



The University of Chicago  
Department of Statistics

MASTER'S THESIS PRESENTATION

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**Estimation of the Lead-Lag  
Parameter from Synchronous Data**

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ABSTRACT

Lead-lag cross-autocorrelations have been identified as a critical component of stock price dynamics. In practice, what we care about most is the lead-lag parameter, which can be measured at various temporal scales. In our paper, we propose a simple estimation procedure of that parameter. In order to verify the accuracy of the procedure, we construct three pairs of individual stocks, and each pair corresponds to a distinct level of correlation—low, median, or high. As a first step in the analysis, we estimate the parameter ( $\theta$ ) based on real data. We then employ GBM model to simulate stock's prices and do the estimation again ( $\hat{\theta}$ ). By comparing  $\theta$  with  $\hat{\theta}$ , we obtain the matching probability. In addition, we set up a process to determine the cut of value of lead-lag relations. Therefore, we build a complete procedure to verify the estimation procedure and simulation process; to acquire the estimator of lead-lag parameter; and to decide whether there does exist lead-lag pattern between two financial assets.