

Economics 403A: Homework 4
Fall 2017, UCLA
Instructor: Dr. Rojas

Due Date: Nov 21, 2017

All problems require detailed worked out solutions to receive full credit, and are all worth the same.

1. Chapter 4 (Green's textbook): Applications #2
2. Chapter 5 (Green's textbook): Applications #1
3. For this problem use the dataset 401KSUBS.
 - i. Compute the average, standard deviation, minimum, and maximum values of *nettfa* in the sample.
 - ii. Test the hypothesis that average *nettfa* does not differ by 401(k) eligibility status; use a two-sided alternative. What is the dollar amount of the estimated difference?
 - iii. Estimate a multiple linear regression model for *nettfa* that includes income, age, and *e401k* as explanatory variables. The income and age variables should appear as quadratics. Now, what is the estimated dollar effect of 401(k) eligibility?
 - iv. To the model estimated in part (iii), add the interaction $e401k(age - 41)$ and . Note that the average age in the sample is about 41, so that in the new model, the coefficient on *e401k* is the estimated effect of 401(k) eligibility at the average age. Is the interaction term is significant?
 - v. Comparing the estimates from parts (iii) and (iv), do the estimated effects of 401(k) eligibility at age 41 differ much? Explain.
 - vi. Now, drop the interaction terms from the model, but define five family size dummy variables: *fsize1*, *fsize2*, *fsize3*, *fsize4*, and *fsize5*. The variable *fsize5* is unity for families with five or more members.
 - vii. Now, do a Chow test for the model
$$nettfa = \beta_0 + \beta_1 inc + \beta_2 inc^2 + \beta_3 age + \beta_4 age^2 + \beta_5 e401k + e$$
across the five family size categories, allowing for intercept differences. The restricted sum of squared residuals, SSR_r , is obtained from part (vi) because that regression assumes all slopes are the same. The unrestricted sum of squared residuals is, $SSR_u = SSR_1 + \dots + SSR_5$ where is the sum of squared residuals for the equation estimated using only family size f. You should convince yourself that there are 30 parameters in the unrestricted model (5 intercepts plus 25 slopes) and 10 parameters in the restricted model (5 intercepts plus 5 slopes). Therefore, the number of restrictions being tested is $q = 20$, and the df for the unrestricted model is $9,275 - 30 = 9,245$.

4. For this problem use the dataset 401KSUBS.
 - i. Using OLS, estimate a linear probability model for $e401k$, using as explanatory variables inc , inc^2 , age , age^2 , and $male$. Obtain both the usual OLS standard errors and the heteroskedasticity-robust versions. Are there any important differences?
 - ii. In the special case of the White test for heteroskedasticity, where we regress the squared OLS residuals on a quadratic in the OLS fitted values, \widehat{e}_i^2 on \widehat{y}_i , \widehat{y}_i^2 , $i = 1, \dots, n$, argue that the probability limit of the coefficient on \widehat{y}_i should be one, the probability limit of the coefficient on \widehat{y}_i^2 should be -1, and the probability limit of the intercept should be zero.
 - iii. For the model estimated from part (i), obtain the White test and see if the coefficient estimates roughly correspond to the theoretical values described in part (ii).
 - iv. After verifying that the fitted values from part (i) are all between zero and one, obtain the weighted least squares estimates of the linear probability model. Do they differ in important ways from the OLS estimates?
5. For this problem, you are to compare OLS and LAD estimates of the effects of 401(k) plan eligibility on net financial assets using the dataset 401KSUBS.
 - i. Use the data in 401KSUBS to estimate the equation by OLS and report the results in the usual form. Interpret the coefficient on $e401k$.
 - ii. Use the OLS residuals to test for heteroskedasticity using the Breusch-Pagan test. Is e independent of the explanatory variables?
 - iii. Estimate the equation by LAD and report the results in the same form as for OLS. Interpret the LAD estimate of β_6 .
 - iv. Reconcile your findings from parts (i) and (iii).