

SERIAL DEPENDENCE IN THE STOCK MARKET: WHAT CAN WE LEARN FROM DERIVATIVES?

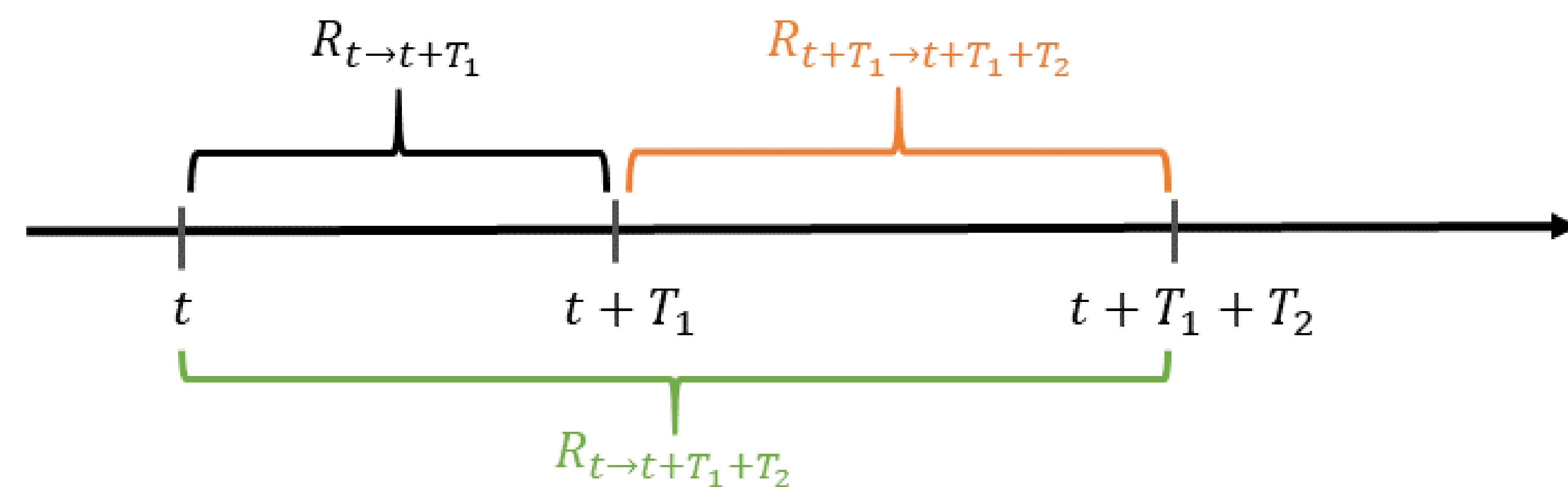
Yueliang (Jacques) Lu, and Weidong Tian

University of North Carolina at Charlotte Contact: Lu, ylu28@uncc.edu; Tian, wtian1@uncc.edu Webpage: JacquesYL.github.io

Serial Dependence by the Q-approach

Do past returns on the market “forecast” future returns?

- Let $X = R_{t \rightarrow t+T_1}$ and $Y = R_{t+T_1 \rightarrow t+T_1+T_2}$ denote gross holding period stock market returns in two consecutive periods, respectively



- In a regression model, $Y = \alpha_{t \rightarrow t+T} + \beta_{t \rightarrow t+T} X + \epsilon$, where $Cov(X, \epsilon) = 0$

$$\beta_{t \rightarrow t+T} = \frac{Cov_t(X, Y)}{Var_t(X)} \quad (1)$$

- The **derivative market** plays an essential role in revealing the underlying market information from recent studies (Ross, 2015; Martin, 2017; Schneider and Trojani, 2019; Jensen, Lando, and Pedersen, 2019)

