

ECON 5350 Final Exam – Fall 2015

Consider three possible models of the relationship between X and Y :

- Model #1: $Y = \alpha X^\beta + \epsilon$
- Model #2: $Y = \alpha X^\beta \exp(\epsilon)$
- Model #3: $Y = \alpha + \beta X + \epsilon$,

where ϵ follows a normal distribution. Assume all the Classical assumptions hold. Unless otherwise stated, answer the questions below for all three models.

1. (25 pts) Discuss an efficient estimation strategy for α and β .
2. (25 pts) Describe a method for testing whether Model #2 or #3 is most appropriate.
3. (25 pts) Describe in detail how to estimate α and β using the Gauss-Newton algorithm. Choose one model only.
4. (25 pts) Describe in detail how to estimate α and β using the Newton-Raphson algorithm. Choose one model only.
5. (25 pts) How would you test the joint null hypothesis $H_0: \alpha = \beta = 1$?
6. (25 pts) How would you test the null hypothesis that $H_0: \frac{\partial Y}{\partial X} = 0$?
7. (25 pts) You suspect a structural break in Model #2 but are not sure where it occurs. Propose a strategy for finding the break point.
8. (25 pts) Now assume that you found the break point, X_* . Describe how to estimate a spline regression for Model #2.