

## Advanced Time Series Econometrics: Labs

# Exam

- The exam contains two parts: one is theoretical and another is practical;
- In the practical part, you will see some output from R (so please familiarize yourself with R output);
- We might compile the R output into a table and will make it clear what the table is (the meaning of each column and each row), so familiarize yourself with what parameters are estimated from each model.

# Lab1

- This lab is about the local level model and the local linear trend model.
- For the R output, you should know what is V and W and familiarize yourself with the output format, as you can expect this format will appear on your exam.
- In the local level model, you have two parameters
  - One is the error variance in the measurement equation (V.variance);
  - Another is the error variance in the state equation (W.variance).
- In the local linear trend model, you have three parameters
  - One is the error variance in the measurement equation (V.variance);
  - Another two are the error variance in the state equation (W.variance).

# Lab1

- Gary also talked about the  $I(1)$  or  $I(2)$  issue.
- The insight is that if the error variance in either of the state equations is zero, then a trend disappears and the variable is  $I(1)$ .
- So the local level model is  $I(1)$ , and the local linear trend model is  $I(2)$ .
- You can use information criteria to make a decision.
- Another way is to use the significance of variances.

## Lab2

- This lab is about the TAR model and the markov switching model.
- For the TAR model, make sure that you can write down the estimates for both TAR (homo) and TAR (hetero).
- For the Markov switching model, make sure you understand the concepts (regimes, transition probability, etc).
- To estimate a three-regime model, just change the parameter  $k = 3$  in function *msmfit*.

## Lab3

- This lab is about the PCA and FAVAR.
- For the PCA: you should know the interpretation of: Proportion of Variance, Cumulative Proportion; and how to select the number of factors;
- For the FAVAR: once you get factors from PCA, plug into a VAR, then you get a VAR which includes your core variables (e.g. GDP growth, inflation) and factors. Any standard tools for VAR can be used.
- The code also provides how to do impulse response. If Niko did not cover this, you can ignore.

## Lab4

- This lab is about the dynamic factor model.
- Please familiarize yourself about the difference between static factor and dynamic factor.
- Dynamic factor models are more suitable for macro variables since they show some persistence.