Homework #4

FE-570 Fall 2023

November 13, 2023

Glosten-Harris model. The Glosten-Harris model is an improvement of the Roll model which takes into account:

- Bid-ask bounce cd_t
- Price impact λx_t

In this model the trade price p_t is given by

$$p_t = m_t + cd_t + \lambda x_t \tag{1}$$

where the efficient price m_t contains also a price impact λx_{t-1} due to the previous trade

$$m_t = m_{t-1} + \lambda x_{t-1} + u_t \tag{2}$$

Here u_t are iid random variables with mean zero and variance σ_u^2, just like in the Roll model.

Note that here x_t are *signed* trade sizes: positive for buy, negative for sell.

Question: Calibrate the λ, c parameters of this model using the provided TAQ dataset. The dataset provided contains trades and quotes for KO (Coca-Cola) on 1-Mar-2022.

For this analysis it is important to exclude from the analysis large trades at the start and end of the trading session. For example keep only trades with time stamps between 10:00 - 14:00.

Hints

First, we need the signed trade sizes $x_t = d_t|x_t|$, where d_t are the trade indicators and $|x_t|$ are the absolute values of the trade size which are available in the TAQ data as `tqdata$SIZE`.

We get the trade indicators using the `getTradeDirection(tqdata)` which is the implementation of the Lee-Ready mid-point criterion.