Economic inequality from a statistical physics point of view

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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, the probability distribution of money among the agents converges to the exponential Boltzmann-Gibbs law due to entropy maximization. Our analysis of empirical data shows that income distributions in the USA and other countries exhibit a two-class structure. The lower class (about 97% of population) is characterized by the "thermal" exponential distribution, whereas the upper class (about 3%) by the "superthermal" Pareto power law. The total income share of the upper class expands and contracts dramatically during booms and busts in financial markets. We also found that global inequality in energy consumption and CO_2 emissions has been decreasing since 1980 (likely due to the globalization) and converging toward the exponential distribution. The decrease in global inequality stopped recently, when maximal entropy was reached, as we predicted in advance. All papers are available at
http://physics.umd.edu/~yakovenk/econophysics/