NBER WORKING PAPER SERIES

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Working Paper 10847
http://www.nber.org/papers/w10847

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 2004

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JEL No. G12, N2

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Minimalist economists stubbornly resist Charles Kindleberger's characterization of investor expectations in a financial bubble as "irrational." This paper seeks to resolve the controversy by imbedding Kindleberger's well-researched, impressionistic theory of financial crises into an expanded, but still-minimalist model of rational expectations. Introducing the concepts of malicious disinformation and rational overpromotion creates an informational environment in which it is time-consuming and costly to distinguish fact from fiction. Rationality still requires that expectations and market fundamentals move together over long periods of time, but dishonorable overpromoters can earn substantial profits in the interim.

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October 12, 2004

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ABSTRACT

Minimalist economists stubbornly resist Charles Kindleberger's characterization of investor expectations in a financial bubble as "irrational." This paper seeks to resolve the controversy by imbedding Kindleberger's well-researched, impressionistic theory of financial crises into an expanded, but still-minimalist model of rational expectations. Introducing the concepts of malicious disinformation and rational overpromotion creates an informational environment in which it is time-consuming and costly to distinguish fact from fiction. Rationality still requires that expectations and market fundamentals move together over long periods of time, but dishonorable overpromoters can earn substantial profits in the interim.

During the last five decades of Charles Kindleberger's distinguished career, composers, painters, and economists developed a strong professional commitment to minimalism. By minimalism, I mean a determination to pare one's work down to an abstract and elemental core.

In music, the arch-minimalist is Philip Glass, who consistently turns handfuls of repeated notes into intriguing rhythmic and harmonic structures. In painting, drip painters and monochromaticists celebrate a similarly sparse aesthetic of beauty. Minimalist economics values theoretical and statistical models in part by the degree to which they simplify the portrayal of complex phenomena or processes.

During Charlie's academic years, three intertwined minimalist paradigms ascended to prominence in financial economics: the Modigliani-Miller Theorem and the twin hypotheses of rational expectations and financial market efficiency. The Modigliani-Miller Theorem clarifies that *sometimes* it doesn't make any difference whether a corporation loads a little or a lot of debt into its capital structure. One of the several conditions needed to produce this result is that debt and equity markets be informationally efficient. Markets are described as semistrong-form efficient when equilibrium prices are based on expectations that rationally incorporate at least all *public*

* The author wishes to thank David Chapman, Wayne Ferson, Burton Malkiel, Robert Solow, Richard Sylla, and Peter Temin for valuable comments on an earlier draft.

information. Strong-form efficiency requires that even private information is fully captured in equilibrium prices.

As a self-styled literary economist, Kindleberger resisted the simplifications embodied in the Modigliani-Miller and rational-expectations paradigms with all his might. In my mind's eye, I envision Charlie as trying to explain to a class of monochromatic painters that they need to enrich their palettes if they want to get things right.

In contradistinction to minimalist models in finance, Kindlebergers's fact-rich, impressionistic theory of financial crises (1978, 1996) posits that irrationally optimistic expectations frequently emerge among investors in the late stages of major economic booms. When this occurs, investors grossly overestimate the future profitability of hot firms. These overestimates lead even well-meaning managers to issue unsupportable amounts of debt and unscrupulous managers to overpromote their firms vigorously and to issue bogus debt and equity with abandon. The more a firm's managers sincerely overestimate their growth opportunities or successfully promote a Ponzi-style fraud, the more securities they try to issue. When the unrealistically optimistic profits fail to develop as predicted, debt and stock values collapse. Markets for overpromoted financial assets may even dry up. The more severe the price decline, the more the collapsing value of previously high-flying assets spreads insolvency to creditors of both the overexpanded firms and their stockholders.

