| *Valuation at 30 Apr 09* | ***Fundamental Valuation Estimate*** | ***Rolling 3 Mos Return in Local Currency*** |
|---|---|---|
| **JPY Equity** | Probably Overvalued | 11.07% |
| | | |
| **USD Real Bonds** | Possibly Overvalued | 2.28% |
| **USD Bonds** | Probably Overvalued | 1.42% |
| **USD Property** | Probably Undervalued | 7.95% |
| **USD Equity** | Likely Overvalued | 7.62% |
| ***Following in USD:*** | | |
| **Emerging Mkt Equity (EEM)** | Possibly Overvalued | 26.58% |
| **Commodities Long** | Possibly Undervalued | -0.23% |
| **Gold** | Possibly Undervalued | -4.43% |
| **Timber** | Probably Undervalued | 19.95% |
| **Volatility (VIX)** | Likely Undervalued | -18.60% |
| ***Return in Local for holding USD:*** | | |
| **USD per AUD** | Appreciate | -13.03% |
| **USD per CAD** | Neutral | -4.33% |
| **USD per EUR** | Neutral | -2.91% |
| **USD per JPY** | Depreciate | 8.89% |
| **USD per GBP** | Neutral | -2.80% |
| **USD per CHF** | Depreciate | -1.62% |
| **USD per INR** | Appreciate | 2.29% |

## Feature Article: Grounding Risk Management in Neuroscience

We recently read a disturbing story in the Australian publication *Money Management*. "Research conducted by CoreData shows that Australian financial planners have lost approximately 215,000 clients over the past 12 months. Even more disturbing, 28 percent of respondents who currently have a relationship with a planner are 'very likely' to consider not using a planner in the future – up from only 4% last November." Equally unsettling was an article in the *Financial Times*, noting that "poor practices in explaining risk to investors are set to be exposed by a surge in the number of complaints against financial advisers in the next few months, according to the Financial Ombudsman Service."



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What is going on? And what can advisers and investors do to reverse these disturbing trends? Over the past few months, we have undertaken a research project focused on developing a new view of risk, and the implications for asset class valuation, portfolio construction, and risk management. In light of recent developments, we have extended this to include implications for financial advisers and regulators. This article summarizes our research and the conclusions we have reached.

Let's start with the obvious: using the standard deviation of a time series of returns as the primary measure of investment risk fails to pass most investors' common sense test. While this approach makes mathematical models easier to solve, it falls flat with most investors. Moreover, there is an even deeper problem. Asset allocation is, in essence, a decision problem. However, both of the two major approaches to decision analysis – Expected Utility Theory and Prospect Theory – focus on making choices in the face of risk – that is, situations in which both the range of possible future outcomes and their associated probabilities are known in advance. In the real world, most decisions – including investment decisions – are made in the face of uncertainty, where neither the full range of possible future outcomes nor their associated probabilities are known for certain in advance. In sum, investors are right to feel confused about the way risk is typically explained to them. The truth of the matter is that the models we use to support investment decision making, at best, only very roughly capture the underlying issues.

So how can we improve upon existing approaches? Our starting point was an article we had read years ago, "Risk as Feelings" by Lowenstein, Weber, Hsee, and Welch. The authors note that "virtually all theories of choice under risk or uncertainty are cognitive and consequentialist. They assume that people assess the desirability and likelihood of possible outcomes of choice alternatives and integrated this information through some type of expectation-based calculus to arrive at a decision...An alternative theoretical perspective, the risk as feelings hypothesis, highlights the role of affect experienced at the moment of decision making...Emotional reactions to risky situations often diverge from cognitive assessments of those risks.



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When such divergence occurs, emotional reactions often drive behavior." In our experience, this hypothesis accurately described quite a few decisions we have seen made over the years. Moreover, in our work as consultants and as a CEO, we have repeatedly found that explicitly asking a group or team to reconcile any differences between their cognitive analysis of a decision and their gut feelings about it never failed to produce a valuable discussion – and improve the quality of the decision.

