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Market Liquidity and Systemic Risk of Government Bond Markets: Network Analysis and Agency Based Model Approach

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Abstract

Recently, the market liquidity of government bond markets has been paid more attention by the market participants, central bankers and policymakers since the spikes of the interest rates have often been seen under the unconventional monetary easing. In this paper, we analyze the network structure of JGB (Japanese government bond) markets using the data from BOJ-NET (the Bank of Japan Financial Network System) and study how the network structures have changed after the QQE (quantitative and qualitative monetary easing). We also investigate systemic risk from the network perspective, through the event studies of fire sales and model simulations.

We find that JGB markets have the hierarchical structure of cores and peripheries, and after the QQE the networks have changed in short-term and long-term markets respectively. In T-Bill market, the number of participants and links drastically decreased not only of core-peripheries pairs but also of core-core pairs, however, after January 2015, the number of links of core-core pairs has gradually been recovering under the BOJ's lending scheme of the government bonds. On the other hand, there seems to be no structural change in long-term JGB market, but the number of links remarkably tends to increase at the time when the interest rate spikes. The event studies (so-called VaR [Value at Risk] shock in 2003 and the shock after QQE in 2013) show that the cores sell their bonds firstly and the peripheries buy them. It is interesting that the number of links rapidly increased especially of core-periphery pairs, although the purchase volume of each periphery rapidly decreased. This implies that the cores needed to search new peripheries for selling their bonds because the peripheries tended to buy the bonds more risk-sensitively than usual. Finally, we propose the agency based model which replicates the fire sales of securities in financial markets.

Keywords: Market Liquidity; Government bond markets; Quantitative Qualitative Easing; Network analysis; Systemic risk; Agency based model

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