Detecting and Timing Bubbles

"Dynamic time warping" reveals a lot about stock-price bubbles

Imagine that two people read aloud the same passage from a book. One speaks fast but takes long pauses between sentences. The other speaks slowly but races through exciting parts. We can all recognize that they are telling the same story. Eventually computers learned this skill, often using a technique called dynamic time warping. Finding the similarities between fast and slow is not only useful for speaking or music – it helps with understanding bubbles in financial markets, too.

Exhibit 1: Cumulative Excess Returns

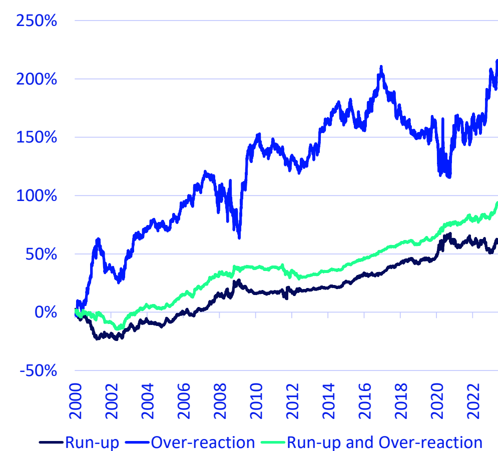

Chart shows the performance of backtested strategies versus the S&P 500 index that invest in bubble run-ups, over-reactions, and both. Details in the paper cited below. Source: State Street Global Markets

We identified more than 2,500 bubbles in stock prices since 1973, each of which crashed by at least 50%. Though the price paths all look like mountains, they have different speeds and contours up and down their sides. We use statistical time warping to compare every bubble to every other bubble, considering more than 6 million bubble pairs, and we mark new normalized time steps in each case. Then, using these synchronized views, we record the distribution of all 6+ million outcomes for 20 attributes at each standardized time interval of the life of a bubble. Stock attributes like investor flows and EPS growth have clear shapes in which they tend to rise and fall, on average, and none of this is apparent from comparisons in standard calendar time.

Thus, stock characteristics offer clues as to whether a bubble exists now in a particular stock, and whether it is near the beginning, peak, or conclusion of its price path. We estimate the phase of a stock bubble, as it occurs, by comparing its set of observed attributes (fundamentals, analyst ratings, flows, sentiment, and more) to the hallmark values of those same attributes at different stages of prior bubbles. A strategy that aims to hold stocks for the first 80% of their run-up and avoid getting caught in the crash beats the market in backtests, as shown in the Exhibit above. So does a strategy that holds stocks at the end of their bubble lifespan, which have overshot in losses. Bending time can be profitable.

For more on this topic, see our 2024 journal article: "**Dynamic Warp Analysis: A New Approach for Detecting and Timing Bubbles**" by Mark Kritzman, Huili Song, and David Turkington. The Journal Of Portfolio Management, Vol. 50, No. 6, April 2024

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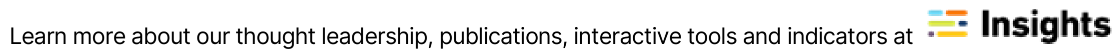

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Expiration Date: 03/13/2025

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