

Nothing To Fear

Sometimes memorable presidential quotes are actually quite inspirational; Franklin Roosevelt's signature line to a nation deeply wounded by the Great Depression has been repeated frequently in the face of stress ever since its delivery in 1933. The stock market persists in qualifying this wisdom in the manner of another president: It depends on what the meaning of the word "fear" is.

The Chicago Board Options Exchange (CBOE) created an index of the implied volatilities of the puts and calls on its S&P 100 index, the OEX. This volatility index, VIX on most quote screens, frequently is referred to as the stock market's fear index. A total of eight put and call options on the two strikes immediately above and below the current level of the OEX itself are used. This index is recalculated continuously during the trading day as the value of the OEX is updated.

The logic behind calling the VIX the fear index is compelling. Few things are more difficult to value than shares of common stock. On an academic basis, equity prices are nothing more than the discounted value of future dividends. All one needs to know, therefore, are the growth and earnings prospects of a company, knowledge subsuming the state of the economy, the firm's industry, future technological change, competitive pressures and cost structures, and so on. An interest rate forecast is required as well. The resulting valuation for an equity with a constant

growth rate, $Price = \sum_{t=1}^T Div_t e^{-(r-g)t}$, represents wishful thinking at its finest, no matter how well it is or isn't grasped by the legions of on-line investors pushing various Internet stocks to market capitalizations exceeding the GDPs of various small countries.

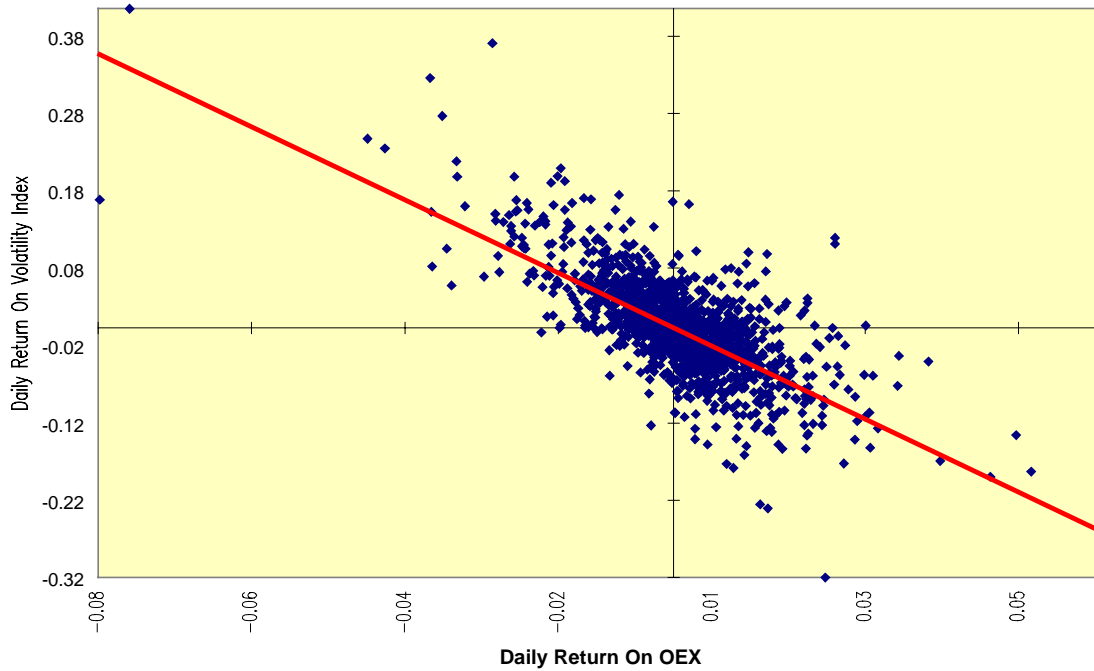
More complex dividend discount models assessing multiple growth rate periods and the probabilities of such states being realized, are even more divorced from reality. The paradox of all this is the indisputable fact equities are the best place to invest over long periods of time. The short periods, however, can get pretty scary. Traders sense that equities fall in price much faster than they rise, and given the extreme uncertainties surrounding fair valuation noted above, begin to fear the loss of principal more than they fear fear itself.

