Statistical Properties of Fluctuations: A Method to Check Market Behavior

Prasanta K. Panigrahi,[1,2] Sayantan Ghosh,[1] P. Manimaran,[3] and Dilip P. Ahalpara[4]

[1] *Indian Institute of Science Education and Research Kolkata 700 106, India.*
[2] *Physical Research Laboratory, Ahmedabad 380 009, India.*
[3] *Centre for DNA Fingerprinting and Diagnostics (CDFD), Nampally, Hyderabad 500 001, India.*
[4] *Institute for Plasma Research, Bhat, Gandhinagar 382 428, India.*

Financial time series are known to show drastically different behavior at different time scales. At smaller scales, the fluctuations reveal random behavior, whereas structured variations manifest at intermediate and longer temporal durations. These variations can be periodic over a longer time scale and may show structured modulations over definite time intervals. A wavelet based approach is illustrated which naturally seperates, fluctuations at different scales and reveals the random and structured behavior at multiple scales. Genetic programming is then utilized to extract dynamical equations from the variations. Subsequently, the statistical properties of the fluctuations are studied both for intra-day variations and the long time properties of the small scale fluctuation. It is observed that these fluctuations can be an accurate indicator of the market behavior in terms of random market forces or of external control.