



Predicting Financial Crises

By Charlie Curnow

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Last year, scientists in central Italy witnessed a strange phenomenon. On April 1, toads near the town of L'Aquila fled from their breeding sites en masse. Five days later, a 6.3-magnitude earthquake struck L'Aquila, killing hundreds.

The toads, it seems, sensed the coming quake.

If only there was an amphibian that could predict tremors in the market. Days before financial crises strike, we could flee, like those Italian toads, to the shelter of bonds, and then return to stocks before prices settle again.

MIT Sloan School senior finance lecturer Mark Kritzman, who is also president and chief executive of Windham Capital Management, a Cambridge, Massachusetts financial advisory firm, thinks he has found such a warning signal – not in a toad, but in a new statistical model called the absorption ratio. The absorption ratio predicts systemic risk by measuring how tightly markets are coupled, and thus how vulnerable they are to the spread of negative shocks. It is calculated by dividing the volatility of a fixed portfolio of assets by volatility across the entire market. When systemic changes in the market correlate more closely with changes in value of the fixed portfolio, the absorption ratio increases, and so does predicted market fragility.

Investors may be able to use the absorption ratio as a market timing mechanism. While tightly connected markets do not always lead to declines in asset values, when market drops do occur, a spike in the absorption ratio nearly always precedes them. A backward-looking analysis conducted by Kritzman found that an individual trader could have escaped both the 2001 dot-com meltdown and the 2008 financial crisis unscathed if he had shifted assets from stocks to bonds in proportion with the absorption ratio as it approached its maximum value, then moved back to stocks as the ratio fell.

If the Fed had known about the absorption ratio several years ago, Kritzman says, it would have noticed the national housing bubble. Between January 1997 and September 1998, the housing market absorption ratio jumped from a relatively average 64.12 percent, to 77.68 percent, just as the national housing bubble began to inflate. It went on to peak several times over the next decade, reaching an all-time high of 93.19 percent in March 2008. Once home prices began to stabilize in 2009, the ratio started falling again.

The absorption ratio seems to predict financial turbulence – periods when prices behave in an unusual fashion relative to historical patterns. In a study of the MSCI USA stock index covering the period between July 1, 1998 and June 30, 2009, Kritzman found that the ratio tended to shift upwards 40 days prior to major turbulent financial events such as the global

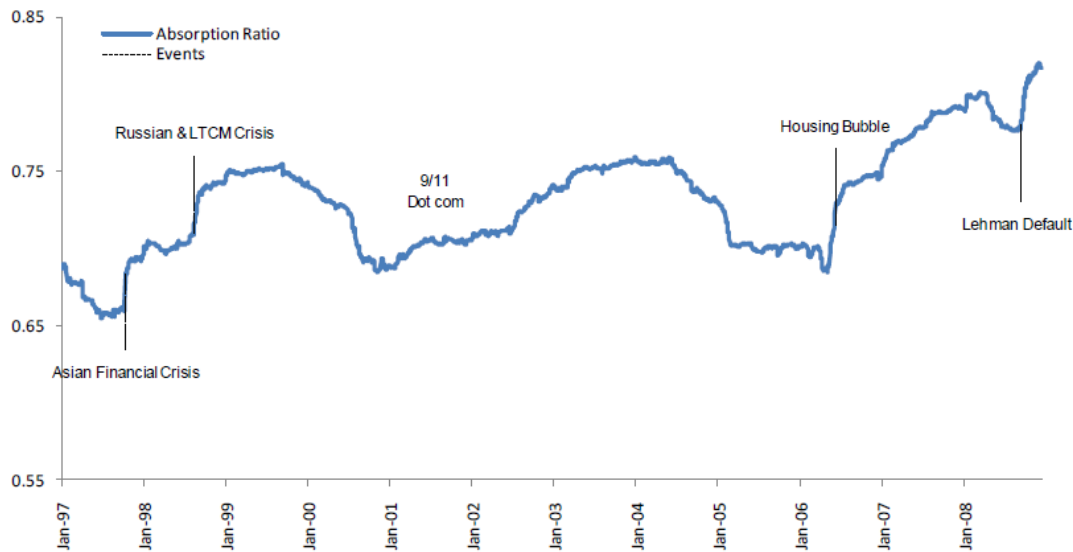


financial crisis and the tech bubble. It usually then continued to rise, peaking a few days after the conclusion of the event.

The absorption ratio also tracks one measure of international contagion (financial market turmoil that spreads across countries). In 2008, Anna Pavlova of London Business School and Roberto Rigobon of MIT Sloan School released a statistical model showing historical asset prices relative to levels of global financial constraint in a discussion paper for the Center for Economic Policy Research. When measured against a common currency, changes in the absorption ratio and the contagion model track each other nearly perfectly, underscoring the close connection between global financial contagion and systemic risk.

Given the ratio's predictive powers, government regulators may be able to use the absorption ratio to help head off global financial crises. In a study of daily stock market returns for 42 countries, Kritzman found that the absorption ratio spiked just before nearly every major market panic of the past two decades, including in October 1997, during Hong Kong's speculative attack after the Asian Financial Crisis; in August 1998, in parallel with the onset of the Russian financial crisis and the collapse of the Long-Term Capital Management hedge fund; and in mid-2006, coinciding with the national drop in housing prices and in anticipation of the collapse of Lehman Brothers. Conversely, the ratio declined leading up to global market expansions. It dropped preceding the recovery in emerging markets in 1999-2001, as well as before the boom that followed severe drops in interest rates in 2001. The graph below shows the trajectory of the global absorption ratio from January 1997 to January 2008, with labels to denote the timing of major financial crises.

Exhibit 15: Global Absorption Ratio



Source: Mark Kritzman

In the end, however, the same caveats that apply to other financial forecasting and trading formulas will likely apply to the absorption ratio as well. Even if Kritzman's formula does fit well with the statistical record of the past two decades, new conditions could emerge that make the ratio stop working as a reliable predictor of market performance. As Kritzman notes, while the absorption ratio does show noticeable spikes immediately preceding financial crises, it has also undergone a long-term upward trend (from 65 percent in February 1995 to 85 percent by December 2009). Considering the rapid pace of liberalization and deregulation in global markets over the past two decades, this is not surprising. The problem, however, is that the absorption ratio only measures susceptibility to the spread of shocks, not the causes of shocks themselves. If the upward trend in the absorption ratio continues, this could erode the statistical difference between times when markets actually are in serious peril and times when threats to markets are relatively few.

Another pitfall of the absorption ratio is its potential to alter investor behavior if it is ever put to widespread use as a market timing mechanism. Shifts in the ratio could become self-fulfilling prophecies. A sudden spike in the ratio could prompt investors to stampede out of the stock market and into bonds, thus contributing to the very market fragility the model purports to predict. Alternatively, a sudden drop in the ratio could fuel a rapid influx of capital into stocks, driving up prices and artificially inflating the market's apparent strength. If this happens, the brief time windows between shifts in the absorption ratio and shifts in



asset values that allow followers of the model to reap profits in the stock and bond markets could eventually dwindle down to zero.

Kritzman first released his work on the absorption ratio in a report for the Revere Street Working Paper Series in March. The paper was coauthored by Roberto Rigobon, as well as Yuanzhen Li of Windham Capital Management and Sebastien Page of State Street Associates. Kritzman presented his findings at a meeting of the Quantitative Work Alliance for Applied Finance, Education and Wisdom on April 20 in Boston.

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