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Bubble Investors: What Were They Thinking?

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We surveyed a large sample of investors who bought stock in a telecommunications company at least once in the 1999-2000 period. We solicited their views on the efficiency of the stock market, and the basis for their personal trading decisions. A significant fraction of the investors holds beliefs inconsistent with various implications of the efficient market hypothesis. Their motives for trade are based upon a belief in the value of fundamental research and a belief in the importance of past price trends. These investors on average believe that markets over-react to news announcements. Many admitted to buying stocks they believed at the time to be over-valued, but claimed to have done so on the anticipation that the share prices would continue to rise. Taken together, these results provide considerable material for theoretical models of asset bubbles.

JEL Classification Numbers: G11

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I. Introduction

At the heart of most behavioral explanations of the stock market crash at the end of the millennium are assumptions about investor beliefs and attitudes. While some empirical studies have analyzed information on investor decisions during this event, only a few have directly sought to analyze the underlying psychology and attitudes of investors active at that time. The objective of the current paper is to provide some new and different information about bubble investor beliefs, attitudes and actions, and to link this evidence to the prevailing behavioral theories regarding the event.

In 2002, we surveyed a sample of investors who were active over a thirteen month period at the peak of the bubble: from November 1999 through December 2000. We polled them about their current investing practices and their opinions with respect to the efficiency of the market. Our questionnaire included questions about the usefulness of past price trends, the value of expert advice, the likelihood of identifying undervalued securities and views on price reactions to news releases. In addition, we were able to ask specific questions about their purchase decision about one particular stock during the thirteen month period. We found that a large number of investors in the sample held beliefs contradictory to the basic implications of efficient market theory. In addition, consistent with psychological models of investor over-confidence, many of the respondents believe that they had some personal capacity to identify misvalued securities.

The information they use to identify misvaluation is particularly fascinating. First, past price trends figure prominently in their valuation. While there is widespread belief that “Chartism” has a strong following among individual investors, the results of the survey provide some specific detail about exactly how investors interpret past trends and which horizon is most

salient to them. Many respondents indicated that they rely on personal research, or the advice of brokers, to determine whether a security is over or under-valued. This framework is consistent with some individual investors forming an opinion of the true value of the security – an opinion that could motivate contrarian trading. Their actions and reported views about their investment decisions during the bubble period were consistent with their current views.

On average, investors in the sample believe that market prices tend to over-react to the release of news. This is particularly striking in light of the well-documented post-earning announcement drift phenomenon (cf. Bernard and Thomas, 1989), which suggests that prices under-react to earnings surprises. Trading motivated by belief in over-reaction would also imply contrarian behavior and may help explain some of the empirical evidence on contrarian trades by smaller investors during the bubble documented in previous research.

Finally, a number of investors reported beliefs and behavior consistent with the rational bubble literature. Some in our sample claimed to have believed that the stock they invested in during the bubble period was over-valued but invested in it anyway in anticipation of a further increases in price.

II. Background and Related Research

The boom in U.S. stock prices in the late 1990's is widely considered to be one of the biggest bubbles in financial history. Analogies have been drawn to the Dutch tulip craze of the 17th Century and to the boom in U.S. stocks in the 1920's. Economists trying to understand the pre-millennium boom and crash have largely focused on behavioral explanations. Robert Shiller (2000) for example, attributed the boom in technology stocks to widespread irrational

exuberance. Scheinkman and Xiong (2003) and Hong, Scheinkman and Wie (2004) show how overconfidence by some investors could have created the speculative bubble. Investor overconfidence figures prominently in the Sornette and Zhou (2003) explanation for the bubble and crash. De Grauwe and Grimaldi (2004) derive crash dynamics from the interaction of trend-followers vs. fundamental investors. An important feature of these and other bubble/crash models is that the actions of informed, rational arbitrageurs are insufficient to drive rising asset prices to their economic value. Indeed, the rational investor in a bubble may profit from buying shares known to be over-valued in anticipation of further gains. In this respect, these behavioral explanations for asset bubbles build on the insights of DeLong, Shleifer, Summers and Waldmann (1990) [DSSW] and Shleifer and Vishny (1997) [SV] who focus on the role played by noise traders in sustaining extended, temporary deviations of assets from fundamental values. The key insight of DSSW and SV might be summarized by the old Wall Street adage “don’t fight the tape.” In plain terms, it is risky for even the smartest investor to profit from contrarian investing unless he is very patient or his pockets are very deep. A bubble can be sustained some time by investor sentiment and feedback trading despite a widespread awareness that assets are mis-valued. When sentiment finally shifts, the result is a crash.¹

¹ Models with irrational investors are not the only explanations for bubbles. Following Blanchard (1979) there has been considerable analysis of the conditions sufficient to support rational models that support bubbles and crashes. See, for example, Leroy (2004), Grauwe and Grimaldi (2004), Walden (2004), Bernardo and Welch (2004). Lamont (2004) shows how Harrison and Kreps (1979) model of investor disagreement and short-sales constraints can generate bubble and crash dynamics. Cochrane (2002) suggests that a fetish for trading particular stocks will drive their price away from fundamental value. These and other theoretical analyses indicate that short-sales constraints, anticipated future liquidity needs, limited investor horizons and other institutional rigidities may play a role in bubbles and crashes. Spiegel (2004) points out that defining bubbles *ex post* is a hindsight bias.