Our next step was to delve more deeply into the latest findings from neurobiology about the nature of the feelings people experience. An important starting point is the distinction between "emotions" and "feelings." The former are essentially pre-conscious reactions to certain types of sensory stimuli that produce measurable changes in bodily function – e.g., physiological responses like the release of adrenaline or other chemicals, a higher heartbeat, or faster breathing. "Feelings" are the labels our consciousness attaches to these combinations of sensory input and emotional reaction – e.g., anxiety, fear, arousal, or euphoria. Our key hypothesis is that when it comes to investment decision making, the feeling upon which we should focus our research is fear – the primal, visceral reaction that is much more real to an average investor than a standard deviation (to distinguish: while they are closely related, fear is anticipation of being harmed in the present, while anxiety is anticipation of being harmed in the future).

Inside the brain, the key to fear is the region known as the amygdala. Functional magnetic resonance imaging (FMRI) studies of brain function have found that this is region that controls the emotional responses we associated with the feeling of fear (for an overview, see "The Amygdala: Vigilance and Emotion" by Davis and Whalen). In essence, the amygdala evaluates sensory input, and decides whether it should prepare the body for a "fight or flight" response (which will depend on how other areas of the brain consciously – but more slowly -- process the input). We were fascinated to learn that this fear response can be triggered both by the looks on other people's faces ("Fear, Faces and the Human Amygdala" by Ralph Adolphs and "Learning Fears by Observing Others" by Olsson, Nearing and Phelps), and that the only sensory nerve that directly connects to the amygdala is our sense of smell. In



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other words, the evidence seems to support old sayings like "I could see the fear on their faces" or "I could smell their fear." One can easily see how this makes sense from an evolutionary perspective, as it no doubt helped our ancestors to survive eons ago on the East African savannah. And one can also see how it could accelerate reactions when financial bubbles collapse.

More specifically, three triggers of amygdala reactions seem critical from an investment perspective. The first is loss (see "Dissociable Systems for Gain and Loss Related Value Predictions and Errors of Prediction in the Human Brain" by Glascher, Schroeder, Sommer, Braus, and Buchel). From an evolutionary perspective, the association of loss with fear clearly makes sense. It also helps to explain media stories about the extreme psychological distress experienced by people who have lost large amounts of money over the past year, but are still "rich" by any objective standard (see, for example, "Money Shrinks Soothe Souls of the Tragically Rich" by Lorinda Toledo of the Associated Press). From a different perspective, it also seems to explain two key findings from Prospect Theory. First, people are more willing to take risks to avoid losses than they are to expand gains – hence the frequently heard saying that "losses hurt twice as much as gains feel good." Second, framing – that is, the way a problem is presented to a decision maker – makes a big difference (see "Frames, Biases, and Rational Decision Making in the Human Brain" by De Martino, Kumaran, Seymour, and Dolan). Decisions that are framed as choices to avoid a loss (e.g., by manipulating a reference point) produce very different behavior than when the same decision is framed in terms of preserving or expanding a positive outcome.

The second important amygdala trigger is uncertainty (see "Neural Systems Responding to Degrees of Uncertainty in Human Decision Making" by Hsu, Bhatt, Adolphs, Tranel and Camerer, "Processing of Temporal Unpredictability in Human and Animal Amygdala" by Herry, Bach, et al, or "The Neurobiological Foundations of Valuation in Human Decision Making Under Uncertainty" by Bossaerts and Hsu). Again, one can see how this is adaptive from an evolutionary perspective – on the East African savannah, a heightened sense of uncertainty (that "funny feeling" about something we still get, but too often try to rationalize away) was usually associated



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with what we now call "significant downside risk" (e.g., something is stalking me). As we have seen over the last year, in financial markets a sharp increase in uncertainty produces an equally sharp increase in investors' preference for the most liquid assets.

