5)

ARMA models are used for stationary processes and are therefore insufficient to model a non-stationary series. However, ARIMA models (the “I” stands for integrated) are explicitly designed for cases when there is “seasonality” in the series, meaning the series in non-stationary. ARIMA models can correct for seasonality patterns by using a more or less simple transformation. For example, a time series that is linearly upward sloping can be transformed into a constant series by replacing each original observation () by the difference with the respective consecutive observation (). In general, describes the -th order differencing for variable .

For the energy returns series, we investigate which ARIMA models, restricted to a maximum p of 8, q of 8, and d of 1, delivers the lowest Akaike information criterion (AIC). Running the test in EViews, we find notice that all reported models do not include differencing. This makes only sense, since we saw early that the series is stationary. We further observe that the ARMA (6, 6) model exhibits the lowest AIC (compare Figure x). Plotting the top 20 AIC models, we see that a ARMA (5, 4)[[1]](#footnote-1) model shows a similar AIC value (compare Figure y). The subsequent models fall off rather steeply. If we based our model selection solely on the AIC, we would select the ARMA (6, 6) model. We should keep in mind, however, that lower-order models perform better in terms of both the BIC and HQIC (compare Figure x). Finally, we report the regression output for the ARMA (6, 6) model in Figure z. First, we see that all ARMA components, but the constant, are statistically significant at the 3% level. The R-squared is decent at a value of 12.29%. All inverted roots lie within the unit cycle, indicating stationarity. Concerning the different AR and MA components, we see a recursive pattern, but we also notice that the respective AR and MA components per time lag seem to almost cancel out.

Recursive pattern

AR match MA components

Overall, there seems to be a predictive relationship between the energy returns and the ARMA components

<http://www.eviews.com/help/helpintro.html#page/content/timeser-Estimating_ARIMA_and_ARFIMA_Models_in_EViews.html>

<http://www.eviews.com/help/helpintro.html#page/content%2Fseries-Automatic_ARIMA_Forecasting.html%23ww154415>

https://www.youtube.com/watch?v=3UmyHed0iYE&ab\_channel=ritvikmath



Table

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Chart, scatter chart

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1. Analyzing the ARMA (5, 4) model, we find that all MA components are highly statically insignificant. [↑](#footnote-ref-1)