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Bubbles, Human Judgment, and Expert Opinion

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Abstract: Research in psychology and behavioral finance is surveyed for evidence to what extent experts such as professional investment managers or endowment trustees may behave in such a way as to help perpetuate speculative bubbles in financial markets. This paper discusses scholarly psychological literature on the representativeness heuristic, overconfidence, attentional anomalies, self-esteem, conformity pressures, salience and justification for insights into weaknesses in expert opinion. The role of the prudent person standard and the news media in influencing experts is considered. The relevance of the literature on testing of the efficient markets theory is discussed.

The widespread public disagreement about whether the stock market has been undergoing a speculative bubble in the past few years reflects an underlying disagreement about how to view human judgment and intellect.

There are many who have been arguing in effect that the market (or major components of it) has been undergoing a bubble. These include some who write for *The Economist, The Wall Street Journal*, and *Barron's.* It would seem that it is essential to their notion of a bubble that investors' actions are, in one way or another, foolish.

Others sharply disagree with these bubble stories, and it is precisely this intimation of foolishness that seems to bother them. It seems to them just implausible that investors at large have been foolish. Rather, it seems to them that the high valuations the market has placed on the stock market recently can be attributed to actions of rational investors who are wrestling with hard-to-interpret evidence about such issues as how much recent technological innovations will promote future economic growth. Suggesting that investors at large have been irrational seems arrogant and presumptuous.

The dispute about whether there has been a bubble is indeed not just a dispute about whether price earnings ratios have gotten too high. One might certainly argue that the ratios have been or are too high without saying that anything irrational underlies the high values. One might argue that market has merely not taken into account certain facts, and that it will do so once these facts are properly disseminated. The idea that there has been a speculative bubble, in contrast, is inherently a statement about some less-than-rational aspect of investor behavior.

[1] The author is grateful to the Commonfund Institute for support for this paper.

One of the most important arguments that it is not foolishness that has brought us the high valuations in the aggregate market is to observe the decisions of some of the most august of investors, the real experts. One may note, for example, that those who manage university endowments had not withdrawn *en masse* from the stock market before its peak in March 2000. According the 1999 NACUBO Endowment Study, in 1999 the median endowment had 54.7% in US equity and another 10.5% in non-US equity. Most of their portfolios have been in US stocks, and so they were indeed involved in the market just before its peak, not withdrawing from it.

Those who manage university endowments have at their disposal some of the finest scholars, and university trustees who are drawn from the highest ranks of the business world. Who would presume to call these people foolish? But, that is what one would apparently have to do if one wishes to attribute the market behavior to human error.

Despite these arguments against calling a bubble, in my recent book *Irrational Exuberance* I do argue that there has indeed been a speculative bubble in the stock market in recent years. But I argue that the kind of less-than-perfectly-rational behavior that underlies it is not abject foolishness. It is not the kind of error of fools, a term I particularly associate with Shakespeare, who portrays many of them in his plays. It is rather more the kind of error in some of Shakespeare's tragic figures.

The kind of errors that people have been making and that underlie the recent stock market bubble do reflect human shortcomings, but they reflect exactly the kind of shortcomings that can infect professors' analysts' and trustees' thinking just as much as anyone else's. The current situation in financial markets is just a fertile ground for the amplification and visualization of the errors.

Moreover, I do not think that it is presumptuous of me (or anyone else) to argue that human error in evaluating the available facts has created the high market valuations, and to argue that it is an error that infects the thinking of some of the most intelligent people in our society. I am not arguing that I am smarter than these people, rather only that I am trying to draw their attention to human foibles that we all are subject to, and that research in psychology, behavioral finance and other social sciences has allowed certain scholars to recognize thoroughly and systematically. What I am doing is rather like what psychologists do when they show, using certain optical illusion charts, that there are certain characteristic visual recognition errors that we all tend to

make, and like what sociologists do when they point out how contagion of ideas patterns underlie the spread of political ideologies.

In this article I will draw out some of the themes in *irrational Exuberance* about human judgment and expand upon the sort of irrationality that seems to be at work in the mechanism by which bubbles are amplified. I will pursue the nature of less-than perfect rationality not only among the general class of investors, but also here focus upon errors characteristic of investment professionals, among the experts.

