

Time Change and Universality in Turbulence and Finance

Ole E. Barndorff-Nielsen, Jürgen Schmiegel and Neil Shephard

Abstract

Empirical time series of turbulent flows and financial markets reveal some common basic stylized features. In particular, the densities of velocity increments and log returns are well fitted within the class of Normal inverse Gaussian distributions and show a similar evolution across time scales with the heaviness of the tails decreasing with increasing time scale. We report empirical findings about the universality of the evolution of the densities of velocity increments/log returns across time scales. In terms of an intrinsic deterministic time change, the densities of velocity increments for various turbulent flows behave in a universal fashion. The same type of universality is found in financial markets.