

Agent-Based Risk Assessment Model of the European Banking Network¹

Tomáš Klinger^a

Petr Teplý^b

Abstract

The 2007-2009 financial crisis highlighted the vulnerabilities in the global banking system and shifted research focus to the study of systemic risk. Network theory and agent-based simulation have been used to investigate complex banking systems that would be difficult to model analytically. Nevertheless, the difficulty of obtaining accurate data, as well as the computational complexity of running such models, are limiting their ability to capture the complexities that are emerging in real-world scenarios. In this paper, we use an agent-based simulation combined with innovative calibration techniques in order to model the European banking system as accurately as possible. We extend the existing network approach by adding the ability to model banks of different sizes as well as the detailed connections of individual banks across countries. Our model consists of 286 banks in 9 European countries. We believe that the experiments in this model provide valuable insights into systemic risk within the European banking system as well as useful guidelines for creating new policies.

Keywords: C63, D85, G21

JEL Classification: *agent-based models, bank, contagion, network models, systemic risk*

¹ We would like to thank Jan Hanousek and Jiří Trešl for valuable remarks and guidance. Financial support from the Czech Science Foundation (project no. GA 17-02509S), University of Economics in Prague (project no. VŠE IP100040), and the CERGE-EI Foundation under a program of the Global Development Network is gratefully acknowledged. All opinions expressed are those of the authors and have not been endorsed by CERGE-EI or the GDN.

^a Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague, Opletalova 26, 110 00 Prague 1, Czech Republic

^b Department of Banking and Insurance, Faculty of Finance and Accounting, University of Economics in Prague, Winston Churchill Square 3, 130 67, Prague 3, Czech Republic