

# The Stability of Networks

## with Direct and Indirect Connections

Kunio Kawamata<sup>†</sup>      Yasunari Tamada<sup>‡</sup>  
*Keio University*              *Keio University*

October 2004

### Abstract

This paper discusses the nature of optimal and stable networks of the link formation game. Players are directly or indirectly connected in each network, and players' incentive to form new links depends upon the relative importance of direct and indirect links. We examine the value of networks for each player by employing the Shapley value. We will then illustrate the specific forms of the stable and optimal networks. Especially, we will show that characteristic networks such as the star or circle form networks can be both optimal and stable.

---

<sup>†</sup>Department of Economics, Keio University, 2-15-45 Mita, Minato-ku, Tokyo, 108-8345, Japan.  
Email: [kkawam@econ.keio.ac.jp](mailto:kkawam@econ.keio.ac.jp).

<sup>‡</sup>Department of Economics, Keio University, 2-15-45 Mita, Minato-ku, Tokyo, 108-8345, Japan.  
Email: [tamada@econ.keio.ac.jp](mailto:tamada@econ.keio.ac.jp).