

Firms growth and network

Yoshi Fujiwara

Network Informatics Laboratories, ATRA, Kyoto 619-0288, Japan

Corresponding author e-mail: yfujiwar@atr.jp

Flow and stock are fundamental concepts in economics. They refer to a certain economic quantity over a given period of time and its accumulation at a point in time respectively. Firms income and size can be regarded as the flow and stock of each firm in a giant dynamical network, which is open to various economic activities. We will talk about our recent findings about firms growth and network.

1. By employing exhaustive lists of japanese and european firms, we show that the upper-tail of the distribution of firm size follows Pareto-Zipf, and that in this region their growth rate is independent of the initial value of size (Gibrat's law). In addition, detailed balance holds in the region; the empirical probability for a firm to change its size from a value to another is statistically the same as that for its reverse process in the ensemble. We prove that Pareto-Zipf law follows from Gibrat's law under the condition of detailed balance, as well as non-trivial relation between the positive (growth) and negative (shrink) sides of the growth distribution.

2. Firms are actors each of which has, in a giant and clustered network, a role of buyers, sellers and value-adding at a same time. That is, each firm buys products or services from upstream, puts added-value on them and sells to downstream constituted by other firms and consumers. The network has hierarchical clusters or structures on which added-value of products and services makes a multitude of flow.

By employing japanese data of such network, we analyze structures from the viewpoint of social network analysis and complex network analysis. We also make discussion about the implication of our findings to macro-economic growth and fluctuations.