

## Homework # 5

Economics 113

Professor Spearot

Fall 2008

Due Wednesday, November 19th, in-class

Please report all regression output and commands.

### Problem #1

Using Wage2.dta from the course website, please run the following regression.

$$wage = \beta_0 + \beta_{Educ}Educ + \beta_{Exper}Exper + \beta_{Tenure}Tenure + u \quad (1)$$

- What is the  $R^2$  for this regression? Using an F-test, conclude at the 95% level whether the variables of the model (Educ, Exper, and Tenure) have any power in explaining *wage*.
- Does education significantly affect wages? That is, can you conclude that  $\beta_{Educ}$  is significantly different from zero? Test this hypothesis at the 95% level.
- Please construct a 99% confidence interval for  $\beta_{Exper}$ . Please interpret your results.
- Suppose that I reject the hypothesis that  $\beta_{Tenure} = 0$  in favor of a two-sided alternative. What is the probability that I'm wrong?
- Now suppose that instead of estimating (1), I estimate the following:

$$\log(wage) = \beta_0 + \beta_{Educ}Educ + \beta_{Exper}Exper + \beta_{Tenure}Tenure + u \quad (2)$$

Which regression is preferred, (1) or (2), and why?

- I claim that education exhibits *diminishing returns*. To test this hypothesis, I run the following regression:

$$\log(wage) = \beta_0 + \beta_{Educ}Educ + \beta_{Educ^2}Educ^2 + \beta_{Exper}Exper + \beta_{Tenure}Tenure + u \quad (3)$$

Is my hypothesis correct? Please test it at the 90% level using a two-sided test.

- Suppose instead that I claim that experience exhibits increasing returns. To test this hypothesis, I run the following regression:

$$\log(wage) = \beta_0 + \beta_{Educ}Educ + \beta_{Exper}Exper + \beta_{Exper^2}Exper^2 + \beta_{Tenure}Tenure + u \quad (4)$$

Is my hypothesis correct? Please test it at the 95% level using a two-sided test

- Finally, combine (4) and (3) and estimate the following:

$$\log(wage) = \beta_0 + \beta_{Educ}Educ + \beta_{Educ^2}Educ^2 + \beta_{Exper}Exper + \beta_{Exper^2}Exper^2 + \beta_{Tenure}Tenure + u \quad (5)$$

Which is the better regression, (5) or (2)? Use an F-Test and the 95% confidence level to support your conclusion.

## Problem #2

- a. Again, using Wage2.dta from the course website, we wish to run the following regression:

$$wage = \beta_0 + \beta_{Educ}Educ + \beta_{Exper}Exper + \beta_{Tenure}Tenure + u$$

However, this time I want to test the hypothesis that  $\beta_{Exper} = \beta_{Tenure}$  - that is, whether a one year increase experience has an identical effect as a one year increase in tenure. Please generate the appropriate new variables and test this hypothesis against the two-sided alternative.

- b. Generate a 95% confidence interval for the predicted wage of a person with two years of education, 3 years of experience and 0 years of tenure.