Homework Ch 8

1. From [Wool 8.7] Consider a model at the employee level.

*yi,e = βo + β1xi,e,1+ . . . . + βkxi,e,k+ fi + vi,e*

where the unobserved variable *fi* is a “firm effect” to each employee *e* at a given firm *i*. The error term *vi,e* is an individual specific error term—that is, it is specific to each individual at each firm. The composite error is  *uie=fi + vi,e* (as in equation 8.28).

1. Assume that *Var(fi) = * and *Var(vi,e) = *and *fi* and *vi,e* are uncorrelated. Show that Var(*uie*) = *+*.
2. Now suppose that for e≠g (that is, we are looking at two different employees), *vi,e* and *vi,g* are uncorrelated. Show that Cov(*uie, uig*)= *.*
3. Let --that is the average composite error within a firm with mi employees. Show that 
4. Discuss the relevance of part (iii) for WLS estimation using data averaged at the firm level, where the weight used for observation i is the usual firm size.
5. [Based on Wool C8.4] Use the data in VOTE1.RAW to estimate the following equation:

*voteA= βo + β1prtystrA+ β2democA+ β3log(expendA) + β4log(expendB) + u*

1. First estimate the equation by OLS.
2. Obtain the predicted OLS residuals. Regress these on all of the independent variables. Explain why you obtain R2 = 0
3. Now estimate the model with heteroskedasticity-robust standard errors. Discuss any differences with (a).
4. Compute the Breusch-Pagan test for heteroskedasticity. You can calculate either the F or the LM statistic version. Please calculate this using the steps described in class—do not just use the STATA command to conduct this test. How do you interpret the results of this test?
5. Compute the special case of the White test for heteroskedasticity. Please calculate this using the steps described in class—do not just use the STATA command to conduct this test. How strong is the evidence for heteroskedasticity based on this test?