Law of firm growth and death rate

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Abstract

By employing Compustat, we find that large amount of listed firms in the database follow the power-law growth. At the same time, by investigating around one million Japanese firms in the Bureau van Dijk's database (ORBIS), we also confirm that firms averagely undergo the exponential growth with very small exponents. Furthermore, we point out that the death rate of the firms does not depend on the firm sizes.

Keyword: Power-law growth, Exponential growth, Firms

Power-law distributions of firm size variables x (sales, assets, and number of employees, for instance):

$$P(x) \propto x^{-\mu-1} \tag{1}$$

have been observed in many annual years and in many countries. The emergence of the power law is described by a stochastic process and is confirmed by using computer simulations.

Several years ago, an interesting study was reported. It takes several hundred years that firm size variables attain to the power-law ranges merely by random stochastic accumulation. This is contrary to what is found in the data [1]. By using notional blueprints owned by firms, the author has presented an economy in which firms grow rapidly in the young age and lose the speed after the rapid initial growth. In the model, the large firms in the power-law range emerge in one hundred years.

The author's finding is significant. In the model, however, the two-phase pattern of growth is not specified clearly. In this paper, we insist that the curve of growth is approximated by using one parameter γ_i as follows:

$$x_i(T) \propto T^{-\gamma_i} . \tag{2}$$

Here, T is firm age from the incorporation and i is an index for an individual firm. This power-law growth is firstly proposed in the investigation about the number of publications of scientific papers [2]. By employing Compustat, we confirm that large amount of firms in the database follow the power-law growth (2). Figure 1 depicts sales growths of 5 major firms in Compustat.

Of course, the power-law growth does not continue in the whole period, and there exist a lot
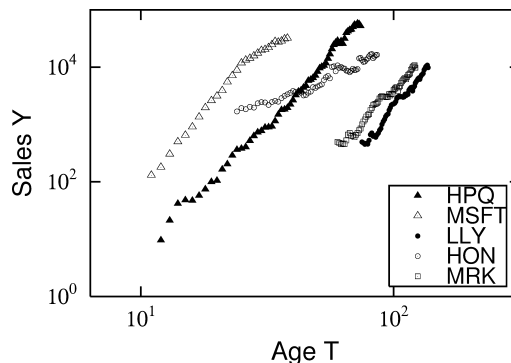

Figure1: Power-law growths of sales Y are observed.

of firms which do not obey the power law at all. By employing around one million Japanese firms in the Bureau van Dijk's database (ORBIS), we also find that firms averagely undergo the exponential growth with very small exponents. Our statement is that power-law growth which certain firms experienced brings firms to the power-law ranges.

Furthermore, by using the database ORBIS, we point out that the death rate of the firms does not depend on the firm size.

References

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