

Assignment I

EC2408/EC7413

Spring 2024

Submissions must be made via Athena. You can submit in groups of up to three. The submission should be in the form of a well-commented script file.

Problem I

Use the variable `income`, quarterly disposable household income in nominal pounds 1971:Q1-1985:Q2, from the dataset `IncomeUK` in the **Ecdat** package.

- (1) Use the first order difference of `income` to estimate the five models $AR(p)$ where $p = 1, 2, 3, 4, 5$. The models should be estimated with `lm()` or `dynlm()`, the latter from the package with the same name. Make sure that the same number of observations are used to estimate the different models.
- (2) Use Akaike's information criterion (AIC) and compare the models. Which model should we choose according to AIC?
- (3) Perform Ljung-Box and Jarque-Bera tests on the residuals of the models. What are the results? Compare with the results from using AIC. *Interpret* the results.

Problem II

- (1) Download from Statistics Sweden KPIF inflation rates (monthly yearly changes) until 2022:M12.
- (2) Use 2002:M12 as the first origin and construct recursive pseudo-out-of-sample forecasts for the horizons $h = 1, 12, 24$ months ahead using an $AR(1)$ model and an $ARIMA(p, d, q)$ identified by the function `auto.arima()` in the **forecast** package. The $ARIMA$ should have the same model order at each forecast origin. Both $AR(1)$ and $ARIMA$ should however have parameters re-estimated at each forecast origin. Repeat this for all months 2003:M01-2020:M11. The result will be 2 x

3 x 216 different forecasts; two different models, three forecast horizons and 216 forecast origins.

- (3) Test the forecasts for bias with use of parameter variance estimated by the Newey-West estimator. This involves six different test for bias.
- (4) Compare the forecasts with the same horizon made by the different models by testing them for equal forecast accuracy measured as the mean squared error (Diebold-Mariano-test) with use of parameter variance estimated by the Newey-West estimator. This involves three different tests for different forecast accuracy.