As an homage, this paper attempts to reconcile Charlie's theory of speculative bubbles and financial crises with the rational-expectations and market-efficiency hypotheses by adding the color of *endogenous* asymmetric information to the minimalist palette. I hope to persuade minimalists to recognize the advantages of dipping their brush in a daub of behavior I call *rational overpromotion*. Rational overpromotion occurs when dishonorable persons can earn profits for a nonnegligible period of time by framing false opinions and data in ways that fool a great many people.

Charlie emphasized that market participants "are from time to time driven by emulation" (Kindleberger, 1994). The historical evidence he so thoroughly investigated (especially his chapter on swindles) shows that overpromoters' ability to disinform potential suckers in a persuasive manner can play a central role in amplifying and

prolonging speculative bubbles. In *Manias, Panics, and Crashes* (3rd Ed., 1996, pp. 24-25), Kindleberger observes that in a bubble speculation "often" develops in two stages. In the first "sober" stage of investment, seasoned professional investors and analysts are gradually persuaded that bubble assets offer a good chance of high returns. In the second stage, "professional company promoters—many of them rogues interested only in quick profits—tempted a different class of investors, including ladies and clergymen."

My friendly extension of this insight is twofold: to claim that "rogues" play a critical part in *all* bubbles and that rogues are at work *at other times* as well. I doubt that Charlie would warmly welcome this cynical extension of his theory. He was a man of such admirable moral standards that he preferred to think that rigorous recruitment procedures assured that the standards of most top corporate and government officials were equally high. On many occasions, both in conversation and in correspondence, Charlie advised me that he found it aesthetically unpleasant to place lying and other dishonorable activities—as I am wont to do—at the epicenter of models of corporate and (especially) government behavior. During my student days, my fascination with incentives for tax and regulatory avoidance and my insistence that traders in forward markets possess a potentially valuable option to renege led him to wonder how I could possess such a devilish mindset. About a year before he died, the two of us finally agreed on the compromise proposition that—at least in recent years (though not necessarily in other trying times)—legal and cultural controls against faithless managerial, regulatory, and trader behavior seem to have lost a great deal of incentive force.

I. Limits of Metaphorical Language

Language is metaphorical and even the hardest sciences have their "black holes," "big bangs," and "asteroid belts." The problem with colorful metaphors is that they convey misleading entailments as well as instructive ones.

Both in musical composition and in painting, impressionism involves the use of strong tonal colors to evoke moods and situation. In writing, impressionism is the theory and practice of emphasizing larger aspects of objects or actions without dwelling on

details. In both senses, Charlie's research on financial crises lies firmly in the impressionist camp.

In various editions of Charlie's *Manias, Panics, and Crashes: A History of Financial Crises*, Charlie states his belief that "markets generally work but occasionally break down" (1996, p. 4). Soon thereafter (1996, p. 6), he characterizes markets as *irrational* when speculation becomes destabilizing.

Everyone knows that, as mere *mechanisms for trading things* (or better claims to things), markets themselves cannot literally be described as either rational or irrational. Nor is it fair to say that a market is not working when speculative traders base their trades on mistaken judgments. In fact, during the run-up phase of a price bubble, market-makers typically execute a substantial volume of orders for members of the misherded "herd." Finally, markets do not truly "break down" at the top of the bubble when traders suddenly learn that their previous expectations have proved wildly inaccurate. What we observe is a sudden "rush for the exit" that creates an order imbalance, whose clearing price takes fearful but rational market-makers a while to locate and support.

Garber (2000, p. 9) notes that Kindleberger defined a bubble as "an upward price movement over an extended range that then implodes" and that this definition is neutral as to the source of the bubble. In contradistinction to Charlie, Garber attributes three famous 17th and 18th Century bubbles to "fundamentals" rather than to trader or market "irrationality." He didn't push the bubble metaphor quite so far, but we might reinterpret Garber's challenge as asking which of two pumps actually supply the gasses a bubble encloses.

