

THERMODYNAMICS FORMULATION OF ECONOMICS

Burin Gumjudpai

The Institute for Fundamental Study “The Tah Poe Academia Institute”, Naresuan University, Thailand

ABSTRACT

A simplest case is to consider a group of information-symmetric consumers with one type of commodity in an efficient market. The commodity is fixed asset and is non-disposable. Connection of thermodynamics formulation to microeconomics is our goal of investigation. Caratheodory approach requires empirical existence of equation of state (EoS) and coordinates as initial ground before optimizing some relevant variables. In the procedure of our investigation, we consider and criticize on nature of EoS of various types of system and we unexpectedly discover new insights of thermodynamics, “the effect structure”. We define what we dub “truly endogenous function”. Effect structure criteria rules and effect structure diagrams are found as criteria in promoting an empirical equation of an aggregated system to a status of EoS. With the rules, EoS in thermodynamics are classified into two classes. Applying the conventional thermodynamics and the new rules to a group of information-symmetric consumers with one type of commodity, we can identify demand-side economics EoS. The price takes a role of intensive variable, demand quantity as extensive variable and consumer’s average personal wealth as temperature. The economics EoS is found to be the new class, the Class III. Having explicitly known EoS of the economy and its coordinates lays reasonable assumptions of Hamiltonian and partition function which are central aspects in application of statistical mechanics to economics and finance.

Keywords: demand function, equation of state, thermodynamics approach to microeconomics