The Hong Kong University of Science and Technology

Seminar on Business Data Science

Department of ISOM

Uncovering Mild Drift in Asset Prices with Intraday High-Frequency Data

by

Prof. Shuping SHI

Macquarie University

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Time: 2:00pm – 3:00pm

Venue: LSK 4047 (LSK Business Building)

Abstract

Asset prices are commonly represented as a drift-diffusion process, wherein the drift component denotes the anticipated return of the asset within some time frame, while the diffusion component accommodates random shocks. The drift component has substantial practical significance but accurate estimation is typically challenging and has met with limited success in the existing literature except over large time spans. This paper explores a comprehensive range of drift-diffusion models, encompassing constant, linear, trending, and bursting drift. The investigation aims to identify conditions under which the realized squared drift (RSD) estimator, defined as a normalized realized autocovariance and derived from high-frequency intraday data, can effectively capture integrated squared drift. The findings indicate that, across all model specifications, RSD fails to capture drift at the first order when using data over a fixed time span (T) with a diminishing sampling interval ($\Delta n \to 0$). However, as the time span extends, the drift component gradually emerges from RSD, eventually dominating the diffusion component. Consequently, RSD proves to be a reliable tool for gauging integrated squared drift when the time span is sufficiently extensive. Further, the recently introduced drift-robust quarticity estimator RiceQ is observed to maintain consistency within the double asymptotic framework ($T \to \infty$ and $\Delta n \to 0$) subject to certain constraints on the divergence rate of T in the presence of various drift forms. With these insights we propose an inferential method to assess the presence of nonzero drift, utilizing RSD and RiceQ, and demonstrate that the proposed drift tests achieve asymptotic consistency under different data generating processes with various conditions on T. The asymptotic results reveal that explosive drifts are easier to identify over shorter periods due to their pronounced nature, while subtler drifts require longer observation periods to be accurately detected. This variation in detection ability underscores the need to consider different time spans in empirical applications for identifying both mild and pronounced drifts. Simulation studies reveal excellent performance of the realized squared drift measure and the drift test in finite samples. For empirical application, we employ the drift test for real-time surveillance of market abnormalities in the Nasdaq Composite Index over two notable sample periods: the dotcom bubble (1996-2003) and the artificial intelligence boom (2016-2024), using intraday data.

Bio

Professor Shi is an econometrician with a theoretically grounded and policy-relevant research agenda in the field of Financial Econometrics and Applied Economics. She received the 2020 *Discovery Early Career Researcher Award* from the Australian Research Council and was honored with the prestigious *2022 Young Economist Award* by the Economic Society of Australia. Her work has been published in leading academic journals, including *Management Science*, *Journal of Econometrics*, *International Economic Review*, *Econometric Theory*, *Journal of Financial Econometrics*, and *Journal of Banking and Finance.* She currently serves as an Associate Editor for *Econometric Theory*. Professor Shi is one of the key developers of the PSY real-time bubble monitoring technique, a tool widely adopted by institutions and featured in several econometric textbooks and standard econometric software. She also co-developed the International Housing Observatory and Housing Fever Lab, which provide real-time monitoring of housing bubbles in over 23 countries worldwide.

All interested are welcome!

Enquiries: Dept of ISOM