

# Detecting infinitesimal lead-lag effects from noisy high-frequency data

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## Abstract

We discuss the problem of testing the absence of a lead-lag effect for two correlated Brownian motions observed at a high-frequency. In particular, we restrict our attention to adopting an alternative that a “small” time-lag is present. We first consider an ideal situation where the correlation parameter is known, and show that a covariance-based test attains the minimax rate of testing in the absence of observation noise. Next we show that a natural extension of such a test to the situation where observation noise is present does not attain the minimax rate of testing, and construct another test that attains the minimax rate of testing. Finally, we explain that the proposed test is feasible without the prior knowledge of the correlation parameter.