Political Methodology Comprehensive Examination

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Part I. To be completed in 4 hours (open book)

1. You have estimated a bivariate regression model with an intercept of 3 and a slope of .5. The mean of your dependent variable (y) is 5, while the mean of your independent variable (x) is 4. The sample size is 10, and the Pearson correlation between x and y is .5.

a) If you add a data point at {4,5}, what happens to the correlation between x & y, the estimated slope and intercept, and the standard errors? What properties of regression and correlation does this illustrate?

b) Now if you add a data point at {10,8}, what happens to the correlation between x & y, the estimated slope and intercept, and the standard errors? What properties of regression and correlation does this illustrate?

2. In a large class, the correlation between midterm scores and final scores is found be be nearly .50, every term. The scores are normally distributed. Predict the percentile rank on the final for a student whose percentile rank on the midterm is:

(a) 5%
(b) 80%
(c) 50%

What statistical property is illustrated by these results?

3. Indicate whether each of the following statements is true or false and provide a brief justification for your answer.

   a. When the error terms in a standard linear model are not distributed normally, the estimated coefficients will be unbiased but the standard OLS estimates of the variances of the coefficients will no longer be correct.

   b. The presence of serial correlation of the error terms makes hypothesis testing inaccurate when OLS is used for estimation, even though the OLS estimates of parameters will be unbiased.

   c. Consider a standard linear model. If the variances of the error terms are a function of one of the exogenous variables, then OLS will still yield unbiased parameter estimates.

d. If we estimate a model that has the right variables but the wrong functional form, the effect will be the same as estimating a model with the right functional form but the wrong variables.

4. A study examines votes cast by senators on the confirmation of a Supreme Court nominee (i.e., votes are dichotomized as for or against confirmation). This study says, "Since the interpretation of logistic regression output can be difficult, we also modeled the equations using ordinary least squares." What are the consequences of using OLS regression to estimate a model that has a dichotomous dependent variable?

5. Political scientists are frequently interested in understanding the how many times particular events occur (e.g., presidential vetoes, entrance into alliances). What are the problems with analyzing data that consist of counts of events with ordinary least squares? What factors should researchers take into account when deciding which of the estimators is better-suited for analyzing event count data to employ?

6. Suppose you are interested in examining the factors that explain the adoption or rejection of laws prohibiting straight-ticket voting in each of the 50 states. Since states adopt or change their policies at different points in time, and because some states change their laws over time, you collect data for each state over a 25 year period of time. You also collect data on exogenous variables that will help you explain whether or not a given state has straight-ticket voting in a given year. What estimation problems are you likely to encounter with these data, and how would you deal with them?

7. Three legislators, A, B, and C, are voting whether to give themselves a pay raise. The raise is worth $20,000 to each legislator, but anyone who votes in favor will incur the wrath of her constituents and lose $10,000 in campaign donations. (Assume each legislator places equal value on a dollar of salary and a dollar of campaign donations).

a) Suppose the legislators vote sequentially in the order A, B, C, and the outcome is decided by majority rule. What outcome do you get if you solve the game using backwards induction?
b) Is there a Nash equilibrium in which legislator C always votes against the raise? If so, describe it. Explain.
b) Is there a Nash equilibrium in which the pay raise does not pass? Explain.

Part II. Submit an empirical research paper along with the exam.

Good Luck!