**Title:** Microscopic data analysis for financial market microstructure: a quantitative test of a microscopic econophysics model for the long memory in market-order flows

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**Abstract:** In this study, we examine a detailed financial dataset from the Tokyo Stock Exchange (TSE) to validate a microscopic econophysics model. A widely recognized observation in financial market microstructure is the persistent nature of market-order flows over long periods. Specifically, let a buy (sell) market order sign at time $t$ be represented as $ϵ\_{t}:=+1\left(-1\right). $The long-term persistence is marked by a power-law decay in the autocorrelation function of these market-order signs, described as $C\_{τ}:=E\left[ϵ\_{t}ϵ\_{t+τ}\right]∝τ^{-γ}$ with $0<γ<1$. In econophysics, the origin of this phenomenon has been a topic of debate for a long time. The most promising microscopic hypothesis is the order-splitting behaviour at the level of individual traders. In 2005, Lillo, Mike, and Farmer (LMF) proposed a corresponding microscopic model based on this order-splitting hypothesis. Furthermore, they predicted that the macroscopic power-law exponent $γ$ should be given by $γ=α-1$ with the microscopic power-law exponent $α$ that is related to the distribution of the total number of order splittings. However, the LMF prediction has not been validated quantitatively by data analyses for 18 years without appropriate large microscopic datasets. In this talk, we solve this long-lasting problem by analysing a large microscopic dataset in the TSE market. Finally, we find that the LMF prediction holds even at a quantitative level.

**References:**

* Y. Sato and K. Kanazawa, Inferring microscopic financial information from the long memory in market-order flow: A quantitative test of the Lillo-Mike-Farmer model, to appear in Phys. Rev. Lett.
* Y. Sato and K. Kanazawa, Quantitative statistical analysis of order-splitting behavior of individual trading accounts in the Japanese stock market over nine years, to appear in Phys. Rev. Res.

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