

ECONOMIC INEQUALITY FROM A STATISTICAL PHYSICS POINT OF VIEW

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ABSTRACT

Inequality is an important and seemingly inevitable aspect of the human society. Various manifestations of inequality can be derived from the concept of entropy in statistical physics. In a stylized model of monetary economy, with a constrained money supply implicitly reflecting constrained resources, the probability distribution of money among the agents converges to the exponential Boltzmann-Gibbs law due to entropy maximization. Our empirical data analysis shows that income distributions in the USA, European Union, and other countries exhibit a well-defined two-class structure. The majority of the population (about 97%) belongs to the lower class characterized by the exponential ("thermal") distribution, which we recently observed in the data for 67 countries around the world. In contrast, the upper class (about 3% of the population) is characterized by the Pareto power-law ("superthermal") distribution, and its share of the total income expands and contracts dramatically during booms and busts in financial markets. Globally, energy consumption (and CO₂ emissions) per capita around the world shows decreasing inequality in the last 30 years and convergence toward the exponential probability distribution, as expected from the maximal entropy principle. All papers are available at <http://physics.umd.edu/~yakovenk/econophysics/>.

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