Is It Possible to Identify "Bubbles"? Can Investors Profit from This?

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by Michael Edesess

How is it possible that stock market bubbles are so obvious after they burst, but are almost never identified in advance – except by what seem, after the fact, to have been a highly perspicacious few? A new study found that there is a way to tell before it bursts that the market, or a segment thereof, is in a bubble. But profiting from an investment strategy designed to exploit bubbles is incredibly difficult.

Take, for example, the tech bubble of 1998-2000. In the 14 months from October 1998 to March 2000, the tech-heavy NASDAQ (as it was typically labelled) climbed 170%. Then, from April to December 2000, it fell 46%. Tech stocks[1], which comprised 18% of total market capitalization at the beginning of the period, rose 128.2% in aggregate then fell 44.6%.

This is a longstanding conundrum that has elicited a variety of stock responses. The broad conventional wisdom is "You can't time the market." This forces practitioners of market timing to disguise their strategies under such banners as "tactical asset allocation" or "mean-reversion."

When is a bubble not a bubble?

Eugene Fama, creator of the concept of three forms of market efficiency, believes that market bubbles don't exist. In a recent paper by Harvard economists Robin Greenwood, Andrei Shleifer and Yang You, "Bubbles for Fama," they say that Fama's argument is, in essence, "that if one looks at stocks or portfolios that have gone up a lot in price, then going forward, returns on average are not unusually low."

The authors do cite persuasive anecdotal evidence for why Fama would hold his counterintuitive belief. The tech stock experience of 1998-2000 is remembered as a clear-cut case of a bubble because it crashed. But some bubbles keep on bubbling. Greenwood et al. point out that health-sector stocks rose more than 100% from April 1976 to April 1978. But because there was no subsequent crash nobody remembers this as a bubble. These stocks kept going up by more than 65% on average over the next three years and didn't experience a slump until 1981.

Fama himself challenged the bubble predictions of Robert Shiller, a frequent Fama adversary and one of the perspicacious few credited with having identified the tech bubble in advance. The following is from Fama's 2013 Nobel Prize lecture:

On the website for his book, *Irrational Exuberance*, Shiller says that at a December 3, 1996 lunch, he warned Fed chairman Alan Greenspan that the level of stock prices was irrationally high. Greenspan's famous "Irrational Exuberance" speech followed two days later. How good was Shiller's forecast? On December 3, 1996 the CRSP index of U.S. stock market wealth stood at 1,518. It more than doubled to 3,191 on September 1, 2000, and then fell. This is the basis for the inference that the original bubble prediction was correct. At its low on March 11, 2003, however, the index, at 1,739, was about 15% above 1518, its value on the initial "bubble" forecast date.

Is there a way to measure whether there really are predictable bubbles?

The Shiller experience shows how difficult it can be to identify a bubble and predict its crash; timing is everything. If you identify a bubble and it bursts 10 years later, it's not going to count.

Greenwood et al. tried to design a research project to measure whether bubbles, and their demise, can be identified in advance. In doing so, they deployed the commonly-used CRSP database of monthly stock returns since 1926, and SIC industry codes to classify the stocks into industry groups. For international returns they used the Compustat Xpressfeed database and GICS industry sector codes.

The care they took with their methodology should be well-noted:

In analyzing this evidence we have followed particularly simple methodologies. We have not tried to search the data to find ex post optimal screens or combinations of variables to predict returns. … We have not sought to identify dynamic strategies of optimal exit from the industry, but focused on simply exiting after a run-up.

In short, they used simple definitions and did not commit the statistical error of overanalyzing the data. They are very clear about the limitations of their sample size, the possibilities for alternative interpretations of their results, and the reasons why they may not be useful going forward.

Nevertheless, given the severe limitations of statistical analysis of chaotic data – a feature not, as a rule, sufficiently acknowledged in the financial literature – their results are of some interest.

They define the run-up to a potential bubble quite simply: return to an industry group greater than 100% over a two-year period. They identify 40 such incidents in the U.S. stock market since 1926.

They then define a crash of a bubble: more than a 40% drop over the subsequent two-year period.

Bubbles and crashes could, of course, be defined in any number of other ways. But that opens up a Pandora's box of possible ways to define them, tempting the researcher into a self-defeating data-mining exercise. Better to keep it simple, even though this seem too simple to a "sophisticated" researcher.

Having defined run-ups and crashes in this simple manner, what do they find?

Fama's claim is correct but nowhere near enough

Greenwood et al. found that of the 40 incidents of greater than a 100% run-up, 21 subsequently crashed while 19 did not.

However, they find that indeed, if the measure of a bubble is whether the *average value* of returns after the run-up was lower than when there was no such run-up, then there's no evidence that bubbles exist. They find that for the one-year and two-year periods after those 100%+ run-up events, the average returns were not significantly different from the average returns in any other one-year and two-year periods. (In fact, they found that the average in the subsequent one-year period was 7%, and in the subsequent two-year period it was 0%. Both of these, while lower than the long-term stock market average, were, presumably, not significantly lower than the corresponding overall average one- and two-year period returns.) Thus, the argument they attribute to Fama is strictly correct.

However, they then ask another question. Was the probability of a crash (a more than 40% drop) in the next two years higher after a 100%+ run-up than it was in any other two-year period? With 21 of 40 crashing in the subsequent two years, the crash probability was more than 50%, as compared to a probability of only 14% in a randomly-selected two-year period since 1928 (11% since 1970). Thus, in this data, a 100%+ run-up does predict a heightened probability of a subsequent crash.

