Abstract: "Mean Field Games and Systemic Risk"

We propose a simple model of inter-bank borrowing and lending where the evolution of the log-monetary reserves of N banks is described by a system of diffusion processes coupled through their drifts in such a way that stability of the system depends on the rate of inter-bank borrowing and lending. Systemic risk is characterized by a large number of banks reaching a default threshold by a given time horizon, and computed using large deviation estimates.

Our model incorporates a game feature where each bank controls its rate of borrowing/lending to a central bank. The function to be minimized reflects the desire of each bank to borrow from the central bank if its monetary reserve falls below a critical level or lend if it rises above this critical level which is chosen here as the average monetary reserve. Borrowing from or lending to the central bank is also subject to a quadratic cost at a rate which can be fixed by the central bank/regulator.

We compute explicitly a Nash equilibrium for the finite players game and we show that in this model the central bank acts as a clearing house, adding liquidity to the system without affecting its systemic risk. We also study the corresponding Mean Field Game in the limit of large number of banks in presence of a common noise.

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