

Lecture 15 - Economics 113

Professor Spearot

- ▶ Agenda
 1. Prediction Intervals
 2. Examples
- ▶ Homework #1 is posted
- ▶ Exam #3 on Friday

Predictions

Introduction

- ▶ Suppose you start with the equation:

$$y = \beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k + u$$

- ▶ You may wish to predict y for various individuals which are not in the sample.
- ▶ Solving for predictions is easy
 - Plug $x_1 = c_1, \dots, x_k = c_k$ into equation
 - Produce prediction, $\hat{\theta}$
- ▶ Also might want Standard Errors. Why?
- ▶ The prediction may be precise or imprecise - need standard errors to figure this out.

Predictions

Getting standard errors

- ▶ Prediction:

$$\theta = \beta_0 + \beta_1 c_1 + \cdots + \beta_k c_k$$

- ▶ Solve for β_0 :

$$\beta_0 = \theta - \beta_1 c_1 - \cdots - \beta_k c_k$$

- ▶ Plug into estimating equation

$$y = (\theta - \beta_1 c_1 - \cdots - \beta_k c_k) + \beta_1 x_1 + \cdots + \beta_k x_k + u$$

- ▶ Simplify:

$$y = \theta + \beta_1 (x_1 - c_1) + \cdots + \beta_k (x_k - c_k) + u$$

- ▶ Estimate \rightarrow gives us prediction θ and standard error.

Predictions

Earnings Example

- ▶ Predicted earnings of a person with
 - 10 years of education
 - 2 years of experience
 - 1 year of tenure
- ▶ Want prediction and standard error.
- ▶ Estimate:

$$wage = \theta + \beta_1 (educ - 10) + \beta_2 (exper - 2) + \beta_3 (tenure - 1) + u$$

- ▶ Confidence interval for θ ?

Comparing Parameters

Earnings Example

- ▶ Regression equation:

$$wage = \beta_0 + \beta_1 educ + \beta_2 exper + \beta_3 tenure + u$$

- ▶ I claim that experience and tenure have identical effects on the wage.
 - ▶ Derive an equation that allows me to test this hypothesis.
 - ▶ Use the Wage dataset to test this hypothesis