

# TRANSACTION NETWORK IN JAPANESE INTERBANK MONEY MARKETS

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Banks and other financial institutions manage their temporal shortage and surplus of their funds through interbank money markets. The markets compose central parts of financial systems in every country and include a short term money market as a target of monetary policy that a central bank, in general, aims to control its interest rate. The structure and function of the interbank money markets, therefore, are of concern to efficiency and stability of financial system and to operation of monetary policy.

Money flows in Japanese interbank markets had changed considerably since the end of 1990s mainly due to i) floods of liquidity under a very loose monetary policy, ii) an introduction of more secure settlement system operated by Bank of Japan, and iii) entry of new participants in the markets. We examine the structural change in the main interbank market, namely “call markets”, applying two analysis methods to transaction data reproduced from settlement records in the BoJ Net, the largest settlement system in Japan. The first approach with network analysis investigates static structure of money transaction network in the call markets in comparison of the networks before and after the structural change. The second one focuses on dynamics of the network using simulation analysis in which omitting a certain type of money transfer leads to shortage of money in the recipient of the transfer and makes the recipient cease his/her payments to the others. The network with information on transaction amounts as well as directions gives us to identify propagation pass of negative shocks such as default and delay of money transfer.

Empirical works show that the shape of network had changed from hub-and-spoke structure to decentralized one. Close studies on the latter reveal that it takes a double shell structure with a core and peripheries. The core network is composed of primary financial institutions with highly dense network close to a complete network, while the peripheries have non primary institutions which own a few links to the core, that is, they transact with a few specific institutions in the call markets. In addition, they are locally segmented and form many periphery groups around the core. Although the whole network possesses a small world network property of high clustering and short distance among all nodes with sparse density in average, detailed structure described above are more crucial for the stability of the call markets with respect to robustness against negative shocks. Some types of shocks might be absorbed in the process of shock propagation by financial institutions with a large amount of funds, but other one might trigger consecutive defaults of money transfer and result in the worst case that the defaults diffuse into the whole network. Since static analysis cannot handle the dynamic phenomena depending on the structure of network and types of shocks, we run a simulation of settlement under a given transactions in a specific date. The simulation exhibits how an initial shortage of money causes chain reactions and which institutions play key rolls to prevent the propagation of default.

**Keywords**

call market, network analysis, core and periphery, propagation of default, financial stability

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