The relationship between market downturns and volatility increases is illustrated by comparing their daily returns over this period. The inverse relationship is highlighted by the regression line

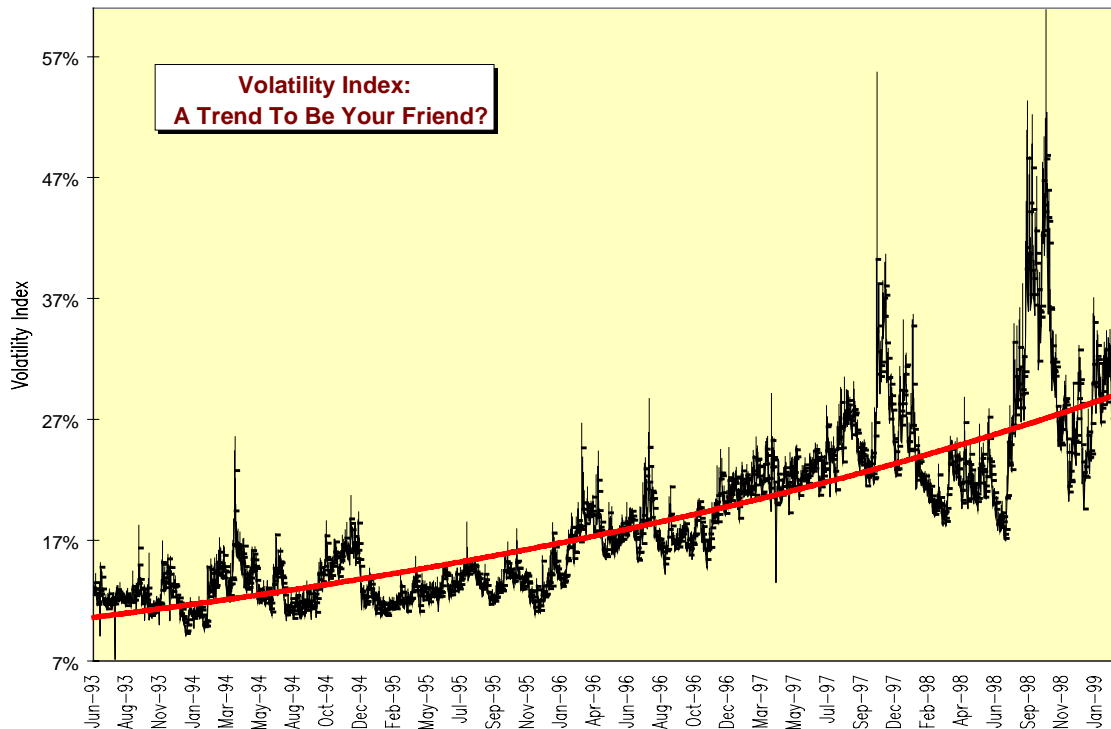
$$\ln\left(\frac{VIX}{VIX_{t-1}}\right) = -4.73 * \ln\left(\frac{OEX}{OEX_{t-1}}\right),$$

which indicates a fairly constant elasticity between the two concepts: A 1% drop in the level of the OEX should produce a 4.73 point increase in the level of the VIX.