Since 2000 there have been some interesting empirical tests of behavioral-based bubble theories. At least two papers analyze asset prices during this period. Ofek and Richardson (2003) survey a range of evidence from the bubble period and conclude that prices at the time did not reflect rational valuations. Lamont and Thaler (2003) find strong evidence of the violation of the law of one price during the tech boom. These and other papers documenting extreme valuations in the 1990's are important because deviations from economic value are the necessary conditions of an asset bubble. They thus implicitly reject the hypothesis that the high prices were based on reasonable economic forecasts of future returns.

No matter how compelling the evidence from price-based tests, it is important to seek cross-validation for behavioral stories by studying actual investor behavior. To this end, some recent studies of the bubble analyze individual investor accounts and trades. This is crucial because drawing inference about human behavior from prices in order to understand price dynamics is tautological. Thus, analysis of behavioral datasets provides a vital check that the hypothesized price effects are in fact related to actual investor decisions. For example, Kyrolainen and Perttunen (2003), studying individual accounts in Finland, are able to contrast the behavior of a great number of investors during the millennium bubble. They find that large, active investors were trend-followers in the period, while small active investors were contrarians. Brunnermeir and Nagle (2004) and Griffin, Harris and Topoglu (2003) use trading information by U.S. institutions and individuals to document evidence for positive feedback trading during the bubble by institutional investors who profited from, and possibly exacerbated the upward momentum in prices. In an interesting historical study, Temin and Voth (2004) use records from an active institutional trader during the South Seas Bubble of 1720 to demonstrate similar

profitable positive feedback trading by large investors. This evidence is consistent with models in which informed traders, in a bubble, decide that “the trend is their friend.”

On the other hand, these studies provide evidence against ordinary investors as noise traders or trend-chasers. In fact, one interpretation of the Griffin, Harris and Topoglu (2003) and Kyrolainen and Perttunen (2003) findings is that the contrarian behavior of smaller investors reflects a formulation of a specific value for a security. Based on this personal valuation, small investors are willing to sell on price rises and buy on price declines, with large and institutional investors presumably taking the other side of the trade.² Large and presumably better informed investors reap momentum trading profits, and are responsible for the resulting feed-back price dynamics. Other studies, using data from the 1990’s, have found that investor sentiment about the direction of the market is an important explanatory variable in asset returns.³ This may be driven by trading behavior by the individual investor sector. On the other hand, the story might actually be more complex. Goetzmann and Massa (2000), in a study of investor trades in index funds in the year 1998, find that momentum investors may be salient in one period while contrarians are salient in another.

Although studies of fund flows and trading accounts bring us a step closer to understanding investor activity during the millennium bubble, this kind of data still does not reveal the motivation for such activity. The decision rules for trade, particularly if these reasons are psychological heuristics, must be inferred indirectly from patterns of behavior. This presents

² This behavior is difficult to distinguish from a disposition effect in that it will cause investors to sell winners and buy (or hold on to) losers.

³ Goetzmann, Massa and Rouwenhorst (1999) and Brown, Goetzmann, Hiraki and Watanabe (2002) document evidence that flow-based sentiment variables may be priced in the U.S. and

a challenge to researchers interested in psychological-based explanations for the bubble and crash because direct verification of investor beliefs that motivated trade in this period would be an important validation of the indirect empirical evidence, as well as of the theory. In short, if crashes are the result of mass psychology, it might be useful to collect information about investor beliefs about trading.

A few studies have taken this latter approach. In particular, surveys have occasionally been used by academic researchers in financial economics to study investor behavior, their opinion and decision-making. Lewellen, Lease and Schlarbaum (1977) for example, analyzed 972 questionnaires sent to clients of a large brokerage firm to query them about their investment goals, behavior and beliefs – including their opinion on the predictability of stock returns. Baker, Hargrove and Saslem (1977) and Gooding (1975) likewise used mail questionnaires to survey investor attitudes towards risk and their perceptions of common stocks as investments. More recently, Robert Shiller (1990) sent survey questionnaires to investors to collect information about their views on the prospects for the stock market. Shiller (1997) used a mailed questionnaire to poll people about their understanding of inflation. Graham and Harvey (2001, 2002) and Graham, Harvey and Rajgopal (2005) employed questionnaires to study the decision-making processes of chief financial officers in corporations. Welch (2000 & 2001) used e-mail questionnaires to poll financial economists on their beliefs about the stock market before and after the crash – including their opinions on the efficiency of public securities market prices. Benartzi and Thaler (2001) polled investors by e-mail about their holdings in various asset classes and their investment strategies. The Yale School of Management Investor Confidence

Japan. More recently, Baker and Wurlger (2004) examine the power of sentiment variables to

indices show that 70% of market participants considered the market to be overvalued in early 2000, while 70% of respondents also believed the market would continue to advance.⁴

Two papers to focus explicitly on the psychology of bubble investors are Fisher and Statman (2002), who used the Gallup/PaineWebber surveys to ask whether there were widespread beliefs consistent with rational bubbles, and Vissing-Jorgensen's (2004) analysis of the UBS/Gallup index of investor optimism. Fisher and Statman document contemporaneous evidence that many investors thought the market at the time was over-valued, even as they professed a belief in increasing prices. Vissing-Jorgensen uses survey data regarding investor beliefs and behavior around the crash. The study includes demographic data, information about investor experience and information about internet stock holdings. Among other things, she also finds evidence consistent with a behavioral bubble -- investors believed the market was over-valued but still expected it to have a high return. She is also able to document direct behavioral evidence consistent with self-attribution bias. Finally, she is able to link beliefs to investor choice.

