

Balancing Fear And Greed

"When the facts change, I change my mind. What do you do, sir?"
-- John Maynard Keynes

The capacity of the human mind to distill relationships and patterns from raw data is at once the cornerstone of productive research and the seductive siren song leading to the suspension of further inquiry. We too often think because we have found a working relationship - a task made far easier now with the proliferation of databases and cheap computing - we have found an immutable law applicable to all future environments.

With this in mind, it is time to revisit an earlier inquiry into the equity tension index (EqTI, see "Crying Over Spilled Milk," *Futures*, February 2001). Like all of the previous tension indexes, the EqTI is based on the premise that a market's volatility structure and forward curve each convey as much useful trading information as does the price itself. This characteristic was exploited in devising the Market Tension Index for storable physical commodities, (see "Measuring Market Tension," *Futures*, February 1996) and the EuroTension Index for short-term interest rates and by extension, currencies (see "Great Expectations," *Futures*, April 1997). Another tension index, the Livestock Tension Index, was introduced for non-storable physical commodities (see "All's Fair In Love And Livestock," *Futures*, September 1999).

We cannot and do not look at the forward curves for either bond futures or stock index futures since the costs of carry for both asset classes is a function of the short-term interest rate and the bond coupon rate and expected dividend rate, respectively. Any distortions in either forward curve would be arbitrated out quickly, and for that reason, both bond futures and stock index futures have only one active contract month. Moreover, the expectation variable for a stock index is embedded not in the non-existent forward curve, but rather in the price of the index itself. The price/earnings ratio subsumes an expected growth rate in earnings over and above the cost of capital.

The Previous Assumption

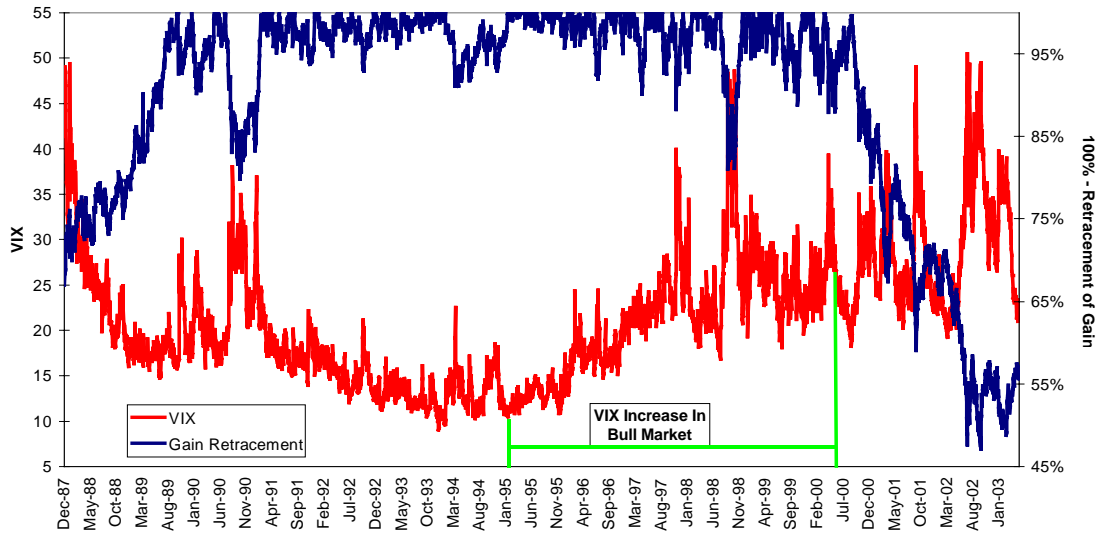
The EqTI described previously employed the concept of a gain retracement ratio (GRR), defined as the difference between the last high in price or equity minus the current value, divided by the last high.

$$GRR \equiv \frac{High - Current}{High}$$

The GRR is based on the psychological phenomenon known as anchoring, wherein we measure our welfare not by an absolute level of wealth, but against our best previous state. Here is where a revision of the EqTI measure became necessary. The longest and most consistent equity market volatility series in the Chicago Board Options Exchange's volatility index (VIX). The VIX had been available in an actual daily history going back to March 1993, and now is available in a reconstructed daily history going back to January 1986. The previous history, through December 2000 in the previous study, had been recorded during a bull market; even by December 2000 it was still debatable whether we were in a new long-term bear market or simply in an ugly setback within the long-term bull market.

