Evidence for power-law tail of the wealth distribution in India

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Abstract

The higher-end tail of the wealth distribution in India is studied using recently published lists of the wealth of richest Indians between the years 2002–2004. The resulting rank distribution seems to imply a power-law tail for the wealth distribution, with a Pareto exponent between 0.81 and 0.92 (depending on the year under analysis). This provides a comparison with previous studies of wealth distribution, which have all been confined to Western advanced capitalist economies. We conclude with a discussion on the appropriateness of multiplicative stochastic process as a model for asset accumulation, the relation between the wealth and income distributions (we estimate the Pareto exponent for the latter to be around 1.5 for India), as well as possible sources of error in measuring the Pareto exponent for wealth.
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1. Introduction

More than a century ago, Pareto had observed that the income distribution across several countries (at least in the high-income range) follows a power-law [1], i.e., the probability density function of income I, $P(I) \sim I^{-(1+\alpha)}$, with the Pareto exponent α lying between 1 and 2. Pareto claimed that, in general, $\alpha \sim 1.5$. The power-law nature was also found to be true of wealth distributions, albeit with a different exponent. The two distributions are not completely unrelated, as those who are significantly

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wealthy also have incomes far higher than the average individual or household. However, the distributions of income and wealth cannot be simply connected, and each have to be measured independently for a particular society. The occurrence of a qualitatively similar distribution across widely differing geographical regions and economic development stages may be indicative of universal features of inequality in human societies. This has led to attempts at developing simple models for generating wealth distributions that are qualitatively similar to those empirically observed, with asset exchange interactions between agents [2–7]. To verify such models further empirical measurements of wealth distribution in different economies is essential.

Very recently, there have been a large number of empirical studies of the income distribution of several countries, with income being defined as the flow of wages, dividends, interest payments, etc. over a period of time. This can usually be inferred from income tax returns. The general consensus, based on these studies, is that at the low-income range the income distribution obeys a log-normal [8] or exponential [9,10] distribution, while the high-income end shows power-law behavior with widely differing Pareto exponents, which are different both in different countries, as well as in different periods for the same country (e.g., see Ref. [11]).

Unfortunately, not many studies have been done on the distribution of wealth, which consist of the net value of assets (financial holdings and/or tangible items) owned at a given point in time. The lack of an easily available data source for measuring wealth, analogous to income tax returns for measuring income, means that one has to resort to indirect methods. Levy and Solomon [12] used a published list of wealthiest people to generate a rank-order distribution, from which they inferred the Pareto exponent for wealth distribution in USA. Follow-up studies used similar techniques to infer the exponents for UK, France and Sweden [13,14]. Refs. [9] and [15] used an alternative technique based on adjusted data reported for the purpose of inheritance tax to obtain the Pareto exponent for UK. Another study used tangible asset (namely house area) as a measure of wealth to obtain the wealth distribution exponent in ancient Egyptian society during the reign of Akhenaten (14th century BC)[16]. Apart from the last mentioned study, all the other wealth distributions were for western highly-developed capitalist economies, and are thus of very similar societies. Observing the wealth distribution of a non-Western developing capitalist society, such as India, which until quite recently had a planned economy, will be not only instructive by itself but it will also provide necessary comparison with the previous studies.

The general feature observed in the limited empirical study of wealth distribution is that of a power-law behavior for the wealthiest 5–10% of the population, and exponential or log-normal distribution for the rest of the population. The Pareto exponent as measured from the wealth distribution is found to be always lower than the exponent for the income distribution, which is consistent with the general observation that, in market economies, wealth is much more unequally distributed than income [17].

In the present paper, we have observed that the high wealth limit of the Indian wealth distribution is consistent with a power-law having an exponent that ranges from 0.81 (2002) to 0.92 (2004). In the next section we describe the data sets used in