SIMON FRASER UNIVERSITY
Department of Economics

Econ 835   Prof. Kasa
Quantitative Methods   Fall 2001

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 unbiased estimates even if a model's error term is serially
   correlated

2. Instrumental Variables estimates must always have the same sign as Least Squares
   estimates.

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 one of the regressors is a lagged depen-
   dent variable.

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 disad-
   vantages?

7. (5 points). Briefly explain the problem with using Least Squares residuals to detect
   outliers.

8. (5 points). Suppose you have a model, $Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + u_t$. Explain how to test
   for first-order serial correlation without assuming the regressors are strictly exogenous.
   Be sure to clearly state your null and alternative hypothesis.

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.

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10. (10 points). Consider a family saving function for the population of all U.S. families:

$$saving = \beta_0 + \beta_1 income + \beta_2 hhsize + \beta_3 educ + \beta_4 age + u$$

where $hhsize$ is household size, $educ$ is years of education of the head of household, and age is the age of the head of household. Assume that $E(u|income, hhsize, educ, age) = 0$.

(i) Suppose that the sample includes only families whose head of household is over 25 years old. If we use Least Squares on this sample, do we get consistent estimates of the β_j? Explain.

(ii) Suppose we exclude from the sample families that save more than \$25,000 per year. Does Least Squares produce consistent estimates in this case?

11. (10 points). Consider the regression model: $y_1 = \beta_0 + \beta_1 y_2 + \beta_2 x_1 + \beta_3 x_3 + u$. 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.