Feedback and Bubbles

The essence of a speculative bubble is a sort of feedback, from price increases, to increased investor enthusiasm, to increased demand, and hence further price increases. The high demand for the asset is generated by the public memory of high past returns, and the optimism those high returns generate for the future. The feedback can amplify positive forces affecting the market, making the market reach higher levels than it would if it were responding only directly to these positive forces. Moreover, a bubble is not indefinitely sustainable. Prices cannot go up forever, and when price increases end, then the increased demand that the price increases generated ends too. Then, a downward feedback can replace the upward feedback.

This kind of bubble theory requires only that past price changes produce an inconstancy to our judgments, not that we foolishly believe that past increases must continue. The theory does not require that our forecasting future price changes by some mechanical extrapolation rule, or that we are placing rulers to chart paper to forecast. It only requires that our observations of the past price changes alter the way we resolve the confusing array of conflicting information that we must all sift through in judging the market.

Ultimately, people who choose asset allocations must use their subjective judgment about the probability that stock trends will continue. This is true among the experts as well as the general public. While there are formal statistical models to help experts, it is widely understood that these models are only as good as their specific assumptions. Assessments of trends and probabilities that underlie asset decisions are inherently subjective.

The study of subjective probability has been a very fertile field for psychologists for decades. See for example the volume of survey articles *Subjective Probability* edited by Wright and Ayton (1994).

There are many aspects to intuitive probability. One of them is the representativeness heuristic, identified originally by Tversky and Kahneman (1974). They showed that in forming subjective judgments, people have a tendency to disregard base rate probabilities, and to make judgments solely in terms of observed similarities to familiar patterns. For example, they performed an experiment in which subjects were asked to guess the occupations of individuals whose personalities were briefly described to them. They tended to guess rare occupations that would seem to match perfectly the personality descriptions, without regard for the rareness of these occupations (low base rate probabilities). People should have guessed humdrum and common occupations more. We can expect the same representativeness heuristic to encourage people to see patterns in stock market price changes, simple patterns like a bull market or a bear market, even though such sequences of same-sign price changes are actually quite rare. Thus, the representativeness heuristic can encourage people to expect intuitively past price changes to continue, even if they know, from professional training, that they should not expect this.

This tendency to fit one's future expectations to salient images or simple patterns is tempered somewhat by a tendency towards conservatism. Phillips and Edwards (1966) conducted experiments in which subjects' abilities to revise probabilities in light of new evidence was tested. Their experiments were constructed so that there was a single correct answer to the probability revision problem posed to the subjects; the answer could be deduced by application of a principle from probability theory called Bayes Law. They found that subjects tended to revise their probabilities in the correct direction, but tended not to revise them far enough. Their finding, that people respond insufficiently to new information, has been replicated in a number of papers, and is now referred to as conservatism bias (see Beach and Braun, 1994).

Barberis Sheifer and Vishny (1998) have developed these twin principles of representativeness heuristic and conservatism bias into a model of speculative bubble propagation. The representativeness heuristic encourages people to react to price changes in an exaggerated manner, but the conservatism bias spreads this pattern out through time. Their model of the propagation of a speculative bubble is undoubtedly oversimplified, relying as it does on only a couple of subjective probability biases, but offers useful insights.

If I may interpret the model more broadly, I think we can say that investors have overconfidence in a complex culture of intuitive judgments about expected future price changes, and an excessive willingness to act on these judgments. This overconfidence is then a powerful force

in the market, and these intuitive judgments ultimately are behind both the feedback that underlies the bubble and the end of the feedback that signals the end of a bubble. There is a lot of evidence that such overconfidence in intuition is a powerful force in the markets. For example, in my questionnaire survey of both individual and institutional investors that I conducted right after the October 19, 1987 stock market crash (Shiller, 1989), I asked both individual and institutional investors whether they recalled that they had a "pretty good idea when a rebound was to occur" on that day. I found that 29.2% of the individual investors (47.1% of buyers of stocks) and 28.0% of institutional investors (47.9% of buyers of stocks) said yes, a remarkably high number given the uncertainty of that day. When I then asked them what made them think that they knew there would be a rebound, the answers they wrote could only be described as merely intuitive. Thus, the intuitive judgments that the psychologists have been studying are ultimately very important in determining the direction of the market.

Another part of the mechanism by which past price increases boost demand for an asset class has to do with the simple attraction of attention that such price increases entail. As long ago as 1890 the psychologist William James noted that attention is a fundamental aspect of human intelligence, and that anomalies of attention are behind many errors that people make. People generally do not know what has attracted their attention, and cannot explain their attention. Psychologists have documented that there is a social basis for attention, that is, people tend to pay attention to what others are paying attention to. Not surprisingly, speculative assets whose price has gone up a lot recently gather a great deal of attention. People are more likely to buy assets that have their attention just because they are thinking about them more. Assets that have not had big price increases are less likely to garner the attention.

