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The Role of Entropy in the Development of Economics

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Abstract

The aim of this paper is to examine the role of thermodynamics, and in particular, entropy, for the development of economics within the last 150 years. The use of entropy has not only led to a significant increase in economic knowledge, but also to the emergence of such scientific disciplines as econophysics, complexity economics and quantum economics. Nowadays, an interesting phenomenon can be observed; namely, that rapid progress in economics is being made outside the mainstream. The first significant achievement was the emergence of entropy economics in the early 1970s, which introduced the second law of thermodynamics to considerations regarding production processes. In this way, not only was ecological economics born but also an entropy-based econometric approach developed. This paper shows that non-extensive cross-entropy econometrics is a valuable complement to traditional econometrics as it explains phenomena based on power-law probability distribution and enables econometric model estimation for non-ergodic ill-behaved (troublesome) inverse problems. Furthermore, the entropy economics has accelerated the emergence of modern econophysics and complexity economics. These new directions of research have led to many interesting discoveries that usually contradict the claims of conventional economics. Econophysics has questioned the efficient market hypothesis, while complexity economics has shown that markets and economies function best near the edge of chaos. Quantum economics has already appeared on the horizon, which recognizes money as a fundamental measurement device in the economy. The development of these sciences may indicate the need to reformulate all mainstream economics from its foundations.

Keywords: thermodynamics, second law of thermodynamics, econophysics, complexity economics, quantum economics,

Full text

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