Default Cascades in Inhomogeneous Financial Networks

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Abstract

Propagation of balance-sheet or cash-flow insolvency across financial institutions may be modeled as a cascade process on a network representing their mutual exposures. We derive rigorous asymptotic results for the magnitude of contagion in a large financial network and give an analytical expression for the asymptotic fraction of defaults, in terms of network characteristics. Our results extend previous studies on contagion in random graphs to inhomogeneous directed graphs with a given degree sequence and arbitrary distribution of weights. We introduce a criterion for the resilience of a large financial network to the insolvency of a small group of financial institutions and quantify how contagion amplifies small shocks to the network. Our results emphasize the role played by 'contagious links' and show that institutions which contribute most to network instability in case of default have both large connectivity and a large fraction of contagious links. We then allow for random recovery rates for the exposures to defaulted banks and give sufficient conditions such that the size of first order cascade due to contagious links in different networks to be small.

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