

Correlations in high–frequency financial data: Compensating asynchrony and tick-size effects

Michael C. Münnix, Rudi Schäfer, and Thomas Guhr

Faculty of Physics, University of Duisburg-Essen, Lotharstr. 1, 47048 Duisburg,
Germany

Abstract.

The estimate of correlations between financial time series decreases significantly when we consider smaller and smaller return intervals. This is known as the Epps effect¹. We demonstrate that the asynchrony between price observations (trades) as well as the lowest possible price change (tick size) give rise to statistical errors in the correlation estimate and constitute a major cause for the Epps effect. We present a parameter-free method to quantify and compensate these errors. The method is based on the assumption of underlying time series which are synchronous and allow for continuous price changes. We test our method both in Monte-Carlo simulations, and on empirical market data.

¹ T. W. Epps, J. Am. Stat. Assoc., Vol. 74, No. 366 (1979) p. 291–298

E-mail: `rudi.schaefer@uni-duisburg-essen.de`