

ECONOMETRICS I, SPRING 2017

Homework 4. Due Wednesday February 22.

1. (This repeats a calculation on the board that I messed up at first). Show, under the standard assumptions of the linear model, that if $CX = I$, where C is an $k \times N$ matrix, the covariance of $CY - \hat{\beta}$ and $\hat{\beta}$ is 0 (where $\hat{\beta}$ is OLS estimator of dimension $k \times 1$ and e is the vector of residuals).
2. Show that if Z is χ^2 -distributed with p degrees of freedom and W is χ^2 -distributed with q degrees of freedom and independent of Z , then $Z+W$ is χ^2 -distributed with $p+q$ degrees of freedom.
3. Assume you have 100 observations and regress Y on X (for this question it doesn't matter how many regressors (columns of X) there are. Prove that if you use only the first 90 observations to estimate the coefficient, the variance of the estimator will be larger.
4. Computer question (continuation of homework 1, 2, and 3). In Matlab, regress real per capita U.S. data consumption growth on income growth and the interest rate using the posted dataset. (This is the what you did in homework 1.)
 - a) Calculate the t-test for each of the parameters and display the P-values.
 - b) Test if the coefficient to income growth is identical to the coefficient for the interest rate. (The tests don't make much economic sense, but this is about the tools.) Explain how you could use a t -test (how) or an F -test.
 - c) Test if the coefficients to income growth and the coefficient to the interest rate are both zero. (I suggest you use a table of critical values for the F and test at the 5% level. This is because you will need to use a table for exams.)
 - d) Test if the sum of the coefficients to income growth and the interest rate are equal to the constant.