

The Bubble-Bath Market

"Those who remain cool in the face of danger simply don't understand the situation." -- Anon.

Investors have remained pretty collected in their wits over the past year; it's almost been as if we're resigned to taking something of a beating after the market's remarkable romp through the late 1990s. Still, enough is enough, and who wouldn't like to get a better feel for when the present round of demoralizing selloffs, profit warnings, layoffs, and the like will be behind us?

A year ago, prattle about market divergences was all the rage, this page included. A paragraph in the February 9, 2000 *Futures Shock* column was entitled "Get Used To The Divergences," and went on to observe:

... it is the high-tech boom itself that is responsible for the strong economic growth and the surge in credit demands that have combined to push interest rates higher. As business capital spending on technology increases -- and it must for competitive reasons -- a wealth transfer occurs between technology consumers and technology producers. This wealth transfer will stop only when technology buyers around the world run out of money and credit with which to stay in business, and this calamity is not yet visible over any horizon.

Like the guns at Singapore, we simply were looking at the wrong horizon! The simple and ugly fact was technology buyers, telecommunications firms and dying dot-coms in particular, did run out of money and credit with which to stay in business. Well, that was then and this is now; we have experienced both the market bubble and the equity bath. Do we have any clues as to when this senseless slaughter will end?

A Quant Gropes For A Bottom

A single equation model for the NASDAQ 100 (NDX) was introduced in the same article. Cash market prices for the NDX were regressed against those for the S&P 500 index (SPX), crude oil, and ten-year note yields between September 9, 1988 and October 8, 1998; this latter date represented the end of the 1998 financial crisis. The model was extremely successful in the sense it explained over 99% of the NDX' variance over that interval:

$$NDX = -285.78 + 1.41 * SPX + 5.74 * TenYear - .64 * CrudeOil, r^2 = .9899$$

The model indicated the NDX was 40% more volatile than the SPX, was influenced negatively by rising crude oil prices, and rose in the face of rising note yields, all of which is intuitively acceptable. These same coefficients were then projected forward to the February 4, 2000 date of analysis, and they indicated a value for the NDX of 1740.48 when the index actually was trading at 3874.37. The conclusion reached from this divergence was that – famous last words – it was different this time. After all, a model that works so well with more than 2,600 observations just doesn't become junk overnight without intervening structural changes in the market.

Let's update this study. First, let's take the period between October 9, 1998 and March 10, 2000, the NDX' peak, our "bubble" period. The single equation model here is:

$$NDX = -1679 + 2.27 * SPX - 152.36 * TenYear + 102.48 * CrudeOil, r^2 = .847$$

Over this period, the NDX was 127% more volatile than the SPX, was negatively influenced by rising note yields, and had a counterintuitive positive relationship with higher energy prices.

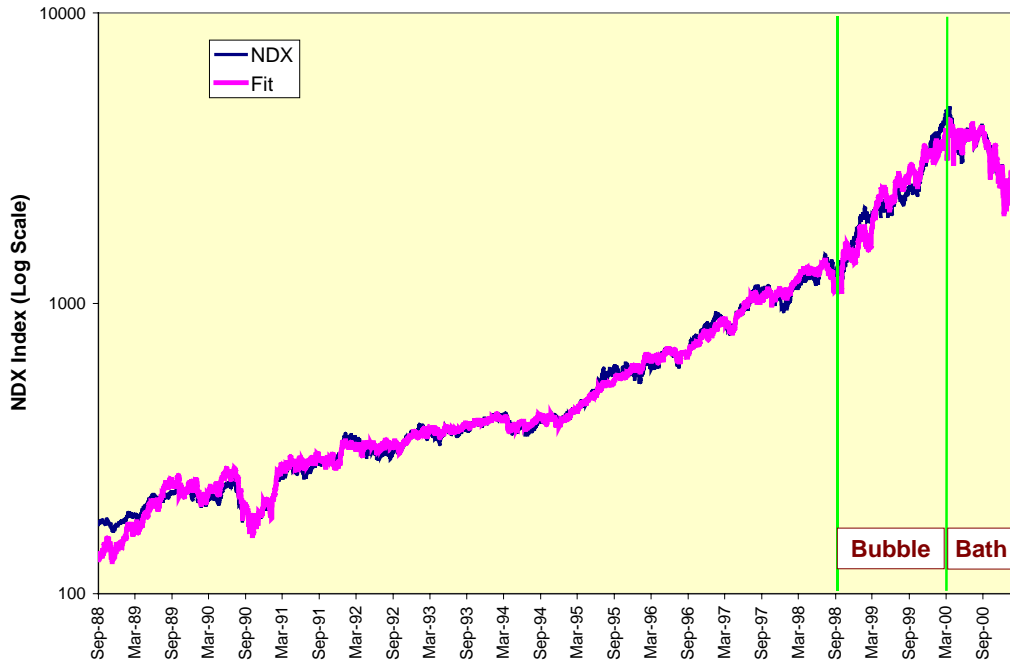
Next, let's add the subsequent "Bath" period from March 13, 2000 onwards:

$$NDX = -8554 + 6.86 * SPX + 388.46 * TenYear - 1.54 * CrudeOil, r^2 = .909$$

Here the coefficients return to their previous signs, but note how the NDX has become 586% more volatile than the SPX over this period (it wasn't just your imagination).