This capriciousness of attention is apparently characteristic even of professional investors. In a study that John Pound and I conducted, we did a questionnaire survey of institutional investors who had reported holdings of stocks whose price had increased greatly in the recent past (the experimental group) and compared them with institutional investors in random stocks (the control group). Regarding their holdings, we asked both groups if they agreed with the statement "My initial interest was the result of my, or someone else's, systematic search over a large number of stocks (using a computerized or similar search procedure) for a stock with certain characteristics." In the experimental group only 25% agreed, while in the control group

67% did. The design of this experiment reveals that institutional investors, just as individual investors, have their attention ultimately attracted by past price increases.

Another part of the mechanism by which the past price increases affect the judgments that are actually made about investing for the future have to do with the feelings of confidence and self esteem that past successes in investing has given successful investors. Success in investing usually involves some acquired skills in understanding the particular category of investment and in the strategy of dealing with it. Acquiring such skills regarding that category increases demand for it. Psychologists Heath and Tversky (1991) have shown through experiments that *holding probabilities* constant people prefer to bet in situations in which their perceived competence is high. In their experiments, subjects were asked to answer general knowledge questions, as about football or political predictions, and then to give probabilities that their answers were right. The subjects were then asked whether they would prefer to bet on their answers or on a chance lottery with the same probability of winning. They found that subjects were likely to want to bet on their own answers when they assigned high probabilities that their answers were right or when they thought that they knew a lot about the subject.

Another part of the tendency for people who recently benefited from a price increase in an investment class is that personal association with past price increases as an investor leads to an aspiration for future price increases. Julius Caesar said that "Men willingly believe what they wish."[2] His insight was on target. It has been shown in a number of psychological studies that people suffer a wishful thinking bias, that is, they overestimate the probability of success of entities that they feel associated with. For example, soccer fans give exaggerated probabilities that the team that they identify with will win (Babad, 1987) and supporters of political candidates give strikingly upwardly biased probabilities that their candidate will win (Uhlaner and Grofman, 1986).

Wishful thinking bias appears to play a role in the propagation of a speculative bubble. After a bubble has continued for a while, there are many people who have committed themselves to the investments, emotionally as well as financially.

[2] Julius Caesar, *De Bello Gallico*, pp. iii, 18.

Judging the Judgments of Others

In making asset allocation decisions, it is important to realize the essentially judgmental nature of the task of any long-term investors. Investing for the long term means judging the distant future, judging how history will be made, how society will change, how the world economy will change. Reaching decisions about such issues cannot proceed from analytical models alone; there has to be a major input of judgment that is essentially personal and intellectual in origin. Asset allocation decisions involve a bewildering complex of relevant factors, some represented by quantitative data, others only suggested by cases or events, still others suggested by intangible intellectual currents in society. With such a confusion of factors, it is hard for anyone to make objective judgments without being influenced by the recent success behavior of the market and the recent success of investments.

The complex judgment that portfolio managers must make about these factors, in turn, is inevitably influenced by the judgments of others. In making major allocation decisions, one almost inevitably winds up trusting to a common view or consensus view about the future. No one person can be at once a historian, political scientist, economist, and psychologist rolled into one. Few of us, even the best investment professionals, can even make much of a beginning at the task. For most professionals, there are too many things to do in one's day, too many other claims on one's time. Institutional investors who attend seminars and keep abreast of research make an effort to synthesize all this knowledge. Unfortunately, synthesizing all this knowledge, deciding who is right, is an even more difficult task than trying to add a piece of scholarly evidence. Professionals ultimately must end up generally assuming that what their colleagues believe is true.

Major speculative bubbles, as I argue in *Irrational Exuberance*, are always supported by some superficially-plausible popular theory that justifies them, and that is widely viewed as having sanction from some authoritative figures. These may be called new-era theories. The judgment error that underlies the bubble is not naïveté or credulousness, but arises instead from difficulties assessing the source of the public prominence of the new era theories. People fail to perceive fully that the new era theory, despite having some concrete facts as part of the story, in fact has no solidity; the concrete facts do not lead to a new-era conclusion without the insertion of some outright guesses. The error people make is in presuming that someone else has verified the conclusion carefully, when, while some have tried, in fact no one has really been able to do

so. The error people make is in assuming that the currency of the new era theory is evidence that many people have completed all the missing links in the argument, rather than evidence of the bubble itself.[3]

Prudent Person Standard

Conforming one's actions to be in accordance with conventional wisdom rather than one's own judgments is not only a natural thing to do; for fiduciaries it is also required by law.

