Erkki K. Laitinen • Professor • University of Vaasa

Stochastic Growth Processes in Large Finnish Companies: Test of Gibrat's Law of Proportionate Effect

The purpose of the study is to analyse the growth processes, as well as the relationship between size and growth, in large Finnish firms in 1987–1995. This time period is very interesting because of radical changes in business cycles in that time. The study is concentrated on growth as a stochastic process and largely rested on the test of Gibrat's law of proportionate effect, which tells that growth is a random process and independent of the size of the firm. If Gibrat's law holds, there is no optimum size for the firm with respect to growth. If the growth of firms does not include the birth-and-death process, Gibrat's law generates a lognormal distribution and the variance of logarithmic size will continuously increase in time (pure Gibrat's law). However, if there is a linear negative dependence between the logarithms of growth and size, Gibrat's law will generate a lognormal distribution but with a constant variance of logarithmic size (Kalecki's model). If the mathematical expectation of increments in the stochastic transition matrix is negative, Gibrat's law generates a Pareto distribution (Champernowne's model). The incorporation of the birth-and-death process in Gibrat's law leads to a Yule distribution when there is a constant rate of birth (Simon's model) or serial correlation between periodic growth rates (Ijiri-Simon's model). These properties of stochastic models gave an interesting basis for the empirical study.

The data for the present study were taken from the ETLA data base including financial statements from the 500 largest firms in Finland. However, it was required that the financial statements for the firm to be chosen had to be available for the entire period of 1987–95. All the firms that were involved in large mergers during the years 1987–1995 were excluded from the sample. These restrictions meant that only 157 firms out of 500 were accepted for the sample. The research period was split into two sub-periods, 1987–1991 and 1991–1995. The size of the firm was measured by nominal net sales. The distribution of the sample firms among industries was very diversified. Moreover, the data consisted of large and medium-sized Finnish firms with wide variation in size. The size distributions and growth processes were analysed by a number of methods. The most important methods were Markov transition matrices and regression analysis. Several measures of concentration were also applied (Hirschman-Herfindahl index, Gini coefficient, and concentration ratios) to analyse changes in the size distributions.

In general, the empirical results showed that the growth processes in large Finnish firms in 1987–1995 have operated in such a way that the concentration of net sales has been extremely stable. There are practically speaking no changes in concentration in the research period in spite of the radical changes in business cycles. The growth processes were almost similar in both sub-periods except that the growth was slower in the latter period due to the recession. There were no large differences in growth distribution between size classes. However, in the largest size class the growth seemed to be slower than in smaller classes. Moreover, the firms in the smallest size class tend to grow rather fast. These two phenomena contradicted with Gibrat's law and may have made it possible for concentration to stay stable over time. Consequently, there was observed a negative relationship between the growth and size but that the effect of size on growth was not very strong, except in very small and very large firms (compare with Kalecki's assumption). There was also a statistically significant negative relationship between the four-year growth rates. Thus, the results on the persistence of growth violated Gibrat's law and gave support to Ijiri-Simon's model. Finally, the results, on the one hand supported the stochasticity of growth but, on the other hand, gave also evidence of a dependence of growth on some financial ratios. This dependence may hold only for a small part of the population (a few of the largest firms) so that there is no statistically significant (linear) dependence.