The third amygdala trigger with important implications for investor behavior is the threat of social rejection or isolation (see "Neurobiological Correlates of Social Conformity and Independence During Mental Rotation" by Berns, Chappelow et al). Again, the evolutionary logic behind this fear seems clear (see "Social Networks, Self Denial, and Median Preferences: Conformity as an Evolutionary Strategy" by Klick and Parisi). Moreover, absent this amygdala response, researchers have concluded that it is doubtful cognition alone would lead to cooperation between large groups of human beings (see "Cooperative Homo Economicus" by Bowles and Gintis). It may also be that fear of social isolation is stronger when other fear triggers are also operating. For example, in "The Dubious Benefit of Group Heterogeneity in Highly Uncertain Situations", David Owens of Vanderbilt University finds that as uncertainty increases, performance improves with team homogeneity. In "Groupthink: Collective Delusions in Organizations and Markets", Roland Benabou of Princeton University shows how in the face of prospective losses an individual's tendency toward conformity may increase. And in "The Effect of Neuropeptides on Human Trust and Altruism", Ernst Fehr shows how this may be due to another neurochemical process. Oxytocin is a brain chemical that dampens the response of the amygdala to fear producing stimuli, creating the conditions for trust to develop. It is released when we eat, when we are touched and possibly through prolonged social contact (conversation, eye contact, etc.). In sum, heightened uncertainty can cause people to pay more attention that usual to the opinions and actions of others – which, of course, is a crucial component of herding in financial markets.

While herding can be stopped by a rising fear of loss, bubbles show that sometimes this process takes a long time. Why is that? One of the answers to this question lies in the neurochemical balance between fear and reward. In addition to oxytocin, dopamine also inhibits the fear response by the amygdala. Not coincidentally, dopamine is produced by those parts of the brain associated with the



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processing of expected rewards. For example, in "The Influence of Affect on Beliefs, Preferences and Financial Decisions", Kuhnen and Knutson show how higher states of arousal and excitement about potential rewards "induce people to take more risk, and to be more confident in their ability to evaluate the available investment options...while negative emotions such as anxiety have the opposite effects." Critically, these authors also note that investors "beliefs are updated in a way that is consistent with the self-preservation motive of maintaining positive affect [feelings] and avoiding negative affect, by not fully taking into account new information that is at odds with an individual's prior choices." To put it differently, we tend to resist searching for, and fully accepting, information that raises our uncertainty, separates us from mainstream views, and potentially causes feelings of loss (in this case, as a result of having to change our mental model and beliefs). In other words, so-called "cognitive biases" like selective attention, confirmation, anchoring, and overconfidence are likely rooted in underlying neurochemical processes involving, to some extent, the amygdala. Perhaps more important, the overthrow of strongly held mental models and beliefs by surprising events (e.g., the 9-11 attacks, or the crash of 2008) is inevitably accompanied by a sharp increase in fear, caused by spikes in loss and uncertainty and the threat of social isolation when we are feeling highly vulnerable.

As we have seen, events that stimulate fear are also likely to stimulate a stronger commitment to group behavior norms, at least in the short-term. For that reason, any discussion of the practical meaning of investment risk must take into account the way humans organize themselves into networks. Like neurobiology, network theory is another area where interesting new research findings have begun to accumulate more quickly. From a static perspective, networks created by human actions seem to have a number of distinguishing characteristics. Assume that a network is described by nodes (e.g., people or companies) and links (e.g., transactions, emails, text messages, phone calls, product and financial flows, etc.) between them. When nodes are sorted by the number of links they have, the result is a power law distribution (i.e., a few nodes have a very high number of links, while a very high number of nodes have very few links). Moreover, these distributions are



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said to be "scale free" or "fractal", because they look similar regardless of the resolution one uses (e.g., connections between investors in California or between investors in North America). There is also a tendency for the majority of a node's links to be with other nodes with a similar level of links. However, thanks to a relatively smaller number of connections between nodes of different degree (i.e., nodes with very different numbers of connections), social networks are also characterized by the familiar "small world" phenomenon – a relatively small number of links can be used to connect a given node to any other node in the network (think "six degrees of Kevin Bacon", or, on the internet, LinkedIn or Facebook).

