

Topology of the interbank network under the Central bank reserves

Jae Wook Song[†] Bonggyun Ko[†] Woojin Chang[†]

[†] Department of Industrial Engineering, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul, Korea

E-mail: † {songjw87, kobg0707, changw}@snu.ac.kr

Abstract

This article extends the previous research on the interbank network topologies by accompanying the central bank's role in the interbank network system. Simulations on the interactive network composed of the central bank reserve and the interbank lending flows informed various topologies in different setting of the interbank network and also explain the relationship between the central bank reserve policy and the credit crunch condition in the market.

Keyword: Interbank network, Central bank reserves, Network centrality

1. Introduction

Topology of the interbank network has been one of the popular topics in econophysics research. Extending to the previous literatures [1,2,3,4], we propose a simple simulated economy of a banking network under the central bank reserves and analyzed the characteristics of the various types of interbank network topologies.

2. Modeling of Interbank Network

A simple economy is composed of one central bank, multiple commercial banks and connecting links.

2.1. Banks and liquidity phenomena

Commercial bank has a stylized balance sheet structure with assets, short-term customer deposits and equity. Each commercial bank deposits a reserve to the central bank and then loans or invests the rest of the customer deposits to the economy. The central bank stores the reserves from all commercial banks and supports a liquidity to the bank experiencing liquidity shortage.

A commercial bank is assumed to possess no liquidity in a balance sheet at the beginning of each period. A bank only receives a liquidity via idiosyncratic liquidity surplus(shortage). Liquidity surplus(shortage) is based on the randomly generated profit(loss) of the loan to the economy.

2.2. Interbank formation and simulation

At the beginning of each time t , two banks are randomly chosen and experience the liquidity phenomena. Liquidity shortage bank must solve the liquidity problem via its reserve or the loan from the surplus bank through interbank

network. If it fails, the bank defaults and possibly generates a serial defaults to the interconnected banks. we employed and implanted the fitness parameter from previous works to define the topology of the network [1,3]

3. Discussion

This study focused on the network topologies of the interbank network where the central bank works as a stabilizer during the liquidity crisis. In order to search for revealing aspects, we employed various methods for network centrality measure [4] such as degrees, closeness, betweenness and Bonachi's centrality by altering key parameters of the model: reserve ratio and fitness. Simulation results show that the different topology exists in each setting of the parameters and yield the insight of relationship between the central bank reserve policy and the credit crunch condition in the credit market.

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