



# ASSET ALLOCATION

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## Measuring Global Systemic Risk: What Are Markets Saying About Risk?

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Systemic market events arise with increasing frequency in our complex, adaptive and highly interconnected markets. Distributions of returns in these markets exhibit characteristics that are particularly ill-suited to the standard Value at Risk methods.

Appealing to extreme value theory, we model the incidences of extreme losses witnessed recently across various global markets. Specifically, we generate maximum likelihood estimates of the Generalized Extreme Value and Generalized Pareto distributions and show how risk migrated further into the tails of these distributions as the financial crisis unfolded after the collapse of Lehman Brothers in September of 2008.

We then extend our analysis to a multivariate framework using hazard models to track the instantaneous risk that returns will fall into the extreme region of the tail conditional on movements in underlying risk factors such as market volatility, liquidity and credit risk. Finally, we use a logistic model to estimate the probability of systemic risk — the joint probability that returns across markets simultaneously cross the threshold into the left tail.

In sum, we present evidence of parametric shifts toward more extreme downside risks across many asset classes during the crisis with sharply rising hazards that are sensitive to market volatility, changes in liquidity, and credit risk.

Additionally, we present a barometer of systemic risk, also conditional on these same risk factors. We believe that these three models offer a potentially useful framework for monitoring risk as well as for conducting sensitivity and scenario analyses.

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