Fiduciaries have been held by common law for hundreds of years to the prudent person standard, that makes it an obligation for them to invest in a way that would generally be regarded as prudent. The prudent person rule has a very long history in common law, it was also enshrined for pension funds in the Employee Retirement Income Security Act (ERISA) of 1974, which states that investments must be made with "the care, skill, prudence and diligence, under the circumstances then prevailing that a prudent man acting in a like capacity and familiar with such matters would use in the conduct of an enterprise of a like character and with like aims." Plainly, this law prescribes that fiduciaries must act on conventional wisdom, not their own judgment.

Shortly after ERISA, pension managers apparently thought that this standard meant that fiduciaries should just do whatever people have been doing for a long time. One such manager, quoted by O'Barr and Conley (1992), spoke of his reaction to ERISA at the time: "If you can find a guy who works in a building that's got granite on the outside and it says 'Established a long, long time ago,' then you're probably complying." But, as the prudent person standard evolved, it became clear that it did not specifically mean that the prudent person was someone who lived a hundred years ago. Nor is it someone who is pathologically risk averse. The prudent person standard refers to someone who is alive today. Ultimately, it must refer to the conventional wisdom.

It is understandable that fiduciaries have been given such a rule. There is a problem restraining the egos investment managers, who often make the error of hubris.

John Silber, the president of Boston University, and a man sometimes accused of having a big ego, invested nearly 20% of the University portfolio in one biotech company, Seragen with

[3] The mistakes people make for this reason can also be rational, see Demarzo *et al.* (1998). Still, the complexity of the problem of discerning other people's reasons for their judgment suggests that mistakes are likely too.

disastrous results. Yale University, in the 19th Century, invested virtually its entire endowment in one firm, The Eagle Bank, and lost it. We must tell fiduciaries not to do such things.

But the problem is that it is hard to know how to tell them just what it is that they are not to do. One cannot just tell fiduciaries to be smart or sensible. Such advice is too vague. Decades ago it used to be presumed that fiduciaries should invest primarily in fixed incomes, but after decades of underperformance, that became inconsistent with concepts of prudence. We wind up telling them not to deviate too far from what others think is right, and inevitably doing that often means following the investment which has outperformed in recent years.

The prudent person standard tells fiduciaries to follow conventional wisdom. The problem with this rule, of course, is that it makes fiduciaries interpreters of conventional wisdom, rather than investors. They cannot take any action without showing that it is conventional.

The News Media

The news media play a prominent role in generating our conventional wisdom, more so among nonprofessionals, but among investment professionals as well. And the news media are themselves in a fiercely competitive business for survival as news media. They cannot be indifferent to the public resonance with the stories they write. They therefore help reinforce a conventional wisdom in some dimensions, and help change it in others.

News media success thrives on good writing. A well-written story can have powerful impact on public thinking, and, indeed, can become a news event itself. One well-written news story that succeeds in grabbing public attention begets a long sequence of follow-up stories in competing media outlets, and reinforces its impact in public thinking.

The news media are therefore generators of attention cascades, as one focus of attention in public thinking leads to a related but different focus of attention, and then in turn to yet another focus of attention. Thus, shifts in public attention to economic issues are rather like the shifts in topic of conversation at a dinner party. During such a party, the focus of attention seems to drift aimlessly as one person after another is reminded of a new interesting story to relate, and there is no telling where the conversation will be in another ten minutes. The succession of attentions in the media are rather like this too, though spread out over days and weeks rather than minutes.

Stock market price increases generate news stories about new era theories just as much as the news stories themselves do. Stories about new era economics surged around 1997, after an

influential *Business Week* cover story that also implicated Alan Greenspan as a recent convert to new era faith. This cover story appeared after the first really enormous increases in the stock market had captured everyone's attention. All of the follow-up stories prominently mention the stock market.

Efficient Markets

Experts' disentangling the source of public credence in new era theories is made more difficult for them by an intellectual theory that has come to dominate much thinking about speculative markets: the efficient markets theory in finance. This theory is widely described as asserting that prices optimally incorporate all publicly available information at all times. If one believes in efficient markets, one believes that the marketplace of ideas somehow works out optimally, and hence, by inference one might suppose that the prominent theories that appear to move investors' decisions are based on the best possible information too. One who believes in efficient markets also believes that broad diversification is the ideal, without any regard for the current market situation.