Although our work is related to some of the empirical work cited above, it differs in certain important ways. While the Gallup survey is extraordinarily valuable, in that it directly polls a set of investors who were active at the peak of the bubble about their reasons for trade, it does not cover the same ground as our survey, in that does not provide evidence on the kind of information that investors rely on as the basis for their security purchase decisions – particularly with respect to price trends, information events and investment advisors. In addition, the Gallup survey does not ask a set of explicit questions relating to beliefs in stock market efficiency.

explain return differences.

Thus, the evidence in the current paper should be viewed as complementary to the papers based on the Gallup database.

Beyond these differences, there are some key issues related to the differences in the sample. The advantage of the Gallup survey is that it polls investors in real time. The disadvantage is that there is no way to match these investors with actual decisions to buy a security. Our study addresses this issue by employing two distinct sets of questions. The first set of questions solicits the respondent's current views about their investment choice. They are not asked to think retrospectively about a past decision, but to provide their views on their current approach and behavior. The second set of questions is retrospective. These ask the subject about the basis for a specific investment decision during the bubble period. These two sets of questions provide complementary data about investment choice.

The remainder of the paper is organized as follows. The next section describes our methodology and data. Section III discusses the results. Section IV concludes.

II. Data Collection

II.1 Background

The opportunity to question these investors arose as a result of a legal case concerning one particular telecommunications firm. As the experts in the dispute, we were asked to design and conduct an empirical study on the issue of investor beliefs in efficiency. Although the study focused on the investors in one particular stock in a particular time period, we had complete freedom to design the sampling procedure, to develop the questions in the survey, to create the

⁴ We thank Owen Lamont for noting this.

mode of analysis, to oversee and monitor the data collection process, to draw our own conclusions and interpretations from the study, and to use the results of the study in our academic research.

III.2 Focus groups

The study began with a set of investor focus groups designed to learn about how people make decisions when it comes to investing in the stock market. The broad goal was to understand how people approach the stock market in general, including their goals in investing, the sources of information they use to help make decisions and how they choose specific stocks to buy. The further intention was to document the concepts that investors use in understanding market efficiency, including how they think about a stock's value, how they think about the price, and how they think about the impact of information on stock prices. Two investor focus groups were conducted in Stamford, Connecticut and two in San Jose, California by the market research firm Research International [RI], giving us some geographical variation in the types of investors we used. The primary reason for the focus groups was to make sure that the telephone questionnaire was complete and comprehensible to the average investor. Following the focus group studies, a questionnaire was developed for the telephone survey.

III.3 The telephone survey questionnaire

The telephone questionnaire was designed to gather information on how investors currently view the investment decision-making process, and then to record their recollections about the investment decision in a specific stock during the thirteen-month period. Thus, one part

of the survey collected information about the present, and one section collected information about recollections regarding a past decision. Questions in both sections focused on motives for investing, sources of information used in the investment process and views on the efficiency of the market price. Since one part pertains to memories about choices taken in that past, it is natural to ask whether the ensuing events of the crash, or even their answers to the current questions in the first part of the survey may have colored their memory and influenced their responses. It is important to consider these potential framing issues in the interpretation of the results. For example, it is entirely possible that the reasons an investor gives now for picking a stock were not the actual motives that governed his or her choice during the bubble period. Thus, the most conservative interpretation of our results is that we are collecting current investment views from people active during the peak of the bubble.

III.3.a Structure

The questionnaire is divided into three main parts. The first part is a set of screening questions to identify investors who purchased the stock of the telecommunications company during the time period November, 1999 to December, 2000. Its secondary purpose was to reject current or former employees of the company. This screening has the benefit of ruling out insiders who are potentially informed investors. The second part queries investors about stock purchases and beliefs about the market in general. The third part asks them specifically about their decision to purchase the firm's stock. The questionnaire took the general form of a series of multiple choice questions over the telephone, some of which required a single response and some of which allowed multiple responses. Some questions were specific follow-up queries

based upon a previous response. In order to discourage guessing, the surveyor asked people to respond with a “don’t know” if they did not have an answer to a question, and most questions included a “don’t know” option.