The impact of social networks on investment returns has been explored in a number of recent studies. For example, in "The Small World of Investing: Board Connections and Mutual Fund Returns", Cohen, Frazzini and Malloy "focus on connections between mutual fund managers and corporate board members via shared education networks. [They] find that portfolio managers place larger bets on connected firms and perform significantly better on these holdings relative to their nonconnected holdings." In "Sell Side School Ties", Frazzini, Cohen and Malloy, find "evidence that sell-side analysts outperform on their stock recommendations when they have an educational link to a senior officer of a company." In "Information Diffusion Effects in Individual Investors' Common Stock Purchases: Covet Thy Neighbors' Investment Choices", Ivkovic and Weisbenner "study the relation between households' stock purchases and stock purchases made by their neighbors. A ten percentage point increase in neighbors' purchases of stocks from an industry is associated with a two percentage point increase in households' own purchases of stocks from that industry. The effect is considerably larger for local stocks and among households in more social states. Controlling for area sociability, households' and neighbors' investment style preferences, and the industry composition of local firms, they attribute approximately one-quarter to one-half of the correlation between households' stock purchases and stock purchases made by their neighbors to word-of-mouth communication." Finally, in "Do Bubbles Have a Birthdate? The Role of College Interaction in Portfolio Choice", Massa and Simonov "show that the impact of college-based interaction is statistically



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and economically significant. Investors invest in the same stocks in which their former classmates do and skew their portfolios towards growth stocks if their former classmates do the same. Moreover, investors are more likely to herd with the other investors who went to the same college than with the rest of the population. College-based interaction also affects investors' decision to concentrate their portfolios in few stocks."

Beyond the structure of human social networks, their dynamics are also critical. For example, the relative centrality of nodes seems to vary over time, with some dropping out, others joining and still others changing their degree of connectivity over time (see "A Dynamic Model of Time-Dependent Complex Networks" by Hill and Braha). A recent example would be the spike in the number of connections to websites with information on pandemic influenza over the past month. More important, the interconnectedness of networks and the time it takes for information and influence to percolate through them (e.g., via positive and negative feedback loops) means that events involving collective human action over time are rarely independent – rather, most are interdependent. This means that events that result from human interactions – like investment returns -- are usually better described by a power law distribution than by the familiar normal (Gaussian) distribution or "bell curve." (see, for example, "Power Laws, Pareto Distributions, and Zipf's Law" by M.E.J. Newman, "Statistical Physics of Social Dynamics" by Castellano, Fortunato, and Loreto, and "Beyond Gaussian Averages: Redirecting Management Research Toward Extreme Events and Power Laws" by Andriani and McKelvey).

Perhaps most interesting and important is the way the dynamics of social networks change over time, and how that may be related to the level and type of fear felt by individual agents. Borrowing from physics and biology, social network researchers have adopted the concept of a "phase change", when conditions in a network shift from one regime to another (e.g., think of the change of water from a solid to a liquid to a gas). Broadly speaking, there are two not mutually exclusive theories about how phase changes occur.



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In the first view, phase transitions result from a change in an external (to the network) variable. In the case of changes in the state of water, this external variable is temperature (or a combination of temperature and pressure). In the case of financial markets, the classic view would be that the external variable is new information; a more recent view is that another critical control variable is the overall amount of leverage employed in the system (see "Anatomy of Financial Crashes: An Agent Based Model of the Leverage Cycle" by Stefan Thurner).