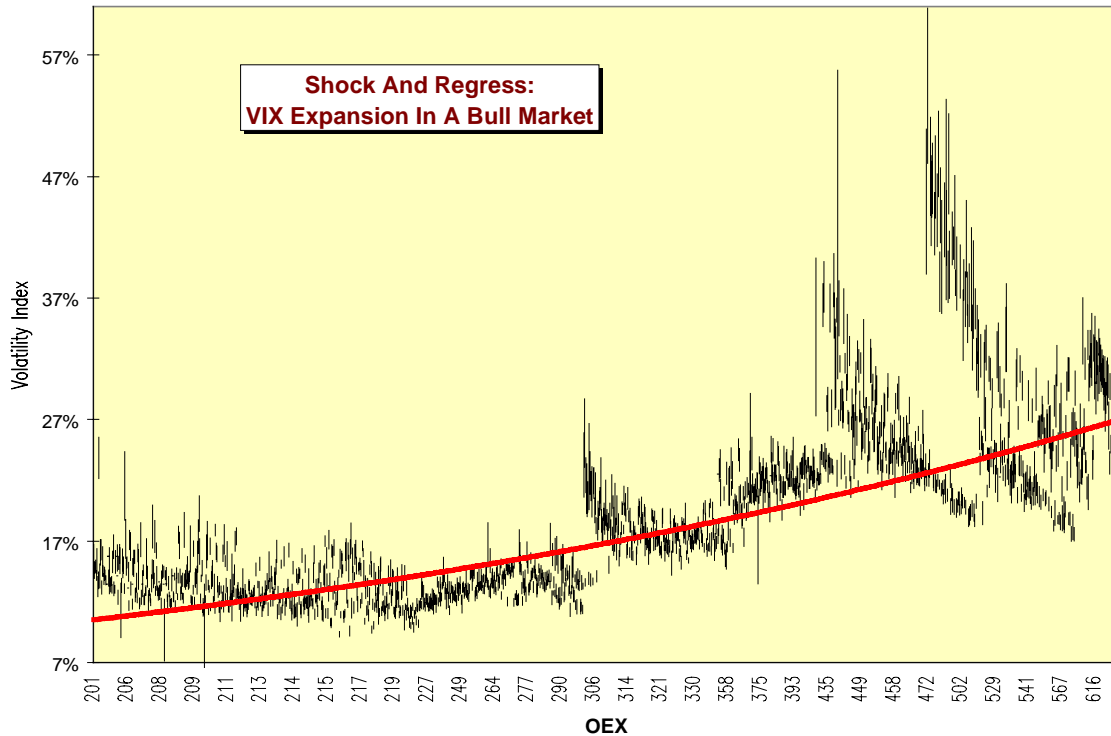
Elastic Relationship



The daily history of the VIX highlights this relationship; it is easy to associate the major spikes in volatility with drops in the market, particularly the October 1997 and August-September 1998 Asian and Russian panics, respectively.



Yet the historical relationship highlights an interesting trend in the VIX: It is clearly rising over time. After each market drop/volatility spike episode, the VIX falls not to the average of the preceding regime, but to a new, higher level. Moreover, the variability of the VIX appears to be increasing when its history is viewed as a function of OEX level and not as a function of time. New advances in the OEX, which have been arriving as a function of time, are accompanied by new VIX surges to higher levels, new retreats to higher bases, and larger variances in volatility – more volatile volatility, if you will.



How can a relationship that is so inverse on a daily basis become exponentially proportional on a longer-term basis? Volatility is nothing more than the market's price for insuring against future events. As the equity market has risen over time, and, more importantly, as the valuation levels of the market have risen over time, the premium investors and traders are willing to pay for this insurance has risen as well. Price-to-earnings ratios have risen to all-time highs, dividend yields have fallen to all-time lows, and the capitalization of the market relative to the GDP is nearly twice its previous historical high.

Reasons to be nervous? The VIX is telling us so; this is one reason for both the upward movement of volatility and the ever-higher peaks therein during market panics. A second reason is trader's perception of risk as dollar-based and not as percentage-based. Even if investors' risk perceptions had not changed as a function of the market's valuation, the dollar risk of a 1% move in the OEX would have tripled in the past six years. Option writers have had to demand additional premium for undertaking this risk to an ever-increasing portion of their equity, just as futures traders have sought smaller contract sizes (see "The People's Stock Index Futures," *Futures*, March 1998).

