

A Network Approach to Interbank Lending and Systemic Risk

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The recent global financial collapse has highlighted the need for a more complete understanding of systemic risk within financial markets, and particular attention has been devoted to the risk stemming from the interconnectedness of banks and other financial entities. We intend to study models of banks with linked balance sheets forming a weighted directional network where edges correspond to interbank assets and liabilities. The study of systemic risk in financial networks will first be addressed using traditional static methods of stress tests, in particular to characterize the emergence of cascading failures stemming from a single bank default. With this approach we will also study the effects of different network topologies on contagion, focusing in particular on the differences between homogeneous and heterogeneous degree distributions. After exploring the static model, we will begin to create a more realistic model in which consumer deposits, interbank loans, external assets, investments, prices, and interest rates are all dynamic and bank assets, liabilities, and investment opportunities are heterogeneous. This model will help us understand economic cycles in which bank assets grow through investment but then fluctuations in assets/liabilities produces a small number of bank defaults which cause a liquidity shortage and eventually propagate to systemic collapse. Through these analysis we hope to explain the robust yet fragile nature of the global financial system, and the fact that banks seeking to minimize their individual risk can inadvertently increase the risk of failures at the systemic level.