**Homework #4**

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Glosten-Milgrom Model

The price process (), follows the following equation where is the trade direction and is the signed trade size. Also, is the mid-price and is a random normal variable .

1) First, we find the trade signs using Lee-Ready and store in variable .

Chart, histogram

Description automatically generated

Also, there is considerable autocorrelation in the trade signs as shown by this ACF chart.

Chart, histogram

Description automatically generated

2) Now, we run a linear regression to determine .

Chart

Description automatically generated with medium confidence

3) Finally, we need to determine , which can be done by rearranging the first equation above and running another regression.

Text

Description automatically generated with medium confidence

In summary, and **.** The constants and give the magnitude of market impact and autocorrelation factor of trade direction signs respectively.

Chart, box and whisker chart

Description automatically generated