The GRR mapped neatly against surges in the VIX throughout the life of the bull market. Demand for put option protection jumped as investors felt their profits threatened, and these jumps often marked a short-term bottom in the market. In fact, many equity analysts used the VIX in conjunction with the put/call ratio and various bullish sentiment surveys as negative indicators. Interestingly enough, volatility trended higher during the late 1990s bubble as the dollar risks in the market grew and investors became nervous about valuations (see "Nothing To Fear," *Futures*, May 1999). The 1987 crash is eliminated from the chart below to preserve scale.

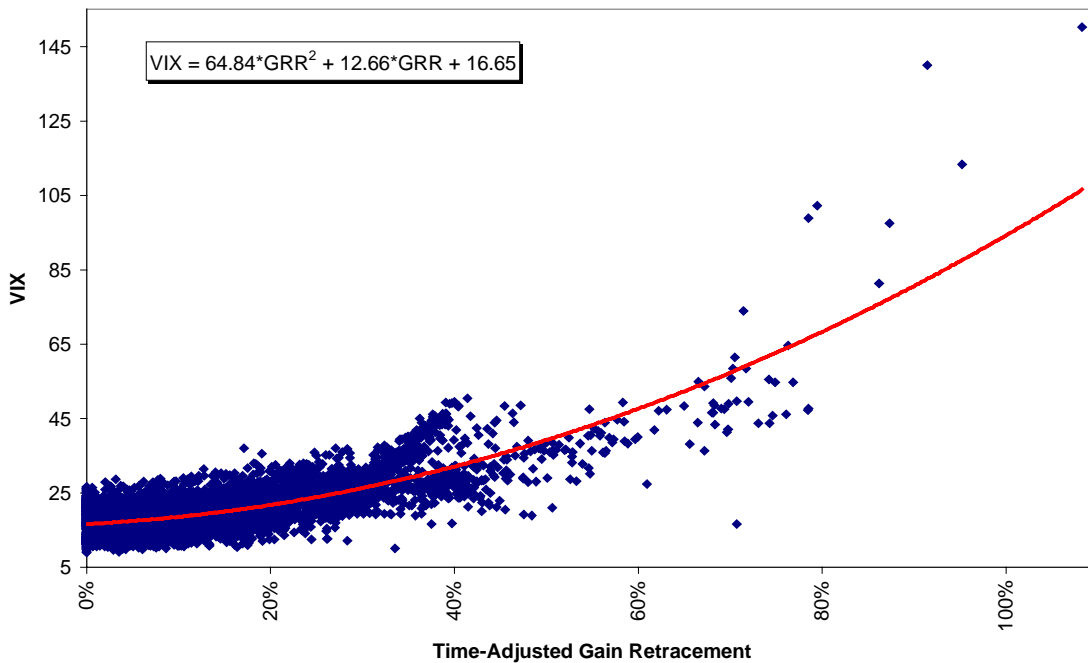
Gains Down, Volatility Up



No Pain, No Gain

Once it became apparent that we were in the worst bear market in decades and the GRR exceeded 50%, it became useless as a measure of anxiety. Lamenting a 20% drop in equity over three months may be normal if unproductive behavior, but if you have not taken 1999 out of your mind in 2003, please do so immediately. The pain of a loss should attenuate over time, and that is one measure needed to modify the EqTI. The attenuation factor will be the square root of the year-fraction since the last new high occurred.

