

# Systemic Risk and Centralized Clearing of OTC derivatives: A Network Approach

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## Abstract

In September 2009, G20 paved the way for the mandatory central clearing of over-the-counter (OTC) derivatives, which came into effect in December 2012. This new regulation involves a *central clearing counterparty (CCP)*: a financial institution acting as an intermediary between buyers and sellers of OTC derivatives. The rationale behind this regulation is that, by removing bilateral agreements, CCPs will absorb the risks facing individual firms and act as a cushion in the event of market stress. However, this increases the systemic importance of CCPs within the financial system.

In this paper, we analyze the effect of central clearing of OTC derivatives on the financial system stability by means of network simulation approach. We build simple but realistic networks of financial firms, connected by bilateral links and via a single CCP. We simulate balance sheets of firms and introduce shocks to the system to simulate defaults. The default mechanism and shock absorption in presence of the CCP is modeled in the way that maximally reflects the reality. We run Monte Carlo simulations of the networks' evolution and obtain their default and contagion characteristics. We analyze the likelihood of the CCP's default and compare the stability of the financial network with and without the CCP for various network configurations and market scenarios.

We find that, for a homogeneous financial system, the presence of the CCP increases the network's stability and the probability of the CCP's failure is virtually zero. However, for non-homogeneous financial networks, we find the opposite effects: the presence of the CCP leads in this case to a disproportionately large probability of contagion defaults, especially for smaller financial firms. Furthermore, we find that the probability of the CCP failure is substantial in this case, regardless of the capitalization requirements. In all, we find that non-homogeneous networks exhibit greater instability and contagion in the presence of the CCP: a worrying fact, given that any real financial system is highly inhomogeneous in terms of size and concentration.

**Keywords:** central clearing, random networks, core-periphery structure, OTC derivatives, contagion.