

Problem Set #9  
Spring 2010

When turning in your problem set, turn in both your STATA .do files (or log file) as well as the output.

1. Director Hastings asserts that the GDP of Kamistan follows an AR(1) process. Agent Bauer believes an informant, who told him that it is an AR(4) process. Hastings says: “I believe it is an AR(1) process until you prove otherwise.” What evidence should Bauer provide to convince Hastings?
2. Data analysts Chloe O’Brian and Dana Walsh have an disagreement whether an AR(2) model (Walsh) or an AR(3) model (O’Brian) does a better job of forecasting background telephone noise. What practical method can be used to settle the dispute?
3. The AIC and BIC are a function of the number of estimated parameters. What is the relevant number of estimated parameters in an AR(1) model? AR(2)? An AR(k) model?
4. When you have  $N$  total number of observations on a series  $y_t$ , how many effective number of observations  $T$  are used when estimating an AR(1) model? AR(2)? An AR(k) model?
5. Autoregressions are estimated for U.S. unemployment rate among women, age 20+. The residual sum of of squares and effective sample size  $T$  for some models are given in the following table. Find the best forecasting model for women’s unemployment rate based on the AIC.

|        | RSS   | $T$ |
|--------|-------|-----|
| AR(0)  | 1191  | 747 |
| AR(8)  | 41.58 | 739 |
| AR(10) | 41.46 | 737 |
| AR(12) | 41.23 | 735 |
| AR(14) | 40.51 | 733 |
| AR(16) | 39.97 | 731 |
| AR(18) | 39.43 | 729 |
| AR(20) | 39.23 | 727 |

6. Take the quarterly investment growth series *investment* from the file “gdp.dta”. Select an autoregressive model using the AIC criterion.
7. Take the s&p return series  $r$  from the file ”s&p.dta”.
  - (a) Estimate AR(0), AR(1) and AR(2) models.
  - (b) Test the hypothesis of no serial correlation (AR(0)) against an AR(2) model. Perform the test both using the classical F test and the robust F test. Is there a difference in the statistical “finding”? Which of the two tests is appropriate?