
EDITORIAL COMMENTARY

The Real Year 2000 Problem: Investor Psychology

With the approaching Millennium, financial markets contemplated the possibility of a large-scale computer program glitch that became known as the Year 2000 problem. Ironically, there was no significant problem with the technology, but a short circuit occurred with the shares of many Internet related technology shares. Investor psychology shifted from strong enthusiasm at the beginning of the year to panic and, then, disenchantment toward the end. The crowd psychology that moved prices beyond even the most optimistic estimates for earnings or even revenues in the early part of the year worked in the opposite direction for much of the remainder of the 2000. As we moved further into the year, the sky-high valuations of many of these shares began their relentless descent. The V-word (for value) emerged after a long absence.

The extraordinarily high prices and total market capitalization during the late 1990's for these shares exceeded even the most sanguine estimates of future earnings. Many of the new high-tech companies had never shown a single year of positive earnings. During 1998 the absence of earnings led to an emphasis in good revenue growth. By 1999 even this criterion became too restrictive for the general investor as companies soared prior to any significant revenues. Paradoxically, this was especially true of Internet-based retailers, or e-tailers, which would undoubtedly face tremendous competition from almost any company that was willing to invest a modest amount into setting up a Web site. Public companies such as Etoys and Irvillage rapidly rose to a market capitalization that rivaled some of America's largest established retailers, many of whom also had similar Web sites in addition to bricks and mortar stores. The crowd psychology and over-reaction to new ideas completely overwhelmed any realistic forecasts. As in previous bubbles, such as the South Sea Bubble, social psychology played an important role in terms of defining a new group of people who believed they had found a new frontier in attaining self-sufficiency and beyond.

Moreover, technology companies that possessed an intriguing idea but no real revenue also rose to dizzying heights. In years past, investors would attribute some value to an idea, but not one that would assume a lock on a significant fraction of a market that was yet to materialize.

Over-valuation and over-enthusiasm was at an extreme for many technology-related initial public offerings (IPO's). Most extraordinary among these was VA Linux, a company that markets an operating system for networks. Late in 1999, the IPO was originally priced in the teens and upgraded to about \$30 shortly before it was launched. An analyst noting the potential market and growth for this software took the unprecedented step of placing a five-year target price of \$300 for the stock even before the first share was traded. This widely publicized price target in a frothy IPO market led to an opening price of about \$300 for the stock. After a year of trading, the stock was near \$10, somewhat below the initial projections for the IPO price.

Underlying this example is the theoretical issue of why stocks should rise in price (beyond adjustment for interest rate returns) if we can calculate the expectation value with a set of probabilities. Perhaps, some would assert, this is a more modern, scientific and efficient way of gauging true valuation. If the outcome of an idea and marketing plan could be predicted to have such tremendous economic consequences, then why not pay close to that price at the outset?

This is a question that can be asked within a more abstract setting of a laboratory asset market. Suppose, for example, that an asset will have a payout at the end of 10 trading periods, and that the participants are told that the "earnings," or change in the expected payout will change each period. Suppose the traders were to know what the expected payouts will be during these 10 periods; for example, that there would be 50–50 chance for a 30% increase or a 5% decrease. Then the traders could calculate, at the outset, a valuation that would be constant for the entire experiment, since all changes have already been incorporated into the expected payout. Thus one might argue that the rising of share prices as a company matures are perhaps unnecessary, and the ultimate valuation could be priced at the first trade of an initial public offering.

One reasonable answer to this paradox is that we do not know the probabilities (such as a 50–50 chance of 30% increase or 5% decrease) at the outset; the investors merely deduce them in time. For example, we do not really know the potential profit to be made on a particular computer operating system. As the years go by we can acquire a better idea of those probabilities,

which in turn, will allow us to recalculate an expected value of the shares. This concept may be regarded as ambiguity rather than risk. The latter is usually assumed to have a well-defined probability distribution. The concept of ambiguity might be described in a mathematical or experimental setting by means of an urn from which different color balls are to be drawn. Each color represents a percentage change in valuation, but we do not know the initial distribution of the colors. We merely make conjectures as we see the draws. After many such draws we may feel that we have a good idea about the approximate chances for each color, at least for the next few draws. At this point the ambiguity is transformed into a probabilistic expectation value, but only if we know for a fact that new balls are not added to the urn in the meantime. In the world we live in, there are always new factors to be added, so that the ambiguity is always present, and more so in the newest markets and companies.

