The Structure and Evolution of Buyer-Supplier Networks

Takayuki Mizuno[1,2,3,5,6,*] Wataru Souma[4] Tsutomu Watanabe[5,6]

1 National Institute of Informatics, Tokyo, Japan
2 Department of Informatics, The Graduate University for Advanced Studies, Tokyo, Japan
3 PRESTO, Japan Science and Technology Agency, Tokyo, Japan
4 College of Science and Technology, Nihon University, Chiba, Japan
5 Graduate School of Economics, University of Tokyo, Tokyo, Japan
6 The Canon Institute for Global Studies, Tokyo, Japan
* E-mail: mizuno@nii.ac.jp

Abstract

In this paper, we investigate the structure and evolution of customer-supplier networks in Japan using a unique dataset that contains information on customer and supplier linkages for more than 500,000 incorporated non-financial firms for the five years from 2008 to 2012. We find, first, that the number of customer links is unequal across firms; the customer link distribution has a power-law tail with an exponent of unity (i.e., it follows Zipf's law). We interpret this as implying that competition among firms to acquire new customers yields winners with a large number of customers, as well as losers with fewer customers. We also show that the shortest path length for any pair of firms is, on average, 4.3 links. Second, we find that link switching is relatively rare. Our estimates indicate that the survival rate per year for customer links is 92 percent and for supplier links 93 percent. Third and finally, we find that firm growth rates tend to be more highly correlated the closer two firms are to each other in a customer-supplier network (i.e., the smaller is the shortest path length for the two firms). This suggests that a non-negligible portion of fluctuations in firm growth stems from the propagation of microeconomic shocks – shocks affecting only a particular firm – through customer-supplier chains.