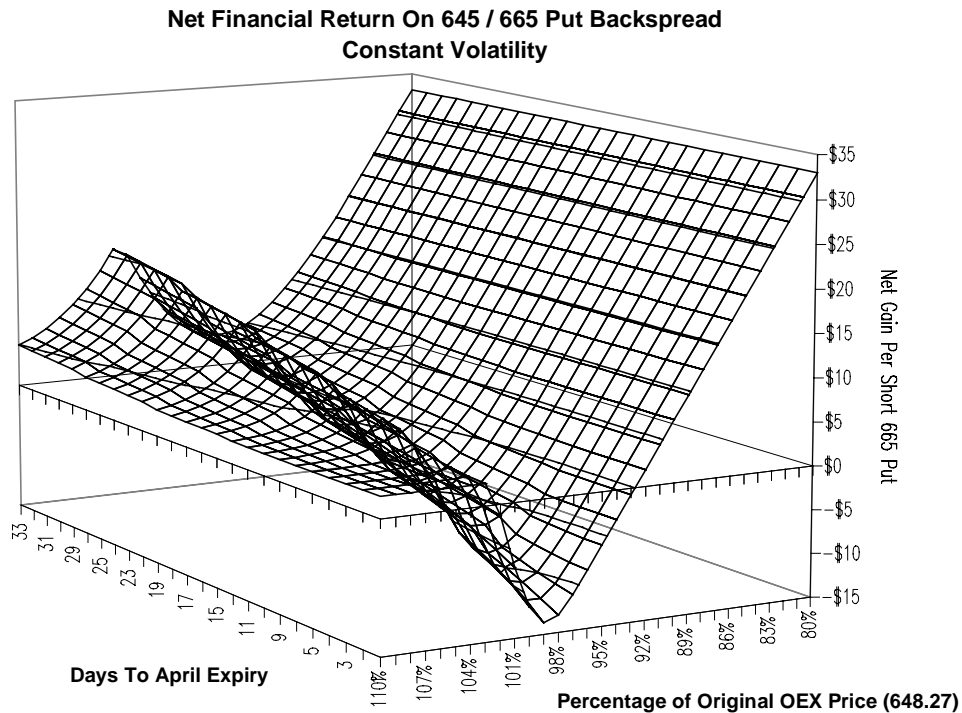
Apocalypse Sometime

Trading strategies need to accommodate both the short-term constant elasticity of returns between the OEX and the VIX, and the long-term acceleration in the VIX' upward drift. First, and most important, a trader should never be naked short puts in this market; while there are many ways to lose a lot of money in a hurry, this mistake has led to the education of many a speculator. Second, anyone who sells volatility looking for a regression to the mean needs to remember the

mean is a moving target: A low level of volatility today would have been considered an upward spike as recently as mid-1996. Third, a buyer of call options needs to be very right on market direction; he is facing both time decay and expected volatility decay. Finally, the expected expansion of put option profit in a selling panic can presents some interesting trading opportunities, one of which is detailed below using data from the close of business on March 12, 1999, when the OEX settled at 648.27.

A market-neutral strategy could be emplaced by selling 5 April 665 puts with a delta of -.638 and a volatility of 21.20% at the bid price of 26.25 and buying 7 April 645 puts with a delta of -.456 and a volatility of 23.86% at the offer price of 17.00 for a net debit of \$1,225 (for a discussion on the logic of these strikes, see "You And Your Strike," *Futures*, March 1999).

The expected return on this strategy at constant volatility is depicted below. Of course, we have seen the assumption of constant volatility to be naïve.



We can apply the -4.73 elasticity calculated above to our calculation of expected profit and loss on the trade. While the differences between the two graphs are subtle, the one feature readily apparent is the expansion of profit in a market panic. This expansion amounts to nothing less than a free put option granted to us by the market in return for our willingness to be long put option gamma and volatility in an initially market-neutral trade.

**Net Return On 645 / 665 Put Backspread
Elastic Volatility**

