

Metric predicts stock market 'flash' crashes

3 December 2010, By Linda Glaser

The May 6, 2010, stock market crash briefly erased almost \$1 trillion in value and plunged the Dow Jones Industrial Average into its biggest intraday fall ever. The market recovered most of its losses within the hour, but the crash left the financial world reeling.

This kind of "flash crash" is now predictable, and possibly preventable, thanks to a new formula developed by David Easley, the Henry Scarborough Professor of Social Sciences and chair of the Department of Economics, and Maureen O'Hara, the Robert W. Purcell Professor of [Finance](#) at the Johnson School, in collaboration with Marcos López de Prado, head of high frequency futures at Tudor Investment Corporation.

The new so-called volume-synchronized probability of informed trading (VPIN) [metric](#) looks at the imbalance of trade relative to the total volume of the market. It identifies flow toxicity, which Easley and O'Hara have been researching for about 20 years.

"Flow toxicity refers to the risk that liquidity providers face when trading with traders who have better information than they do," explained Easley. The flow of orders "is considered toxic when traders are selling when they'd rather be buying, and buying when they'd rather be selling."

Flash "events" -- short-term illiquidity crises in the market -- occur when market makers suddenly stop trading in response to a high level of flow toxicity, resulting in a sudden drop of prices.

"All morning long on May 6 order flows were becoming increasingly unbalanced, and volumes were huge," said O'Hara. "An hour or more before the flash crash our measure hit historic levels."

The VPIN could prevent future flash crashes by giving market regulators warning of flow toxicity early enough that they could slowly adjust the market, said Easley.

The metric could also give traders a way to hedge the risk of flash crashes, so that they don't have to be as concerned with the value of their inventory plummeting. "We believe that's what caused so many of the high frequency market makers to get out of the market during the flash crash," said Easley. "They were taking huge losses, and they didn't know exactly what was going on. They reached position limits so they quit. And if they could have hedged that risk, perhaps that wouldn't have happened or the results wouldn't have been so severe."

O'Hara serves on the Joint Commodity Futures Trading Commission-Securities and Exchange Commission (CFTC-SEC) Advisory Committee on Emerging Regulatory Issues established after May 6. "One of the problems that regulators face now is that markets are so fast that regulating after the fact is really too late," she said. "One of the advantages of our measure is that it is forward looking, so it could be a useful tool." Both the CFTC and the Financial Industry Regulatory Authority [economic](#) advising board have expressed interest in the VPIN. Private firms, such as Tudor Investments, have also used O'Hara and Easley's research to develop trading algorithms for high-frequency markets.

"Research on these things is extremely important because when markets falter the whole economy is affected," said O'Hara, who also studies market fragmentation and information flow to traders.

Easley, who is also a member of the Department of Information Science, recently co-authored "Networks, Crowds and Markets: Reasoning About a Highly Connected World" with computer science professor Jon Kleinberg. The book takes an interdisciplinary look at the new science of networks.

Provided by Cornell University

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