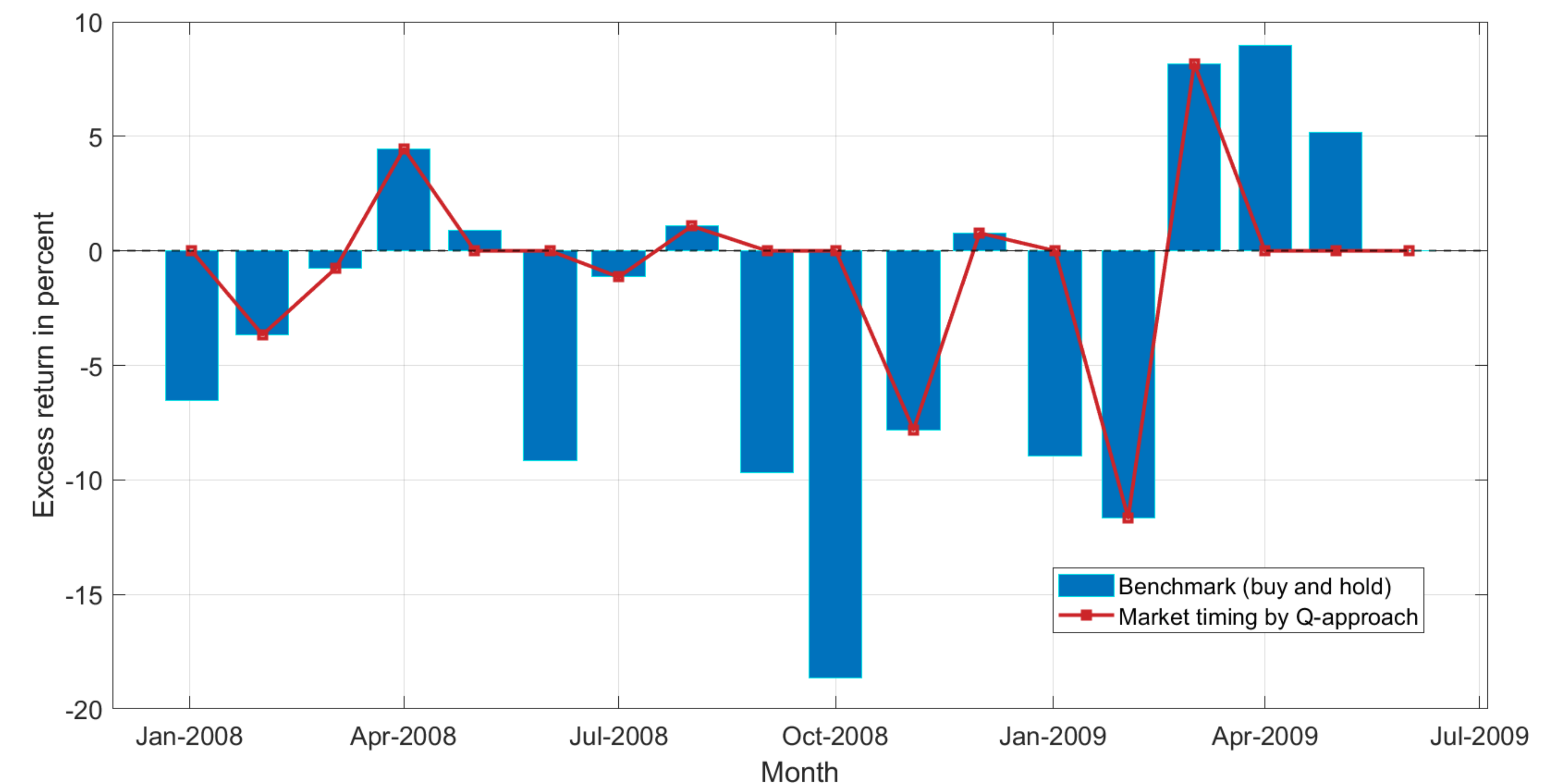


Figure 2: Market timing from short-term reversal identified by Q-approach

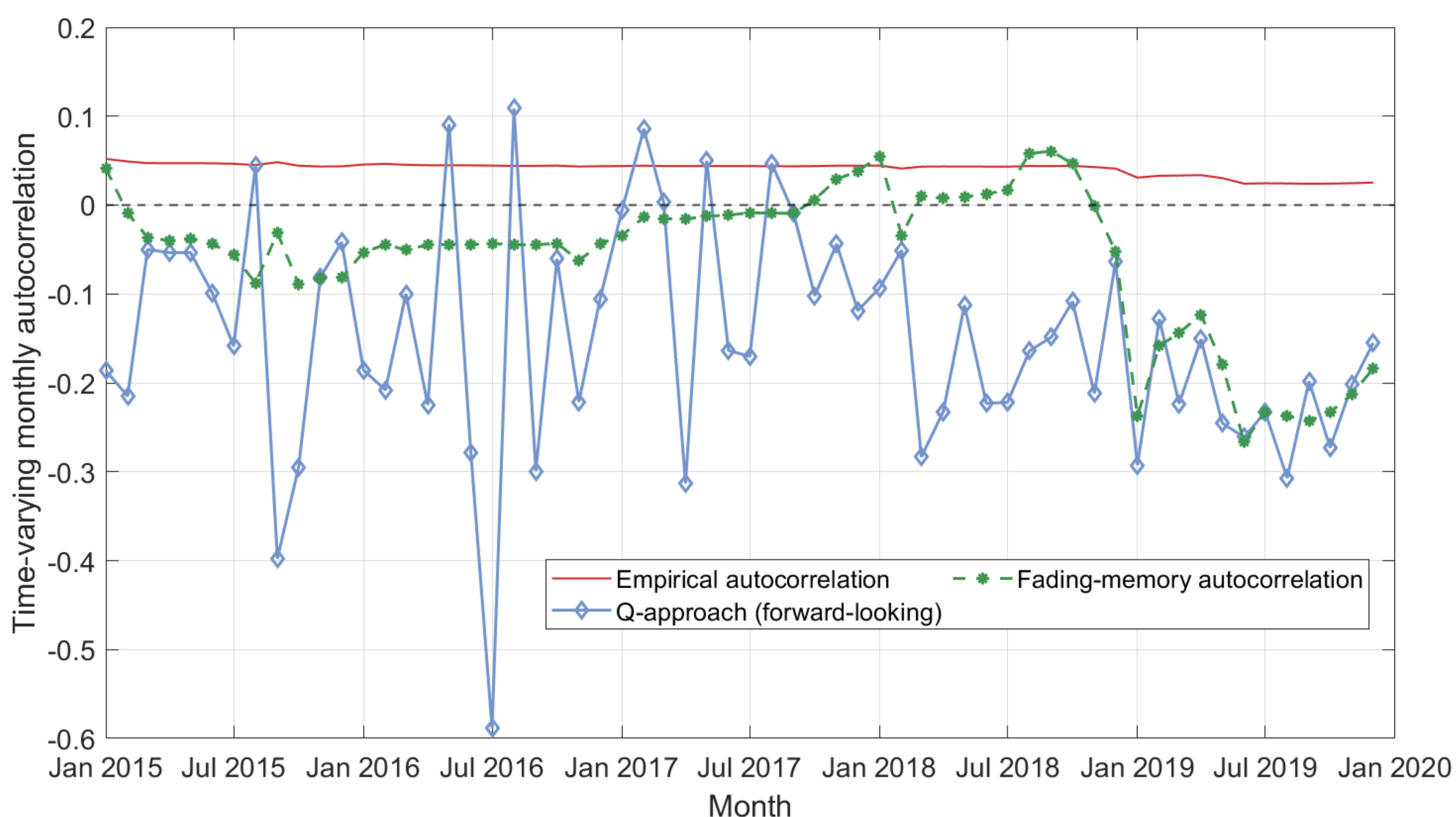


Figure 1: Empirical & fading memory, and Q-approach-based autocorrelations

Three Major Implications to the Stock Market

In this paper

- We find the regression coefficients, $\{\beta_t, \alpha_t\}$, and market autocorrelation, $corr_t(X, Y)$, without using historical data or having to estimate any parameters, and imposing minimal theoretical structure, from a **forward-looking** perspective, and **in real time**
- The method is free of distributional assumptions, robust to different choices of pricing kernel process, and provides a real-time conditional point of view on the stock market

Three major implications to the stock market

- From a forward-looking perspective, $corr_t(R_{t \rightarrow t+1mo}, R_{t+1mo \rightarrow t+2mo}) \approx -20.9\%$
 - A **persistent and robust short-term reversal** of the monthly market return
 - The short-term reversal identified by the derivative market is economically relevant in timing the market
- The Q-approach serves as a benchmark to compare several different **methodologies** in statistical inference to compute market statistics
 - The results support the Nagel and Xu's (2021) *fading memory distribution*
 - And reject the *sample distribution* and Adam, Matveev, and Nagel's (2021) *risk-neutral measure* with derivative data
- We also conduct the first study on the term structure of the conditional expected future return using derivatives only
 - The Q-approach provides a new angle to “forecast” the equity risk premium: around 3.409% per annum