Measuring Global Systemic Risk: *What Are Markets Saying about Risk?*

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Extreme market movements, especially in recent years, have prompted our efforts to better understand the complexities of market dynamics. This article seeks a better understanding of the features that characterize market environments through time. Specifically, we first demonstrate how market distress impacts return distributions. We then propose a global systemic risk indicator that jointly connects market conditions across asset classes using a multivariate failure model. The systemic risk barometer we devise determines how a set of complex, interconnected attributes coordinate in a way that describes turbulent market environments and the likelihood that markets are either in, or entering, a crisis phase. By combining high-frequency information that measures changes in key variables across time and across markets, our risk hazard model yields valuable insight into the changing nature of market risks over time, both within and across markets.

The model has important implications for portfolio risk management decisions. By taking into account skewness and kurtosis—moments of the distribution of returns beyond mean and variance—our nonlinear model framework is less restrictive than traditional methods, which depend on returns to follow a Gaussian process. One practical application of the model is that it provides a monitoring device for market instability and portfolio vulnerability.[1] In this sense, investors are able to act before the iceberg is under the ship's keel. The result is a dynamic technique that allows investors to proactively manage portfolio risk.

As suggested by Waldrop [1992], Sullivan [2008], and Bookstaber [2007], among others, global capital markets have become increasingly complex, interconnected, and dynamic, and they will almost certainly continue to jump, sometimes abruptly, from state to state, a characteristic of fat tails in the distribution of returns. Risk management and portfolio construction techniques must therefore evolve to accommodate a wider array of possible outcomes. With this effort, we hope to provide a framework that can better illuminate the changing nature of risk during crises in order to help guide and manage risk.

DISRUPTIVE EVENTS AND FAT-TAILED DISTRIBUTIONS

It is well understood that financial markets occasionally experience abrupt and sometimes severe disruptions. As a consequence, market returns are arguably more appropriately modeled using heavy-tailed, or fat-tailed, distributions rather than Gaussian (normal) or even log-normal distributions. Risk models, such as traditional Value at Risk (VaR), often fail to predict the duration and magnitude of extreme losses because they are parametrically ill-suited to that task. Symmetric, two-parameter densities do not admit the extreme