The Eisenberg-Noe Paradigm for Financial Systemic Risk

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Financial Systemic Risk (FSR), the risk that large parts of the global financial system become vulnerable to domino-like cascades of failures, has been a topic of intense research in the years since 2008. This minicourse is intended to show how mathematical tools can be developed that begin to address the enormous complexities that underlie the global financial system. While for a variety of reasons predicting systemic risk is out of reach of researchers and regulators, I believe we have made significant progress in understanding the main mechanisms that will likely be involved in future systemic events. Following an extensive review of features believed to be essential aspects of FSR, the minicourse will focus squarely on the Eisenberg-Noe model published in 2001. This is an extremely stylized model of a network of financial institutions with their balance sheets, with directed edges that represent significant debtor-creditor exposures. It asks how these exposures can be fairly resolved in the event that one or more banks fail on their obligations. I think of EN 2001 as the "Black-Scholes model" of FSR. While it cannot be taken seriously as a representation of reality, its elegant mathematical structure provides a framework, language and concepts that have advanced the subject to the next level. In particular, its suggestion that a crisis "cascades" down to a "cascade equilibrium" that can be represented as a fixed point of a non-linear equation is a tremendously useful idea that links all aspects of systemic risk.

The remainder of the minicourse will explore ways the EN paradigm can be adapted to help us understand other channels that we imagine will be activated during any fully developed financial systemic crisis. We will address a diversity of topics, such as funding liquidity cascades, asset fire sales, and bank panics. Finally, we will consider how what we've learned can be relevant to pragmatic operational questions such as how to measure risk in real systems, how to understand macroprudential stress testing, and what it means to be a

SIFI (systemically important financial institution).