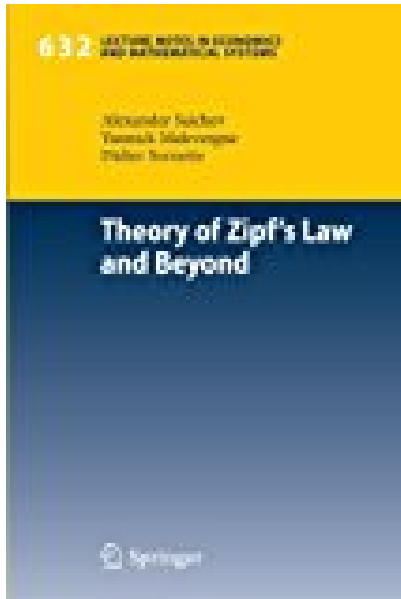


# Theory of Zipf's Law and Beyond Lecture Notes in Economics and Mathematical Systems

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## BOOK DETAILS

- Author : Alexander I. Saichev
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## BOOK SYNOPSIS

Zipf's law is one of the few quantitative reproducible regularities found in economics. It states that, for most countries, the size distributions of cities and of firms (with additional examples found in many other scientific fields) are power laws with a specific exponent: the number of cities and firms with a size greater than  $S$  is inversely proportional to  $S$ . Most explanations start with Gibrat's law of proportional growth but need to incorporate additional constraints and ingredients introducing deviations from it. Here, we present a general theoretical derivation of Zipf's law, providing a synthesis and extension of previous approaches. First, we show that combining Gibrat's law at all firm levels with random processes of firm's births and deaths yield Zipf's law under a "balance" condition between a firm's growth and death rate. We find that Gibrat's law of proportionate growth does not need to be strictly satisfied. As long as the volatility of firms' sizes increase asymptotically proportionally to the size of the firm and that the instantaneous growth rate increases not faster than the volatility, the distribution of firm sizes follows Zipf's law. This suggests that the occurrence of very large firms in the distribution of firm sizes described by Zipf's law is more a consequence of random growth than systematic returns: in particular, for large firms, volatility must dominate over the instantaneous growth rate.

### **THEORY OF ZIPFS LAW AND BEYOND LECTURE NOTES IN ECONOMICS AND MATHEMATICAL SYSTEMS**

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