III.4 Sample selection issues

Since the original intent of the study was to question people who were likely to have made stock investments in one particular company in the period of interest, we decided to use a random sample of affluent individuals from a database of approximately 7 million people compiled by the research firm Target America. By focusing on affluent individuals, rather than randomly calling telephone numbers in the United States, the questionnaire was intended to reach people more likely to be stock investors. The Target America sample is constructed from publicly available information used to identify wealthy and philanthropically oriented individuals. Besides drawing randomly from the Target America database, the survey also drew randomly from a specific subset of individuals in the database that was judged to be more likely to invest in telecommunications stocks. This group was identified by cross-indexing the Target America database with subscription files for telecommunications periodicals. The hope was that this sub-group might provide a higher yield than the broader Target America database, although it also raised the question of whether they would broadly representative of the larger sample. To address this issue, Research International was instructed to sample 100 investors from each set, so that an evaluation of the response rate and comparison of the similarities in the responses of the two groups could be performed. This test suggested very little difference in either the response rate of the individuals in the Telecommunications sample or their answers to the

questions. As a result, Research International was instructed to continue sampling from the broader Target America database, and the analysis below is based upon the pooled sample.

A natural question is whether the sample might be somehow biased. In particular, would affluent or philanthropic individuals be less likely to believe in the efficiency of stock prices, or to rely upon certain kinds of information in their purchase decision? Might they be more prone to belief in their personal ability to find investment opportunities? On the other hand, more affluent individuals would be more likely to have learned about the efficient market hypothesis, either through university or business school education. Recent research (cf. Goetzmann and Kumar, 2001) suggests that education and affluence is associated with wiser investment behavior. Higher income individuals are more likely to be diversified across more stocks – a sign they may be comparatively sophisticated. Results in Dhar and Zhu (2005) also suggest that at least one major behavioral bias – the disposition effect – is less prevalent among people who work in white-collar jobs. Thus, if anything, we would expect evidence of irrationality to be attenuated in this sample.

A particular advantage of the sampling procedure used in the study is that it allows us to focus on individuals who were buying telecom stocks during the peak of the bubble. While these investors might not be broadly representative of the investing population at large, they are an ideal group to help us understand what motivated active investors during that period, since we explicitly screened on whether they were buying a telecom stock at the time. No other survey actually conditions on stock purchase behavior. If buyers of telecom stocks were significant contributors to the market dynamics of the time, our sampling strategy is likely to capture the views of this group at that time. A more cautious interpretation of our analysis, given potential

concerns about retrospective bias, is that we provide information about the current investment practice and beliefs of investors who were active buyers during the bubble. This is also useful evidence.

Research International was asked to conduct the survey in a manner consistent with the professional procedures and standards typically used by the firm for market research. The survey was double blind and callers were not explained the specifics of the case, nor any expectations about the outcome of the survey. Interviewers dialed telephone numbers from a random sample of the Target America database. They were monitored randomly by a supervisor, and the authors listened in on some of the calls to insure that they were conducted according to the agreement. Each respondent answered a standard, scripted questionnaire read by a telephone interviewer. Upon conclusion of the questionnaire, the responses were validated by an independent supervisor. Of the 156,319 telephone numbers directed to the project from the Target America database, 16,733 respondents met the criteria in the first part of the questionnaire to complete the interviews. Of these, 845 completed the entire survey. 204 of these completed surveys were drawn from the telecommunications sub-sample and 641 were drawn randomly from the broader Target America database. This sample size is not too different from the Gallup sample size of 1,000 respondents.⁵

IV. Analysis of the Questionnaire Results

The analysis focuses first on responses to the general questions about stock market investment, and then upon the responses specific to the telecommunications company stock

⁵ It is not known whether Gallup's response rate is higher or lower than that of our survey.

purchases. The general questions reveal current investor attitudes towards the stock market and the efficient market hypothesis. The stock-specific questions show whether these attitudes were pertinent to their decision to purchase a specific stock in the time period of interest, and what their particular beliefs and motivations might have been regarding that decision.

IV.1 General questions

We began by asking for reasons why investors buy individual stocks, and what factors were most relevant to their purchase decisions. The responses indicate that investors in the sample tended to purchase stocks for reasons of risk and return. Less frequently, investors admitted to buying stocks as a hobby, or because it was something they enjoyed doing, however the general picture is of a group that invests for rational, economic reasons. The two main sources of information employed for the stock selection were their own research and a professional recommendation.

IV.2 Questions about beliefs in an efficient market

According to theory, an efficiently priced stock cannot be expected to trade at a price different from its economic value. Question M-1 asks the investor directly for his opinion regarding the likelihood of such an event. The overwhelming majority of investors believe that it is at least somewhat likely that the price of an individual stock is higher or lower than its true value. Only about 13% +/- 2.5% believed that it was not too likely, or not at all likely that the price of an individual stock would be higher or lower than its true value. More than 40% +/- 3.3% believed it was very likely or extremely likely that the price of an individual stock could be

higher or lower than its true value.

Question M-2 follows up on beliefs about the potential to identify mispriced stocks by asking about the factors that investors rely upon in determining whether a stock is undervalued or overvalued. The most frequent response was the long-term trend in the stock price, with personal research and the opinion of a broker or financial advisor being the next two most frequent answers. Personal research and the trend of the stock price over the past three years were of roughly equal importance when respondents were asked in the next question, M-3, for the single most relevant factor they relied upon in determining whether the price of a stock differs from its intrinsic value.

