

Introduction to Econometrics

Homework 2

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1 Guidelines

- This homework needs to be hand in by email (rombouts@essec.edu) the Friday after the final exam.
- You need to send one clearly written report in pdf format which answers all questions point wise. Send also your R-script (if you use R). Use R-Markdown, which allows you to embed the answers and the code in one pdf document, if you want to improve your reporting skills.
- Work in groups of at most 3.
- When you are asked to do a test, then write the null and alternative hypotheses, the value of the test statistic and the 5% critical value (or p-value).

2 Modelling Inflation in France

We develop a univariate time series model for the inflation rate in France (CPI). We downloaded monthly data from January 2000 from the website of OECD statistics.

QUESTIONS:

1. Make a table with standard descriptive statistics for CPI. Make a time series plot and a sample autocorrelation plot. Interpret.
2. Discard the last 50% of your observations, they will be used below for evaluating forecasts. Using the remaining 50% of the data, estimate a AR(1) model for CPI_t .
3. Forecasting exercise: Given the AR(1) model, for the last 50% of your observations, make forecasts for horizon 1 to 6 months. Re-estimate your model parameters after every forecast. Store your parameter estimates and make a plot of them once the forecasting exercise is finished. Check visually for breaks in the parameter estimates.

Example of a recursive forecasting procedure with 20% out-of-sample and forecast horizon 1 and 4: We have 100 observations initially. We keep 20 observations for forecast evaluation. We determine the best model with 80 observations. Given this best model we forecast observations 81 (horizon 1) and 84 (horizon 4) and we store the forecasts. Next, we estimate the same best model again using 81 observations and forecast observations 82 and 85 and store them. Continue with this procedure until the end of the sample. Doing this, we obtain a series of horizon 1 forecasts and horizon 4 forecasts.

4. Compute horizon 1 to horizon 6 forecast errors using the last 50% of your observations. Compute the mean forecast error (MFE) and the root mean squared forecast error (RMSE).

5. Do the same forecasting exercise for a naive forecasting model which computes as forecast the mean of the last 12 CPI observations.
6. Do the same forecasting exercise for a random walk model (i.e. the forecast for any horizon is the last available observation).
7. Make a summary table with the mean forecast error (MFE) and root mean squared forecast error (RMSE) for the three models and different forecast horizons. Discuss which model is best for which horizon.
8. Make a time series plot of the forecast errors and discuss the forecasting performance over time.