

## Size distribution of Portuguese firms

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### Abstract

It is known that the size distribution of firms follows a power law with an exponent that is always very close to unity. This is true for different countries, different time periods (associated with different periods of economic growth and recession) and even for different measures of firm size (sales, income, number of employees, assets, etc.) [1]. This striking universal feature of the so-called Pareto-Zipf law is still an unsolved and very puzzling question. Here we verify this universal behavior in the case of the largest Portuguese companies.

Another open problem is the validity of the Gibrat's law of proportionate effect that states that the growth rate of each firm is independent of its own size. We show that Gibrat's law does hold true in the Pareto regime of the size distribution of Portuguese companies and breaks down in the other region (due to the lack of sufficient data samples, we argue), thus confirming the literature's recent proposed relationship between these two laws [1], through the also confirmed detailed balance condition.

On the modeling side, we study a recently proposed [2] non-growth mechanism that generates the power law distribution when growth is not expected and the dynamics of the system is solely based on interactions between elements. We also present some possible generalizations of this model of additive preferential redistributions regarding the interaction strength and underlying network structure (extending it to the small-world topology).

## References

- [1] Y. Fujiwara, C. Di Guilmi, H. Aoyama, M. Gallegati, and W. Souma, Do Pareto-Zipf and Gibrat laws hold true? An analysis with European firms, *Physica A* 335, 197 (2004)
- [2] S. Ree, Power-law distributions from additive preferential redistributions, *Phys. Rev. E* 73, 026115 (2006).