In my first term at MIT, I heard Charlie articulate what he called "Kindleberger's Law of Alternatives." According to this law, the answer to every sensible either-or question that can be formulated in economics is "both." The law applies neatly in this case. As interacting drivers of asset prices, fundamentals and irrationality are impressionistic names for forces whose effects cannot in the end be sharply distinguished.

The value of minimalism lies in stressing the benefits of reining in the profusion of colorful images conveyed by impressionistic names for crisis phenomena: crashes, manias, panics, bubbles, irrationality, herding, stampedes, and breakdowns. Garber's

attack on Kindleberger's theory of crises seems to me to emphasize distracting elements rather than the central features of the colorful word *mania*. Charlie's analysis holds up equally well if we replace mania by the milder word *fad* or even by Shiller's (2000) colorless, but telling phrase *positive feedback loops*.

To explain a bubble economically, one needs only to provide a unified account for two contrasting phases of price movement: a lengthy up followed by a sudden large decline: A large and long-lasting overvaluation that is corrected in something like one fell swoop. In minimalist financial economics, upward and downward asset-price movements can be driven by either homogeneous or heterogeneous expectations among individuals that change over time. Minimalism only requires that the path of individual expectations must eventually track evidence of fundamentals in a logically consistent way. This means that expectations and fundamentals are *simultaneously determined*. The economic (i.e., market) process of converting today's expectations into tomorrow's fundamentals and the psychological process of converting evidence on the past and current behavior of fundamentals into expectations are twin activities that adaptively influence the time path that each other follows.

With rational expectations and symmetric information, what minimalists call a "rational bubble" may exist. In a rational bubble, investors are assumed to be aware that the securities they hold are trading at higher prices than are justified by their current dividends (Leroy, 2004). Kindleberger deals with cases where information is asymmetric. However, he does not assume (á la Mishkin, 1999) that differences in insider and outsider expectations are exogenous. This paper explains expectational divergences by distinguishing between information and disinformation and by formally introducing the disinformational efforts of an "overpromoting" team of profit-maximizing entrepreneurs who strive to influence the expectations held by the investing herd.

II. Hyper-rational Expectations *vs*. Herded Rationality

Financial information may be deemed perfectly true and timely only if it conforms to all relevant facts that are knowable at a given time. Disinformation consists

of false and half-true statements or opinions that interested parties convince others to take seriously. Its message is designed to be negatively correlated with unfavorable information that insiders manage to withhold from outsiders and sometimes (through the psychological mechanism of denial) even from themselves. Financial disinformation relies on deceptive reports and misleading claims about upside and downside risks. The spurious elements or false implications of these claims are shaped for the express purpose of preventing outside counterparties from grasping the full-information or "inside" risks inherent in holding a particular class of assets (Kane, 2004).

Rational expectations is a dynamic equilibrium concept, in which "expectations generate outcomes which confirm the original expectations" (Savin, 1992, p. 285). The governing intuition is that rational individuals must *eventually* perceive that they are making persistent systematic forecast errors (if they make them) and adapt their ways of forecasting to eliminate such errors. "Eventually" is what Charlie liked to call a weasel word. The error-learning that the rational-expectations hypothesis entails should be rapid if: (a) the stochastic part of the process being forecast is stationary and asymptotically mean-convergent and (b) data on reported outcomes can be *verified costlessly*. Let us suppose that data on the current value of the determinants X_t of the future values of any variable Y_{t+k} (k = 1, 2, . . .) contain both relevant information (I_t) and disinformation (D_t).

In the case where assumptions (a) and (b) both obtain,

$$E(Y_{t+k} \mid X_t) = E(Y_{t+k} \mid I_t + D_t) = E(Y_{t+k} \mid I_t), k = 1, 2, \ldots \quad (1)$$

In words, (1) assumes a benign informational environment, which allows a "Hyper-Rational Expectations Hypothesis" to hold. It requires that consensus expectations of any financial variable conditional on the sum of existing information and disinformation are unaffected by the disinformation (no matter how cleverly the disinformation might be framed and conveyed).

