
Optimal Control for financial system with default contagion

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Abstract

Our work lies in the area of systemic risk in financial systems and focuses on the study of the tradeoff between financial contagion and benefit of connectivity.

We consider a financial network described as a weighted directed graph, in which nodes represent financial institutions and edges the exposures between them. The distress propagation is modeled as an epidemics on this graph.

We first study the optimal intervention of a lender of last resort who seeks to make equity infusions in a banking system prone to insolvency and to bank runs, under incomplete information of the failure cluster, in order to minimize the contagion effects.

Our study provides some insight on the relation between the value of a financial system, connectivity and optimal intervention.

More precisely, we consider a stylized core-periphery financial network in which links lead to the creation of projects in the outside economy but make banks prone to contagion risk. The controller seeks to maximize, under budget constraints, the value of the financial system defined as the total amount of projects. Under partial information on interbank links, revealed in conjunction with the spread of contagion, the optimal control problem is shown to become a Markov decision problem.

We determine the optimal intervention policy by using dynamic programming. Our results show that the value of the system depends on the connectivity in a non-monotonous way: it first increases with connectivity and then decreases with connectivity.

Moreover, for highly connected systems, it is optimal to increase the rate of intervention in the peripheral banks rather than in core banks.

In the second part of the talk, we study the magnitude of default contagion in a large financial system, in which banks receive benefits from their connections, and investigate how the institutions choose optimally their connectivities by weighting the default risk and the benefits induced by connectivity.

*Speaker

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