There are many factors involved in the spectacular rise and fall of perhaps the world's greatest bubble to date. For many established companies that traded at triple digit price/earnings ratios, the valuations were not very different from the most recent bubble in the Japanese stock market that ended in 1990, or some components of the US market in the 1960's.

The full magnitude of this most recent bubble, however, was exhibited in the companies that were public for a relatively short time and valuations were exaggerated even by the lofty standards of the late 1990's. The level of public participation, media attention and advertising appears to be greater than any other stock market bubble. With the arrival of Internet trading and nonstop business news, the public was able to take part as never before.

The extent of over-valuation is difficult to assess in this recent bubble, since there was considerable variation among the different companies. At one extreme, numerous companies with market capitalization in excess of \$1 billion witnessed declines of 99% or more without significant change in their business activity. For stocks in this category, the high-tech bubble dwarfs many of the legendary bubbles in which assets lost 90% to 95% of their value within a comparable time frame.

Some basic questions come to mind immediately. Was the nature of the bubble known to those who were underwriting it? The IPO market appeared to add fuel to the flames as each week featured a new set of IPO's that rose spectacularly. For many technology issues the IPO was often oversubscribed and a large number of buyers waited to buy the shares at the first opportunity. Retail investors lucky enough to obtain an allotment of the IPO were usually restricted from selling for a month lest they be banned from future IPO's. Short selling is not usually possible until the fourth day after the pricing. Without selling on the part of many retail

investors, the institutions had a considerable degree of control on the price during the initial days. For investment houses that were able to pick the most appealing ideas and arouse public eagerness to buy them, the business was lucrative. Prices rose to ludicrous proportions as analysts were defending more and more surrealist methodology. Early in 2001, analysts found themselves downgrading, for the first time, some of these IPO's when they had fallen to a fraction of the IPO price and a small percentage of the all-time high price.

The media attention on the IPO's served to entice a public with stories of 100%, 400% and even a 1000% profit in a single day. Much attention was focused on fairly inexperienced people, e.g. the CEO of the new company, acquiring (at least on paper) a net worth of hundreds of millions or even billions prior to making a dollar of profit for the company.

Despite sensational appearances, the media cannot be blamed for the frenzy that surrounded the investment world. In most cases, they reported the news accurately, and in a timely manner as the technology of cable and Internet made possible. When an IPO increases by 1000% in its first day, turning a few people of modest means into instant billionaires, it would be difficult to report the story accurately without the sensational impact. In fact, much of the media was rather conservative and cautious in its approach to these phenomena. The Wall Street Journal and its sister publication, Barron's, repeatedly warned of the surreal atmosphere surrounding the rise in these prices. Often, readers responded in letters by saying the paper was being old-fashioned and incapable of understanding the New Economy. Unlike the Old Economy these New Economy companies could develop at a much faster rate in cyberspace, their advocates said. And there was some truth in this. For example, the time interval between the first and one-millionth customer for Sears is surely much longer than the corresponding interval for Amazon. Of course this ratio does not immediately translate into profits since the development of a rapid customer base is also possible for the competition and pricing of goods must account for that fact. As many of the news articles stated, it is possible that the main economic beneficiaries of the New Economy technology could be the consumers.