In the second view, phase changes are caused not by changes in outside (exogenous) control variables, but rather by the dynamic evolution of the network itself, and in particular the extent to which nodes are connected, and hence their actions are no longer independent. In physics, the classic example of this "self-organizing criticality" phenomenon is a sandpile. Dropping additional grains of sand on a pile causes increasing pressures that in turn result in tighter bonds between the grains of sand. As the pile grows larger, weak bonds break, producing small slides. Eventually the pressures and connections become so great that one additional grain of sand triggers an extremely big slide (also note that the size of these slides follows a power law distribution). In investments, quite a few researchers employing agent based models have found that financial markets experience phase changes (e.g., bubbles and crashes) when the proportion of wealth managed using different strategies (e.g., trend following momentum investors, or momentum plus passive investors) passes a critical threshold (e.g., see "Complex Evolutionary Systems in Behavioral Finance" by Hommes and Wagener, "Heterogeneity, Market Mechanisms, and Asset Price Dynamics" by Chiarella, Dieci, and He, or "Dynamic Regimes of a Multi-Agent Stock Market Model" by Yu and Li). Other researchers have shown that the financial market effects of phase changes caused by outside (exogenous) news are very different from (endogenous) changes caused by self-organizing criticality in the market itself (see, for example, "Stock Price Jumps: News and Volume Play a Minor Role" by Joulin, Lefvre, Grunberg and Bouchaud, and "Volatility Fingerprints of Large Shocks: Endogenous Versus Exogenous" by Sornette, Malevergne and Muzy).



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To sum up this research, the volatility impact of exogenous shocks dissipates much more quickly.

Thus far, almost all the financial market phase transition models created by Hommes, Chiarella, and other researchers have been based on cognitively driven strategy switches – for example, assuming an investor switches from a fundamental value to a momentum strategy when he or she observes that the latter has delivered better returns over some period of time. Indeed, the literature on herd behavior in financial markets is extensive (e.g., see "Thought and Behavior Contagion in Capital Markets" by Hirshleifer and Teoh). However, based on the research noted above, we believe it is highly likely that changes in network dynamics are as much driven by emotional factors (fear and reward reactions) as they are by cognitive processes. In particular, factors that affect an investor's perception of loss or uncertainty seem to be critical in determining when herding (extra-high conformity) becomes more likely. For example, the metric used to measure performance (whether of an asset manager, an adviser, or an investor's portfolio) has a critical impact on the perception of what constitutes a loss, or a potential loss. Identical performance may be perceived as a loss under a peer benchmark, or as a gain under a liability-driven benchmark (i.e., the long-term real return an investor must earn on his or her portfolio to achieve his or her financial goals).

The quality of an investor's mental model – i.e., their framework for identifying important information and understanding its meaning in light of their goals -- also seems critical to their feelings of uncertainty and the fear it produces. Indeed, researchers have found a clear link between managers' performance and the quality of their mental models (see, for example, "Mental Models, Decision Rules, Strategies and Performance Heterogeneity" by Gary and Wood). Other research has shown a link between levels of uncertainty and investors' tendency to herd (see "Herd Behavior in Financial Markets: An Experiment with Financial Market Professionals" by Cipriani and Guarino of the IMF, or "Ambiguous Information, Risk Aversion and Asset Pricing" by Philipp Illeditsch). Finally, other researchers have shown that there is a strong link between levels of uncertainty and levels of liquidity in financial markets (see "Trading



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Asymmetric Information Asset Pricing Models" by Kelly and Ljungqvist and "A Simple Model of Trading and Pricing Risky Assets Under Ambiguity" by Guidolin and Rinaldi).

