## Mean Field Games with Heterogeneous Groups:

## **Application to Banking Systems**

<u>孫立憲</u>1

1國立中央大學

## Abstract

We study the system of heterogeneous lending and borrowing based on the relative average of log-capitalization given by the linear combination of the average within groups and the ensemble average and describe the evolution of log-capitalization by a system of coupled diffusions. The existence of closed- and open-loop Nash equilibria for the two-group case is guaranteed by the solvability for the coupled Riccati equations. Both equilibria consist of the mean-reverting term identical to the homogeneous game and all group averages owing to heterogeneity. The comparison of the obtained open-and closed loop Nash equilibria is also discussed. Finally, in financial implications, we study the influence of the incentive and relative parameters and also the number of banks on the corresponding liquidity rates through numerical analysis.

Keyword: Systemic risk, inter-bank borrowing and lending system, heterogeneous group, Nash equilibrium, Mean Field Game