Preservation of market behaviour: the underlying psychological mechanism

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Abstract

Numerous trading and forecasting algorithms are based on the assumption that parameters characterising asset price series remain constant over time. For instance, Black-Scholes formula is based on the assumption that assets, which exhibited random walk behaviour in the past would continue obeying this law also in the future.

In this paper we addressed the question what mechanisms help preserving market parameters. We used fractal time series as a model of the market. In a laboratory experiment, participants (N=34) were presented with a sequence of 20 graphs of fractal time series. Each graph could be smoothed by application of a moving average filter. Participants could control the smoothing level of each graph by a slider determining the size of the averaging window. Participants were asked to choose for each graph the smoothness level they considered the most appropriate for making financial decisions from it. Then, they were asked to make forecasts from the smoothed graphs. We manipulated two variables: the Hurst exponent of the presented graphs and the density of required forecasts.

Analysis of the results showed high variability of chosen smoothness levels. However, participants’ choices of smoothness levels depended linearly on the number of required forecast points, and exhibited a U-shape dependence on the Hurst exponents of the given graphs. We did not find a significant effect of the number of required forecasts on the local steepness of the smoothed graphs or their oscillation. However, the local steepness and oscillation of the resultant smoothed graphs were correlated with the Hurst exponent, local steepness and oscillation of the data graphs. Furthermore, both the Hurst exponent of data graphs and the number of required forecast points were significantly correlated with properties of participants’ forecasts.

Our results show that people’s forecasts preserve the structure of the given data and explain this phenomenon through the way people perceive the market. If one accepts the assumption that forecasts determine what prices traders consider “fair” for buying or selling, our results provide evidence supporting the idea that bid prices encapsulate structural properties of price series.