Certainly many of investment professionals make no effort at all to take account of information about the long run outlook, even on a matter of principle. Many of them are not in the business of asset allocation at all, their charge being to attend to other issues. Others, who have the discretion to do so, do not do so on a matter of principle.

Charles Ellis, in his popular book *Winning the Loser's Game*, has put it bluntly: "Market timing is a wicked idea. Don't try it — ever."[4] David Swensen, in his book *Pioneering Portfolio Management*, asserts that "market timers run the risk of inflicting serious damage,"[5] and that portfolio managers should focus their energies instead on alternative asset classes where there is a greater degree of opportunity for active managers than in the broad stock market.

As regards listed stocks, they are apparently advocating free-riding on the judgment of others who are supposedly looking at the long run outlook, and deciding that their game is so well played that there is no point in trying to compete. There is a curious irony in their saying this, for if such astute investors as these would never try to judge the future course of the market,

[4] Ellis ([1998), p. 10.
[5] Swensen (2000), p. 68.

then who is assessing whether the market is appropriately priced, and who is providing guidance to the market?

The basic problem with the efficient markets hypothesis is that it is a half truth. It is useful to present market efficiency as a concept to students and amateur investors lest they come to believe that it is easy to get rich quickly. It is not easy to get rich quickly by trading in speculative markets. The short-run, day-to-day or month-to-month profit opportunities that many people imagine they have found are most probably not there.

But, one should not extrapolate from this simple notion of market efficiency to the idea that markets are also efficient in the long run. In fact, if one looks at data over long intervals of time, it appears that the stock market is anything but efficient.

I show in *Irrational Exuberance*, following work that John Campbell and I presented to the Federal Reserve Board in 1996 and later published, that ten-year real returns on the Standard & Poor index have been substantially negatively correlated with price-earnings ratios at the beginning of the period.[6] When the market gets high, it has tended to come down.

Talking about ratios as forecasters of returns, while enshrined in quite a number of papers in finance journals going back to Basu in 1983, has never become a part of conventional wisdom about investing. Arguments have been made that the effect is not necessarily unexplainable in terms of some rational model of human behavior. Most studies of the forecasting of returns used very short return horizons. Arguments about statistical issues have confused the issues. For all these reasons, the conventional wisdom seems to be stuck on the idea that stock market returns can always be expected to be the same, regardless of the ratios.

Conformity Pressures

Irving Janis, in his book *Groupthink* about professionals' herd behavior, refers to a number of reasons why professionals operating in groups may may be unwilling to deviate from the group consensus. His book reviewed a number of case studies in which professional groups made serious errors.

Janis refers to a tendency for people to try to conform to the consensus of the group in order to preserve their status within the group. He refers to the "effectiveness trap." The term derives from interviews he made with people in the Lyndon Johnson administration during the escalation

[6] Campbell and I have prepared a revised version (2001).

of the Vietnam War, one of case studies of serious errors. They told him that there was an epithet used to describe dissenting members of the administration, "I am afraid he's losing his effectiveness." By dissenting from the prevailing view in the administration, one gradually begins to be regarded as a "has been," and is gradually excluded from voice and power. People were allowed to express some dissention without losing effectiveness, as long as it was presented in a suitably detached way, and in good humor. The dissenter would have to accept mild jokes at his expense. Bill Moyers, a close advisor to President Johnson, was referred to as "Mr. Stop-the-Bombing," and Undersecretary of State George Ball as "the in-house devil's advocate on Vietnam." But Janis concludes that their subdued and collegial criticism of the policy served more to sustain conventional wisdom than challenge it. Their weak presence gave decision-makers the mistaken impression that they had considered the dissenting view and rejected it. Moreover, the dissenters were forced to remain silent publicly about their dissension, which blunted their ability to pursue their arguments. (Janis, pp. 115-119.)

Janis reports that in his memoirs, Johnson said that he felt that there was substantial dissension within his group. But the actual dissension that he remembers and reports was limited to disagreements about temporary halts in bombings. At this time, Johnson does not remember any fundamental disagreements about the wisdom of the bombing campaign itself. Johnson instead emphasizes the unanimous assent that his advisors often gave to his decisions.

