

# Ordered fear plays a strong role in market chaos

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When the current financial crisis hit, the failure of traditional economic doctrines to provide any sort of early warning shocked not only financial experts worldwide, but also governments and the general public, and we all began to question the effectiveness and validity of those doctrines.

A research team based in Israel decided to investigate what went awry, searching for order in an apparently random system. They report their findings in the American Institute of Physics' journal *AIP Advances*.

The novelty of their study is the incorporation of time variation of "human factors" into [mathematical analysis](#). The team, led by Dr. Yoash Shapira, former head of the Atomic Energy Commission Research and currently a guest scientist at Tel Aviv University, along with Eshel Ben-Jacob, a professor of physics, Tel Aviv University School of Physics and Astronomy, and his doctoral student Dror Y. Kenett, hypothesized that temporal order (arrangement of events in time) should be hidden in variables associated with fear, such as [volatility](#).

They analyzed the volatility time series of 10 different [stock markets](#) from seven countries over a period of about 50 years and, rather than following traditional economic analyses, they analyzed time variations in the volatility—or the "volatility of volatility," a.k.a. "fear volatility".

In all markets studied, analysis revealed the existence of hidden temporal order in the volatility and very high correlations between the volatility and the magnitude of price variations. This marks the first time hidden

temporal order has been found in these market "human factors."

"To a non-economist, economic theories seem decoupled from human reality. The fundamental assumption is that investments are made rationally. But investors can behave irrationally—driven largely by greed and fear, and other human factors," explains Ben-Jacob. "It's also odd that many mathematical analyses, such as the design of investment portfolios, assume no memory. It's assumed that stock prices behave with no apparent temporal order. Yet investors, including professional traders, take into account past behavior and are particularly influenced by the variation in prices or the volatility associated with the fear index."

The existence of such volatility order, or "ordered fear," implies that proper portfolio design should take into consideration the "volatility of volatility," according to the team. For example, the common approach to reducing risk is to select stocks with negative or low correlations in their sequence of returns. The new findings suggest that selection criteria should incorporate the correlations in the stocks' volatility dynamics.

"We're working on incorporating [human factors](#) into market analysis," Ben-Jacob says, "by constructing a new parameter to replace the traditional systemic risk parameter."

**More information:** The article, "Hidden Temporal Order Unveiled in Stock Market Volatility Variance," by Yoash Shapira, Dror Y. Kenett, Ohad Raviv, and Eshel Ben-Jacob, appears in the *AIP Advances*.

Provided by American Institute of Physics

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