IV.1.a Weak form market efficiency

The suggestion from questions M-2 and M-3 -- that long term price trends are useful to the investor in determining whether a stock is over or under priced -- is interesting in light of the theory of weak-form market efficiency. A weak-form efficient market is one in which past stock prices or trends cannot be used to identify over-valued or under-valued securities. Belief in the use of past relative stock price trends as useful inputs to identifying future security returns is a direct violation of this form of efficiency. Although inconsistent with the EMH, these responses are consistent with widely reported information in the financial press, which often includes 52-week highs/lows in security price charts.

Questions M-4 and M-5 ask specific questions to the 234 investors who indicated in question M-2 that they used the 52-week high or low as a value indicator. Question M-4, suggests that, of this group, more than half interpreted a stock trading close to its 52-week high

as evidence that it was either somewhat or very over-valued. Equivalently, in question M-5, many of the respondents, 131, interpreted the circumstance of a stock trading close to its 52-week low as evidence of it being somewhat or very under-valued. Taken together, these responses imply a contrarian strategy as opposed to a momentum strategy. Interestingly enough, momentum strategies based on 52-week trends have been shown to be profitable in empirical back-tests using U.S. and international data.⁶ Thus the prevalent beliefs in our sample run counter to known sources of investment profits, but consistent with the conceptual framework of contrarian investing.

The evidence at the three-year horizon is mixed. A steadily increasing three-year trend is taken by roughly half of the respondents as evidence of correct valuation, while a steady three-year decline is regarded most frequently as a sign of the stock being somewhat over-valued. Thus, a three-year drop signals the potential for continued decline, but a three-year rise does not appear to imply continued gains.

Questions M-6 and M-7 suggest that 3 to 6 month trends are interpreted in a variety of ways by investors. A short-term rise is most frequently regarded as a sign of fair valuation. A short-term drop is regarded as a sign of over-valuation by some and under-valuation by others. In general, the responses to questions about the usefulness of past price trends, both short and long, suggest that a significant number of investors in the sample regard trends as potentially important indicators of the relationship between price and value, although there is not a clear consensus with respect to what past trends might signify. The lack of consensus is itself of

⁶ Cf. Jegadeesh and Titman, (1993)

some interest, since it suggests that stock price dynamics themselves may stimulate trade. Few noise-trader models assume cohorts with contradictory interpretations of trends. The questionnaire results suggest such a model might make sense. This hypothesis of trend-conditional disagreement is potentially testable using volume and price data. Of related interest is the apparent contradiction between beliefs in long-term reversals and short term continuation. Short and long term trends might be framed by investors in different ways. On the other hand, this view of the market is not inconsistent with published versions of the Dow Theory, in which primary market trends are sustained for periods of a year or more, while secondary trends that depart from the primary movement last a few weeks or months.⁷

In sum, the evidence from questionnaire responses provides considerable support for beliefs inconsistent with the weak-form efficient market theory. Perhaps this is not surprising in light of recent financial research suggesting that momentum and contrarian trading at different time horizons may be profitable. Never-the-less, the interpretations of the price signals themselves are interesting in that they do not match known profitable filter rules, and, at least in the short horizon, they appear to indicate different and contradictory trading strategies.

IV.1.b Semi-strong market efficiency

A key implication of the efficient market theory is the inability to trade profitably on publicly available information. That is, if prices were efficient, an active portfolio manager relying on public information would not be able to identify under-valued or over-valued securities. A large proportion of investors indicated that they relied on their own research on a

⁷ See Brown, Goetzmann and Kumar (1998)

company's financial information in determining whether the price of a stock differs from its fundamental value. A follow up question M-8 asked these investors their opinion on how likely they were to identify stocks that are either undervalued or overvalued, based on their own research. The overwhelming majority of these investors, 300, answered either somewhat likely, very likely or extremely likely. This response is consistent with a subset of investors being confident – in all likelihood over-confident -- about their ability to pick stocks based upon public information. Given that overconfidence is a crucial element in a number of behavioral models of the crash, it is useful to document it in the direct responses of the investors who identified themselves as purchasing shares during the peak of the bubble.

The questionnaire posed the same type of question (M-9) to the 236 investors who answered in question M-2 that they relied upon the opinion of their broker or financial advisor to determine whether the price of a stock differs from its intrinsic value. The answers were qualitatively similar. They suggest an overwhelming belief that the broker or financial advisor is at least somewhat likely to identify overvalued or undervalued stocks. One common criticism of the financial industry during the bubble is that analyst reports were overly optimistic, and that this had the effect of stimulating investment. The investor responses are consistent with this theory. Together, the responses suggest that a number of people in the sample hold beliefs in apparent contradiction to semi-strong form market efficiency.

