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# Is Price Behavior Scaling and Multiscaling in a Dealer Market? Perspectives from Multi-Agent Based Experiments

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## Abstract

Empirical findings point out that the scaling and multiscaling properties can be found in many dealer markets. But how do these properties emerge from these financial markets? What are the dynamical causes for these nonlinear properties? Are they the results of random perturbations, or of the intrinsic characteristics of the markets? To answer these questions, first of all, I proposed a minimally structured agent-based model of a dealer market, and then conducted many experiments under several scenarios. This artificial financial market is occupied with heterogeneous agents characterized with bounded rationality and heterogeneity, and a dealer who is responsible for market liquidity and supply-demand balance. By means of simulations based on different scenarios, trading time series (prices, volumes, volatilities, etc) are generated and then are analyzed

by Multi-Fractal Detrended Fluctuation Analysis (MF-DFA). Interestingly, the generated price series display scaling and multiscaling features, which is consistent with empirical findings in the real markets. Furthermore, the plausible explanation for these properties is nonlinear temporal correlation instead of probability distribution after the series are shuffled and phase randomized. All of the results imply that these properties of nonlinearity may derive from market participants' heterogeneity and mutual interactions; thereby, they may be the underlying characteristics of dealer markets.

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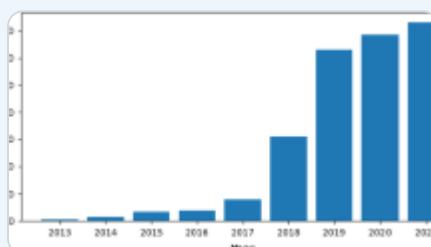
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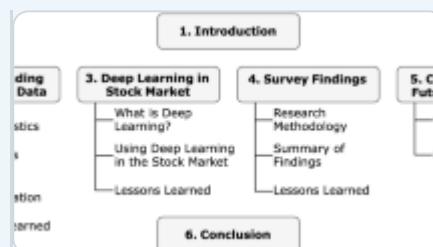
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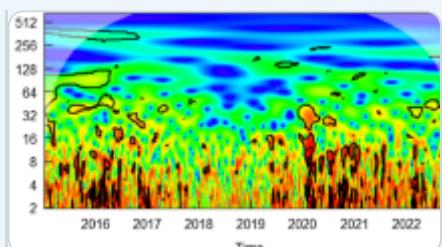
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