

Lecture 19 - Economics 113

Professor Spearot

- ▶ Agenda
 1. Adjusted R^2
 2. Model Selection
 3. Questions
- ▶ Homework 1 due friday. - LONG!!!
- ▶ Midterm 4 is Friday, in class.

Regressions

Adjusted R-squared

- ▶ Recall the equation for R^2

$$R^2 = 1 - \frac{SSR}{SST}$$

- ▶ What does R^2 tell us?
- ▶ Do SSR or SST account for degrees of freedom?
- ▶ R^2 cannot decrease when adding variables.
- ▶ Good for model selection?
- ▶ Motivate an alternative:

$$R^2 = 1 - \frac{\frac{SSR}{n}}{\frac{SST}{n}}$$

- ▶ $\frac{SSR}{n}$ is a biased estimate of $\hat{\sigma}^2$
- ▶ $\frac{SST}{n}$ is a biased estimate of $\hat{\sigma}_y^2$

Regressions

Adjusted R-squared

- ▶ Instead, use the following "adjusted R^2 "

$$AdjR^2 = 1 - \frac{\frac{SSR}{n-k-1}}{\frac{SST}{n-1}} = 1 - \frac{\hat{\sigma}^2}{\hat{\sigma}_y^2}$$

- ▶ Accounts for:
 1. Degrees of freedom used in estimating SSR
 2. Degrees of freedom used in estimating SST
- ▶ Adjusted R^2 can go down when adding more variables.
- ▶ Use to choose between non-nested models.

Model Selection

Wage example

- ▶ Model 1

$$\log(\text{wage}) = \beta_0 + \beta_1 \text{educ} + \beta_2 \text{exper} + \beta_3 \text{tenure} + u$$

- ▶ Model 2

$$\log(\text{wage}) = \beta_0 + \beta_1 \text{educ} + \beta_2 \text{exper} + \beta_3 IQ + u$$

- ▶ Should I use $AdjR^2$?

Model Selection

wage example

- ▶ Model 1

$$\log(\text{wage}) = \beta_0 + \beta_1 \text{educ} + \beta_2 \text{exper} + \beta_3 \text{tenure} + u$$

- ▶ Model 2

$$\begin{aligned} \log(\text{wage}) = & \beta_0 + \beta_1 \text{educ} + \beta_2 \text{exper} + \beta_3 \text{tenure} \\ & + \beta_4 \text{urban} + \beta_4 \text{south} + u \end{aligned}$$

- ▶ Should I use $AdjR^2$?
- ▶ Nested model: Use the F-Statistic.
- ▶ Critical statistic: 3.00 at 95%