IV.1.c Response to release of public information

Another implication of the efficient market theory is that stock prices respond quickly and fairly to the release of value-relevant information. Financial economists have tested the

efficiency of markets by examining whether stock prices do, in fact, respond quickly to information events such as earnings announcements. They have also investigated whether such information events represent a fair response. Question M-10 put this question directly to the entire set of investors. It asked them to think in general about stock prices and how they change in response to the release of news and public announcements about the company. If investors believe in the efficient market theory and understand its implication about the reaction to public information, they should answer that the price of a stock tends to react about the right amount to information release. The most common response -- made by nearly half of the sample group -- was instead that stock prices tend to over-react a good deal to news releases and public announcements. Very few individual investors believed that prices under-reacted. Less than 10% of the sample answered that stock prices tend to react about the right amount. If we include the response "Don't know/it depends" as a contradictory response, more than 93% of the sample responded in a manner contrary to an important implication of the semi-strong form of the efficient market theory.

The tendency of individual beliefs about over-reaction is particularly interesting in light of the empirical evidence in the finance literature on security prices *under-reacting* to potentially value-relevant information such as earnings surprises. It suggests that it may be useful to explore whether beliefs in over-reaction by individual investors can lead to price under-reaction, or more generally whether widespread belief in over-reaction can lead to delayed price reaction to value-relevant information.

IV.1.d Belief in overvaluation and investing anyway

One characteristic of rational asset bubble theories is the conscious investment in over-valued assets in anticipation of further price rises. It has loosely been termed the “greater-fool” theory. This theory implies a belief in prices deviating from economic values and a belief that this gap can widen. A rational bubble is one in which investors understand that stock prices are too high to be justified by fundamentals but they expect to profit by purchasing stocks anyway. Do investors behave in this manner – or at least, do they tell us that they behave in this manner? To address this issue, we asked “How often have you purchased a stock that, at the time seemed over-valued, but you purchased it anyway because you thought that the price was likely to go even higher?”(Question M-11). Four hundred and fifty-nine respondents – more than half the sample – answered “Sometimes,” “Often” or “Very Often.” An affirmative answer to this question has two implications. The first is that the investor recognized that, at some time in the past, he or she believed a stock to be over-valued. As such, it deviated from a forward-looking expectation of its value formed at the time of investment. This can be interpreted as a belief in the violation of semi-strong market efficiency, provided the investor was not relying upon non-public information at the time.

The second implication of an affirmative answer is that the investor explicitly relied upon the continued *inefficiency* of the market price as the basis for a purchase decision. Not all of the sample admitted to speculating on the inefficiency of the market price of a stock. Indeed, roughly 13% of the respondents answered they never purchased a stock that, at the time, seemed over-valued. On the other hand, roughly 9% of the respondents answered that they had often done so. This provides some direct, empirical evidence in support of the rational bubble characterization

of the run up in stock prices in the late 1990's.

IV.2 Company-Specific Questions

Up to this point, our analysis has focused on general questions about the views and behavior of investors. Although we know this is a sample of investors who were active around the peak of the bubble, we have thus far not asked them to recall and discuss any detailed instances of investing. In this section, we ask them to answer questions about investment activities related to the purchase of a particular stock in a particular window of time. Although we have agreed not to disclose the name of the company that was the focus of the survey, it is important to describe a few key characteristics of the firm, since all the data collection was conditional upon the respondent's trading in the stock in a particular window of time. The value of this is two-fold. To the extent that the investors are able to correctly recall their views, actions and motives during that period, it provides some evidence on what active bubble investors were thinking. Alternatively, these views might be colored by the frame of the preceding questionnaire, and intervening historical events and interpretations, in which case they may be less useful as direct, timely evidence. However, even in this circumstance, investor responses about a particular stock purchase can be compared and contrasted to their general stated investment views and behavior.

Some background on the company is useful. The firm is a telecommunications company listed on the NYSE. Its stock price history is shown in Figure 1, together with the S&P and NASDAQ indices. As the figure shows, the price was relatively volatile over the period from 1998 through 2004 – rising more than the indices through 1999, but falling more than the indices

from 2000 to 2003. In the window from 11/1999 to 12/2000 the firm’s price drifted up with the market in the first few months and then dropped dramatically with the fall in the indices. The rise in the late 1990’s presumably would have attracted the attention of momentum traders. The telecommunications industry as a whole participated in the “tech” boom. Thus it is possible – perhaps even likely – that momentum investors are over-represented in our sample. In addition, by focusing on people who made a purchase of an individual stock as opposed to investing in a diversified portfolio or index funds, we are more likely to pick up individuals who are less prone to belief in efficient markets. As a result, we cannot infer a lot about the broader population base rates with respect to investor beliefs. On the other hand, noise traders are interesting to economists precisely because they are actively trading. Thus, conditioning upon investing in a single stock – particularly a telecom stock during the peak of the bubble allows us to focus specifically on the traits of a group of economic interest.

Of the 845 investors in the sample who purchased shares in the specific company at some time in the sample period, more than 300 indicated they had purchased the stock more than once. For multiple purchasers, we only asked questions about their first and second purchases. This provided an opportunity to examine the first and second purchase decisions separately. The questions in this section followed the format of the general questions put to the respondent regarding their reasons for investing, the sources of information they relied upon in their decision and their views on the relative valuation of the firm’s stock price at the time of purchase.

