University of Illinois   Department of Economics
Spring 2006   Roger Koenker

Economics 471
Final Exam Review

1. Based on data from 200 Central Asian cotton farms you would like to estimate a model for annual
   output of the farm
   $$Q_i \; = \; \beta_0 \; + \; \beta_1 L_i \; + \; \beta_2 N_i \; + \; \beta_3 F_i \; + \; \beta_4 W_i \; + \; u_i$$
   where

   - $Q_i =$ Log(annual output in bales)
   - $L_i =$ Log(hectares of land in production)
   - $N_i =$ Log(labor in annual man-hours)
   - $F_i =$ Log(fertilizer in tons)
   - $W_i =$ dummy variable $= 1$ if farm is irrigated

   Consider the following potential problems commenting briefly on the consequences of each one and
   how you might deal with them. *Treat each problem separately as if it were the only problem you face.*
   One sentence is probably sufficient to dispose of each part of this question.

   (a) All 200 farms are exactly the same size.
   (b) The standard deviation of log output is proportional to farm size.
   (c) Some farms may have used so much fertilizer it had a detrimental impact on output.
   (d) Fertilizer may be more effective for irrigated farms.
   (e) A test of the hypothesis that increasing L, N, and F all by p percent will increase output by p
       percent is needed. That is, we would like to test whether the farms exhibit constant returns to
       scale.

2. You have been asked to comment on a paper on the world demand for coffee at the summer meetings
   of the Juan Valdez Foundation. The estimated model looks like

   $$\log p_t \; = \; \begin{matrix} -3.67 \\ (0.23) \end{matrix} \; - \; \begin{matrix} 1.04 \\ (0.03) \end{matrix} \; \log q_t \; + \; \begin{matrix} 2.86 \\ (0.42) \end{matrix} \; \log x_t$$

   where q_t, p_t, x_t are quantity, price and per capita income (in billions of pounds, dollars per pound,
   and thousands of dollars per year) respectively. *Standard errors are given in parentheses.*

   You have decided to focus your remarks on the implications of the model for recent proposals suggesting
   that coffee growers could increase their revenue if they could agree to destroy 5 or 10 percent of the

annual crop, currently approximately 1.3 billion pounds. Based on models for similar commodities you are quite convinced that the static model reported above is misspecified. You reestimate the model and obtain:

$$\log p_t = \underset{(0.18)}{-1.54} + \underset{(0.12)}{0.78} \ \log p_{t-1} - \underset{(0.06)}{0.20} \ \log q_t - \underset{(0.02)}{0.05} \ (\log q_t)^2 + \underset{(.31)}{1.04} \ \log x_t$$

Compare the long-run (equilibrium) implications of your estimated model with those of the first model stressing their implications for the policy question raised above.

3. The probability that the incumbent party will win the U.S. Presidential election based on a sample of elections with no third party candidate has been estimated to be:

$$\text{logit}(p_t) = \underset{(.17)}{1.12} - \underset{(2.0)}{80.0} \ \Delta u_t - \underset{(1.5)}{4.0} \ u_t + \underset{(0.6)}{2.0} \ x_t$$

where p_t is the percentage of the popular vote for the Presidential incumbent's party, Δu_t is the change in the unemployment rate during the quarter before the election, u_t is the level of the unemployment rate at the end of that quarter, and x_t is the rate of growth of GNP at the end of that quarter.

Assuming no significant third-party candidacy, who does the model predict would win the election, if the unemployment rate increases from .08 to .09 in the quarter before the election and the growth rate is .06. What is the predicted margin of victory?

4. Based on data from the Harris Trust and Savings Bank in Chicago, Conway and Roberts estimated the following models for employee salaries as a function of educational qualifications and the sex of the employee:

$$Logsalary = \underset{(0.07)}{8.38} - \underset{(0.03)}{0.232} \ Sex + \underset{(0.01)}{0.088} \ Education$$

and

$$Education = \underset{(2.86)}{-35.2} + \underset{(0.13)}{0.106} \ Sex + \underset{(0.30)}{5.17} \ Logsalary$$

Education is measured simply by years-of-school-attended. Sex is a dummy variable coded 0 for men and 1 for women. Interpret the two equations stressing what they have to say about whether there is evidence of discrimination against women by Harris Bank, and under what circumstances each would be more appropriate.