

Problem set 5  
607: Applied Macroeconometrics  
Fall 2016  
Jon Faust

The following is due at the beginning of next class. You can turn in any paper in my mailbox or in class; email me and requested computer work. You may work in groups; hand in a single submission for the group. The submission should list those who contributed.

1. Definitions

- (a) Consistent test
- (b) Noncentral  $\chi^2$  distribution.
- (c) What does the noncentral  $\chi^2$  distribution have to do with the consistency of standard tests that are asymptotically  $\chi^2$  under the null hypothesis.

2. Suppose that the maintained model is an invertible, Gaussian MA(1):

$$y_t = \alpha + \varepsilon_t + \theta\varepsilon_{t-1}$$
$$(1 + .5L)\varepsilon_t \sim iidN(0, 1)$$

- (a) You attempt to fit this using an AR model. What is the ‘true’ order of AR matching the MA(1).
- (b) Run a Monte Carlo for  $\theta = [-.9 - .5 - .1, 0.1.5.9]$  and sample sizes  $[20, 50, 200]$ . Generate the samples using the DGP. On each sample:
  - Estimate an AR selecting the lag length by both AIC and BIC, where the maximum lag is  $T/5$ . Save the selected lag length.
  - For the chosen models, save the sum of the AR coefficients the estimated variance of  $\varepsilon$ .

Note: Once again, I’ve provided some code to start from. After this problem set, it’ll mainly be up to you. There are some things

to complete in the code, marked ????. There are probably other errors (this is a new problem and I'm letting you debug the code). I've included my code to compute the ARs. It is VAR code, but an AR is just a 1 equation VAR, so that should be fine. The VAR routines (basicVAR, basicVARPickLag, prepVAR) should be fine (no errors). You may want to read them in any case.

- (c) Summarize which criterion did best from the standpoint of
- Picking the correct lag length
  - Bias, variance, and mean squared error in estimating the sum of the AR coefficients (hint: for each DGP, you'll have to figure out what the sum of AR coefficients should be.)
  - Bias, variance, and mean square error in estimating the variance of  $\varepsilon$ .
- (d) As a general rule, which criterion should you use?
3. Read Campbell, J.Y. and N.G. Mankiw (1987): Are Output Fluctuations Transitory?, Quarterly Journal of Economics, 102, pp.857-880. You may also want to consider Gagnon, Joseph, Short-Run Models and Long-Run Forecasts: A Note on the Permanence of Output Fluctuations The Quarterly Journal of Economics, Vol. 103, No. 2 (May, 1988), pp. 415-424. (Links to both articles on the course reading list.)
- (a) Are output fluctuations permanent or transitory?
- (b) Discuss virtues and limitations of Campbell and Mankiw's approach especially noting the Gagnon argument.
- (c) Make a case that macroeconomists should be permanently banned from using the word *permanent*.