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**“Why and when is risk diversification undesirable?”**

**Abstract:** Before the financial crisis in 2007-2008, the general expectation was that everyone can lower individual risk by risk-sharing, and therefore the entire system may become more stable. Obviously something went wrong in 2007-2008, and questions were raised in economics regarding the opposite effect: it may be possible for a system to have high systemic risk while every agent in this system perceives low individual risk.

This phenomenon will be explained by considering a banking system as a mean-field model. In this model, a system failure is considered as a rare event and its probability can be computed by large deviations while the individual risk is calculated by the central probability analysis. On the one hand, the central probability analysis shows that as long as the system is stable, any individual can accommodate a high external risk and keep individual risk low by risk-sharing. On the other hand, the overall system is not always stable; the large deviation analysis shows that the tail probability of a system failure will increase if the individuals take on, and diversify, higher external risk.