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

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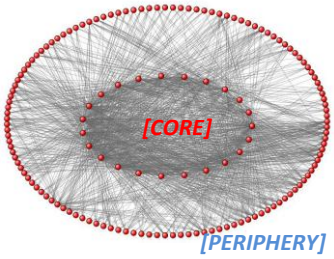
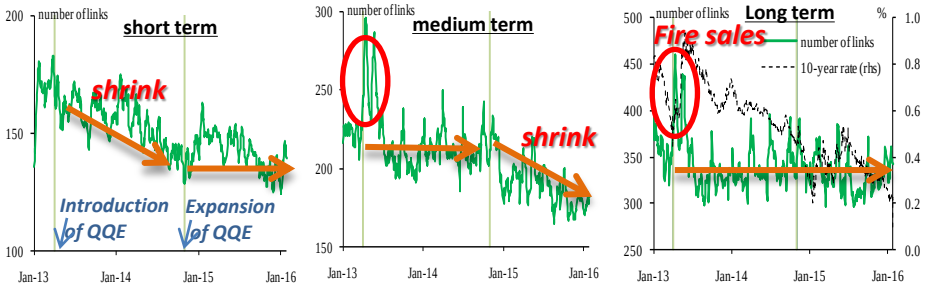
The networks of JGB markets have ***core-periphery structures***.

## Network Structure of JGB Markets

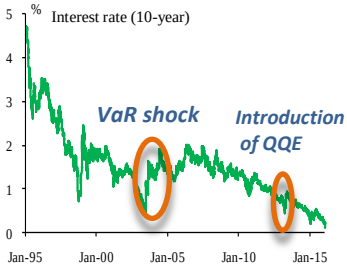



## How QQE affected the network structures?

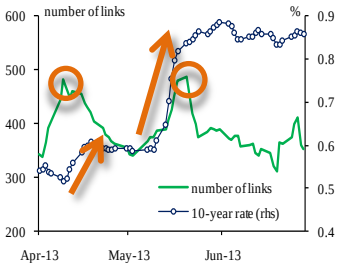



***Event Studies of Fire Sales*** shows that ***Cores needed to search new peripheries*** to sell their bonds, and peripheries bought them ***because price was discounted***.

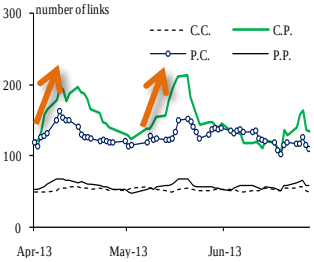
### Fire Sale Events in JGB market



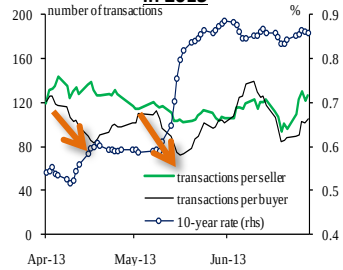

### Number of links in 2013




### Number of links (detail) in 2013




### Transaction volume per Player in 2013

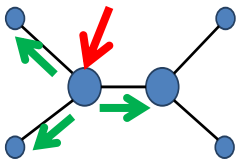



→ *The same results are obtained in the case of VaR shock.*

***Systemic Risk Simulation Model*** show that not only the capital adequacy of market participants but also ***the network structure are important for financial market stability***.

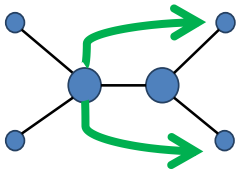
### Systemic risk simulation model

**i) Hit VaR-constrain**



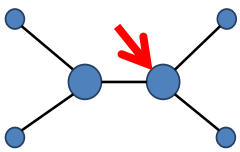
**ii) Firstly, players who are directly connected purchase to a certain level.**

**iii) in the case that selling pressure of player in VaR-constrain is not satisfied, go to step iv)**



**iv) Then, players who are not connected purchase. In this situation, the price declines additionally because of bargaining power.**

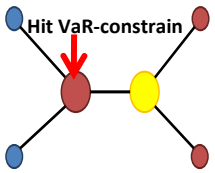
**v) Due to this drop in price, hit VaR-constrain**



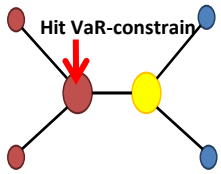
**vi) FIRE SALES!**

### The results

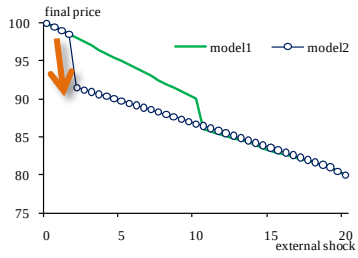
**Simple example（N = 6、model 1 v.s. model 2）**




***Peripheries connected to red core have enough capacities***




***Peripheries connected to red core have little capacities***




• **When peripheries connected to red cores have little capacities to absorb shock, the price declines with small external shock.**

→ *The same results are obtained if number of player =100)*