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Quantifying reflexivity in financial markets: Toward a prediction of flash crashes

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Abstract

This introduces a measure of activity of financial markets that provides a direct access to their level of endogeneity. This measure quantifies how much of price changes are due to endogenous feedback processes, as opposed to exogenous news. For this, we calibrate the self-excited conditional Hawkes model, which combines in a natural and parsimonious way exogenous influences with self-excited dynamics, to the E-mini S&P 500 futures contracts traded in the Chicago Mercantile Exchange from 1998 to 2010. We find that the level of endogeneity has increased significantly from 1998 to 2010, with only 70% in 1998 to less than 30% since 2007 of price changes resulting from some revealed exogenous information. Analogous to nuclear plant safety measures concerned with avoiding "criticality," our measure provides a direct quantification of the distance to criticality as the limit of diverging trading activity in the absence of any external driving.

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