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**Homework 2**

Table

Description automatically generatedFrom previous homework, the model ARMA(1,1) was chosen. From the correlogram, no evidence of autocorrelation was found.

The AC and the PAC of the residuals also indicate no autocorrelation.

The square residuals are generated, and they’re correlogram suggests that the null hypothesis of no autocorrelation is rejected, evidence of heteroscedasticity is found.

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Before running an ARCH regression on the square of the residuals, it needs to be known how many lags must be used. An AR(8) regression on the square residuals is run.

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The last eight lags are tested, and the null hypothesis of them being equal to 0 is not rejected.

An AR(4) regression is run, and when testing the four lags, the null hypothesis of being equal to 0 is rejected.

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Table

Description automatically generatedNow an ARMA(1,1), with and ARCH(4) regression on the square residuals is run.

The sum of the ARCH lags is less than 1, so this process is stationary.

Next step is predicting the residuals, and the variance. After that, the standardized residuals are generated as the residuals over the square root of the variance. Lastly, the square standardized residuals are generated; and the correlogram of the residuals and the square standardized residuals is checked to make sure there is no heteroscedasticity is left.

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Description automatically generatedFrom the correlogram of the residuals, the null hypothesis of no autocorrelation is not rejected.

Table

Description automatically generatedFrom the correlogram of the square standardized residuals, the null hypothesis of no autocorrelation is not rejected.

In purpose of not using so many ARCH lags, another model to be tried is a GARCH(1,1).

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The coefficients of the GARCH process sum less then 1, so this process is also stationary.

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Description automatically generatedOnce run, the residuals and the square standardized residuals are obtained to check for any left heteroscedasticity.

The correlogram for the residuals suggest there is no statistical evidence of autocorrelation.

Table

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Table

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