Unfortunately, the roles of some of the Internet trading brokerage firms were not nearly as responsible. The years prior to 2000 featured a collection of e-trading commercials that could be viewed as hilarious by the seasoned professional and convincing by the novice trader. A typical commercial began by showing a teen-age boy or an elderly woman who appear to be very ordinary, and are treated as such. In the next scene, the other characters, and no doubt the viewers, are surprised to find out that this person is being thanked for bailing out a country, for example. The

strong suggestion is that anyone who has a modest savings account can acquire a fortune, and be treated accordingly, if only they start trading on the Internet. For any skeptical viewers having their doubts, a resumption of the news, particularly the business news cable stations, would often turn to factual stories of the day's new IPO billionaires.

Throughout this meteoric rise of the Internet related technology stocks, the group of people known as analysts had an interesting and difficult role. They are asked to assess the future earnings, revenues, etc., and estimate a price that is likely to be paid in the future. Their job was highly complicated during the late 1990's for several reasons. One is that someone sticking to any reasonable business measures would simply be asserting that these stocks are too richly valued, and therefore, should be sold. As prices soared beyond these levels, however, it places the analyst in the tenuous position of recommending holding no stocks in his group. An analyst restrained by realistic forecasts is also subject to peer pressure as prices catapult beyond these levels. Social psychologists have long addressed questions related to the pressures on an individual making an assessment of, say, \$10, when everyone else is making assessments ranging between \$100 and \$200. Another reason is that an analyst who is part of a large investment company is aware that his parent company stands to make a tremendous profit from underwriting and other activity. Thus any effort to restrain the price to a realistic value is detrimental to the analyst's parent company and also leaves the analyst behind as prices vault beyond valuation.

Consequently, analysts sought more creative ways to estimate target prices. With near unanimity among analysts who are presented to the public as experts, the psychological hurdle is daunting for the individual or institutional investor who attempts to seek a more realistic view.

As some recent research has shown in the laboratory, momentum is a key factor in bubbles. A self-feeding mechanism is established as rising prices lead to more buying which raises prices. A tempering influence to momentum is trading based upon fundamental value. As analysts de-emphasize fundamental value, and new investors are mesmerized by prices, while insufficiently equipped to gauge value. The advertisements only served to further redirect new investors toward looking at price changes and ignoring fundamentals.

All of this could not be possible without a huge amount of excess cash, sometimes called liquidity, available to enter the market and push prices higher. Demographic factors, together with a booming economy and low interest rates, ensured a steady flow of additional cash into the market. The baby boomers that had previously swelled the ranks of college students in the late 1960's, increased the demand for consumer

goods and energy in the 1970's, and pushed up housing prices in the 1980's, were now in their prime earning years and putting more money to work in terms of savings and retirement. As parts of this money flowed into the equity markets, some asserted that this might continue for many more years until the baby boomers reached retirement. Of course, in the marketplace any large demand has the potential to be met by a large supply, in this case the huge supply of IPO shares as well as secondary offerings.

During this bubble, the excess cash provided by the demographics was enhanced by a wider participation of the general public than in previous eras. The lower commissions available for small accounts through Internet trading, the wider hours for trading, the rapid access to information through high tech communication all contributed to this wider participation. Of course, the nature of the advertising and the media attention served to enhance the self-feeding spiral.

One way to begin addressing the question of how this bubble evolved is to find the beneficiaries and victims. As the advertisements told of riches for the novice trader, while charging only \$5 or \$10 trading commissions, the novice trader was usually unaware of the additional cost in terms of the bid-ask spread. For a volatile, non-listed stock, the bid-ask spread would generally amount to a fairly substantial cost for frequent traders. For many novice frequent traders, the total paid in such costs would ultimately far exceed their profit if any. For many of the newly public companies, the underwriting fees plus the possibilities of selling some of the shares held during the days following the launching of an IPO, provided a lucrative business for many of the large investment houses. The losses were often borne by the retail investors that believed the hype by the analysts, and had confidence in the name of the investment house.

The marketplace will always have a spectrum of participants from the most highly informed to the least informed. The Efficient Market Hypothesis (EMH) depends upon a mechanism of arbitrage that is an idealization that assumes the existence of many different agents with diverse interests. When the participants belong to one of a few distinct groups each with its own interests, the basic assumption is far from valid.