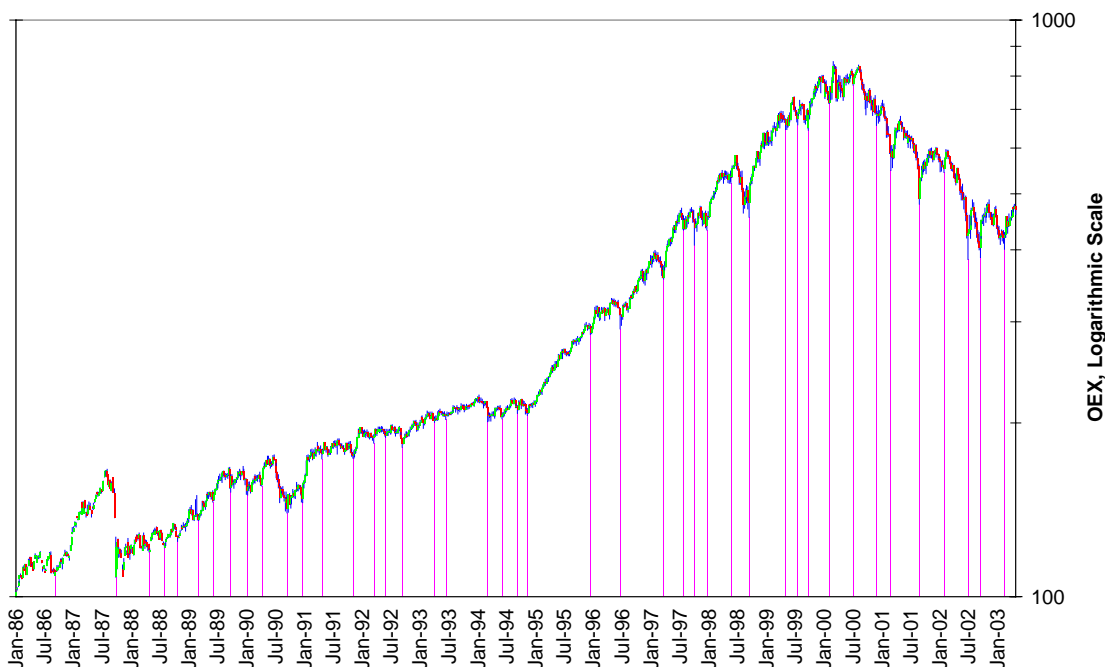
Volatility And Retracement of Gain



A second necessary modification needed to accommodate the previously unseen bear market is an approach to the latest new low in the market. Stocks tend to produce spike bottoms, or bullish hammers in candlestick parlance (see "Everything You Know Is (Still) Wrong," *Futures*, June 2003). As the VIX' underlying index, the OEX, approaches the previous spike low, we should expect to see anxiety increase should the impending double bottom fail. These

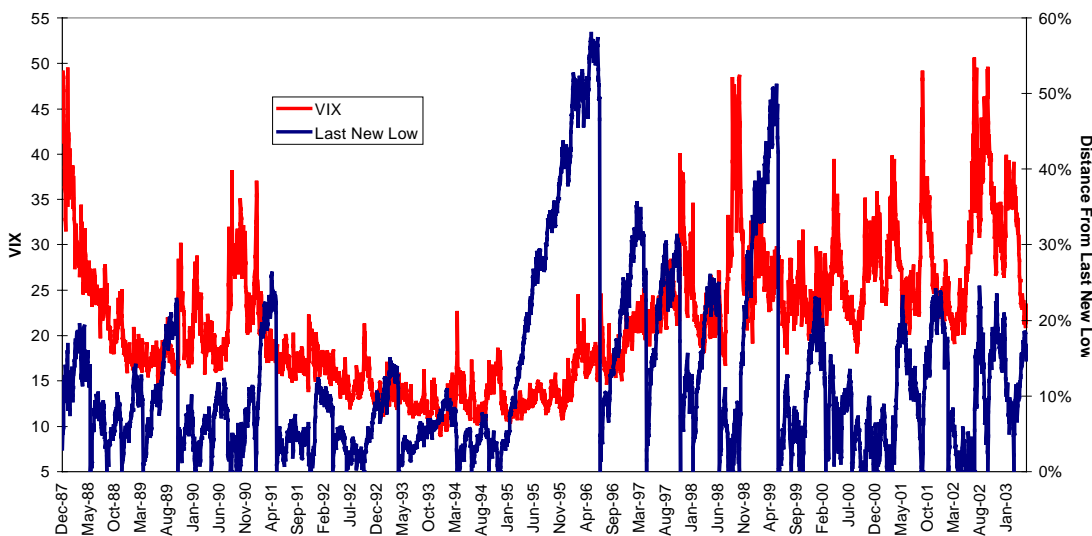
relative, pattern-driven bottoms are independent of both the absolute price level and the underlying trend of the market. Just as many occur in bull markets, with their pattern of higher lows, as do in bear markets with their lower lows. The "Weekly Spike Bottoms" chart depicts these bullish hammers over rolling nine-week timeframes.

