

On the Notion of Randomness in the Study Input-Output relations and the Maximum Entropy Principle: an application to the assessment of Brody's Conjecture

Topic: (7.1) Mathematical Treatments of Input-Output Relationships

Author: Daniel TORRES

The purpose of this paper is to lay down the foundations for the study of observable Input-Output (IO) matrices from the Maximum Entropy Principle (MEP). The MEP is a statistical inference method that allows to estimate probability distributions based on partial information and at the same time be noncommittal with missing information ---it gives the least biased estimate consistent with the given information. Following this principle, we study the literature dealing with stochastic aspects of the IO models and identify their notion of randomness and the statistical and economic implications of their assumptions, i.e. their constraints. As a first exercise in the use of this principle, we will assess Brody's Conjecture, or the random matrix hypothesis on the distribution of eigenvalues, using 12 US Benchmark IO matrices for the period 1947-2007. We conclude that there is no empirical evidence to suggest that the IO matrix that would represent the statistical structure of observable matrices has 1) independent and identically distributed a_{ij} coefficients and 2) a tendency to have rank one. Our conjecture on the empirical behavior of eigenvalues is that IO matrices' column sums are constrained in their dispersion.