Gibrat and Pareto-Zipf revisted with European firms

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Abstract

By employing exhaustive lists of large firms in European countries, we show that the upper-tail of the distribution of firm size can be fitted with a power-law (Pareto-Zipf law), and that in this region the growth rate of each firm is independent of the firm's size (Gibrat's law of proportionate effect). We also find that detailed balance holds in the large-size region for periods we invesitigated; 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. We prove that Pareto-Zipf law is equivalent to Gibrat's law under the condition of detailed balance. Furthermore, we also show that the distribution of growth rate possesses a non-trivial relation between the positive side of the distribution and the negative side, through the value of Pareto index, as is confirmed empirically. Related to these findings, we also mention about bankruptcy, especially Zipf's law for the distribution of debt when bankrupted, and life-time of firms.

This works is based on

• Yoshi Fujiwara, Corrado Di Guilmi, Hideaki Aoyama, Mauro Gallegati, Wataru Souma, "Do Pareto-Zipf and Gibrat laws hold true? An analysis with European Firms" *submitted*.

• Yoshi Fujiwara, "Zipf Law in Firms Bankruptcy" *submitted*.

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