

SIMON FRASER UNIVERSITY
Department of Economics

Econ 435
Quantitative Methods in Economics

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FINAL EXAM

Answer the following questions True, False, or Uncertain. Briefly explain your answers. No credit without explanation. (5 points each).

1. Least Squares produces biased estimates if a model's error term is serially correlated
2. The Instrumental Variables estimator has a larger variance than the Least Squares estimator.
3. Measurement error in an explanatory variable causes the Least Squares estimate of its slope coefficient to be biased toward zero.
4. The Durbin-Watson statistic is not valid when the regressors are not strictly exogenous.
5. It is not possible to test whether a potential instrument is uncorrelated with the error term. One must simply assume this.

The following questions are short answer. Briefly explain your answer. Clarity will be rewarded.

6. (25 points). In class we discussed three strategies for dealing with potential omitted variable bias: (1) Use of Proxy Variables, (2) Panel Data with Fixed Effects or First-Differencing, and (3) Instrumental Variables estimation.

Briefly compare and contrast these methods. What are their advantages and disadvantages?

7. (5 points). Briefly explain the problem with using Least Squares residuals to detect outliers. Can you think of a better idea?
8. (5 points). Suppose you have a model, $Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + u_t$, and you find evidence of first-order serial correlation in the residuals. Explain how you could transform the model to obtain valid standard errors and efficient estimates.
9. (10 points). Suppose you want to estimate a "Qualitative Response Model", i.e., a model in which the *dependent* variable takes on values of either zero or one. Using a graph, explain intuitively the problem encountered in this setting when using Least Squares. Use the same graph to illustrate how a Logit or Probit Model would correct this problem.

10. (10 points). I have data on medical expenditures on a sample of individuals. Some of them, who did not have any ailments, or did not bother to go to the doctor even if they had ailments, had zero expenditures. I want to estimate the income elasticity of medical expenditures, and I am thinking of excluding the individuals with zero expenditures and just estimating the model by Least Squares. My friend says that I would be overestimating the income elasticity by doing this. Is he correct? Explain.
11. (10 points). Consider the regression model: $y_1 = \beta_0 + \beta_1 y_2 + \beta_2 x_1 + u$. Suppose you are concerned that y_2 is “endogenous” (i.e., correlated with u). Also suppose that z is a candidate instrument for y_2 . Explain how to do a Hausman Test to check for the endogeneity of y_2 . What test statistic would you compute? What is your null and alternative hypothesis?
12. (10 points). In 1985, neither Florida nor Georgia had laws banning open alcohol containers in vehicle passenger compartments. By 1990, Florida had passed and implemented such a law, but Georgia had not.

Suppose you have a random sample of the driving-age population in both states, for both 1985 and 1990. Let *arrest* be a binary variable equal to one if a person was arrested for drunk driving during the year. Write down a Linear Probability Model that allows you to test whether the open container law reduced the probability of being arrested for drunk driving. In doing this, make sure you allow for aggregate trends in drunk driving arrests that affect both states equally. Also allow for the possibility that drunk driving behavior or law enforcement differs across the two states. Be sure to explicitly indicate what coefficient measures the effect of the law.