Charlie would laugh if someone were to ask him to analyze the consequences of relaxing the stochastic assumptions (a), but it is fully consistent with his way of thinking to reject assumption (b). The resulting "Herded Rationality Hypothesis" assumes instead that the cost (V_t) to outsiders of fully verifying current data reported by entrepreneurs

makes disinformation effective and that this cost increases with the amount, complexity, and novelty of the disinformation that herders imbed in their reports. The larger this cost, the more reasonable it becomes for investors to use low-effort substitutes for hyper-rational calculation.

Of course, rationality requires that the influence of disinformation on future values of Y must vanish asymptotically (cf. Kane, 1996). If we conceive Y_t to be the price of one or more speculative assets, the purpose of rational overpromotion is to increase current expectations of future values above $E(Y_{t+k} \mid I_t)$, so that effects of disinformation on expectations must now be written as $E(Y_{t+k} \mid D_t;V_t)$ and these effects must be positive at least for a subset of nearby k. I propose to redefine rationality so that it requires only that the influence of D_t on expectations of future prices eventually declines with their futurity k. As the great impressionist Paul Cézanne opined in the year before his death: "Time and reflection . . . modify little by little our vision, and at last comprehension comes to us."

Cézanne held that our preconceptions routinely limit our ability to see and to reason, a view confirmed by experiments performed by cognitive psychologists. Arrow (1982) notes that the scientific method does not allow adherents to hypotheses about the rationality of expectations formation to neglect this robust experimental evidence. Tversky and Kahneman (1974 and 1981) pioneered the idea that it may be irrational for individuals faced with uncertainty *not* to shirk some of the time-consuming and burdensome intellectual tasks of cataloging all possible outcomes and the risks that attach to them. They and others have empirically supported the hypothesis that, in forming and modifying judgments about the future in response to events that introduce or resolve particular risks, individuals make use of low-effort rules of thumb or "heuristics." Like a minimalist's model, a heuristic deliberately simplifies the processing of incoming information. In taking a heuristic shortcut, an individual makes a calculated gamble much like the act of investing itself. The user rationally (but perhaps to his or her future regret) accepts a higher incidence of mistakes in exchange for a saving in the time and energy allocated to assembling a provisional probability distribution. However, there is no reason to assume the existence of a universal heuristic that applies to all situations.

Arrow goes on to cite two well-documented heuristics that, as alternatives to the hyper-rational expectations hypothesis, go a long way toward explaining the existence of occasional asset-pricing bubbles. The first is the *representativeness heuristic* (RH). The RH roots excessive market reactions to current information in individuals' well-documented habit of judging the likelihood of a future event by the similarity of current evidence to it. This heuristic rationalizes a dual tendency for individuals both to undervalue older information (especially distant history) in a long-lived price run-up and to expend little effort on exploring the potentially superficial quality of the information and disinformation they may have currently in hand. Since bubbles and crises are infrequent, the RH implies that perceptions of the threat these events pose declines as fewer and fewer members of the population have directly experienced them.

The second heuristic fosters an opportunity for promoters to generate income by manipulating the informational environment to make disinformation persuasive. This heuristic posits that the *framing* of issues and questions—i.e., the precise way in which various situations are formulated—can and does affect the opinions most individuals will express or draw about them. Glaeser (2003) relates such context-dependence to *situationalism*: the behavioral hypothesis that decisions are based disproportionately on local influences and short horizons. This heuristic implies that, during times of great technological and social transition, credulous investors may prove extraordinarily easy to deceive.

