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A Study of Contagion in the Financial System from the Perspective of Network Analytics

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Abstract

The increase in the frequency and scope of financial crises has made the stability and robustness of the financial system a major concern in the field of finance worldwide. Due to the interconnectedness between institutions, the negative effects of financial crises spread through the financial system in a process referred to as financial contagion. In this study, we focus on a financial system in which large numbers of financial institutions are connected by direct balance sheet linkages through their lending-borrowing relationships. We mainly focus on modeling and analyzing financial contagion from a network analytics perspective. First, we model the financial system and the mechanism of contagion by introducing the concepts of exposure matrix, book value, market value and liquidation cost. Second, we propose a simple contagion algorithm based on this modeling process. Third, we study the effects of the financial system's heterogeneity on the magnitude of financial contagion by applying the proposed algorithm. The level of heterogeneity is measured by the diversification of exposure ratio and the extent of network connectivity. According to the results of our comprehensive numerical simulation, we conclude that an increase in heterogeneity has a significant influence on the stability of the financial system. Our study has significant implications for the practice of financial regulation and surveillance.

Keywords: Financial Contagion; Financial System; Network Analytics; Systemic Risk; Financial Stability.

1. Introduction

In recent years, the increasing frequency and scope of financial crises has made the stability and robustness of the financial system a major concern for finance managers around the world. One crucial characteristic of these financial crises is the contagion effect (or avalanche effect) of distress and failure, which increases the potential for shocks to spread among a wide range of interconnected financial institutions. Although these institutions are not necessarily large in

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