Weekly Spike Bottoms In OEX



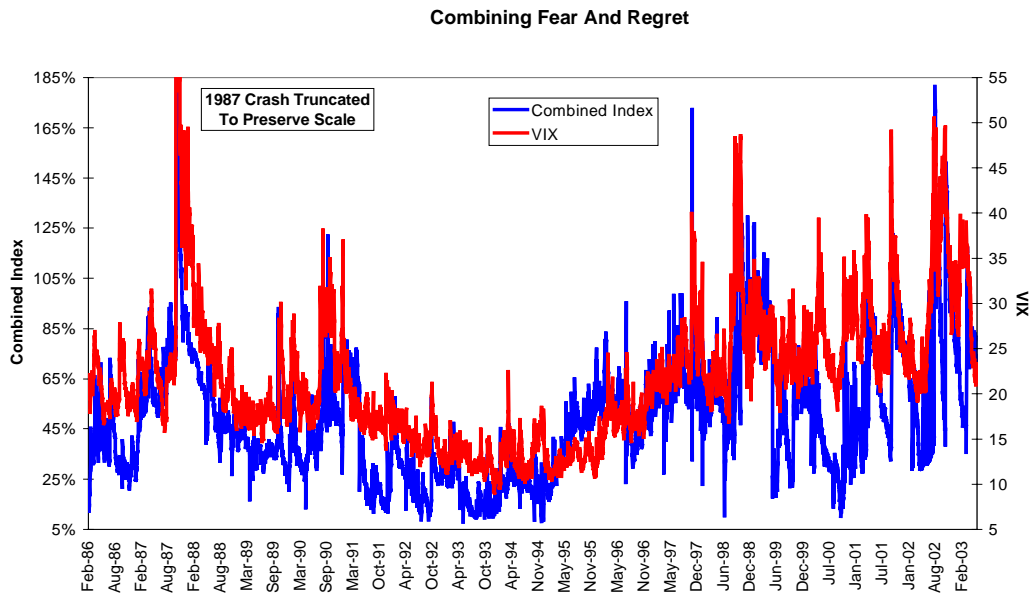
A measure parallel to the GRR, the distance from the last new low, can be created. This statistic provides a different perspective on the extent of the 1990s bull market. On two different occasions, the summer of 1996 and the fall of 1999, the OEX rose more than 50% from its most recent spike low. This measure will be attenuated by the square root of the year-fraction since the last new low occurred before inclusion in the new EqTI.

Remembrance Of Lows Past



Once the two measures are blended together in equal weighting, the combined index mirrors the historic VIX closely. Two periods of poor fit stand out, the near-flat market between April and October 1991, and the final move

higher of the bull market moving into September 2000. Both of these periods were near to both the old highs and to the last new low.



Toward A Revised Equity Tension Index

All of the tension indices noted above have had two components in common, the Adaptive Moving Average trend oscillator and the ratio of implied volatility to high/low/close volatility. To refresh, the N-day Adaptive Moving Average (AMA) is the number between 4 and 29 days that minimizes the following relationship