Question C-1 asks for reasons that were important in the first decision to purchase the stock. As before, the questions were read in randomized order so as to reduce bias towards the beginning or the end of the list, and investors could respond affirmatively to more than one of the

categories. As before, a “don’t know” category was also included. The two most frequent reasons given were, first, that the company was a leader in its industry, and second, that the industry to which the firm belongs was expecting strong growth or profits. One hundred and seventy-one investors, roughly 20%, answered affirmatively to the response, “The stock was selling at a price that corresponded to its true value.” 411 investors out of 845 included either “broker/advisor” or “friend” or “true value.” Thus, the efficiency of the market price was evidently a factor in the purchase decision of some of the respondents. This fraction was slightly lower in question C-1a, which asked for reasons important to the second decision to purchase the stock. The efficiency of the market price for the firm specifically appeared to be less relevant to the respondents’ purchase decision than to their purchase decisions regarding stocks in general. The proportion of people who indicated in two responses that the efficiency of the market price was among the important factors for them was 40%, while the proportion who listed this characteristic for their purchase decision was a bit more than 20%. A natural interpretation of this difference is that, while market efficiency is among the important factors that affect investor purchase decisions in general, it was less relevant to their decision to purchase shares in this particular firm.

Question C-2 asks for the single most important reason for first purchasing the stock in the sample period. Fifty-five respondents, or about 7%, indicated that “The stock was selling at a price that corresponded to its true value.” Thus, some fraction of the investors queried consciously regarded the efficiency of the stock price as the most important variable in their decision, while a slightly larger fraction, 20% regarded it as among the important factors in the decision. However, a large fraction of investors did not indicate that the correspondence

between price and true value was an important factor in their purchase decision.

Question C-3 and C-3a ask about investor beliefs at the time of the first and second purchases. One important caveat to the interpretation of these answers is that hindsight is 20/20. We are not soliciting their views at the time of purchase, but rather asking them to recall their views more than a year later. In that year, the share price of the stock dropped. In question C-3, roughly 5% indicated they did not know (or did not remember) whether the company's shares were misvalued at the time of purchase. The remaining 95% of investors were split on the issue of their valuation beliefs at the time of first purchase. Thirty-two percent answered that they believed the firm to be either somewhat or very undervalued at the time of first purchase. Forty percent said they believed the firm to be valued about the right amount at the time of first purchase. Twenty-three percent indicated that, when they first purchased the shares in the sample period, they believed the stock to be somewhat or very over-valued. In the responses to the question regarding the second purchase of the shares, the fractions differed somewhat. Forty-five percent indicated they believed the firm to be somewhat or very under-valued, 27% said they believed the firm to have been valued about the right amount, and 21% said they believed the firm was somewhat or very over-valued at the time of their second purchase.

Questions C-4, C-4a, C-5 and C-5a all follow up with investors who responded in Question C-3 that, at the time of purchase, they believed the firm to be somewhat or very undervalued. Responses to questions C-4 and C-4a suggest that purchasers relied upon personal research on the company as well as upon price trends in the determination of under-valuation. First purchases tended to be based more on personal research and the long-term trend in prices, while second purchases tended to be based more on short-term trends. It is of potential interest

that these differences may be due to the fact that investors who made multiple purchases are more likely to be more active or speculative investors, however we did not investigate this possibility in further detail. When asked to identify the single most important factor used to determine that the firm's stock was under-valued at the time of purchase (question C-5), the first-purchase respondents gave personal research as the top reason, while second purchases gave the short-term trend in the stock price.

Questions C-6, C-6a, C-7 and C-7a were put to investors who answered in question C-3 that they believed at the time of purchase that the stock was over-valued. Regardless of whether it was a first or a second purchase decision, the investor's own research was the most frequently cited basis for their assessment of relative value. The message from these investors seems to be that their own analysis of the fundamentals suggested that its price was too high, however they purchased the stock anyway. Question C-8 asked why they did that. Not surprisingly, the vast majority of respondents to this question said they bought shares because they expected the price to continue to go higher. Twenty-three respondents to question C-8 gave the alternative explanation that they did it for purposes of diversification, and 11 indicated "Other" or "Don't Know/No Answer." Likewise there were a few diversification or "other" answers in question C-8a.

The evidence in C-3 through C-8 taken together suggests that the majority the purchasers of the stock in the sample period (54%) reported that they believed the stock price differed from its fundamental value when they purchased it. The reasons for such beliefs are also instructive. Those who believed the firm was undervalued relied on a range of inputs, both technical and fundamental. They presumably bought on the expectation of the price eventually returning to

true value through market forces, or alternatively that the long-term return to holding the stock would more than compensate them for their investment. It is more difficult to understand the purchase motives of those who bought the stock while believing that it was over-valued, except in the context of a rational bubble, i.e. one in which at least some investors believe that prices exceed economic value, but they never-the-less expect to profit on the continued widening of this gap. In fact, in question C-9, we directly ask investor views on whether the recent peak in telecom share prices was a bubble. The question defines a bubble “...as a time when stock prices are considerably above their true values.” Nearly half responded that it was “definitely” a bubble. On the other hand, consistent with a belief that prices cannot significantly deviate from consensus values, a little more than 5% responded that it was definitely not a bubble.