However, few researchers have examined how investors' increased desire to conform due to heightened fears due to loss and/or uncertainty, as well as the socially contagious nature of fear itself affects network dynamics. Five studies address this issue indirectly. In "Information and Noise" Eli Berniker notes that as a network becomes more tightly coupled (i.e., as the time available to make decisions shrinks, as in the case of an investor using a momentum strategy), and as it becomes more complex (in terms of the number of nodes and links it contains), the quality of information communicated within it degrades, as the ratio of noise to signal increases. Hence, the degree of uncertainty would seem to increase with the proportion of momentum-based traders in a market. This conjecture finds further support in another paper, "Cognitive Hierarchy: A Limited Thinking Theory in Games" by Chong, Camerer and Ho. In essence, successful momentum investing requires an investor to correctly anticipate the future actions of other investors, who are all making the same calculation. Chong and his co-authors study the extent to which individuals are capable of this type of reasoning, and find that most can only reason one or two steps ahead (a finding also made by other researchers). In another paper ("The Reality Game"), Cherkashin, Farmer and Lloyd describe in detail the extreme complexity (and hence uncertainty) involved in situations where the amount wagered on different outcomes (e.g., invested using momentum strategies) affects the probability they will occur.

We also note two papers which analyze how financial markets can self-organize to critical points that lead to phase changes (i.e., bubbles and crashes). In "Explaining What Leads Up to Stock Market Crashes" Yalamova and McKelvey focus the interaction between the proportion of informed (e.g, fundamental and market making) and noise (e.g., momentum, liquidity, passive) traders in a market, and the level of asset valuations. Increasing complexity (e.g., due to the introduction of derivatives) raises uncertainty and causes a relative increase in noise strategies, which drive up valuations. Absent exogenous shocks with sufficient force to reverse the process,



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rising valuations increase uncertainty and the proportion of noise traders in a positive feedback process that gradually reduces underlying liquidity and ultimately triggers a crash when the system passes a critical point. In "Endogenous Versus Exogenous Origins of Financial Rallies and Crashes", Harras and Sornette describe a process where random exogenous news flows generate high performance for some investors, which sets off copying by both rational investors (who see the superior performance as a sign that some investors possess superior private information about correct valuations) and by noise traders, who simply copy the investments made by the successful investors they observe. This sets off what the authors call "a transient herding regime" that, in the absence of offsetting exogenous news (which must be increasingly powerful as momentum builds) eventually results in a crash. Finally, in "Global, Local, and Contagious Investor Sentiment", Baker, Wurgler, and Yuan use an innovative principal components technique to create sentiment indices in six equity markets, and use them to show not only contagious effects, but also that their sentiment indicator is a contrarian predictor of future returns (i.e., rising sentiment forecasts lower returns, and vice versa).

What none of these papers capture, however, is the underlying process that churns in investors' brains, as fear triggered by rising uncertainty and either actual (relative to a peer benchmark) or anticipated (when the bubble breaks) loss competes with fear of abandoning the herd and with the euphoric affect of continuing (and, for a time at least, increasing) rewards. We believe these emotional factors, which exist below the level of conscious thought, constitute the most basic "quantum" building blocks of the risk and return relationships we ultimately observe in financial time series data.

Let us now turn to the implications of changing from a mental model based on "risk as the standard deviation of normally distributed returns" to one based on risk as the fear produced by loss, uncertainty, and social isolation. We divide our conclusions into six areas: asset class valuation, portfolio construction, risk management, financial advisers, individual investors, and regulation.



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In terms of asset class valuation, this approach to risk as emotion reinforces the findings of other studies (e.g., by "rational herding" researchers) that substantial overvaluations are a danger to which investment portfolios are unavoidably exposed. Given the complexity of today's financial markets, as well as the information overload broadband creates, a greater percentage of investors than in the past may feel overwhelmed and uncertain. At the same time, they receive a higher number of messages telling them where the herd is headed. So investors and those with fiduciary responsibilities must continue to be on guard for the appearance of new bubbles that can destroy financial plans when they eventually (and inevitably) implode.