Experiments in the burgeoning field of behavioral finance identify several other situational elements and heuristics (Ricciardi, 2003), each of which might assist an overpromoter to implant or spread disinformation. Glaeser (2003) notes that self-interested investors are more likely to accept and to hold overlong to beliefs that make them happier (i.e., promise to make them wealthier) and more likely to indoctrinate others in these beliefs when their missionary work promises to increase the price of assets they hold. However, there is no reason to assume that a single set of heuristics applies to all situations. In choosing a particular expectations-information shortcut, an individual makes a calculated subjective gamble that closely resembles the act of investing itself. As a testable empirical statement about the limits of arbitrage opportunities and the

rationality of producing and spreading disinformation, the concept of herded rationality turns on whether profits can be earned by one or more malicious shepherds.

III. Rational Overpromotion

To make overpromotion rational, we need to make assumptions about the costs and benefits of producing disinformation. When managers' wealth is sensitive to their firm's stock-price or accounting performance, they may be able to benefit by hiding adverse information or exaggerating their firm's prospects. Moreover, it may pay brokers and financial analysts to join in the overpromotion.

The benefits in question will be temporary and will be offset to some degree by the discounted value of anticipated personal stress (P_t) that unsavory behavior and accompanying prospects of reputational and career damage generate. Rational executives must expect labor markets and the government to eventually punish executives that are found to have engaged in fraud or negligent misrepresentation.

Holding externally imposed legal and career penalties fixed, the value of P_t will vary directly with an executive's sense of honor and inversely with his or her personal discount rate (á la Fisher, 1930). For opportunistic individuals with a high rate of time preference, the disincentive exercised by distant and uncertain punishments is easily overcome by the promise of nearby rewards. Other things equal, such persons are more likely to serve as overpromoters.

We assume that anticipated personal benefits $B_t(D_t;V_t)$ net of penalties may be expressed as a weighted integral of equation (1) between t and t+h, where h is the anticipated life of the scam:

$$B_t(D_t;V_t) = \int_t^{t+h} b_k \, E(Y_{t+k} \mid D_t;\, V_t)dk - P_t. \qquad (2)$$

In (2), b_k is nonnegative and declines on average with k.

For individuals for which internal and external ethical codes and penalties are severe enough, (2) itself may be negative. Otherwise, rational individuals must weigh the

benefits of producing disinformation against its production cost. We presume that the nominal costs of framing and disseminating effective disinformation are the same for everyone and increasing both in the amount of disinformation to be produced and in the time that the effort to mislead investors has been underway. We represent the discounted value of these costs as $C_t(D_t)$. On average, the marginal cost of maintaining the overpromotion rises over time as the overpromoters' credibility is undermined and finally destroyed by convincing whistleblowers or by the uncontrollable buildup of persuasive contrary evidence. At each date, the overpromoter chooses D_t to maximize:

$$\Pi (D_t) = B_t(D_t;V_t) - C_t(D_t; V_t). \quad (3)$$

In cases where transparent counterevidence suddenly drives V_t toward zero, a dramatic price adjustment occurs: (say) at date $t + h^*$. Under these circumstances, prices collapse to the risk-adjusted value of $E(Y_{t+h^*} \mid I_{t+h^*})$ and the further production of disinformation about the assets encased in the bubble ceases to be profitable.

Besides explaining asset bubbles, recognizing the potential profitability of overpromotion accounts for the existence of watchdog professions and government securities and exchange commissions. Of course, watchdog institutions operate under incentive conflicts and restraints on their authority that are bound to limit their effectiveness (Kane, 2004).

IV. Casting a Long Shadow

W.H. Auden once remarked that "poets adore explosions, thunderstorms, tornadoes, conflagrations, ruins, scenes of spectacular carnage." So it was with Charlie. His poetic representation of financial carnage evoked a follow-on round of academic explosions. These explosions shook the very foundations of the long-dominant hyper-rational paradigm of finance. For that, he is justly regarded as a founding father of the neo-impressionist school of behavioral finance. For economists who want their assumptions to preserve as much rationality as they can, my paper offers a more

measured way to respond to Charlie's challenge: by recognizing that entrepreneurs and securities firms often have a rational incentive to engage in overpromotion.

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