Despite finding a small group that appeared to be trading on expected positive momentum, the most striking is that 72% said they bought the stock because they thought it was either undervalued or valued about right. This is particularly interesting in light of their own interpretation of the period as a bubble, and the widespread media discussion of the period as a bubble in asset prices. A surprisingly small percentage justified their purchase by claiming to have “known” the stock was over-valued at the time. A large proportion recall that they based their purchases upon personal research into fundamental values, as well as reliance upon trends. This was generally consistent with their responses in the previous section. This evidence thus strongly re-enforces the interpretation of active retail investors as “fundamentalists” in the sense of believing in the power of personal research. This is a violation of efficient market theory in a particular direction – towards over-confidence and self attribution, even when confronted with the ex-post historical evidence that their choice turned out to be (mostly) a losing proposition.

VIII. Conclusions

During the 1990's there was considerable speculation about a "new economy" in which assets could not be evaluated using old economy methods. Stocks were routinely valued in terms of multiples of sales or other measures of business activity as opposed to traditional earnings multiples adjusted for expected growth. Investors who subscribed to "new economy" asset valuations may very well have based their opinion of telecom stocks on their own research and the research of analysts touting the "New Economy." The widespread shift in demand for stocks during the bubble period might not be viewed by participating investors as irrational – either at the time or in hindsight. They may have formulated opinions on the economic value of stocks by researching public information and used these opinions as a guide to purchase and sales decisions – even if these prices in hindsight and in the contemporaneous views of some wise investors were far beyond economic value. The evidence in the survey described in this paper suggests that at least one large sample of investors believed their valuations were grounded in fundamental research and they used this to justify purchases of shares in one telecom stock at the peak of the bubble.

What does this tell us about models proposed to explain the bubble? First, the foundations of sentiment about the market may be based upon a belief in the value of personal research. What might appear to be irrational exuberance might not seem irrational at all to participants, but instead justified by the personal effort invested in the decision to buy. Paradoxically, this reliance upon personal effort – or the advice of trusted experts -- might serve to exacerbate misvaluations by making it difficult for investors to reverse their views on security

values in light of new information.⁸

More generally, our analysis of a large survey of investors who purchased the shares of one telecommunications company stock during the period November 1999 to December 2000 provides some interesting insights into current and past investor beliefs and behavior. Responses to the questionnaire suggest that many investors understood the concept of market efficiency the way it is commonly expressed, and in the way financial economists generally interpret the term. A significant percentage of the respondents regarded the efficiency of the market price as an important factor in their purchase decision. By the same token, a significant number of investors did not list the efficiency of the market price among the relevant factors influencing their decision to purchase stocks in general and one firm's stock in particular.

The questionnaire asked more detailed questions regarding the fundamental implications of a belief in market efficiency. Investor responses to these questions document a range of opinion regarding the likelihood that each of the nested forms of market efficiency may be violated. The results suggest that telecom stock investors who were active in 1999 and early 2000 believe it is possible to use past price trends to pick undervalued or overvalued stocks. This is a clear violation of weak form efficient market theory. A significant proportion of these investors believe that they, or their advisors, are likely to be able to identify overvalued or undervalued stocks. This is a violation of the semi-strong form of the efficient market theory. The common belief among respondents in the survey that the market price under or over-reacts to the public release of information is also a violation of an important implication of the semi-

⁸ An older literature on the consumer psychology may be germane. Cognitive dissonance is a theory of psychic "cost" induced by information contradictory to the grounds for a previous purchase decision. See, for example Goetzmann and Peles (1997).

strong form of the efficient market theory. Taken together, these results suggest that a large proportion of investors in the sample do not believe in the efficient market theory as commonly understood.

When asked about one firm specifically, only a minority of investors responded to questions in a manner consistent with belief in the efficient market theory. When asked about their beliefs at the time of purchase, for example, only a minority of respondents thought the stock was valued the right amount. When asked about the important factors in their purchase decisions, only a modest proportion – less than 25% – appeared to regard the efficiency of market price as a relevant factor. This is a lower proportion than those who answered affirmatively when this same question was put to them about their stock purchases in general. While many investors recalled regarding the firm as undervalued at the time of the purchase decision, a surprising number also recall believing at the time that the company was somewhat or very overvalued. Why then, did they purchase it? Most answered that they expected the stock to go even higher. In short, a number of investors in the sample believed that the market price was inefficient, and speculated on the inefficiency increasing, rather than decreasing.

These results provide some direct information regarding the mindset of investors at the peak of the Internet boom, albeit through a detailed exercise in hindsight. Most surprising in the results is the extent to which investors willingly admitted to buying overvalued stocks on the expectation that their prices would continue to rise. We cannot determine directly whether they really believed at the time that the stocks were overvalued but the sample period followed the publication of Robert Shiller's *Irrational Exuberance* which famously forecast the crash. Thus, public skepticism about the economic values of shares was not muted at the time. Interestingly,

the general response of the sample of investors to past price trends and information shocks was, if anything, contrarian.

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Figure 1.