True Uncertainty and Organizations

Frank Knight, a University of Chicago Professor in the first half of this century, highlighted the distinction between risk and what he called uncertainty. Risk, he explained, concerns events whose probability law is known, and that have quantifiable probabilities. Uncertainty concerns events that are essentially unprecedented in nature, whose probability must be judged by thinking by analogy and induction, by thinking globally rather than specifically. He argued that an essential reason for the success of the free enterprise system is its ability to deal with this true uncertainty. Bureaucracies, he thought, are fundamentally ill-equipped to deal creatively with uncertainty. Enterprise, entrepreneurship, relishes true uncertainty, pursues advantages that are seen only by human insight, that can never be proven objectively.

Other examples of true uncertainty concern national issues, whether to go to war, whether to invest more in infrastucture or education, or the like. Decisions about such national issues tend

also to be debated in committees, with expert testimony, just like the decisions about institutional portfolio allocations.

The present situation in the stock market is no different. In judging whether the stock market remains a good investment despite high price earnings ratios, organizations must somehow judge whether we are entering a new era as some claim. Organizations are fundamentally ill-equipped to make such judgments, just as organizations are ill-equipped to write books on history. Making such judgment means weighing evidence about current technological advances and recent changes in national and world institutions, and comparing these against past innovations and past changes in institutions. We must make judgments about such things as the importance of computer networking relative to the importance of the telephone, of the importance of changes in free market institutions versus New Deal institutions, and the like. The answers we get will depend on answers to questions that have animated historians, philosophers, and political scientists throughout history. No committee is competent to answer such questions.

The recent empirical literature here suggests that institutional or professional investors have been able to do a little better than the market, and that there is persistence of performance among investors. But, the overall differences seem rather small.

One reason that institutional investors may not do better is that they feel that they are dealing with clients who have expectations of them that make it difficult to pursue their own best judgment. The clients expect them to invest in accordance with certain fads. The clients expect them to trade frequently, or, at least, are not willing to pay high management fees unless they do so. These effects dilute the advantages that institutional investors naturally have.

Another reason I believe that the differences are so small is that institutional investors do not feel that they have the authority to make trades in accordance with their own best judgments, which are often intuitive, that they must have reasons for what they do, reasons that could be justified to a committee. Their obeisance to conventional wisdom hampers their investment ability.

Psychologists have argued that human thinking that leads to action, even individual human thinking, tends to be motivated by qualitative reasons and justifications, rather than abstract weighing of probabilities and scenarios. Psychologists Eldar Shafir and Amos Tversky have conducted some experiments that show that people need some salience to a justification before they take action. In one experiment, one group of subjects were asked to decide which of a pair

of divorcing parents to award child custody to, another group to decide which pair of divorcing parents to deny child custody to. Subjects were given brief descriptions of both parents. Both groups tended to pick the same parent, (in one group to award, and in the other to deny, which means they were contradicting each other). Both groups tended to choose the parent for which there were a more salient reasons given, both pro and con.

The need for justifiable authority to change investing behavior that has been successful in the past imposes a sort of conservative compliance with broadly perceived conventional wisdom and past procedures. Committees apparently have great difficulty taking action to alter their decisions on the basis of changing weight of evidence. One does not easily stand up and have impact in challenging conventional wisdom because one's intuitive assessment of probabilities is a little different. One needs a striking argument that is trenchant and on target, otherwise one is likely to have little prospect of impact. When one senses that there is little prospect of having an impact, one tends to hold one's silence, or make only perfunctory objections.

Summing Up

I have laid out in this article a number of factors that help us to understand the propagation of bubbles, the feedback mechanism from price change to further price change and the interaction of this feedback with changing conventional wisdom. I have given particular attention to institutional investors.

We have seen that a lot of the elements of this propagation mechanism have to do with the nature of subjective probability, and intuitive and personal judgments. Other elements have to do with the social environment in which decisions are made, the prominence of the news media, and the nature of human interactions within organizations.

Returning to a theme at the opening of this article, it should be clear that human patterns of less-than-perfectly rational behavior are central to financial market behavior, even among investment professionals, while at the same time there is little outright foolishness among inestors. It is hard for writers in the news media, who describe financial markets, to convey the nature of any essential irrationality, since they cannot all review the relevant social science literature in their news article. They are left with punchy references to pop psychology, that may serve to discredit them in many eyes. That is part of the reason why we have been left with a sense of strong public disagreement about the nature of speculative bubbles.

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