to own technology dinosaurs. Though we think of dinosaurs as old and dying, they dominated this earth for hundreds of millions of years. In this stage we often find that if you buy them right, the risk reward could be terrific. If I can find a large, established technology company (dinosaur) that has clear competitive advantage, great balance sheet, significant competitive advantage, with high return on capital I'd be happy to own it. I just described **Microsoft** [MSFT], a dinosaur, but this dinosaur is not on the route to becoming Polaroid. **ET**

The Emerging Tech Portfolio

Company[symbol]	Coverage Initiated	Current Price	52-week range	Mkt Cap ($mil)	Buy/Sell/Hold
Intellectual Property Incumbents *Leading researchers in the physical sciences, with big potential for spin-offs and revolutionary breakthroughs*					
GE [GE]	8/07	$15.20	$5.87-$21.04	$161,700.00	Buy
Hewlett-Packard [HPQ]	3/02	48.56	25.39-49.20	115,140.00	Buy
IBM [IBM]	3/02	120.36	69.50-128.61	158,860.00	Buy
Materials *Companies producing materials with novel properties that have applications for a wide range of industries*					
Symyx [SMMX]	3/02	5.98	2.39-7.75	205.75	Buy
ShengdaTech [SDTH]	8/08	6.67	2.52-7.20	361.53	Buy
Life Sciences *Companies that are working at the cutting edge of medical technology*					
Life Technologies [LIFE]	11/05	47.75	19.56-49.54	8,420.00	Buy
Nanosphere [NSPH]	11/07	5.95	2.71-8.61	132.26	Buy
Electronics *Companies that have corralled the key intellectual property that will be the foundation for next generation electronics*					
Nanosys [private]	3/02	n/a	n/a	n/a	n/a
NVE Corporation [NVEC]	7/03	42.38	16.56-63.64	199.19	Hold
Energy *Companies that are developing high-efficiency, low-cost alternative energy technologies*					
First Solar [FSLR]	8/07	152.39	85.28-207.51	12,900.00	Hold
A123 Systems [AONE]	9/09	22.38	16.56-28.20	2,200.00	Buy
Enabling Technologies *Tools and instrumentation that enable critical science and technology discoveries*					
Veeco [VECO]	3/02	25.56	3.22-27.24	831.82	Buy
FEI Company [FEIC]	1/03	24.24	11.36-26.50	910.70	Buy
Accelrys [ACCL]	3/02	5.66	2.63-6.28	155.21	Buy
Investment Vehicles *Funds that have investments in promising emerging technology companies*					
Harris & Harris Group [TINY]	5/02	4.82	2.65-6.93	125.16	Buy
PowerShares Lux Nanotech Portfolio [PXN]	8/07	10.12	5.25-13.64	58.67	Buy
PowerShares WilderHill Clean Energy [PBW]	8/07	10.70	5.78-17.20	783.14	Buy

Word on the Street

GE: General Electric lost 7% after its Q3 earnings report failed to reassure investors. The company's earnings from continuing operations declined 47% to $2.5 billion ($0.22 per share), from $4.6 billion ($0.45 per share) in the prior year. Wall Street had predicted a profit of $0.20 per share. GE's total revenues dropped 20% to $37.8 billion, also falling short of analyst estimates. GE said its health care unit will set aside $250 million for strategic investments and the company also announced several new private cleantech investments during the month.

HPQ: Hewlett-Packard was up more than 3% on the month. There was feverish analyst speculation that HP would make a formal bid for network equipment maker Brocade. HP is a major player in servers used in corporate data centers and following Cisco's aggressive moves into its HP's core business, HP is reportedly looking to fill holes in its product portfolio.

IBM: Shares of Big Blue slipped after beating Q3 earnings expectations, but falling short of Wall Street's rosiest forecasts. IBM generated sales of $23.6 billion, down 7% from the prior year, but ahead of analysts' consensus of $23.4 billion. IBM's Q3 2009 net income was $3.2 billion ($2.40 per share), up 14% from Q3 2008's $2.8 billion ($2.04 per share). Analysts had been expecting $2.38 per share. IBM said it expects EPS of at least $9.85, higher than the Street's forecasts of $9.78 per share.

SMMX: Symyx lost 10.4% in advance of its Q3 2009 earnings announcement on October 28. Wall Street expects SMMX will earn $0.02 per share on $36.29 million in revenues.

SDTH: Shengdatech dropped nearly 2% despite being upgraded by Oppenheimer & Co. from Perform to Outperform

LIFE: Life Technologies climbed nearly 4% on the month, hitting a fresh 52-week high. The company will report the results from its Q3 2009, with analysts expecting Life to earn $0.62 per share on $791 million in revenues. LIFE trades for a reasonable 17x 2009 EPS.

NSPH: Nanosphere plummeted nearly 20% after closing a stock offering led by Piper Jaffray that raised $35.3 million. Earlier in the month, the FDA approved the company's automated Verigene SP system, and a test for the flu and respiratory syncytial virus. On the Verigene SP system, samples are taken from a patient and processed at the same location, with results available in a few hours. The new testing product can detect influenza A and B strains, as well as RSV.

NVEC: NVE Corp. lost nearly 18% on the month after reporting its Q2 2010 results. Quarterly revenues increased 14% to $6.51 million, from $5.73 million in the prior year period. The majority of revenue growth was attributed to an increase in contract R&D revenue. Net income increased 17% to $2.69 million ($0.55 per share), from $2.30 million ($0.48 per share) in Q2 2009.

FSLR: First Solar shares were flat despite being added to the S&P 500 during the month. Pacific Crest Securities downgraded shares of First Solar to Sector Perform. The investment bank said FSLR was likely to lose market share in 2010 and report declining EPS year-over-year.

AONE: A123 zoomed to as high as $28.20, before falling back to a 14% gain, closing at $22.38. A123 will report its first quarterly results as a public company on November 10.

VECO: Shares jumped 16.5% in expectations of a strong Q3 2009 report, delivered after the close on October 26. Wall Street projects the company will generate $0.01 in EPS on $86.43 million in revenues.

FEIC: FEI was flat on the month. Analysts expect FEI will earn $0.11 per share on revenues of $140.34 million, when the company reports its Q3 2009 results on November 3..

ACCL: Accelrys made small gains after releasing its Materials Studio 5.0 software package for chemicals and materials research.

TINY: Harris & Harris lost more than 25% of its market capitalization after closing a $21.5 million common stock offering at $4.75 per share. TINY said it plans to use the proceeds for new and follow-on investments in nanotechnology and cleantech companies, as well as operating expenses.

PXN: The PowerShares Lux Nanotech portfolio fell more than 4%, despite strong performance from Headwaters and Veeco.

PBW: The PowerShares WilderHill Clean Energy portfolio was flat on the month, as investors were unable to gain consensus on the near-term direction for clean technology stocks.

Stock prices as of October 23, 2009

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