A Measure of Market Incertitude Executive Summary

Motivation

A trending market leads to inevitable questions: *Is the trend exhausting? Is a market correction coming?* Technical analysts seek to answer these questions with internal strength techniques that fall primarily into two areas. First, internal market breadth measures which quantify the extent to which constituents are going along with the overall trend – often via a count of declining issues and advancing issues. Second, diffusion measures which quantify breadth via a count of the number of issues meeting a given criteria such as those above a 40-day moving average. This paper explores market incertitude as a third area of strength measurement emanating from the question: *Does today look like yesterday?*

The full range of daily price changes of a market's constituents may be arranged as a granular continuous probability distribution function or arranged as a less-granular categorical distribution function. Advance/decline (A/D) counting is framed as categorical data binning as it places the entire set of daily price change data into only three bins (advancers, decliners, and unchanged). The data discretization of data binning is known to lead to information loss. It stands to reason then that if the A/D methods do indeed discard information about the structure of daily price change, then analysts would seek methods that capture all the information. The motivation for this study then is pursuit of a strength measure to statistically use all of the data without this information loss.

Methodology

From the rich field of statistics, the Lepage nonparametric statistic was selected to measure the change in location and scale for two consecutive days' continuous distribution of daily price changes. The Lepage calculation benefits from the granular inclusion of all the applicable constituent data. The resulting value is a measure of the difference in the structure of each day's price change with its prior day's structure. A pair of similar days with a small degree of deviation from one another results in a small Lepage value. A pair of dissimilar days with a large degree of deviation from one another results in a large Lepage value.

The statistic was fully developed into a new breadth measure in two forms. The ***Incertitude Indicator*** is the three-day simple moving average of each day's Lepage statistic. This indicator represents the extent to which days are unlike their previous days. The ***Incertitude Oscillator*** is the difference between two exponential moving averages of the Incertitude Indicator. When the indicator value is high it reflects a degree of *chaos* in the market; When the indicator is low it reflects a degree of repetition or *sameness* in the market. The oscillator interpretation ranges from *overchaos* at its highs to *oversameness* at its lows.

The incertitude approach posits that either high degrees of sameness or high degrees of chaos may portend a change in market character. An over-extended market with characteristics of either extreme chaos or extreme sameness reflects conditions ripe for a trend reversal. It is from these extremes that incertitude signal is sought.

The assess the viability of the incertitude approach, various signal forms using the Incertitude Indicator and Incertitude Oscillator were modeled in Python and tested with 33 years of S&P 500 constituent data from Norgate. Given the goal was assessing changes in market strength, momentum metrics and internal strength metrics were selected for use as objective measures of signal outcomes. The assessment of each signal type was based upon the counter-trend change in the selected metrics for various time periods after each signal is triggered.

Findings

The testing of several signal formulations showed statistically significant degrees of post-signal outcomes in strength and momentum reversal. The change in incertitude at the extreme regions of the sameness-to-chaos scale does indeed portend the likelihood of a trend reversal. The incertitude approach has merit in measuring the market environment and detecting conditions that lead to trend reversals. This third view of market strength is a recommended addition to the technical analysis community's tool set. Thorough technical analysts will likely benefit by augmenting their existing market breadth and market strength techniques by embracing new incertitude techniques.