636, Fall 2008

Homework 8 and 9

Heteroskedasticity and Autocorrelation.

Turn in December 4th. Note, put all regressions in an appendix and make sure they are carefully labeled. You should have two appendices (I, II) and each page of each appendix should be numbered. Place all answers on separate sheets of paper. These pages should come first and I should be able to quickly score homeworks with the correct regressions. Unless your regressions are wrong, I should not have to sift and winnow through mountains of output to find out what you want me to look at. I want you to check with at least one other person to verify your regressions.

Question 1: Heteroskedasticity (60 points)

You can download the "ds8" (houthak.dta) dataset from the AAE636 website. The data is from a paper by Houthakker (1951) who analyzed the demand for electricity in a cross section of towns in Great Britain. The data descriptors are:

Name	new label	description
income:	inc	Income of electricity consumers (pounds per year)
p36:	p1	Price of electricity in 1935-36 (pence per kwh)
p38:	p2	Price of electricity in 1937-38 (pence per kwh)
gas36:	pg	Price of gas in 1935-36 (pence per kwh))
equip:	he	Average holding of heavy equipment by consumers (kwh)
consump:	con	domestic consumption per customer
expend:	exp	average total expenditure on electricity by consumer
num:	num	Number of customers in each town

1. replace name with new labels.
2. Estimate the following model:

$$con = \beta_0 + \beta_1(inc) + \beta_2(1/\ p1) + \beta_3(pg) + \beta_4(he) + e$$

3. Print out the errors in relation to the (he) variable and discuss.
4. Conduct the G-Q test for the (pg) variable and discuss your findings.
5. Conduct the (second) Glejser test for the (1/p1) variable and discuss your findings.
6. Conduct the White test but drop all the interaction terms. Discuss your findings.

7. Note that the data are collected by averaging across very different numbers of consumers (i.e. look at the "num" observations) This suggests a errors may have a variance scheme of $\sigma_i^2 = \sigma^2 / n_i$. Manually transform and estimate the model using this information.

8. Stata knows what you are planning to do with $\sigma_i^2 = \sigma^2 / n_i$ in terms of weighting. So, to check the results in question 6, estimate the model in part 2 but append [aweight=num]. Discuss your findings.

Question 2. Autocorrelation (40 points)

In a trade context, dumping is an action in which a nation or firm exports below the cost of production. Theoretically, dumping can force hardship on domestic industries that, if severe enough, could force them out of business. Antidumping laws are used to protect nations from firms looking to unload excess quantities on the world market. Data from a study by Krupp and Pollard (1996) were used to analyze antidumping legislation designed to protect barium chloride producers in the U.S. against actions in China. These data are at the AAE636 web page as ds9 (bariumch.dta):

The descriptors are:

1. chnimp	Chinese imports, bar. chl.	17. lrtwex	log(rtwex)
2. bchlimp	total imports bar. chl.	18. lchempi	log(chempi)
3. befile6	=1 for all 6 mos before filing	19. t	time trend
4. affile6	=1 for all 6 mos after filing	20. feb	=1 if month is feb
5. afdec6	=1 for all 6 mos after decision	21. mar	=1 if month is march
6. befile12	=1 all 12 mos before filing	22. apr	etc.
7. affile12	=1 all 12 mos after filing	23. may	.
8. afdec12	=1 all 12 mos after decision	24. jun	
9. chempi	chemical production index	25. jul	
10. gas	gasoline production	26. aug	
11. rtwex	exchange rate index	27. sep	
12. spr	=1 for spring months	28. oct	
13. sum	=1 for summer months	29. nov	
14. fall	=1 for fall months	30. dec	
15. lchnimp	log(chnimp)	31. percchn	% imp. from china
16. lgas	log(gas)		

1. Estimate a linear regression model: lchnimp=f(lchempi, lgas, lrtwex, befile6, affile6, afdec6)
2. Get the Durbin Watson statistic and interpret it.
3. Run and interpret the Breusch-Godfrey Test
4. Calculate the Box Pierce and Ljung-Box statistics and interpret.
5. Run the iterative Cochrane-Orcutt Procedure
6. Run the Prais-Winsten procedure

7. Describe what the interative process is doing in steps 5 and 6.