$$\frac{1}{N} * \sum_{i=1}^N \frac{N}{HLCVol^2} * |(P - AMA)| * |\Delta AMA|$$

high/low/close volatility is calculated

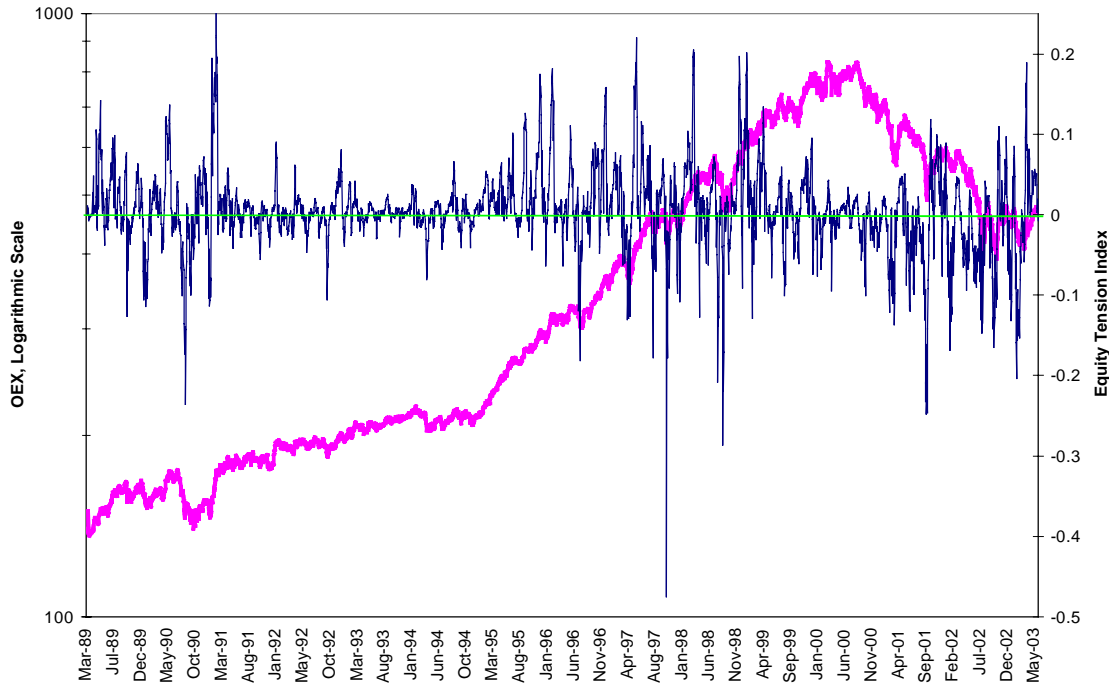
$$HLCVol \equiv \sum_{i=1}^N \left[\frac{.5 * \left(\ln \left(\frac{\max(H, C_{t-1})}{\min(L, C_{t-1})} \right) \right)^2 - .39 * \left(\ln \left(\frac{C}{C_{t-1}} \right) \right)^2}{N} * 260 \right]^{.5}$$

and the trend oscillator is calculated

$$TR \equiv \frac{\left[\frac{P - AMA}{HLCVol} \right]}{P}$$

The excess volatility described by the VIX, $\log(VIX/HLCVol)$, has a virtually random relationship - a R^2 of .0215 - to the combined index, as does the trend oscillator with an R^2 of only .004. For the sake of completeness, excess volatility and the trend oscillator are unrelated, or orthogonal, to one another as well; their R^2 is .029. The three measures now can be blended into the EqTI without fear of collinearity.

Symmetric Panic: The Equity Tension Index



The EqTI values, both higher and lower, and both during periods of narrow and wide variance, appear to describe the behavior of the stock market quite well over time. The important questions, though, is whether the EqTI be used for daily signal generation? All simulations, backcasts, and hypothetical trading records must be taken with a massive grain of salt, and that certainly applies here. Trading decisions are made solely by the combination of the EqTI and the classification of market structure by the Adaptive Moving Average trend speed.

Trading Rule Matrix

	Buy	Sell
Trending Market AMA >= 21	EqTI > 0 & EqTI > EqTI(t-1)	EqTI < 0 & EqTI < EqTI(t-1)
Transitional Market 11 <= AMA < 21	EqTI > 0 or EqTI(t-1) < 0 & EqTI > EqTI(t-1)	EqTI < 0 or EqTI(t-1) > 0 & EqTI < EqTI(t-1)
Sideways Market 10 < AMA	EqTI > 0	EqTI < 0

The results are somewhat more erratic than what we would like to see, which is an indication of contact with reality. The irregular relationship between the VIX, the level and trend of the OEX and the VIX' responses to both retracement of gain and approach to new lows preclude significant further refinement without engaging in egregious over-fitting of the data. However, the blending of these variables and the move beyond the simplistic notion of some magic level of the VIX being a buy signal suggests this to be a promising area for further research.

Hypothetical Cumulative Realized Equity of EqTI System

