In 1987, automated trading programs shoved the market off a precipice. In 2008, a liquidity crisis brought the global financial system to its knees. Associate Professor Rama Cont, who uses probabilistic methods to model financial markets, has studied such system-wide discontinuities for more than a decade. His research on market discontinuities and systemic risk has made him a valued contributor in redesigning financial markets to reduce the impact of major shocks.

“When an epidemic spreads by contact and you cannot vaccinate the whole population, you have to prioritize vaccination resources to prevent further spread. We ask similar questions about market mechanisms that could lead to a financial meltdown.”

Cont takes a system-wide view of financial markets. “We cannot understand why several banks failed simultaneously in 2008 by looking at individual bank portfolios,” he said. “Instead, we must look at the flow of funds and assets in a network of interlinked portfolios.” A theoretical physicist by training, he uses the mathematical language of science to analyze financial networks and identify where they are prone to breakdowns.

In the past, Cont said, regulators promulgated rules that restricted the behavior of individual institutions. “Now, they are trying to look at the market as a whole and assess risks in the entire system. Most markets evolved spontaneously from traders’ needs. Some degree of intervention that strengthens their weakest links can make them less vulnerable to disruption,” he said.

Cont believes clearinghouses can strengthen the system by acting as intermediaries for trades. They would require trading parties to register their transactions. This would increase market transparency about the price – and risk – of derivatives and other instruments that traded at wildly varying prices in the past.

Clearinghouses would also require deposits on all trades. The amounts would rise as institutions take on more risk. The deposits would act as brakes on risk and help compensate for losses if a party defaulted.

Cont is applying his systemic approach to risk management to the design of new derivatives clearinghouses. He is one of the two academics collaborating with the Market Transparency Working Group, a panel of industry officials and regulators charged with redesigning over-the-counter derivatives markets.

“Some people thought that after the market crash, financial engineering was finished. Instead, it raised awareness about the need for rigorous methods for managing risk,” Cont said. “More than ever before, quantitative modeling is in demand now.”


Modeling Systemic Risk in Financial Networks

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