The implications for portfolio construction of an approach to risk grounded in neurobiology also seem clear. The research on the power law distributions produced by interacting human activity suggests that the burden of proof should shift to those who continue to argue for the use of normal distributions in asset allocation analyses. Regime switching methodologies and other approaches that include non-normal distributions seem much better supported by the available evidence. Beyond this, the finding that loss triggers fear further reinforces the already strong case for using shortfall risk minimization (i.e., Roy's "Safety First" approach) as a key decision criterion when building portfolios to achieve long-term objectives. Similarly, the findings on the linkage between uncertainty and fear suggests that allocation methodologies need to incorporate high uncertainty regimes, and take into account the tradeoff between returns and asset classes like government bonds, volatility futures and gold that perform best when uncertainty rises.

Our findings on the key triggers of investor fear also imply the need for changes in our approach to risk management. We have long argued that while diversification and rebalancing are necessary, they are not sufficient for adequate risk management. The possibility of dangerous overvaluations sometimes makes more active steps, like moving to cash or buying options, both necessary and prudent steps to take. In light of the research findings we have presented, we now believe that effective risk management requires even more active approaches, aimed not at the portfolio, but rather at the investor, to minimize his or her perceptions of loss, uncertainty and social



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isolation. The use of liability driven instead of external benchmarks can not only minimize the perception of losses, but also help to avoid them, to the extent that their use makes it easier for an investor or adviser to justify reducing exposure to a dangerously overvalued asset class.

Just as important are more frequent and better structured communications between advisers and clients. For example, Metrinomics recently interviewed about 1,000 financial adviser clients in eleven countries. They found that "clients are demanding constant hand-holding and vastly improved client service...The responses were [filled] with calls for more regular, more informative, and more transparent client communications." Similarly, IBM recently surveyed 2,754 investors and other investment industry participants from around the world. They found that above all else, clients sought, and were willing to pay a premium for, "unbiased, high quality advice and excellent service."

It is clear that when uncertainty rises, investors are more likely to need (if not always proactively seek) reassurance, advice and social connection. Rather than reducing communication during these periods, advisers must increase it, helping clients to understand the source of their fears, and constructively work through them. Advisers need to proactively send carefully structured messages designed to minimize clients' uncertainty (e.g., highlighting frameworks for understanding the current situation and identifying key information in the flood of daily data) and reduce their perception of loss (e.g., keeping the focus on different ways that post-retirement income targets can still be achieved, such as by saving more or working longer, etc.). The good news is that there is ample evidence that better thinking enabled by effective advisers can help clients control their fears (e.g., see "Thinking Like a Trader Selectively Reduces Individuals' Loss Aversion" by Sokol-Hessner, Hus, et al, or the reams that have been written on various approaches to "cognitive therapy").

For individual investors, our findings have some important implications. First, we must recognize that the way we frame issues has a strong impact on our emotional response to them. For example, considering portfolio losses not on their own, but rather in relation to gains experienced in other aspects of life can reduce feelings of



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fear and anxiety. So can other efforts to reduce uncertainty, such as using a comprehensive personal financial planning model to put portfolio losses into a less threatening perspective (e.g., "I can save a bit more, and work a couple of years longer, and still achieve my long-term goals", or "relative to my long-term real return target, things don't look that bad"). We also need effective mental models that help us bound the range of outcomes that could occur, and identify critical information about them in the flood of data that we face each day (this is the purpose of our monthly economic updates). Finally, though many of us find it difficult to talk about money, to minimize our fear of social isolation we need to connect with others, to share our uncertainty and sense of loss. Talking with other people forces us to cognitively engage our fears, which often weakens their power over us. A good financial adviser is ideally positioned to play this role, while maintaining the confidentiality investors desire.

The research we have reviewed in this article also has at least two important implications for future regulatory changes. The first is the need for regulators concerned with limiting systemic risk to directly monitor and control the drivers of destabilizing phase transitions in financial markets. Clearly, tighter regulation of leverage is part of this (see, for example, "Could a Systemic Regulator Have Seen the Current Crisis?" by Eric Rosengren, President of the Federal Reserve Bank of Boston). Equally important are initiatives to reduce complexity and uncertainty, maintain the heterogeneity of views and strategies in the financial system, and ensure the most important nodes in the network (e.g., the biggest banks) are adequately capitalized and regulated. Far and away, the best paper we have read on this is "Rethinking the Financial Network" by Andrew Haldane of the Bank of England. It renews our hope that the future (at least when it comes to financial market regulation) will be better than the past!