The causes of a bubble are closely related to its bursting. The momentum that raises prices works in reverse on the way down. Various studies have demonstrated that open-end funds that terminate new cash inflows in order to limit their assets often do not perform as well subsequently. This suggests that the inflow of new cash, with which the manager buys more of the stocks he owns, leads to pushing up of share prices. At least one does not need to do large scale selling that pushes down prices. Once the cash flows are directed outward, the situation is exactly the opposite. The mutual fund must necessarily sell some of their positions, thereby lower-

ing the prices of the shares they own, leading to more redemptions by investors in a vicious cycle.

Like the legendary South Sea Bubble, the Internet bubble was sparked by a new frontier. The South Sea Bubble stimulated the imagination about the riches to be discovered in the New World. Just how these riches were to be translated into profits for shareholders was yet to be determined. Similarly, the Internet technology will surely dominate a significant portion of the economy, but will not profit the shareholders of hundreds of companies seeking to capitalize on it. The social psychology aspect was very similar in terms of defining a new group of people with the spirit of pioneers, seeking to attain self-sufficiency and beyond with this exciting new frontier. The marketing of the retail brokerage industry appeared to understand thoroughly the appeal of this psychological perspective.

Inevitably, one wonders about the timing of the market peak. The same segments of the market had been overvalued in 1999 and earlier. What were the factors in the first quarter of 2000 that finally resulted in a downturn? Lowered earnings expectations and a background of higher interest rates were the most fundamental changes that the year 2000 ushered in. Many speculative bubbles had ended with a calendar year as investors with large gains hoped to postpone the capital gains tax. The high tech market may have been in a similar situation in late 1999 as well. However, early in 2000, value-based investors faced another challenge when the AOL merger with Time-Warner was announced. The fact that the lofty AOL share price would be exchanged for the more conservatively valued Time-Warner meant that a group of experienced businessmen, not novice traders, were valuing AOL's stock at these prices. Perhaps this re-evaluation that spilled over to other stocks served to prolong an overextended market that was already to topple. Many of the stocks in the Japanese high tech market were even more fanciful in terms of valuation. At the end of the first quarter of 2000 cash flow problems were threatening some of these companies. The pro-business prime minister also suffered incapacitating health problems that prompted further selling in Japan. On the same day in the US, the talks between Microsoft and the Federal government

broke down, surprising many who had assumed that there would be some amicable settlement of the lawsuit that many in the high-tech industry watched apprehensively. While unfortunate news and setbacks are to be expected in business, the shares of many of these companies were priced to perfection, and left little room for error and the randomness of the marketplace.

Perhaps the bubble could have been punctured at any time by the announcement of a large-scale failure in the Internet related business. It turned out that such a clear, visible signal was not needed. In the early spring of 2000, Barron's published a list of companies along with the number of months they could survive in terms of cash flow. Although many skeptical articles had been published in Barron's, this was very precise in setting a finite time horizon, in some cases, weeks, before the companies would be incapable of functioning, and presumably seek bankruptcy protection. Several investment houses also seemed to have a change of heart shortly after this time. As the selling started, much like the corrections that had occurred in previous years, some large hedge funds were forced to liquidate significant blocks of shares. During many market debacles, there is a point where the value-based investors will buy at a particular point irrespective of the prospect of further decline. In this case, however, the fundamental value, as assessed by these investors, was so much lower than the prevailing prices, that for all practical purposes, there were no buyers. The free fall had started.

In the years to come, scholars will undoubtedly study the causes for the bubble and the factors that made it so extreme in some aspects. *The Journal of Psychology and Financial Markets* enters its second year during these provocative times in finance. From a scientific perspective, the events of 2000 provide a rich data set that will challenge theorists in economics, finance, psychology and other disciplines. Accordingly, we plan to feature works that study the various aspects of the remarkable market phenomena we have witnessed during the past few years.

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