

Economics 421/521
Winter 2008
Final Exam

Answer SEVEN of the following eight questions (do not answer all eight):

1. (a) Explain how to test the following model for heteroskedasticity using the Goldfeld-Quandt test:

$$Y_i = \beta_1 + \beta_2 X_{i2} + \beta_3 X_{i3} + u_i$$

(b) Are the coefficient estimates biased in the presence of heteroskedasticity? Briefly explain.

2. For the model:

$$Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + u_i$$

(a) Explain how to test the null hypothesis that β_4 is equal to one using a t-test. (b) Explain how to conduct an F-test of the hypothesis that the coefficient on β_2 and the coefficient on β_3 are jointly zero. (c) Explain how to conduct an F-test of the hypothesis that $\beta_2 - 4\beta_4 = 2$.

3. (a) Explain the steps needed to perform a Durbin-Watson test. (b) Why is the Durbin-Watson statistic invalid when there is a lagged dependent variable? What should you use instead (just name the test).

4. (a) Explain how to perform an LM test for whether an explanatory variable should be added to the model. (b) When a variable that ought to be in the model is omitted, how does that impact the estimated coefficients?

5. Suppose that the true model is:

$$Y_t = \beta_0 + \beta_1 X_t^* + v_t$$

However, data on X_t^* are not available. Instead, you use $X_t = X_t^* + w_t$ as the explanatory variable, where w_t is independent of all other variables in the model, to estimate the model with OLS. Show that the OLS estimates are inconsistent. Very briefly, how can the inconsistency problem be overcome?

6. (a) Are the following equations identified? The Y's signify endogenous variables and the X's exogenous or predetermined variables. (b) Explain how to implement the 2SLS estimator for the α 's in the model.

$$Y_1 = \alpha_0 + \alpha_1 Y_2 + \alpha_2 X_1 + \alpha_3 X_3 + u$$
$$Y_2 = \beta_0 + \beta_1 Y_1 + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_4 + v$$

7. What problems does multicollinearity among the independent variables pose when estimating a model by OLS? How can multicollinearity be detected? What solutions are available?

8. (a) What is a linear probability (or binary choice) model? What problem(s) does this model have? (b) Explain how the presence of limited dependent variables can cause OLS estimates to be biased.