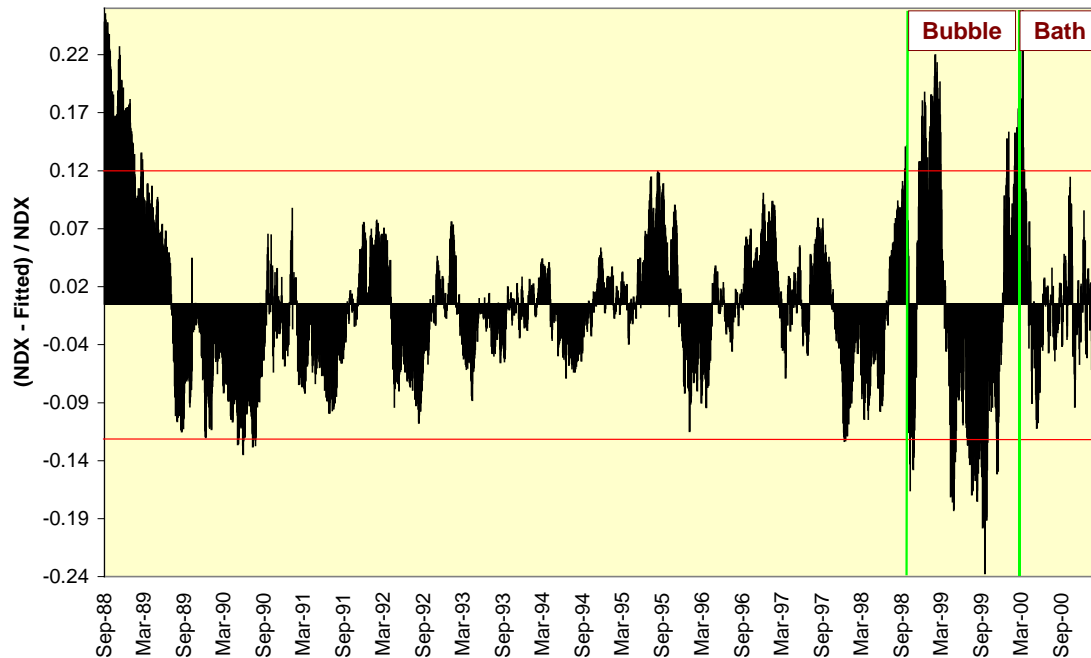
We can splice the model results together for the entire data period and present the data two ways. First, we can plot the actual and fitted values together on a semi-log scale to show progression over time.

It Was Different That Time: Actual And Fitted Values For NASDAQ 100



Next, we can plot the residuals, or the [(actual - fitted)/actual] data of the three model periods to show overall quality of fit. The same markers for the time periods are used, and 95% confidence intervals from the 1988-1998 period are included as well. The large number of large residuals – unexplained points – during the Bubble period becomes apparent quickly.

Model Residuals Over Time



Chow Down On This

The standard statistical test for comparing two regression results is called a Chow Test:

$$F_{k, N+M-2k} = \frac{(ESS_r - ESS_{ur}) / k}{ESS_{ur} / (N + M - 2k)}$$

Where F is a statistic used for testing a distribution of data, ESS are the regressions' sum of squared residuals, N and M are the number of observations, k the restrictions imposed in each equation, and r and ur are the restricted (Bubble and Bath periods) and unrestricted (1988-1998) tests.

The probability that the 1988-1998 and Bubble periods are not different is a minuscule 5.47 E-78%, while the probability that the 1998-1998 and Bath periods are not different is a much higher 1.96 E-6%. In other words, the current unhappy period is coming back to a much more normal relationship than had existed during the rock-'n'-roll days.

When the market comes back to this "normal" relationship, the energetic selloff in technology should be over, and the sector should rise and fall with a beta of 1.41 to the SPX. Good news, right? Well, yes and no. If we run the numbers through the 1988-1998 model, we get a NDX of 1465 at present, as opposed to a closing value of 1881.34 on March 2, 2001. So, unless the SPX rallies, or crude oil falls, or money flees bonds for stocks, we might have another 25% to go to the downside.