The research we have reviewed also has important implications for a second issue: official enquiries into financial advisers' sales practices that are now underway in Australia, the U.K. (following publication of the Retail Distribution Review) and the United States. In all three countries, surveys have found that the majority of clients



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continue to be confused about the difference between a salesperson (broker, tied agent, etc.) and an adviser who has a fiduciary obligation to his or her client. This issue is central, not only because of the impending wave of complaints about allegedly inadequate risk disclosure (how could it be otherwise, when standard deviation was the criterion used?), but also because the betrayal of trust has repeatedly been shown to trigger a strong response in the amygdala (due to the powerful mix of loss, uncertainty, and fear of social isolation it involves). When people trust an adviser to provide fear reducing advice, it should come as no surprise that some become explosively angry when they realize that, in legal terms, they have been dealing with the product provider's salesperson, not a fiduciary who is legally obligated to put their best interests first. It is therefore very encouraging to see that in all three countries, the debate seems to be swinging in favor of a stronger separation between financial product salespeople and fiduciary advisers. For example, in Australia, Bruce Baker the Director of Puzzle Finance stated in his recent parliamentary submission that "it is time to give consumers of financial advice a fair go. Remuneration practices and conflicts of interest in the financial planning industry are very complex and it is unreasonable to expect consumers to appreciate how these can and do taint the advice. The Financial Services Reform Act attempted to address this issue through disclosure, but clearly this has not achieved the desired outcome...Therefore, it is time to take the next regulatory step...Consumers want conflict free advice. The regulatory system needs to be adjusted ...to provide it." Similar steps towards the clear separation of fiduciary, fee based advice and financial product sales are also underway in the UK. And in the US, Paul Stevens, the head of the Investment Company Institute (the mutual fund industry's biggest trade group) has said that he supports requiring all financial advisers to be covered by fiduciary regulations.

In sum, the emerging focus on the neurochemical drivers of investor decision making will eventually lead to a new, and much better, approach to a wide range of issues, including asset class valuation, portfolio construction, risk management, the provision of financial advice and regulation of the financial system. For financial advisers, it also has important short-term implications for improving client retention and



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increasing satisfaction following one of the most challenging periods in financial history. And for all investors, the "risk as emotions" approach offers important lessons for improving the way we make investment and other decisions.

## May 2009 Economic Update

Our economic analysis methodology utilizes two alternative scenarios that are based on traditional attractors for complex social systems operating in far from equilibrium conditions. The first is enhanced cooperation and the second is higher levels of conflict. Realization of the cooperative scenario should result in a higher level of stability and predictability in the system's operations, while development of the conflict scenario will prolong and quite possibly worsen the system's instability. These scenarios are described in more detail in our previous issues, which (as you go back in time), also describe the scenarios that preceded them. Overall, our political analysis process is best characterized as a sequence of two scenario alternatives, one which is discarded, and one which develops and then generates two new scenarios that describe the alternative paths along which events could evolve in the future.

We further assume that financial market returns reflect the complex interplay between political and economic conditions and investor perceptions, emotions, and behavior. With respect to current economic conditions, we believe that three issues must be resolved in order for the current "high uncertainty regime" to be replaced by a "normal growth regime" – high levels of household debt, a deeply weakened financial system, and destabilizing structural imbalances in the balance of payments accounts of the United States and China. Finally, we believe that the actions of three groups – middle class Americans, Chinese peasants, and Iranian youth, are linchpins that could have an outsized impact on the future evolution of political and economic events.

This month, we will start our update with what, in our judgment, are potentially high value pieces of information from China, in the sense that they



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