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A power law tail in India's wealth distribution: Evidence from survey data

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Abstract

This study uses survey data from India to examine the top percentile of the wealth distribution in India. Using nationally representative samples from two years, 1991 and 2002, a power law tail is found with a Pareto exponent ranging between 1.8 and 2.4. The tail is examined for three specific groupings: households in the rural areas, households in the urban areas and all households. The distribution of top households also appear to be regionally concentrated with states having the highest number of households in the top 1% in 1991 also generally having the highest number in 2002 as well.

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1. Introduction

Vilfredo Pareto, the first discoverer of a power law, suggested in his Cours d'Economie Politique that "in all countries and at all times the extreme distribution of income and wealth follows a power law behavior" [1]. Several studies have found thereafter empirical justification for a probability density function of the form $P(x) \sim Ix^{-(1+a)}$ for incomes across several countries, at high levels of income [2–4]. Verification of this property for the wealth distribution on the other hand has been sparser, especially in the case of developing economies.

Several reasons are given for this gap. Wealth is more difficult to measure consistently—especially across time—than income. Pareto's emphasis on the word "extreme" is also important because as Mandelbrot [5] argued, distributions follow a "weak Pareto law" and it is usually only the tail of the wealth distribution that is a power law (the rest of the body often obeys a log-normal or exponential distribution [3,6,7]). Many data sets do not provide an adequate number of observations from which to infer the shape of the probability density function, especially at the upper end of the distribution which makes it difficult to test for power laws. Finally, for developing countries in particular, there are often very few wealth surveys or other reliable data to measure wealth as noted in Ref. [8]. To examine whether the finding of a Pareto distribution in the upper tail is a

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universal feature of wealth inequality (as Pareto believed), or is more restricted to advanced capitalist economies continues to be an empirically unsettled question.

India, however is an exception to the general rule regarding the non-availability of survey micro data in developing economies. This study utilizes a consistently collected all-India survey with such data from two years, 1991 and 2002, to examine the extreme distribution of wealth. Earlier research [4] has found evidence for a power law distribution in wealth for the wealthiest 125 households in 2002–2004. These correspond to the top 0.0000001% of all households in India for 2003 since there were over 140 million households in that year. This study can be seen as expanding upon the earlier work; using the nationally representative decennial All India Debt and Investment Survey the paper finds evidence of power law distribution for a much larger tail, specifically in the top 1% of the surveyed population for both years.[1] In addition the data allows for a disaggregation of the data according to whether the household was from a rural area or an urban area. Several recent models have been developed which approximate observed wealth distribution by focusing on asset exchanges between connected agents [9–13]. To the extent that agents in the rural and urban sector interact primarily with other agents in the same sector, we may expect to find power law behavior within each sector separately.[2] This study finds evidence for such a hypothesis, with power law behavior being exhibited in the aggregate wealth distribution as well as for rural and urban wealth distributions alone.

The rest of this paper is set out as follows. The following section describes the data and provides some caveats as to their use. The next section provides the results-showing that in both years there is strong evidence of a power law tail. The Pareto exponent is found to be 2.44 and 2.04 for the rural and urban areas of India in 1991 and 2.27 for the overall wealth distribution. Equivalently, in 2003 the exponent is found to be 2.17, 1.85 and 2.00 for the three groupings, respectively. The rankings of top states according to the proportion of wealthiest households is shown to be relatively, stable. The final section concludes.

2. Data

The micro-data used in this paper are extracted from the All India Debt and Investment Survey (in 1991–1992 and 2002–2003) collected by the National Sample Survey Organization (NSSO). We focus on a standard measure of wealth: total household assets. The NSS Survey defines total household assets as comprising of ''physical assets like land, buildings, livestock, agricultural machinery and implements, non-farm business equipment, all transport equipment, durable household goods and financial assets like dues receivable on loans advanced in cash or in kind, shares in companies and cooperative societies, banks, etc., national saving certificates and the like, deposits in companies, banks, post offices and with individuals'' [17, p. 5]. As such the metric for wealth is much more broadly defined than in most other studies. In doing so, it allows for capturing the wealth of different agents whose wealth is comprised of different subcategories. Thus for example, the overall wealth of the urban wealthy households may be comprised of a greater proportion of fungible and liquid assets such as shares and deposits than the overall wealth of the rural wealthy (for whom wealth is primarily from land holdings).

The surveys were conducted in a two-stage stratified sampling procedure. The first stage units are villages for the rural areas and blocks for the urban areas, while the second stage units were households. For the 1991

[1]The choice of 1% is somewhat arbitrary, and the question of what constitutes the tail has been a source of contention in previous assessments as noted. The major reason to choose the top 1% as opposed to the top 5% or the top 10% was that the households in the top 1% were nearly completely unique in the level of their asset holdings. As one expands the tail to include those in the top 5% or top 10%, several households are found to have the same quantity of asset holdings. Whether this is due to the households actually possessing identical wealth or due to rounding off by the surveyors is unclear. This certainly creates difficulty in ranking households, and hence the top 1% is examined. However, as a visual consideration of Fig. 3 shows, there is substantial linearity even up to the top 40% of the wealth distribution.

[2]This assumption is drawn from the development economics literature on mobility. It has been recognized among development economists for some time that India displays very low geographical mobility for a country of its size and level of economic development. Migration out of rural areas among Indians has been shown in fact to have reduced between 1982 and 1999 [14]. Indeed a standard theoretical assumption made by empirical researchers on India often assumes little rural mobility(for e.g. [15,16]).