Econometrics

Final Exam

Time limit: Due at 5 p.m. (Beijing Time) on December 17, 2022

Fall 2022

The data set for the exam is in the "final" folder, where there is a folder under your student ID, on Google drive. Work on the data set in the folder under your name, and answer the following questions. Answer all the questions and compile your answer in ONE word or pdf file.

a. Run the following regression by OLS:
$$y_1 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + u,$$
where y_1 is the variable y1 in the data set and x_k is the variable xk, $k = 1,2,3,4$, in the data set.
(a.1) Report the regression result. (Your regression results should contain at least estimated coefficients, standard errors, and R-squared.)
(a.2) What is the interpretation of β_4?
(a.3) Test the hypothesis $H_0: \beta_2 = 2$ against the alternative $H_1: \beta_2 \neq 2$. Is it statistically significant at 1% level?
(a.4) Suppose there is another variable $z = x_1 + x_2$. Can we put this variable in the regression? Why or why not?

b. Run the following regression by OLS:
$$\log(y_2) = \beta_0 + \beta_1 x_1 + \beta_2 \log(x_2) + \beta_3 x_3 + \delta_3 x_3^2 + \beta_4 x_4 + u,$$
where y_2 is the variable y2 in the data set.
(b.1) Report the regression result.
(b.2) What is the F-statistic of the test for overall significance of this regression?
(b.3) Interpret the estimated β_2.
(b.4) If $x_3 = 0.1$, what is $\frac{\%\Delta y_2}{\Delta x_3}$, given all other factors unchanged?
(b.5) What is the F-statistic of test for null hypothesis $H_0: \beta_3 = \delta_3 = 0$?

c. Run the following regression by OLS:
$$y_2 = \beta_0 + \beta_1 x_1 + \beta_2 \log(x_2) + \beta_3 x_3 + \delta_3 x_3^2 + \beta_4 x_4 + u.$$
(c.1) Report the regression result.
(c.2) How can you test whether there is heteroskedasticity in the regression? Implement the test and report the test result.
(c.3) Obtain and report the heteroskedasticity-robust standard errors of this regression.
(c.4) Suppose that $Var(u|x_1, \dots, x_4) = \sigma^2 x_1$, can the weighted least square (WLS) method be used to correct the heteroskedasticity in your regression? If so, re-estimate the regression equation by WLS and report the results. If not, explain why?