Econometrics Prelim Examination
Ag and Applied Economics Dept.
University of Georgia

May 20, 2008

Please answer each of the following questions. You have until 4:00 pm.
GOOD LUCK!!

1. How are the problems caused by measurement error and omitted variables different and/or the same? Which is a more severe problem? What would you do to correct each one?

2. For the model $y = X\beta + \varepsilon$ where X is (50 x 4) answer the following:
   a. If $E(\varepsilon_i^2) = \sigma_i^2 = \delta_0 + \delta_1 X_{i2}$ explain what the properties of a least squares estimator for β will be if you correct for heteroscedasticity using the wrong pattern (perhaps, $\sigma_i^2 = \lambda_1 X_{i3}$).
   b. Compare this outcome to the properties of a least squares estimator that is corrected for the presence of an AR(1) error term when autoregression is not actually present in the model.

3. When can you use an exact F-test to test a multiple hypothesis and when must you rely on asymptotic tests? Also discuss when it is advantageous to use each of the three asymptotic tests (likelihood ratio test, LaGrange multiplier test, and the Wald test).

4. In addition to causing flood damage, El Nino has created social costs by interfering with Southern Californians' enjoyment of their public beaches. Suppose the Department of Beaches has asked you to assess the welfare effects of beach closures due to storm-drain runoff from El Nino events. To do this, you need to estimate a model of local demand for public beaches, and then see how consumer's surplus from beach trips changes as this demand function shifts according to the number of days of beach closures (CLOSURES) each month. You collected survey data each month from a different random sample of Angelenos concerning the number of beach trips (TRIPS) they have made in that month as a function of the distance (DIST) they live from the beach. (Since beach access is free in most of Southern California, you will use this distance times average-travel-cost-per-mile as a rough proxy for the price of access). In the process of analyzing the effects of closures, you model demand by regressing TRIPS on DIST and CLOSURES and a set of sociodemographic characteristics such as age, income, and gender. Suppose a 1% change in DIST corresponds roughly to a 1% change in the "price" of a beach visit. Why should you be cautious about taking the results from this regression at face value (especially those concerning the price elasticity of demand for beach visits)?

5. Suppose you have been hired by a large national recreational equipment cooperative to assess individual consumer expenditures on the types of products sold by the cooperative. You are provided with some survey data on individual expenditures (EXP) by AGE, gender (FEM=1 if female) and income (INC, in thousands of dollars per year). The best-fitting model you discover is displayed below.

a.) Based on the point estimates, provide a formula that would give expected expenditures for a randomly selected female. (Two significant digits will be adequate.)

b.) Explain how you would go about testing whether expected expenditures differ by gender.

c.) What appears to be the main difference between the male and female age profiles of expenditure on recreational equipment in this sample?

d.) Does an extra $1000 of annual income have any statistically discernible effect on recreational equipment expenditures? Explain carefully.

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|_sample 1 50
 |_read(recr.dat) exp age inc fem

 |_stat / pcor
 NAME         N    MEAN         ST. DEV      VARIANCE     MINIMUM      MAXIMUM
 EXP          50    175.70        66.647        4441.9       58.336       290.47
 AGE          50    47.144        16.882        284.99       17.355       72.648
 INC          50    39.511        21.061        443.57       2.3366       85.351
 FEM          50   0.52000       0.50467       0.25469      0.00000       1.0000

 |_genr age2=age*age
 |_genr inc2=inc*inc
 |_genr femage=fem*age
 |_genr femage2=fem*age2
 |_genr ageinc=age*inc

 |_ols exp age fem inc age2 femage femage2 ageinc

  R-SQUARE =    0.9463     R-SQUARE ADJUSTED =    0.9373
 VARIANCE OF THE ESTIMATE-SIGMA**2 =    278.36
 STANDARD ERROR OF THE ESTIMATE-SIGMA =    16.684
 SUM OF SQUARED ERRORS-SSE=    11691.
 MEAN OF DEPENDENT VARIABLE =    175.70
 LOG OF THE LIKELIHOOD FUNCTION = -207.311

 VARIABLE    ESTIMATED   STANDARD    T-RATIO        PARTIAL STANDARDIZED ELASTICITY
   NAME     COEFFICIENT    ERROR       42 DF    P-VALUE CORR. COEFFICIENT  AT MEANS
 AGE          4.9635       1.458        3.404     0.001 0.465     1.2573     1.3318
 FEM         -39.113       45.82       -0.8536    0.398-0.131    -0.2962    -0.1158
 INC        -0.57530      0.5049        -1.140    0.261-0.173    -0.1818    -0.1294
 AGE2      -0.63225E-01 0.1844E-01    -3.429     0.001-0.468    -1.4807    -0.9003
 FEMAGE      -6.0847       2.109       -2.885     0.006-0.407    -2.6707    -0.9700
 FEMAGE2    0.78749E-01 0.2295E-01     3.432     0.001 0.468     2.2651     0.7275
 AGEINC     0.26949E-01 0.9574E-02     2.815     0.007 0.398     0.5965     0.3174
 CONSTANT    129.80       26.40        4.916     0.000 0.604     0.0000     0.7387
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