But what about the semi-strong efficient market theory?

The authors note that while Fama created the categorization of three forms of the efficient market theory – weak, semi-strong and strong – he rejects bubbles only within the framework of weak efficient market theory.

Weak efficient market theory says that price history will not help you to predict the next price move, even with a probability. Mathematicians call this the "Markov property" – the past history of transitions tells you nothing about the probability of the next transition. (There is a fundamental exception to this statement: to be able to assess the probability of the next price move at all, you need to know the parameters of the probability distribution; these parameters are usually estimated based in part on the whole history of price moves.)

Semi-strong efficient market theory says that it is not only the history of past price moves that is useless in predicting the next price move, it is in fact all publicly available information that is useless.

But Fama does not couch his rejection of the possibility of detecting bubbles in terms of all publicly available information; only in terms of past price moves such as run-ups in price.

Greenwood et al. try to dig deeper by using their limited sample size to test whether non-price-change information, including volatility changes, new stock issuance, age of companies, P/E ratio (CAPE) and turnover, can help to predict which run-ups are followed by crashes – and thus are "bona fide" bubbles – and which are not.

And here, they hit paydirt. Some of these – upward shifts in volatility, increase in new issuance of shares, a preponderance of young companies in the industry rather than older ones (think dot-coms) and high P/E ratios (but not turnover) prove to have been significant predictors that would have told you that a run-up would be followed by low returns, rather than a continuation of the run-up.

After describing their findings using U.S. stock data, Greenwood et al. then describe their findings when they applied the same tests to international data (which is more limited, having started only in 1985). Virtually all of the findings are the same when the international data was analyzed.

Would you have beaten the market if you had known this?

Acknowledging that these findings by themselves are not quite the same thing as proving that you would have beaten the market if you had applied them, the authors then proceed to test that proposition. They regress the two-year return after a run-up against the value of each characteristic during the run-up (e.g. change in volatility).

From these regressions, they find that “The change in volatility, Age Tilt, issuance, book-to-market ratio, CAPE, and Acceleration significantly predict … returns …” (They actually measure returns in three ways: raw returns, excess returns, and net-of-broad-market returns. Only the change in volatility and age tilt predict net-of-market returns. They interpret this to mean, in effect, that an industry bubble is often associated with a bubble in the whole market.)

It would have been better if instead of regressing subsequent two-year returns against each of these characteristics, they had run simulations of a set of strategies over the whole time starting in 1926. In each simulation, investment would be in the industry, until after a two-year run-up had occurred; then, if one of the characteristics exceeded a threshold (which they do define), the investment would be switched to cash until the end of the subsequent two-year period (during which a crash would be predicted). The result could be compared with a simple buy-and-hold strategy of staying invested in the industry the whole time. This would be more conclusive than the regression approach.

Could these results really be applied in practice?

It would seem that the authors have found the Holy Grail, the elusive beat-the-market strategy. But could it really be applied successfully?

The answer is probably no, for complicated reasons. They are quick to point out the simplest reason themselves: “Perhaps the future will not be like the past, and the characteristics that helped us identify which price run-ups crash will be different for the next bubble.”

But even if one believes that the relationships they found will be persistent, it will probably not prove feasible in practice to take advantage of them.

Trying to do so in a disciplined way would mean very strictly adhering to precisely the strategy that they showed worked in the past (up to a probability). Maybe someone who did that over a period of 50 years really would experience greater-than-market returns.

But would an investor be able to stick to that strategy? I don’t mean that irrationality and lack of discipline would inevitably grip the investor and lead the investor astray. I mean that developing realities, and possibly more studies like Greenwood et al., would come to light and make the investor think that indeed, the admonition should not be ignored – discipline or no discipline: “Perhaps the future will not be like the past, and the characteristics that helped us identify which price run-ups crash will be different for the next bubble.”

Would the investor really stick tenaciously to the two-years-over-100%-and-out-for-two-years strategy when one of the leading characteristics reached a threshold, under the conviction that Greenwood et al.’s findings were an immutable fact of the market? Would it even make sense to do so?

No it wouldn’t, because nothing of the sort is immutable in the market. Then wouldn’t it *still* make sense to do it, because we don’t know of a better strategy, and because this fact – which was inherent in the past data – may well continue into the future?

The answer to that will not and cannot be known. Lacking that knowledge, I would say there are three other alternatives:

1. Invest only in a total market index fund at low cost.
2. Try things without such a strictly disciplined plan and hope to muddle through.
3. Invest as if the future mattered; that is to say, invest for the reason that investment was invented: to develop things that people in the future will think make their lives better – and don’t try to engage in the futile exercise of estimating what your own return on investment will be as a result.

These three correspond roughly to passive, active and impact investing. The alternative of strictly following a prescription like that of Greenwood et al. – let us say, the zero’th alternative – would be categorized as quantitative investing.

The zero’th, second, and third option all have records of underperforming option 1 after fees. The first and third at least have the virtue of not making the apparently unrewarding effort to outperform option 1. (Some “sustainable investing” strategies do, however, lay claim to expecting to beat the market.) To the extent that option 2 overlaps option 3 – as it should – it may be virtuous, too.

Where does this leave us about bubbles? Surprisingly, I may be in Fama’s camp. As unintuitive as this may seem, you may not be able to identify bubbles before they burst reliably enough to take advantage of it.

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[1] Tech stock includes these industries: online retail, online info, computer systems, computer programming, network equiptment, software, wireless communications and telecom.

